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Assessing profitability in competition policy analysis

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PREFACE

This report was commissioned by the Office of Fair Trading (OFT) from OXERA. The paper is intended to be a 'practitioner's guide' to profitability assessment, targeted at lawyers, economists and generalists, both at the OFT and at other relevant government institutions, law firms and companies. It is also intended to stimulate debate on this increasingly important, and yet relatively unexplored, branch of competition policy analysis.

Any views expressed are those of the authors and they do not necessarily reflect the views of the OFT. This report is not and should not be treated as a guideline issued as a consequence of the OFT's obligation to publish general advice and information under the Competition Act 1998 and Enterprise Act 2002.

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CONTENTS

1 EXECUTIVE SUMMARY

1.1 OXERA has been commissioned by the Office of Fair Trading (OFT) to produce this discussion paper on assessing profitability in the context of competition analysis. The paper is intended to be a 'practitioner's guide' to profitability assessment, targeted at lawyers, economists and generalists, both at the OFT and at other relevant government institutions, law firms and companies. It is also intended to stimulate debate on this increasingly important, and yet relatively unexplored, branch of competition policy analysis.

Relevance of profitability and the implications for competition policy

1.2 Profitability assessment and its tools are of relevance to a wide range of competition policy issues. An obvious example is the assessment of market power or the degree of competition in the market, since these concepts are defined in terms of firms' ability to raise prices consistently and profitably above competitive levels. Another example is the assessment of excessive pricing under the abuse-of-dominance provisions in EC and UK competition law. In addition there are many other applications of profitability assessment, as shown in Table 1.1.

1.3 Despite the relevance of profitability assessment, it is not yet a commonly and systematically applied tool in competition policy, other than for pricing practices such as predation and margin squeeze. The UK seems to be one of the few jurisdictions where the usefulness of profitability assessment in the context of competition analysis has been explicitly recognised, and where it is regularly applied in investigations. (Part II of this paper presents a number of case studies of competition investigations in the UK.) There may be reasons why in other jurisdictions, such as the EC and the USA, profitability assessment is not used frequently.

- First, conceptually, it has not been well established what profitability analysis should be measuring — i.e. what is the relevant measure of profitability, and what is the most appropriate competitive benchmark?

- Second, profitability analysis raises various measurement and interpretation issues. For example, accounting data, which is normally the primary source of information, is rarely presented in such a way that it can be easily and

TABLE 1.1 – RELEVANCE OF PROFITABILITY ASSESSMENT IN COMPETITION
POLICY

Context within competition analysis	Relevant question
Assessing market power or degree of competitiveness in a market	Are profits persistently in excess of the competitive benchmark?
Market definition	Are prices in excess of marginal costs (in which case the 'cellophane fallacy' may apply)?
Assessment of entry barriers	Are profits of the firms in the market persistently in excess of the competitive benchmark?
Excessive pricing	Are profits persistently in excess of the competitive benchmark?
Margin squeeze	Is the vertically integrated firm's downstream operation making excessively low profits?
Predation and cross-subsidy	Are profits excessively low or are prices below the relevant cost floor?
Coordinated effects in merger cases	Is pre-merger profitability in excess of the competitive benchmark (in which case the merger may lead to a further lessening of competition)?
Failing-firm defence in merger cases	Is the acquired firm so unprofitable that it is likely to exit the market?
State aid	Is the state investment or grant making a normal market return such that a private investor would have made the same investment?
Quantification of damages and determination of fines	To what extent have the perpetrators profited from the infringement; and to what extent have the victims forgone profits?

readily used for economic analysis for competition policy purposes. Furthermore, accounting policies are far from uniform across companies and countries. Even if profits can be measured, profitability figures can be difficult to interpret. For example, when are profits too high or too low, and what is the relevant time period to consider? If high profits are found, are they due to market power or to superior efficiency?

1.4   This paper deals with these issues. It has two main objectives:

- to define an appropriate conceptual framework for profitability analysis, based on the existing economics and finance literature. This literature suggests that the internal rate of return (IRR) and the net present value (NPV) are the conceptually correct measures of profitability of an activity (an investment, a line of business, or a company). The literature has also developed a framework for applying the IRR methodology using accounting data and over limited segments of an activity's lifespan ('truncated' periods), which is usually what competition policy is concerned with, and

- to translate this theoretical framework for assessing the IRR based on accounting data into a practical approach in a structured way. In particular, the paper aims to address the practical issues arising in measuring the IRR, and to close the gap between the theory and practice of estimating the IRR in profitability assessments. The paper shows that the potential measurement and interpretation issues signalled above are not always insurmountable in practice. These issues do not justify ignoring profitability in competition analysis.

1.5   Caution should be exercised when undertaking profitability assessments and drawing conclusions from them. However, this holds equally for most of the other indicators and techniques commonly used in competition policy. Conceptual, measurement and interpretation issues also arise, for example, when defining relevant markets based on price-elasticity evidence, or when determining market power based on market shares. Therefore, profitability analysis should be seen as one among a number of complementary economic indicators and techniques that can be used together in a competition policy analysis.

1.6   This discussion paper introduces the relevant academic literature, initiated by Kay (1976) and developed over the last three decades by various authors, which sets out, first, that a theoretical relationship exists between the IRR and accounting rates of return, and second, following Edwards et al. (1987), the conceptual framework that allows the IRR to be estimated using accounting data over a truncated period of time. Using this framework, the IRR can be estimated for ongoing activities for which information is available over a specified time period only.

1.7   The key information required for the truncated IRR methodology is:

   ●   cash flow data for the activity in question over a reasonable length of time, and

   ●   estimates of the value of assets employed in that activity at the start and end of the truncated period.

1.8   The paper shows that the truncated IRR methodology is particularly suitable for competition investigations where the objective is to assess past performance, and for which reliable data on cash flows and asset values is available over a sufficiently long time period. The methodology may be less suited for assessing future performance based on forecast data, or in cases where cost and revenue allocation or asset valuation are particularly complicated.

1.9   The paper discusses a number of ways to address these issues. Where the IRR estimate may be less reliable, other measures of profitability can be useful as 'proxy' measures, in addition to, or instead of, the IRR. However, this is only relevant to the extent that these other measures do not significantly and systematically diverge from the IRR; and that they provide additional information about a company's profitability. As explained in the paper, the measures that may satisfy both these conditions in certain circumstances include the return on sales (ROS), gross margins and market valuations, but not always the return on capital employed (ROCE) or the return on equity (ROE).

1.10   The paper also suggests ways to mitigate some of the measurement problems related to the quality of accounting data, cost and revenue allocation and asset valuation, and to test the sensitivity of the conclusions to the assumptions made.

1.11   The estimates of the IRR (or its proxy measures) must be compared against a suitable competitive benchmark so as to assess whether profits are excessively high or low. The paper emphasises two types of benchmarks:

   ●   the opportunity cost of capital of the activity in question, and

   ●   the IRR (or its proxy measures) of other suitably chosen comparator companies or industries.

The IRR methodology

1.12   Economic activities typically have a pattern of an initial investment (cash outflow), followed by a stream of revenues (cash inflows) in subsequent periods. A profitability assessment refers to the measurement of the rate of return made on investments in a line of business, company or industry over a time period; and comparing it against an appropriate benchmark. If the estimated returns are higher than the benchmark, the investment can be said to be profitable; if lower than the benchmark, the investment is unprofitable. This in turn guides the investment decision of firms.

1.13   From an economic point of view, the profitability of an activity can be defined in terms of net increases in value resulting from that activity and realised over time. The IRR and the NPV are the conceptually correct methods for measuring this profitability. They take into account the inflows and outflows of an activity over time, and reflect the economic principle of time preference of money. They are also the two most frequently used profitability measures in the business world (as shown in a recent study by Graham and Harvey, 2001).

1.14   In general, competition authorities are concerned with profitability over a relatively limited time horizon, in contrast with investment appraisals which normally consider the full lifetime of an activity. In addition, the required data for the analysis (in particular, accounting information) may only be available for a limited time period.

1.15   The literature on the use of accounting information to inform economic rates of return is significant. Following Edwards et al. (1987), the literature has shown that it is possible to estimate from accounting data the IRR over a segment of an activity's lifespan. The theoretical framework for estimating this truncated IRR is of direct relevance to competition policy analyses. To do so requires data about the cash flows of the activity in question over the relevant time period, and the asset values at the start and end of that period. As Edwards et al. show, asset values should be based on either the cost of replacing the asset (specifically on a 'modern equivalent asset', or MEA, basis), the present value (PV) of future earnings, or the value derived from selling it (its net realisable value, or NRV). In particular, assets should be valued on the lower of the replacement cost or economic value, where its economic value is determined by the higher of its PV

of its future earnings or its NRV. This valuation principle is also known as the value-to-the-owner principle. For the assessment of excessively high profits, assets should be valued on an MEA basis. As long as information is available about these cash flows and asset values, the truncated IRR can be estimated and used to assess profitability over that period.

1.16 A concern addressed in this literature is whether accounting data is of any use for obtaining information about the IRR. (This was questioned by, for example, Fisher and McGowan, 1983.) Kay (1976) was the first to establish that there is a theoretical link between the IRR and accounting rates of profit (such as the ROCE), and hence that accounting data can be used in a meaningful way to assess the IRR. At any rate, the IRR methodology itself is not questioned by Fisher and McGowan or others. If the truncated IRR methodology discussed in this paper is used, the problems with accounting rates of profit, as signalled by Fisher and McGowan and others, are not relevant.

1.17 As a final step in the assessment, the estimated IRR needs to be compared against an appropriate, competitive benchmark. In competitive markets, characterised by free entry and exit, companies are expected in the long run to make profits that equal the minimum returns required by investors (the opportunity cost of capital). Profits above the cost of capital would invite entry by new competitors, and profits below would induce exit. Hence, returns that are **persistently** in excess of the cost of capital can be an indication of market power or of a lack of competition in the market.

1.18 Over relatively shorter time periods, however, profits could diverge from the cost of capital for a variety of reasons, not all of which are necessarily related to market power or anti-competitive practices (e.g. economic cycles, windfall gains that are not related to a company's main operations, or temporarily high profits in dynamic, innovative markets). Therefore, in addition to the cost of capital, information on returns made by appropriate comparator firms or industries should also be considered as benchmarks for the profitability assessment.

Estimating asset values for the IRR calculation

1.19 The most readily available estimates of asset values are from audited accounts. However, these normally provide asset values based on historical costs, which

may bear no resemblance to the MEA value, which is the relevant valuation basis if assessing excessive profits. Furthermore, such book values of assets may omit intangible assets, which can sometimes be a substantial part of a company's capital base. This paper therefore describes various techniques that could be used to cross-check the validity of the book value of assets, and, if necessary, to adjust these values to obtain an estimate of the MEA value. Possible adjustment methods include the following:

- *the modified historical-cost accounting method*, which adjusts the historical cost of assets to take into account the effect of a number of price changes

- *market valuations and industry benchmarks* — the market value of assets in the industry or of comparator companies operating in competitive markets (but not the market value of the company or companies under investigation) can be used to provide additional information for the calculation of the value of assets of the company in question. This is based on the principle that the market value of assets in the industry, and of competitive companies, would tend to approximate the replacement value, and

- *bottom-up cost modelling* — in some industries, such as telecommunications, valuations based on detailed cost modelling and an engineering approach are undertaken and should be considered in the profitability assessment.

1.20   Estimating the MEA value is not straightforward and often there remains a degree of uncertainty as to the accuracy of the estimates. If the estimated IRR is robust to potential asset valuation uncertainties, the IRR methodology can be meaningfully implemented. If, however, there are large potential errors in estimating the MEA value, it may not be possible to obtain a robust estimate of the IRR. Therefore it is important to assess the extent of such potential measurement errors and their implications for interpretation and conclusions.

1.21   The paper discusses conditions under which uncertainties in asset valuation could cancel each other out such that the accuracy of the estimated IRR is not significantly affected. In light of potential errors, the competition authority can test the sensitivity of the estimated IRR to variations in the asset values. If, after adjusting for potential margins of error, the relationship between the estimated IRR and the benchmark remains unchanged (e.g. the IRR is still above the benchmark), then the competition authority can be confident of the results. If, in contrast, the results vary widely within the range of potential margins of errors,

they cannot be taken as conclusive in isolation from other relevant evidence. In this case, it may also be appropriate to use proxy measures of profitability.

1.22 In addition to testing the sensitivity of the IRR to changes in the asset values, the competition authority could test the robustness of the estimates by undertaking a statistical analysis of the difference between the estimated IRR of the company or industry in question and the IRRs of a sample of comparator companies. For example, if the difference between the means (or medians) of the two samples is not statistically different from zero, the profitability assessment may not yield a conclusive assessment.

1.23 The relevant steps in asset valuation and estimation of the IRR are summarised in Figure 1.1.

FIGURE 1.1 – STEPS IN ASSET VALUATION AND ESTIMATING THE IRR
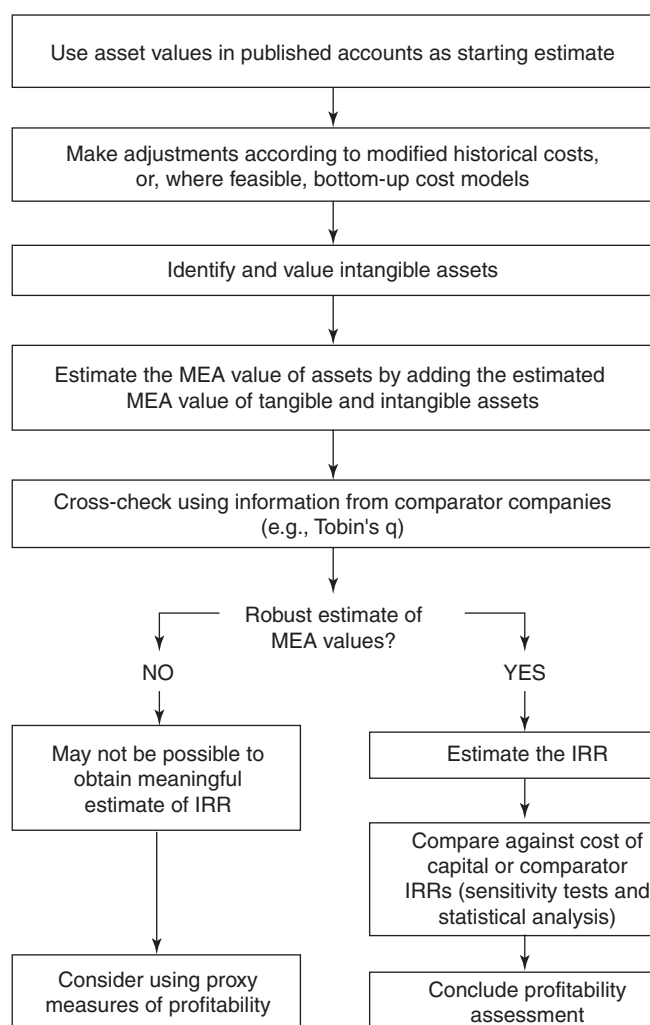
The use of proxy measures of profitability

1.24   In certain circumstances it may be appropriate to use proxy measures of
        profitability in addition to, or instead of, the IRR and NPV. These fall into two
        broad categories:

        ● *accounting ratios* — in particular the ROS and gross margins. These are
          essentially snapshots of a company's performance at particular points in
          time, and

        ● *market valuations* — in particular the Tobin's q and total returns to
          shareholders (TRS) of the company under assessment. These measures are
          based on investors' expectations of future returns.

1.25   These proxy measures can be usefully applied in cases where it is difficult to
        estimate the IRR. As explained above, this may be the case if MEA values are
        difficult to estimate with a reasonable degree of accuracy. Industries where this
        typically arises include those characterised by rapid technological change, and
        those with substantial levels of intangible assets. If the adjustments and methods,
        described in this paper, to improve the asset valuation estimates do not mitigate
        these measurement problems, then the competition authority may choose to rely
        on proxy measures of profitability in addition to the IRR.

1.26   Furthermore, it can sometimes be difficult to estimate the IRR as a result of
        difficulties in obtaining reliable cash flow data for a sufficiently long time period.
        This may be the case for businesses that are still in the dynamic stages of growth.
        cash flow data may also be difficult to obtain if the competition authority is
        interested in the profitability of a company's activities in a particular line of
        business only, and extensive cost and revenue allocation exercises are required.

1.27   Where cash flow data is not reliable, the competition authority may choose to rely
        on the ROS, gross margins or market valuations of comparators as proxy
        measures. ROS and gross margins can be useful indicators of past performance.
        Where assets are difficult to allocate, the ROS may be useful (to the extent that
        costs and revenues can be reliably allocated). Gross margins may be more robust
        where overheads are difficult to allocate.

1.28   If neither reliable cash flow data nor robust MEA values are available, the
        competition authority is unlikely to obtain robust estimates for the IRR or for the

proxy measures. A profitability assessment in such circumstances cannot be taken as conclusive in isolation from other relevant evidence.

1.29 The decision steps regarding the application of the IRR and proxy measures under various scenarios of data availability are illustrated in Figure 1.2.

FIGURE 1.2 – APPLICATION OF THE IRR AND PROXY MEASURES UNDER VARIOUS SCENARIOS

	Data required to estimate IRR: • cash flow data over sufficiently long period • MEA values			
Data availability	Good cash flow and MEA data	Poor cash flow data	Poor MEA data	Poor cash flow and MEA data
Industry or product-line characteristics	Likely to hold in established industries with historical data over long periods (e.g. retailing, manufacturing, utilities, phamaceuticals and banks); may not hold for new product lines in established industries	In new businesses in dynamic stage of growth without much historical data; where forecasts are required; or where cost and revenue allocation is difficult	In industries with high intangibles and low fixed assets (e.g. trading companies and knowledge-based sectors); or where it is not possible to allocate capital between lines of business	
Profitability measures	Estimate IRR	Estimate IRR and proxies (ROS, gross margins or market valuations)	Estimate ROS, gross margins or market valuations	Difficult to obtain meaningful estimates of IRR or proxy measures
Benchmark	Benchmark against WACC and IRR of comparator companies	Benchmark IRR against WACC and IRR of comparator companies; benchmark proxies against corresponding measures of comparator companies	Benchmark against corresponding measures of comparator companies	Profitability assessment not likely to provide meaningful results

The IRR versus the ROCE

1.30 As discussed in this paper, a large number of past competition investigations in the UK have relied on the ROCE, among other indicators, to infer the extent of monopoly profits of a firm or industry. The ROCE is usually a measure of a company's earnings before interest and taxes (EBIT) in a given period (usually a year), divided by the capital employed in that period. In addition, there is considerable reliance on the ROCE in regulated utilities, such as water, electricity, gas, airports and rail, where the regulators periodically set price caps to allow the companies to make a normal return (usually the market-based weighted average cost of capital, or WACC) on their estimated 'regulatory' asset base. The

application of profitability analysis to the utility industries is outside the scope of this paper, so the discussion below focuses on the use of ROCE in competition investigations in other sectors.

1.31 Under certain conditions, a weighted average ROCE gives the same result as the truncated IRR, in particular if:

- the correct asset valuation is used — i.e. based on the value-to-the-owner principle

- the accounts are fully articulated such that all changes in the book value of assets flow through the profit and loss account, and

- the weighted average ROCE is calculated using Kay's formula (see Box 4.1).

Under these conditions, there is a direct correspondence between the weighted average ROCE and the IRR using the value-to-the-owner rule over truncated periods. This weighted average ROCE is in fact the IRR.

1.32 While the weighted average ROCE equals the truncated IRR, the use of **annual** (unaveraged) ROCE estimates, however, can be problematic for the following reasons.

- In principle, competition authorities can estimate the ROCE. This estimation should nevertheless take into account that both the numerator and the denominator in the calculation of annual ROCE are sensitive to variations in accounting practices (over time and across companies). The EBIT figure in the numerator is particularly affected by accruals — which can cause a significant wedge between the actual cash inflows and outflows in a period and the revenues and costs, and hence profits, assigned to that period — and by the choice of depreciation schedules. Depreciation also has a significant impact on the value of the capital employed in the denominator of the ROCE. These factors could affect the annual ROCE estimates even if the underlying performance of the activity is unchanged. In contrast, the truncated IRR calculation uses actual cash flows in each year rather than earnings. Cash flows are a relatively 'hard' statistic, and are not affected by accruals or depreciation schedules.

- In addition, the denominator in the annual ROCE estimate is also subject to uncertainties in asset values. This can affect the usefulness of year-to-year (or company-to-company) comparisons of annual ROCE over a particular period of time. While the truncated IRR also depends on an appropriate valuation of assets, these valuations are required only at the start and end of the

assessment period (not each year, as for the ROCE). Hence, in general, while the truncated IRR can also be affected by uncertainties in asset valuations, it is less sensitive to these effects. In fact, the paper shows that there are situations where the estimated IRR is actually not that sensitive to uncertainties in asset valuations, so that robust results can still be obtained.

Accounting and allocation issues arising in profitability assessments

1.33   Understanding accounting data is important in a profitability assessment, as it is the primary source of information for such assessments. However, there are several associated problems. First, companies prepare accounts for general purposes such as internal management and external reporting, which means that, in general, they cannot be readily used for profitability assessment for competition policy purposes. In addition, established accounting principles — the UK Generally Accepted Accounting Practices (GAAP) — still leave sufficient flexibility for accounting policies to differ across companies, across types of report, and over time.

1.34   For these reasons, a key challenge for competition authorities is to interpret, and, if necessary, adjust, the available accounting data in such a way as to provide meaningful insight into profitability. One adjustment relates to the principle of prudence in accounting. Although this principle has been de-emphasised somewhat under the current UK GAAP, accounting data prepared for investors, in particular valuations of assets, still tends to understate the value of net assets. For competition policy purposes it may be more appropriate to avoid bias towards any undervaluation of assets (an observation also made by Carsberg, 2002). Part III of this paper provides guidance on how to use and interpret accounting data.

1.35   A problem frequently encountered, and discussed in this paper, is that of cost and revenue allocation. Companies usually operate multiple lines of business, but competition authorities are often interested in assessing the profitability of a company's activities in one or a subset of the products only. This requires an allocation of a portion of total company costs and revenues to that line of business.

1.36   For profitability assessments in competition policy, determining the fully allocated or fully distributed costs (FDC) is often the relevant starting point. Broadly, cost allocation can be based on three types of cost drivers (either separately or in

combination): input-based drivers (where indirect costs are apportioned based on other known inputs); output-based drivers (allocation based on production or sales volumes); and value-based drivers (using demand factors such as prices, revenues or consumers' willingness to pay).

1.37   There may be no single method of allocation that is obvious or correct. For competition policy purposes, value-based cost drivers should be used with caution, as a circularity problem may arise. For example, if revenue is used as a cost driver, excessively high profits tend to be overlooked, since higher prices lead to higher levels of cost allocated to that line of business and, consequently, lower estimates of profitability. To the extent that the competition authority is interested in whether prices are cost-reflective, the cost-allocation method used should embody the 'cost-causality principle', which means that costs are allocated to the source that caused those costs to be incurred. However, cost-causality cannot be applied to all common costs, nor, by definition, to joint costs.

1.38   The competition authority should therefore consider using a range of methods. The estimated IRR should be sensitivity-tested within this range, using the techniques described in this paper. The FDC can also be compared with the incremental and stand-alone costs of the activity. If, using a range of plausible allocation methods, the estimated IRR is consistently above the benchmark cost of capital then the competition authority can be confident that the evidence points to excessive profits. Indeed, if the estimated IRR exceeds the cost of capital even on the basis of stand-alone cost, this can be taken as prima facie evidence of excessive profits. If, on the other hand, the use of reasonable alternative methods of cost and revenue allocation still leads to a wide range of FDC, it may be that no meaningful IRR estimate can be obtained. In this case proxy measures — in particular, the ROS and gross margins — may provide useful additional insight.

1.39   With regard to revenue allocation for bundled products, in principle the objective is to assess the implicit price of each good in the bundle. Without direct information on the willingness to pay of the consumer, this is difficult, although a number of proxy methods are available. With regard to transfer prices, the competition authority should, if possible, use market-based prices as the basis for determining the appropriate transfer price between related activities within the same company.

Benchmarking profitability

1.40 The final step in the analysis is to compare the estimated IRR with the cost of capital and IRR of appropriate comparator companies. Similarly, proxy measures of profitability, such as the ROS, gross margins, Tobin's q or the TRS, should be benchmarked against the corresponding measures for comparator companies.

1.41 The cost of capital is an estimate of the price the company must pay to raise the capital that it employs. In profitability assessments of realised rates of return, the relevant cost of capital is the *ex ante* cost of capital (i.e. the cost of capital that provides the hurdle rate over the lifetime of the project in question). The required return will reflect the level of risk associated with the investment and the nature of the investment instrument (eg, debt or equity). The cost of capital of a company is calculated as a weighted average of the cost of debt finance and the cost of equity finance. The cost of equity capital is commonly estimated using the capital asset pricing model (CAPM). For unquoted companies or lines of business, estimates for comparator listed companies may be suitable.

1.42 In addition to adopting the cost of capital benchmark, the profitability assessment can be based on benchmarking profitability against the level of profitability achieved by comparable firms or industries. Using the returns of comparators as benchmarks has some advantages; for example, it allows the competition authority to check whether the estimated returns of the company in question are affected by economic cycles.

1.43 The critical issue in using the comparator benchmark is the selection of suitable comparators. The aim of the assessment would be to compare the profit measure of an activity with that which would have been achieved in a fully competitive environment. The selection should be based on good reasons to believe that the comparators are subject to some degree of competitive pressure and operate in industries with similar cost structures and risks.

Use and interpretation of the results of the profitability assessment

1.44 The application of the IRR methodology is straightforward if good data on cash flows and MEAs is available, and if the objective is to establish the existence of market power and excessive profits, or lack of competition. Good data is likely to

be available for established industries with historical data over a long period of time. In these circumstances it is possible to obtain meaningful insight into whether profits are above the competitive level, and hence whether there is a competition problem that needs to be addressed.

1.45 A profitability assessment using the IRR methodology described in this paper can therefore be useful as one competition indicator, among others, for the following types of competition analysis:

- to analyse, based on past data, whether an individual firm has market power, or whether competition in a market with few suppliers is effective. The market power assessment can be of relevance to any Competition Act 1998 case. Assessing the degree of competition in an oligopolistic market can be of relevance to any merger case or market investigation under the Enterprise Act 2002, and

- to analyse, based on past data, whether a dominant firm has been charging excessive prices — thus allowing it to make excessive profits — in breach of the Chapter II prohibition of the Competition Act 1998.

1.46 The IRR methodology is less straightforward to apply in situations where the available data on cash flows and MEAs is less good. Yet, as discussed in the paper, profitability assessments can still provide useful insight into market power, the degree of competitiveness, and excessive pricing, by using proxy measures of profitability in addition to, or instead of, the IRR itself.

1.47 Competition policy is sometimes also concerned with whether profits are excessively low — for example, for predation, margin squeeze, state aid and the failing-firm defence. For these investigations the IRR methodology discussed in the paper is still relevant, but its application is less straightforward than for assessments of excessively high prices. This is for a number of reasons.

- First, in order to estimate the IRR over a segment of an activity's lifetime in cases of excessively high returns, assets should be valued on an MEA basis. However, where the investigation is about whether returns are excessively low (i.e. the IRR is less than the cost of capital), assets should be valued either on the basis of the lower of PV or NRV. Thus, when assessing excessively low returns, the asset valuation basis may have to be modified. In any case, it may still be useful to start with the MEA basis. If the IRR is less than the cost of capital on this basis, the competition authority should go further and consider the PV and NRV of assets. This adjustment is relevant for

all investigations involving excessively low profits, including predation, cross-subsidy, margin squeeze, state aid, and failing firms.

- Second, predation and margin-squeeze cases have a number of characteristics that complicate all aspects of the investigation, not just the assessment of profits. For example, predation and margin-squeeze cases often require a detailed cost-allocation exercise since they are typically concerned with specific lines of business, and, in the case of margin squeeze, involve an often complicated revenue-allocation exercise between upstream and downstream activities as well. In addition, when assessing predation or margin squeeze, an IRR at or above the competitive benchmark may not always provide conclusive evidence of the absence of anti-competitive low pricing. This is because a positive NPV would also be obtained in a situation of exclusionary pricing in the beginning of the period, followed by monopoly pricing in the rest of the period.

1.48 As discussed in this paper, the results of a profitability assessment may still raise a number of interpretation issues. For example, where high profits are found, it may not be clear whether these are due to a lack of competition, or reflect superior efficiency or temporary high profits in a dynamic market. Where profits do not seem to exceed the benchmarks, it may not be clear whether this is due to a lack of efficiency ('X-inefficiencies'). Again, in these situations a number of cross-checks could be made:

- the profitability assessment could be extended to a longer time period. Temporary positions of market power and high profits are commonplace in well-functioning markets, and, indeed, may provide appropriate price signals and incentives to firms. However, in a competitive market, profits would be expected to be eroded over time by new entrants. Therefore, if the high profits are persistent, this could be a signal that the market is not functioning properly, and

- the authority could analyse whether the high profits are indeed due to superior efficiency (or whether the low profits are due to inefficiency). One way is to consider whether other companies in the same market are selling at the same price, but are making lower (or higher) profits at that price. Another, more complicated, way would be to analyse whether the costs of the firm in question are efficiently incurred. This paper reviews a number of methods to undertake such analysis.

1.49 If profits are high due to superior efficiency or temporary positions of market power, there may not be an immediate competition problem. However, superior efficiency does not exclude the exercise of market power, and the authority

should again address profitability in conjunction with other competition indicators, such as entry barriers and strategic behaviour, in order to ensure that the market can indeed function efficiently and that other firms can enter the market if they become as efficient as, or more efficient than, the incumbent firm.

Conclusion

1.50   This paper draws on the theoretical literature on the use of accounting data to undertake an economic analysis of profitability. It provides a framework for undertaking a profitability assessment and addresses a wide range of practical difficulties that may arise. It is important to note that, while measurement and interpretation problems may arise in profitability assessments, this is no reason to reject the use of such assessments in competition policy. The same problems arise for most other indicators and techniques commonly applied in competition policy. The important point is to use profitability assessment in conjunction with a number of complementary economic indicators and techniques. In other words, profitability assessment simply forms part of the toolkit for competition policy analysis.

PART I: CONCEPTS, METHODOLOGY AND POLICY IMPLICATIONS

2 INTRODUCTION: RELEVANCE OF PROFITABILITY ASSESSMENT TO COMPETITION POLICY

2.1 OXERA has been commissioned by the Office of Fair Trading (OFT) to produce this discussion paper on assessing profitability in the context of competition analysis. The paper is intended to be a 'practitioner's guide' to profitability assessment, targeted at lawyers, economists and generalists, both at the OFT and at other relevant government institutions, law firms and companies. It is also intended to stimulate debate on this increasingly important, and yet relatively unexplored, branch of competition policy analysis.

2.2 This introductory chapter explains why assessing profitability is relevant for competition policy. Paragraphs 2.4–2.8 explain that profitability can be used as an indicator of market power or dominance of an individual firm, or of the degree of competitiveness in a market as a whole. Paragraphs 2.9–2.18 show that profitability analysis has a much wider range of applications in competition law than commonly thought. Profitability is relevant to specific questions addressed in the market definition and market power stages of any competition investigation. It can also be used to assess many types of anti-competitive practices and mergers, and for other competition law areas, such as state aid and quantification of damages.

2.3 Despite the relevance of profitability assessment, it is not yet a commonly applied tool in competition policy (certainly outside the UK), other than for pricing practices such as predation and margin squeeze. OXERA submits that there is no legitimate reason not to consider profitability assessment as an indicator that complements other competition indicators, such as market shares and entry barriers. This discussion paper explains that there is a robust conceptual framework for assessing profitability which is based on economic theory and which can be used in competition policy analysis. It also discusses how, and in

what circumstances, this framework can be applied in real-world cases, and how and when practical difficulties related to measurement and interpretation of profitability can be dealt with. The objectives and structure of the remainder of this discussion paper are outlined in paragraphs 2.19–2.27 and 2.28–2.34, respectively.

Profitability as an indicator of market power or degree of competitiveness

2.4   Under the UK Competition Act 1998, an 'appreciable effect' test is usually applied to assess anti-competitive agreements under Chapter I, while a dominance test is applied to abuse cases under Chapter II. Both appreciability and dominance are related to the concept of market power. In competition law, market power is usually defined in terms of a firm's ability to raise prices consistently and profitably above competitive levels.[1] This definition has its origins in micro-economic theory. According to the theory, in a perfectly competitive market, prices are set at the level of cost, where cost includes a 'normal' profit margin to cover the cost of having to remunerate providers of capital to the firm or industry. In contrast, in monopolistic and (most) oligopolistic markets, prices are set in excess of the level of cost.

2.5   One way to determine whether a firm has market power, therefore, is to assess whether it has been making profits in excess of the 'normal' return on the product(s) in question. Indeed, in its market power guidelines, the OFT (1999b, para 6.3) states that:

> An undertaking's conduct in a market or its financial performance may, in itself, provide evidence that it possesses market power. It might, for example, be reasonable to infer that an undertaking possesses market power from evidence that it has:
>
> ● consistently raised prices in excess of costs, or
>
> ● persistently earned an 'excessive' rate of profit.

2.6   Profitability can also give important insight into the degree of competitiveness in a market as a whole, as opposed to the market power of individual firms. This is particularly relevant for oligopolistic markets. Competition authorities frequently

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[1] See, for example, the OFT's market power guidelines (OFT, 1999*b*, para 1.2), and US antitrust case law since the Supreme Court's decision in *Fortner Enters v. United States Steel Corp.*, 394 U.S. 495, 503 (1969).

have to deal with competitive issues, such as mergers and certain types of business conduct, in oligopolistic markets where no single firm is dominant, but where there is a concern about the degree of competitive pressure that the few firms in the market impose on each other.

2.7   Economic theory shows that some oligopolistic markets can be very competitive, leading to prices close to costs, while others can exhibit prices close to monopoly levels. It is difficult to infer from pricing behaviour alone (eg, when all firms set equal prices) whether a given market is competitive or not. In these situations, assessing profitability can shed light on the degree of competitiveness — high profitability would indicate a lack of effective competition.

2.8   This approach has been taken by the UK Competition Commission (and its predecessor, the Monopolies and Merger Commission, MMC) in various 'complex monopoly' inquiries under the Fair Trading Act 1973, in a wide range of markets.[2] Complex monopolies are typically found in markets where no individual firm is dominant, but where competition is not effective. Industry profitability is a standard indicator (among others) used by the Commission to assess the degree of competitiveness. Under the Enterprise Act 2002, the complex monopoly provisions of the Fair Trading Act 1973 are replaced with provisions for market investigations. The same approach is likely to be taken for these market investigations. Indeed, in its guidelines on market investigation references, the Competition Commission (2003b, para 3.82) states that:

> A situation where, persistently, profits are substantially in excess of the cost of capital for firms that represent a substantial part of a market could be an indication of limitations in the competitive process. For instance, in some cases a high level of profitability could be indicative of significantly coordinated behaviour. Therefore, in the context of a market reference, the Commission will normally consider profit levels, usually in terms of rates of return on capital in the market or markets concerned, as a further indicator of competitive conditions.

Likewise, in its own market investigation guidelines, the OFT (2003a, para 4.5) states that information on profitability can be a useful supplement to other evidence on market structure and conduct, and, indeed, that it may sometimes be the trigger of the OFT's interest in a particular market.

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[2] Several of these inquiries are discussed in this paper.

Additional applications of profitability in competition policy analysis

2.9　The determination of market power or degree of competitiveness is the most obvious use of profitability. However, the assessment of profitability has a wide range of further competition policy applications, which can be organised under the following headings:

- applications during the market definition and market power (entry barrier) stages of any competition investigation into agreements, abuses of dominance or mergers

- applications to specific abuse-of-dominance cases

- applications to merger cases, and

- other applications.

MARKET DEFINITION AND ENTRY BARRIERS

2.10　*Market definition* — the hypothetical monopolist test for market definition, which is a conceptual framework used by many competition authorities around the world, is defined in terms of the ability of a hypothetical monopolist to increase price profitably.[3] An important factor in this test is the margin between price and marginal cost of the firms in the market to be assessed. The higher this margin, the less likely it is that a hypothetical monopolist would increase price further. Assessing this margin requires some of the tools used for profitability analysis.

Furthermore, for cases where the profit level is already very high due to existing market power, consideration has to be given as to whether the current price was already above competitive levels such that even a monopolist would find it unprofitable to raise prices further. An adjustment may need to be made in order to avoid the 'cellophane fallacy' — i.e. the SSNIP test may need to start from a competitive, rather than the current, price level. Determining this competitive price level requires a full profitability analysis.

2.11　*Entry barriers* — analysis of entry barriers usually forms part of any market power assessment, and here profitability analysis can also provide useful insight. For

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[3] The hypothetical monopolist test is also known as the SSNIP test (where SSNIP stands for small but significant and non-transitory increase in price). The SSNIP test, and the 'cellophane fallacy' mentioned below, are explained in detail in OFT (1999*a*).

example, if profitability is found to be persistently high in an industry and is not eroded by new entry, this could be an indication of the existence of entry barriers.

ABUSE-OF-DOMINANCE CASES

2.12 *Excessive pricing* — under EC law, an abuse of dominance can be determined if prices are 'excessive in relation to the economic value of the service provided'.[4] One way to determine whether prices are excessive is to assess whether they allow the company in question to sustain profits higher than could be expected in a competitive market (see OFT, 1999*c*, section 2). Another way would be to compare the price directly with the underlying costs of the product. For either approach, similar issues, such as cost allocation and measurement of returns, need to be addressed; these issues are discussed in this paper. See also Box 2.1.

2.13 *Margin squeeze* — in EC case law, margin squeeze is a form of abuse of dominance where a vertically integrated firm 'squeezes' its downstream competitors by raising the cost of the key upstream input that it controls or by lowering its prices in the downstream market.[5] One method of identifying margin squeeze is to assess profitability: if the firm's downstream operations make infra-normal (or even negative) profits at current input prices, there could be a margin squeeze. See also Boxes 4.2 and 6.1.

2.14 *Predatory pricing and cross-subsidy* — profitability is also relevant for predatory pricing and cross-subsidy investigations under Chapter II of the Competition Act 1998. Some of the tests commonly applied in these cases require tools used for profitability analysis — for example, the average variable cost (AVC) test, the incremental cost test and the net revenue test (the latter assesses the incremental profitability of price cuts). (See OFT 1999*c*, section 4, and Boxes 2.1, 4.2 and 6.1.)

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[4] Case IV/28.851, *General Motors Continental* (75/75/EEC), December 19th 1974, OJ L 029, 30/02/1975; and Case C-26/75, *General Motors v Commission*, November 13th 1975, E.C.R. 1367. The Commission decision was annulled by the European Court on the basis of the facts, but the definition of excessive pricing was upheld.

[5] Case IV/30.178, *Napier Brown/British Sugar* (88/518/EEC), July 18th 1988, OJ L 284, 19/10/1998.

BOX 2.1 – PROFITABILITY IN EC COMPETITION LAW —
        UNITED BRANDS AND SUBSEQUENT CASES

An early, but still leading, EC case setting the precedent for the application of profitability assessment in competition investigations was *United Brands* (1976). United Brands (now called Chiquita Brands International) was one of the main suppliers in the global banana market. Both the European Commission[1] and the European Court of Justice (ECJ)[2] considered the banana market to be sufficiently distinct from other fresh-fruit markets. From 1971 to 1974, United Brands had a market share of around 40% in the whole of the European Union (EU) and around 45% in Denmark, the Benelux, Germany and Ireland.

The Commission found that United Brands had infringed Article 86 (now 82) through several practices, including the imposition of unfair prices for the sale of Chiquita bananas in the countries mentioned above. The Commission compared prices for green bananas intended for the Irish market with those intended for the Danish market, and found that the price in the latter was 2.38 times that in the former. It concluded that prices in the Danish market were excessive and abusive.

The ECJ rejected this argument, however, and considered that the basis for using the Irish price as a reference price had not been sufficiently investigated. In particular, it could be that the Irish prices were loss-making. The ECJ stated that a detailed cost analysis is a necessary prerequisite for establishing that a price is excessive. Specifically:

> 'Charging a price which is excessive because it has no reasonable relation to the economic value of the product supplied may be an abuse of a dominant position within the meaning of subparagraph (a) of Article 86; this excess could, *inter alia*, be determined objectively if it were possible for it to be calculated by making a comparison between the selling price of the product in question and its cost of production, which would disclose the amount of the profit margin.' (paras 250–1)

Further, the ECJ held that prices should be compared with those charged by competing suppliers of the same product. Excessive prices would be established if prices were outside the 'normal commercial range'. It found that the price difference between United Brands and its main competitors was only 7%, and considered this insufficient to establish an abuse of dominance (para 266).

Since United Brands there have been several Article 82 cases in which profits have been assessed. In *ECS/Akzo*,[3] the Commission used profitability as an indicator of dominance. In particular, the fact that Akzo was able even during periods of economic downturn to maintain its overall margin by regular price increases and/or increases in sales volume was one of the factors considered by the Commission as evidence of dominance (para 69).

Profitability assessment also played an important role in *Tetra Pak II*.[4] Tetra Pak is a major supplier of aseptic and non-aseptic cartons for the packaging of liquid and semi-liquid foods. The case involved an allegation of predation by Tetra Pak in Rex carton, its main product in the non-aseptic category. The Commission considered the profitability of Rex carton and compared this with the profitability of Tetra Pak's other carton type. It found that Tetra Pak's supply of aseptic cartons, in which it faced little competition, was very profitable, while its supply of Rex cartons, in which it faced most competition, proved to be unprofitable. The Commission found Tetra Pak to have abused its dominant position by, among other reasons, charging prices that discriminate between user groups in different markets. As part of its investigation, the Commission considered various profit measures, including net profit margins, gross margins, and the difference between the selling and the purchasing price.

Source: [1] Case IV/26.699, *Chiquita*, December 17th 1975, OJ L 95, 09/04/1976. [2] Case 27/76, *United Brands Company and United Brands Continentaal BV vs Commission of the European Communities*, Chiquita Bananas, February 14th 1978, E.C.R. 00207. [3] Case No IV/30.698, *ECS/AKZO* (85/609/EEC), December 14th 1985, OJ L 374, 31/12/1985. [4] Case IV/31.043, *Tetra Pak I*I, July 24th 1991, OJ L 72, 18/03/1992.

MERGER CASES

2.15 *Coordinated effects* — under the Enterprise Act 2002 a substantial lessening of competition test will be applied to mergers, while, under the EC Merger Regulation, the test is whether a merger creates or strengthens a dominant (or joint dominant) position.[6] Both these tests cover both unilateral effects (i.e. whether the merged entity will have market power) and coordinated effects (i.e. whether the remaining competitors will compete vigorously). Coordinated effects are notoriously difficult to assess *ex ante* — i.e. before the merger takes place. However, profitability analysis can provide important insight here: if pre-merger profitability is already high, this is an indication that competition is not effective, and hence that the merger is likely to worsen the situation (in terms of EC law, the merger is likely to 'strengthen' a joint dominant position). The Competition Commission has signalled that it may take this approach under the Enterprise Act 2002 (Competition Commission, 2003*b*, para 3.43).

[6] In Case T-342/99, *Airtours PLC v EC Commission*, June 6th 2002, E.C.R. II-02585, the Court of First Instance established criteria for the assessment of joint dominance in merger cases.

2.16 *Failing-firm defence* — profitability analysis can be relevant to the 'failing-firm defence' in merger control. Mergers and acquisitions are often considered more favourably if it can be shown that one of the merging parties is in financial difficulty and about to exit the market. This requires evidence on the profitability of the firm in question. For example, the European Commission (2002*b*) has indicated that it may approve a merger which creates or strengthens a dominant position if one of the firms is failing, such that the deterioration of the competitive structure that follows the merger cannot be said to be caused by the merger (i.e. in the absence of the merger, the exit of the failing firm would lead to a strengthening of a dominant position anyway). The OFT has also recently set out a number of criteria for assessing failing-firm defences in merger cases under the Enterprise Act 2002 (OFT, 2003*b*).

OTHER APPLICATIONS

2.17 *State aid* — under the EC state-aid rules, the European Commission often applies the 'market economy investor test' (these rules are applied only at the EU level and have no direct equivalent in UK competition law). (See European Commission, 1984.) According to the test, a measure will constitute state aid if capital is put at the disposal of undertakings under conditions which would be unacceptable for a private investor operating under normal market economy conditions. In other words, if a state investment or capital injection is expected to yield a normal return such that a private investor would do the same, it does not constitute state aid, and therefore requires no further assessment under the state-aid rules. Hence, the market economy investor test is, in effect, a profitability assessment.

2.18 *Quantification of damages and penalties* — the Enterprise Act 2002 provides greater scope for parties affected by anti-competitive practices to claim damages. In the USA, damages claims have been a common feature in antitrust law (partly because it is possible to claim 'treble damages'). Assessing profitability is relevant for the quantification of damages — for example, how much profit would the affected party have made without the anti-competitive practice; or how much extra profit did the perpetrator(s) make because of the anti-competitive practice? Similar principles may be applied by competition authorities and courts when determining appropriate penalties or fines for infringement of competition law.

Objectives of the discussion paper

2.19   Despite the wide range of applications described above, profitability assessment is not yet a commonly applied tool in competition policy around the world. In fact, UK competition policy may be the only exception. Under US and EC competition law, some of the techniques for profitability analysis are sometimes used to assess specific practices, such as predation and state aid (as discussed above). However, there is no systematic analysis of profitability in competition investigations generally. In most EC cases, dominance is assessed mainly with reference to indicators such as market shares and entry barriers, rather than profitability.[7] The same holds for monopolisation cases under the Sherman Act 1890 in the USA.[8]

2.20   The limited use of profitability analysis in competition policy stands in contrast with monopoly inquiries in regulated utilities, where the assessment of profits is an essential feature of price-cap regulation. This has inspired academic and policy debates on the appropriate measures and benchmarks of profitability. The experience from the utility field has strong relevance to competition policy analysis, since, ultimately, utility regulation and competition policy deal with the same fundamental issues of monopoly power and competitive pricing.

2.21   There are several explanations for why competition policy does not yet use profitability analysis on a systematic basis. First, conceptually, it has not been well established what profitability analysis should be measuring — i.e. what is the relevant measure of profitability, and what is the most appropriate competitive benchmark? However, this discussion paper shows that it is possible to define an appropriate conceptual framework for profitability analysis, based on existing theoretical work.

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[7] A reflection of this can be found in the European Commission's recent market analysis and market power guidelines for the regulatory framework for electronic communications networks and services. These guidelines, which build on existing EC competition case law, identify a long list of criteria for determining dominance, but this list does not include profitability (European Commission, 2002*a*, para 78.)

[8] For example, in *Blue Cross & Blue Shield of Wisconsin v. Marschfield Clinic*, 65 F. 3d 1406, 1412 7th Cir. 1995, cert. denied, 526 US 1184, 1996, a US appeals court determined that monopoly power cannot be inferred from a high rate of return, stating that 'there is not even a good economic theory that associates monopoly power with a high rate of return.' For an overview of the (limited) use of profitability in US antitrust law, see Areeda and Hovenkamp (2000).

2.22 The first objective of this paper is therefore to define an appropriate conceptual framework for profitability analysis. In particular, economic and finance theory inform that the internal rate of return (IRR) and the net present value (NPV) are the appropriate measures of profitability of an activity. The assessment of profitability in competition policy analysis should be based on these measures. Other measures of profitability — such as accounting ratios and market-based valuations — are only useful to the extent that they are related to, and provide information about, the IRR and NPV, in which case they can be used as 'proxy' measures.

2.23 As explained in this paper, a sound theoretical framework for assessing profitability based on the IRR and NPV has already been developed in the academic literature. In particular, this literature demonstrates that it is possible to apply the IRR methodology using accounting data (the primary source of information for such assessments) and over segments of an activity's lifespan (i.e. over truncated periods).

2.24 The second explanation for why competition policy does not yet use profitability analysis on a systematic basis is because it raises various measurement and interpretation issues:

- *measurement issues* — accounting data is normally the primary source of information for profitability analysis. However, companies rarely present such data in a way that it can be easily and readily used for economic analysis for competition policy purposes. Furthermore, accounting policies are far from uniform across companies and countries, and

- *interpretation issues* — even if profits can be measured, profitability figures can be difficult to interpret. For example, when are profits too high or too low, and what is the relevant time period to consider? If high profits are found, are they due to market power or to superior efficiency?

2.25 This leads us to the second objective of this paper, which is to translate the theoretical framework for assessing the IRR based on accounting data into a practical approach in a structured way. In particular, the paper aims to address the practical issues arising in measuring the IRR, and to close the gap between the theory and practice of estimating the IRR in profitability assessments. The paper shows that the potential measurement and interpretation issues signalled above are not always insurmountable in practice. These issues do not, however, justify ignoring profitability in competition policy analysis.

2.26   In particular, the IRR methodology described in this paper is most effective for assessing past performances for which there is reliable data for a sufficiently long period. The methodology may be less suited for assessing future performances based on forecast data. In such cases, as described in this paper, other proxy measures can be useful.

2.27   Caution should be exercised when undertaking profitability assessments and drawing conclusions from them. However, this holds equally for most of the other indicators and techniques commonly used in competition policy. Conceptual, measurement and interpretation issues also arise, for example, when defining relevant markets based on price-elasticity evidence, or when determining market power based on market shares. Therefore, profitability analysis should be seen as one among a number of complementary economic indicators and techniques that can be used together in a competition policy analysis.

Structure of the discussion paper

2.28   This discussion paper comprises four parts:

- Part I: Concepts, methodology and policy implications

- Part II: Case studies

- Part III: Guide to using accounting data for profitability assessment, and

- Part IV: Reference material.

2.29   Part I forms the main part of the paper, and consists of Chapters 2–8. Following this introduction, Chapter 3 sets out the conceptual framework underlying profitability assessments in the context of competition policy. Building on the basic theory of investment appraisal, the paper explains why the IRR and NPV are the relevant measures of profitability.

2.30   Chapters 4–7 are concerned with measuring profitability. Chapter 4 describes how the IRR and NPV can be calculated, and discusses their advantages and drawbacks in terms of practical usage. It also presents a number of other profitability measures, and discusses in which circumstances it may be appropriate to use these in competition policy analysis as proxies for the IRR. In addition, it is signalled in Chapter 4 that asset valuation is of particular importance for determining the IRR in the context of competition policy. Chapter 5 therefore deals with conceptual

and practical issues regarding asset valuation. It also discusses the implications of measurement uncertainties in asset valuation for the IRR and suggests practical steps to ensure that any conclusions drawn by comparing the IRR with the competitive benchmark(s) are robust to such uncertainties.

2.31   Chapters 6 and 7 deal with the two remaining building blocks of a profitability assessment. Chapter 6 discusses cost and revenue allocation. This is of major relevance because competition authorities will often need to measure the profits of a particular line of business rather than of a company as a whole. Chapter 7 considers the benchmarks that should be used in determining whether profits are excessively high or low. In particular, it gives an overview of the measurement of the cost of capital and the choice of appropriate industry (company) comparators.

2.32   Chapter 8 concludes Part I with a discussion of policy implications. The emphasis is on the question of how competition authorities, and other practitioners, might use profitability assessment in the way described in this paper as an additional economic indicator in competition investigations, among other competition indicators. The chapter also signals that the truncated IRR methodology described in this paper has in fact not been commonly applied in past competition investigations in the UK.

2.33   Where appropriate, references to relevant literature are also given. In addition, Part II of the paper contains four case studies on the application of profitability assessments in past UK competition investigations (Chapters 9–12). The objective is to illustrate how competition authorities have applied the tools of profitability assessments, and the role profitability played in the overall outcome of the investigation.

2.34   Finally, Part III (Chapter 13) provides guidance on how to use and interpret accounting data. Understanding accounting data is important in a profitability assessment, as it is the primary source of information for such assessments. However, there are several associated problems. First, companies prepare accounts for general purposes, such as internal management and external reporting, which means that, in general, they cannot be readily used for profitability assessment for competition policy purposes. In addition, established accounting principles still leave sufficient flexibility for accounting policies to differ across companies, across types of report, and over time. For these reasons, a key

challenge for competition authorities is to interpret, and, if necessary, adjust, the available accounting data in such a way as to provide meaningful insight into profitability. These general problems are addressed in Part III.

The structure of the paper is illustrated in Figure 2.1.

FIGURE 2.1 – STRUCTURE OF THE DISCUSSION PAPER

KEY QUESTION	PART/CHAPTER
	Part I: Concepts, Methodology and Policy Implications
Why is profitability assessment relevant?	2 Introduction: relevance of profitability assessment to competition policy
What is the conceptual framework?	3 Economic principles of profitability assessment
How can it be applied in practice?	4 The IRR and proxy measures of profitability
	5 Asset valuation
	6 Cost and revenue allocation
	7 The cost of capital and industry benchmarks
How can it be used in competition investigations?	8 Policy implications
How has it been used in past competition cases?	**Part II: Case Studies**
How can accounting data be used and interpreted?	**Part III: Guide to Using According Data for Profitability Assessments**
	Part IV: Reference material

3 ECONOMIC PRINCIPLES OF PROFITABILITY ASSESSMENT

3.1 This chapter discusses the economic principles that underpin a profitability assessment for competition policy purposes. An assessment consists of two main stages:

- measurement of the profitability of a line of business, company or industry, and

- comparing the measured profitability against a competitive benchmark.

3.2 The question arises as to what the appropriate measure of profitability is, and against what benchmark this measure should be compared. Paragraphs 3.3–3.8 explain that, conceptually, the IRR and NPV are the appropriate measures of profitability. This follows from the way in which firms make investment decisions in competitive markets. Paragraphs 3.9–3.13 discuss how the concepts of IRR and NPV can be used for competition policy analysis.

Investment decisions and the competitive market

3.3 Economic activities (e.g. investment projects, lines of business, or companies) typically have a pattern of an initial investment or outflow, followed by a stream of net revenues or inflows in subsequent periods. From an economic point of view, the profitability of an activity can be defined in terms of net increases in value resulting from that activity and realised over time.[9] The IRR and NPV are two commonly accepted and well-established methods for measuring the profitability of an activity. Both methods take into account the inflows and outflows of an activity over time, and reflect the economic principle of time preference of money. They are also the two most widely used techniques for investment appraisal in the business world.[10]

3.4 Intuitively, the IRR and NPV can be explained by considering the decision steps an investor would make when evaluating whether to undertake a certain activity (a more detailed explanation of the IRR and NPV is given in Chapter 4). The steps are as follows.

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[9] A decision to invest can be thought of as a decision to allocate consumption over time. In making the initial investment, current consumption is forgone in return for expected future consumption.

[10] In a study covering 392 chief financial officers (CFOs) of companies in the USA and Canada, Graham and Harvey (2001) find that around 75% of CFOs always or almost always use the IRR or NPV as their evaluation technique.

- *Assess the cash flows that the activity would generate* — this includes the cash outlay required to make the initial investment and future cash inflows from sales revenue and ongoing outflows from expenses.

- *Discount the expected cash flows to their present value (PV)* — the principle of (positive) time preference of money means that a pound received today is worth more than a pound received in the future. There are two key reasons behind this principle: first, the potential loss of utility of giving up consumption today; and, second, the risk associated with delaying consumption due to, for example, default or inflation risks. A discount or hurdle rate must therefore be applied to future cash flows to obtain their PV. Discount rates typically reflect the opportunity cost of the investment — i.e. the minimum rate of return required by investors. This minimum required rate of return is known as the cost of capital (see Chapter 7).[11] The NPV of the activity is the sum of all the discounted cash flows (DCFs) associated with the activity, less the initial investment outflow.

- *Calculate the IRR* — alternatively, instead of calculating the NPV, the investor could determine the discount rate that would give an NPV of zero — i.e. when the sum of the discounted future inflows equals the initial outflow. This discount rate is known as the IRR.

- *Make the investment decision* — if the NPV is greater than (or even equal to) zero, the investor will normally decide to go ahead with the activity. Likewise, if the IRR is greater than (or equal to) the minimum required by investors — the cost of capital — the decision would also be to go ahead. If, on the other hand, the NPV is negative or the IRR is less than the cost of capital, the investment should not be made.

3.5   Thus, the IRR and NPV are based on the same cash flow figures, and will often (but not always) lead to the same investment decision. For investment appraisals where different investment projects are ranked, the NPV has certain advantages over the IRR (see, for example, Brealey and Myers, 2002). However, for competition policy purposes, this difference is less relevant, as the objective is to compare the rate of return of a project against the cost of capital, not to rank it against the returns of other projects. The IRR has the advantage that it is expressed as a percentage, which makes it easier to interpret and to compare against benchmarks such as the cost of capital, which is also a percentage (the NPV gives an absolute amount). Therefore, while both the NPV and the IRR are the relevant profit measures for competition policy analysis, this discussion paper places more emphasis on the IRR.

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[11] For specific projects, companies may adjust the cost of capital upwards to obtain a hurdle rate that reflects risk factors.

3.6   The above investment appraisal framework can be related to the concept of competitive markets, which are characterised by free entry and exit. Hence, if the incumbent firms were making relatively high profits, new competitors would enter the market. Similarly, if profits are too low, companies exit the market and move to other investment opportunities instead.

3.7   In theory, such free entry and exit should lead to a market outcome in which the returns made in the market are equal to the cost of having to remunerate providers of capital to the firm or industry. Consider the example of the investor above. If the NPV of the cash flows, obtained using the cost of capital as the discount rate, were positive, or the IRR of the activity were greater than the cost of capital, it would be profitable to invest and enter the market. Other investors would make the same decision. With each additional entrant, the market returns fall until the rate of return, the IRR, equals the cost of capital (or the NPV equals zero).

3.8   If market returns are persistently above the cost of capital, this is an indication that the process of free entry and exit may not be functioning. For example, the investor in the example above may *not* enter for the following reasons:

- *cost advantages* — an incumbent may have access to specific knowledge or other resources that enable it persistently to produce more efficiently than its rivals, which do not have access to the same resources

- *economies of scale* — given the capacity of the incumbent, it may not be possible for the investor to reach a minimum efficient scale and therefore to make entry worthwhile

- *sunk costs and overcapacity* — the incumbent, which has incurred sunk costs, may deter entry by threatening to undercut the prices of the new entrant,[12] or

- *other entry barriers* — other barriers, such as regulatory requirements or lack of access to essential inputs, could also prevent entry.[13]

These reasons are indicative of the presence of entry barriers and hence of a market that may not be competitive.

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[12] The industrial organisation literature has explored in-depth the use of capacity and sunk costs to deter entry. The seminal article is Spence (1977).

[13] For a discussion of the range of possible entry barriers, see OFT (1999*b*), section 5.

Application to competition policy

3.9   The investment appraisal framework described above considers profitability over the lifetime of an activity. Competition authorities will often, but not always, have to analyse profits that have been made in the recent past and are likely to continue to be made in future. That is to say, competition policy is concerned with past as well as future profits, and with relatively shorter time periods (see Box 3.1). Nonetheless, the principles of investment appraisal can still be applied, and the IRR and NPV are still the relevant profit measures, although there are a number of implications for measurement and benchmarking in competition policy. Both are discussed below.

BOX 3.1 – FORWARD- AND BACKWARD-LOOKING PROFITABILITY ASSESSMENTS IN COMPETITION ANALYSIS

The applications of profitability assessments in competition policy, as discussed in Chapter 2, can be either forward-looking (assessing expected profits) or backward-looking (examining past profits and performance), or a combination of the two, as shown in the table below. The table also distinguishes between applications that are concerned with excessively high profits and those concerned with excessively low profits. This is further discussed in Chapters 4 and 8 in the paper.

	Profits too high	Profits too low
Backward-looking	Market power; ineffective competition; SSNIP test; coordinated effects; excessive pricing; quantification of damages (perpetrator)	Margin squeeze; predation and cross-subsidy; failing-firm defence; state aid; quantification of damages (victim)
Forward-looking	Entry barriers; excessive pricing (in future)	Margin squeeze (in future); predation and cross-subsidy (in future); failing-firm defence; state aid (in future)

The main application—profitability as an indicator of market power or the effectiveness of competition in a market—fits in the top-left cell of the table above. Its focus is on whether past profits of the firm(s) or line(s) of business in question have exceeded a certain competitive benchmark. Applications, such as the SSNIP test for market definition, coordinated effects in merger investigations and quantification of damages, also emphasise past performance.

The three abusive pricing applications (excessive pricing, margin squeeze and predation) will usually be backward-looking and involve assessments of past profits, but are sometimes also forward-looking. In most cases, the competition authority needs to determine whether past pricing behaviour has been abusive. In some cases, however, it may need to assess complaints about recently introduced pricing policies, which require projections into the future to assess their likely future profitability. Sometimes, both forward- and backward-looking assessments are needed. In the above example, in order to determine whether a new pricing policy is profitable, it may be relevant to consider profits in the recent past as well. Finally, failing-firm defence and state-aid applications can also be either forward- or backward-looking. For example, whether a firm is really failing can be assessed by looking at its performance in the recent past and/or its expected performance in the immediate future. Whether a government investment constitutes state aid can be assessed by how profitable it is expected to be, or how profitable it has been.[1]

Note: [1] State-aid cases have the peculiarity that *ex post* assessments are in fact also forward-looking. When investigating whether aid given in the past meets the market economy investor test, the European Commission would assess whether, at the time the aid was given, it was expected to become profitable, rather than taking past data and assessing whether the aid actually has become profitable. See, for example, para. 76, Case T-16/96, *Cityflyer Express v Commission of the European Communities*, April 30th 1988, OJ L 125, 05/05/2001; and Case C-482/99, *French Republic v Commission of the European Communities*, May 16th 2002, E.C.R. I-04397.

3.10   With regard to measurement, profitability assessments in competition policy tend to differ from investment appraisals in two areas. First, to the extent that past performances are being examined, such profitability assessments have the advantage that cash flows can actually be taken from real data — i.e. there may be no need for forecasting. Second, while investment appraisals are normally based on the expected IRR over the entire lifetime of the activity, assessments in competition policy are usually concerned with relatively shorter time periods. With regard to the question of whether a company currently has market power, for example, it is meaningless to consider its profits decades ago or in decades to come. Therefore, the objective would be to assess profitability for a particular period. As further explained in Chapter 4, a theoretical framework exists that determines the IRR by considering only a limited time period (i.e. it shows that there is no need to rely on data for the entire lifetime of the activity). This truncated IRR is of direct relevance to profitability assessments in competition policy, which are also concerned with only a limited time segment of an activity.

3.11   In spite of the above, the competition authority may sometimes have insufficient data to assess the IRR. In such cases, proxy measures of profitability may be applied, as further discussed in Chapter 4. However, this is only useful to the extent that such proxy measures are related to, and informative about, the IRR.

3.12   With regard to benchmarking, two questions arise: what is the appropriate benchmark, and how should the competition authority interpret the results? In particular, even if the IRR and the cost of capital were estimated with reasonable accuracy, how confident is the competition authority that an IRR in excess of the cost of capital is due to a company's market power or anti-competitive behaviour? This is an important question, as a company's IRR estimated over a particular time period could diverge from the cost of capital for a variety of reasons, not all of which may be related to market power or anti-competitive practices. For example, a company could be earning an IRR in excess of the cost of capital in any particular period for various reasons that are not necessarily related to a lack of competition in the market. Such reasons include economic cycles, differences in efficiency, a survival bias and windfall gains or losses, as further discussed in Chapter 8.

3.13   In order to assess the profitability of an individual company, simply comparing the IRR with the cost of capital may therefore not be sufficient when assessing past performance. In these cases the returns made by comparator firms or industries should be used as additional benchmarks. Indeed, if measures of profitability are used instead of the IRR, it may be necessary to use the equivalent measures of comparator companies as benchmarks, as these proxies may not be directly comparable to the cost of capital (see Chapter 7).

Implications for competition policy

3.14   The above discussion can be summarised as follows.

- The IRR and NPV are the conceptually correct measures of profitability for competition policy purposes. They reflect the way in which companies make investment and entry/exit decisions in competitive markets.

- The IRR should be benchmarked against the cost of capital. In addition, it is often useful to benchmark the IRR of a company against that of other comparator companies, particularly for *ex post* assessments. This would

allow the competition authority to take into account the effects of external factors, such as economic cycles, which are not related to competition problems (see Chapters 7 and 8).

- Where poor-quality data limits the use of the IRR, other proxy measures of profitability should also be applied. However, these are useful insofar as they are related to, and provide information about, the IRR or NPV (see Chapter 4).

4 THE IRR AND PROXY MEASURES OF PROFITABILITY

4.1 Chapter 3 explained the principles of capital budgeting theory and their relevance to the assessment of profitability in the context of a competition policy analysis. Specifically, the objective of such an assessment is to examine the IRR (or NPV) of an activity relative to what would be expected in a competitive environment. This chapter sets out the methodology and tools that can be used to assess the profitability of an activity, based on the principles developed in Chapter 3.

4.2 Paragraphs 4.4–4.37 introduce the truncated IRR methodology, which has been developed in the academic literature and is concerned with profitability over a limited segment of the activity's lifespan. While this truncated IRR may not necessarily reflect the true IRR of the activity over its entire lifespan, it is sufficient for answering the questions about profitability that are relevant for competition policy purposes. Key to the application of the truncated IRR is the valuation of assets according to the 'value-to-the-owner principle'. The application of the NPV methodology is also briefly discussed.

4.3 The IRR and NPV methodologies are not the only ones relevant for competition policy investigations. Paragraphs 4.38–4.65 address some of the other measures of profitability — in particular, accounting ratios and market valuations. Finally, paragraphs 4.66–4.75 discuss how and under what conditions it is appropriate to use these other measures as proxies for the truncated IRR.

The truncated IRR methodology

DEFINITION OF THE IRR AND TRUNCATED IRR

4.4 As discussed in paragraphs 3.3–3.8, an economic activity would typically have a pattern of an initial capital outlay followed by a stream of cash flows in subsequent periods. Given that the cash flows are spread out across time, they would have to be discounted to convert future costs and benefits to a common date — normally the present date — to give the NPV of the activity. The IRR is the discount rate which, if applied to the calculation, would yield an NPV of zero.[14]

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[14] For a more detailed explanation of NPV and discount rates, see Brealey and Myers (2002). Under the IRR approach, multiple solutions may be attained if there is a double change in the sign of the cash-

4.5 Formally, the IRR is defined as the discount rate, r, that equates the PV of an activity's sum of expected stream of cash flows (C_1, C_2, ..., C_N), together sometimes referred to as the discounted cash flows (DCFs), to its initial capital outlay (A_0). This can be expressed as follows, where t refers to the time period from 0 to N:

$$A_0 = \sum_{t=1}^{t=N} \left(\frac{C_t}{(1 + r)^t} \right)$$ (Equation 4.1)

4.6 Intuitively, the larger the stream of cash flows, given a certain initial investment, the higher the discount rate (the IRR) that would have to be applied to ensure that the NPV of these cash flows equals the initial capital outlay. In this way, a higher IRR reflects greater profitability.

4.7 The IRR can then be compared with the cost of capital to assess whether the activity is profitable. If the IRR is lower than the cost of capital, this would imply that the returns to that activity are insufficient to compensate for returns forgone by not investing in an alternative activity (which would, in principle, give a return equal to the cost of capital). The reverse is the case if the IRR is higher than the cost of capital.

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flow stream. This could arise, for example, if somewhere down the track a major refurbishment takes place that involves outlays greater than the revenues for the year in question. In fact, if the cash flows after this point are all positive and much larger in aggregate, there will still be no problem. The problem is most likely to arise, however, when there is a major outflow at the very end of the project because of the need to dismantle a building or restore a site (nuclear decommissioning being the most striking example).

Consider the following example, taken from Damodaran (1999, pp. 171–2). A firm has a project with a four-year life. There is an initial investment of 1,000, followed by positive cash flows of 800, 1,000 and 1,300 in years one to three. In the final (fourth) year, there is a large negative cash flow (–2,200) in. The firm's cost of capital is 12%. The project has a positive NPV of 38.65 if the cash flows are discounted at 12%. So the project is unquestionably worthwhile. However, there are two IRRs: 6.6% and 36.5%.

Most textbooks regard the multiple sign changes problem as yet one more reason to use the NPV method in preference to the IRR and say no more about it. However, this is not much help in many competition cases. One solution suggested by Merrett and Sykes (1963, pp. 163–5) is to compute the IRR by what they call the 'extended yield' method. This involves discounting future negative flows back at the cost of capital (not the IRR), year by year, until they are absorbed by the earlier positive cash flows. At that point, all the remaining (positive) flows are discounted back at the IRR. The idea is that money has to be set aside to pay off these future outflows. In terms of the example, if the negative fourth-year flow is discounted and deducted from the third-year flow, there is still a negative balance: 1,300 – (2,200/1.12) = –664.3. The exercise is then repeated taking into account second-year cash flow. This now gives a positive balance: 1,000 – (664.3/1.12) = 406.9. The IRR can now be found in the usual way: 1,000 = 800/(1 + r) + 406.9/(1 + r)^2. This gives an IRR of 15.3%.

4.8   As outlined in Chapter 3, it has been commonly accepted that the IRR is the appropriate measure for investment appraisals and, in theory at least, for competition policy purposes as well. There has been a debate in the literature as to whether accounting data (and accounting measures of profitability such as the ROCE) are of any use for obtaining information about the IRR. As discussed in Box 4.1, it has been established in the literature that there is a theoretical link between the IRR and accounting rates of profitability, and hence that accounting data can be used in a meaningful way to assess the IRR. The subsequent chapters and Part III of this paper provide more detail on how to use accounting data.

BOX 4.1 – THE RELATIONSHIP BETWEEN ACCOUNTING RATES OF PROFIT AND THE IRR

In a widely quoted article, Fisher and McGowan (1983) state that the annual accounting rates of return (ROCE or return on equity, ROE) of an investment would only equal the IRR under highly specific assumptions. They therefore claim that 'there is no way in which one can look at accounting rates of return and infer anything about relative economic profitability.' However, while accounting rates of return on an annual basis do not tend to reflect the IRR (see also Box 4.3), the literature initiated by Kay (1976)—and further developed by Peasnell (1982), Steele (1986), Edwards et al. (1987) and Franks and Hodges (1996)—shows that a relationship between the IRR and accounting rates of return *does* exist. As Franks and Hodges (1996) note, such claims as those by Fisher and McGowan 'must be seriously qualified'.

Kay (1976) was the first to demonstrate this relationship between the IRR and accounting rates of profit, and to show that the IRR can also be derived from accounting rates of profit. Specifically, using the 'clean surplus relation' between accounting profits and cash flows (see Part III), Kay shows that the IRR is a weighted average of the accounting rate of profit. While Kay derives his results using integral calculus and assumes that all cash flows occur continuously, Peasnell (1982) shows that his results hold in discrete time as well. According to Kay's method, if a rate of return, a^*, is weighted by the value of capital discounted at the weighted average of the rate of return itself, then that weighted average rate or return is the IRR, r, itself—that is:

$$r = a^* = \sum_{t=1}^{t=N} w_t \frac{EBIT_t}{A_{t-1}}$$

where A_t is the asset value in period t, EBIT is the accounting profit,

$$w_t = \frac{v^t A_{t-1}}{\sum_{j=1}^{N} v^j A_{j-1}}, v = \frac{1}{1 + a^*} \text{ and the weights sum to one: } \sum_{t=1}^{t=N} w_t = 1.$$

This equation can be solved iteratively.

Kay's approach is not often used as a practical tool for estimating the IRR because, if all the information required to calculate the IRR using his approach is available, the IRR can in fact also be calculated directly from cash flows and asset values, which is more straightforward (see Equation 4.2 below).

Finally, the accounting rates of profit also link into the PV of an activity, via the residual income relationship:

$$
\begin{aligned}
PV_0 &= \sum_{t=1}^{t=N} \frac{C_t}{(1 + d)^t} \\
&= \sum_{t=1}^{t=N} \frac{EBIT_t - dA_{t-1}}{(1 + d)^t} \\
&= \sum_{t=1}^{t=N} \frac{[(EBIT_t/A_{t-1}) - d]A_{t-1}}{(1 + d)^t}
\end{aligned}
$$

where PV_0 is the present value of cash flows at the start of the period, C_t is cash flow in period t and d is the cost of capital.

4.9   Another issue that has been addressed in the literature is how to assess the IRR over a limited time period. As shown in Equation 4.1, the IRR refers to the cash flows of the entire lifespan of an activity. To calculate such an IRR for ongoing activities would require accurate forecasts of future cash flows; it would otherwise not be possible to estimate the IRR for activities that have not yet ended. Accurate forecasts are, however, very difficult to obtain. This would pose a practical problem, as it would imply that the IRR could only be estimated for activities that have come to an end. In addition, as discussed in Chapter 3, competition authorities are usually only interested in profitability over relatively shorter time periods, and not over the lifetime of activities.

4.10   The academic literature (in particular Steele, 1986; Edwards et al., 1987; and Franks and Hodges, 1996) has shown that it is possible to estimate an IRR based on accounting information on a segment of the activity's lifespan — i.e. a measure of the profitability of the activity over that particular period. As long as assets at the beginning and end of that time segment are appropriately valued, this truncated IRR provides information that is sufficient for the purposes of investment appraisal in general and competition policy analysis in particular.

4.11   The formula for the truncated IRR is obtained by modifying the formula in Equation 4.1 as follows:

$$A_0 = \sum_{t=1}^{t=N} \left(\frac{C_t}{(1+r)^t} \right) + \frac{A_N}{(1+r)^{t.}}$$

(Equation 4.2)

where A_0 is now the opening value of assets at the start of the period assessed, A_N is the closing value of assets at the end of the period, r is the truncated IRR and time period $t = 0, \ldots N$. The IRR can be solved for iteratively.[15] Edwards et al. (1987) show that as long as the opening and closing assets are valued according to the value-to-the-owner principle, the truncated IRR can be estimated over the period that yields useful results about performance of the activity over the period considered.

THE VALUE-TO-THE-OWNER PRINCIPLE

4.12   As explained above, the truncated IRR methodology requires accurate estimations of the opening and closing asset values of the activity in question. Further, these values need to be consistent with the value-to-the-owner principle. This principle determines the value of assets on one of three possible bases:

- *the modern equivalent asset (MEA)* — theoretically, this is the lowest cost of purchasing assets today that can deliver the same set of goods and services as the existing assets. The MEA is based on current, best-practice technology and uses the optimal configuration of assets to deliver the goods and services as efficiently as possible. For example, the design of an existing telecommunications network may have been optimal given the technology and services offered at the time, but sub-optimal when considering current technology and services. An operator setting up from scratch would be likely to use a superior network configuration to deliver the same set of services (hence the term modern equivalent asset)[16]

- *the present value (PV)* — the expected future cash flows discounted at the asset's cost of capital, or

- *the net realisable value (NRV)* — this is essentially the price the asset would fetch if it was sold (disposed of) today.

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[15] Several alternative approaches have been put forward to measure the IRR in practice. This includes Kay's approach, where the IRR is measured as a weighted average of the accounting rates of profit (see Box 4.1); the Ijiri method, which derives the IRR by using the cash-recovery rate, the ratio between the cash inflows from capital investments and the outstanding gross capital investments; and Ruuhela's method of estimating the IRR directly from financial statements. For further details on these last two methods, see Ijiri (1980), Salamon (1982) and Ruuhela et al. (1982).

[16] Edwards et al. (1987) use the term 'replacement cost' instead of MEA.

4.13　The value-to-the-owner principle values the asset as (see Table 4.1):

- its MEA, if its PV is greater than its MEA

- its NRV on disposal, if this is greater than its PV and less that its MEA, or

- its PV, if this lies between the MEA and its NRV.

4.14　This can be written formally as: $A_t = \min\{MEA, EV_t\}$, where EV is what Edwards et al. (1987) label the economic value of the asset (i.e. the most economic use of an asset once in possession) expressed as $EV_t = \max\{PV_t, NRV_t\}$. The possibility of the MEA being less than the NRV is ruled out, because such a situation is unlikely to persist for long. In such circumstances, firms will be able to make a profit by selling their asset and buying a new one, which will lower the selling price and raise the buying price, until the NRV no longer exceeds the MEA.

TABLE 4.1 – VALUE-TO-THE-OWNER PRINCIPLE, INVESTMENT APPRAISAL AND ESTIMATED IRR

PV of asset	Investment decision	Estimated IRR
Equal to or greater than MEA	Purchase asset	Equal to or greater than cost of capital
Between NRV and MEA	Retain existing asset but do not purchase new asset	Lower than cost of capital
Less than NRV	Dispose of existing asset	Lower than cost of capital

Source: Adapted from Mayer (1988).

4.15　There is a natural interpretation of these rules (see Edwards et al, 1987, for a detailed exposition). If the PV of the assets is greater than their MEA then the value-to-the-owner rule states that assets should be valued at their MEA. In other words, where returns are high and entry or investment should take place then assets are valued at the lowest cost of entry. If returns are greater than the cost of capital then entry is profitable. Put differently, the question of whether entry should occur earlier rather than later is one of whether the cash flows earned during that period compensate for the opportunity cost of bringing forward the date at which entry cost is incurred.

4.16   If the PV of the assets is less than their NRV then the value-to-the-owner rule values assets at their NRV. If the estimated IRR on this basis is lower than the cost of capital then exit or disposal of asset should take place. If neither of these conditions holds then neither exit nor entry should occur and assets should simply continue to be employed in their current activity.[17]

4.17   Based on the above, the value-to-the-owner rule can be used to provide evidence of barriers to entry and exit over particular periods. In this case, the question can be framed in the context of whether the company should exit earlier rather than later — i.e. whether the cash flows earned during that period compensate for the cost of delaying the receipts from the disposal of the assets. If the estimated IRR is in excess of the cost of capital when assets are valued at their MEA, then entry and investment should have occurred at the beginning rather than the end of the period. If it does not occur, there is *prima facie* evidence of a barrier to entry and excessive returns. The returns over and above the cost of capital indicate the additional profits earned by entry at the beginning rather than the end of the period (i.e. the excess profits earned during that period).

4.18   If, on the other hand, rates of return are below the cost of capital when assets are valued at NRV, then exit should have occurred at the beginning rather than the end of the period. If it does not occur, this is an indication of a barrier to exit. Finally, where PV lies between the MEA and its NRV, normal profits are being made. The value-to-the-owner rule therefore provides the right measure for answering economically meaningful questions over a segment of the life of a firm.

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[17] The value-to-the-owner principle can be illustrated as follows. If the MEA of an asset is £100 and it generates an income stream whose PV at the cost of capital (say, 10%) is £110, then the IRR that discounts that earning stream to the MEA of £100 would be greater than 10%. Using the MEA gives the correct answer that the IRR exceeds the cost of capital. This would be indicative of excessive profits, entry barriers or market power. If, on the other hand, the PV at a 10% cost of capital were £90 (which is less than the MEA), the value-to-the-owner principle would imply valuing the assets at £90. The estimated rate of return would then be 10%, equal to the cost of capital. This implies that entry may not be attractive (i.e. the asset should not be replaced) since the MEA exceeds the PV. However, a firm that is already in the market would still find it optimal to continue operations rather than dispose of the assets (since PV exceeds NRV). Finally, if the PV is even lower, say £40, and is less than the NRV of £50, then an IRR that discounts that earning stream to the NRV would be less than the cost of capital of 10%. This would give the correct result that the asset is earning returns below the cost of capital and should be disposed of. Both these scenarios may suggest the existence of excessively low profits.

4.19 If the value-to-the-owner principle is applied to asset valuation, it would be possible to compare the truncated IRR derived from Equation 4.2 with the cost of capital, in order to make investment appraisals or profitability assessments in competition policy analysis.

4.20 The value-to-the-owner principle and the truncated IRR methodology can therefore be implemented as follows.

- The first step is to value assets according to their MEA. If the estimated IRR is higher than, or equal to the cost of capital, it implies that the true PV indeed exceeds MEA and that the MEA valuation is the correct valuation.

- If, however, the estimated IRR is below the cost of capital, this implies that the economic value of the asset is less than its MEA. As a next step, the competition authority should estimate the truncated IRR on the basis of the NRV of assets. If returns are below the cost of capital, this can be taken as an indication of excessively low profits. If not, then by elimination the competition authority may conclude that normal returns are being made.

4.21 In practical terms, this means that, as long as information is available about cash flows for a period of time and the asset values at the start and end of that period, a truncated IRR, which yields information about a company's performance in that period, can be estimated. The results can be used to make inferences relevant to competition analysis. The practical issues surrounding asset valuation are discussed in Chapter 5.

4.22 The IRR over a truncated period cannot provide information on performance outside those periods. For example, a firm may earn low rates of return in its initial stages of development anticipating higher returns subsequently. In principle the truncated IRR should be measured over a sufficiently long period to capture these effects (see also Chapter 8). If this is difficult, for example, because the activity in question is only in its initial stages and forecast data is needed, then it may also be useful to use other measures, such as the Tobin's q (see paragraphs 4.56–4.62), to assess whether higher returns are anticipated in the future.

FURTHER PRACTICAL ISSUES IN ESTIMATING THE TRUNCATED IRR

4.23 There are three further practical issues worth mentioning in relation to the estimation of the truncated IRR. First, business activities can be funded through either debt or equity. In many cases, a combination is used. Thus, there are two

categories of IRR that can be calculated: an IRR of the entire activity (i.e. the rate of return to both debt and equity); and an IRR for equity alone. To calculate the (post-tax) IRR for debt and equity, the cash flows after tax and before interest payments are used (this is then comparable with the post-tax weighted average cost of capital, or WACC, as discussed in paragraphs 7.5–7.30). To calculate the post-tax IRR to equity alone, the post-tax cash flows after interest payments are used (this is then comparable to the post-tax equity cost of capital). If the truncated IRR is calculated using pre-tax cash flows, it must be compared with the pre-tax WACC or pre-tax equity cost of capital.

4.24   Second, the truncated IRR can, in principle, be calculated for an investment, a line of business, or for the whole company. In practice, the first two situations require assets, costs and revenues to be allocated to different investment projects or lines of business in order to determine the relevant assets and cash flows. Allocation issues are discussed in Chapter 6.

4.25   Third, there are two ways in which the truncated IRR can be calculated: in nominal terms (i.e. unadjusted for inflation); and in real terms, where inflationary effects are accounted for. The latter would reflect the true purchasing power of the returns from the investment.

4.26   Most accounting reports contain data in nominal terms. Calculating the truncated IRR using this data would provide nominal indicators of profitability. The nominal IRR should be compared with the nominal cost of capital.

4.27   Although profitability assessments often use nominal figures, there is no theoretical reason for preferring either nominal or real calculations. The important point is that the analysis needs to be consistent — i.e. both measure and benchmark should be calculated on the same basis. To calculate the real IRR, the nominal figures must be deflated to a chosen base year's prices. The choice of the base year does not matter, as long as the same base year is consistently applied to all figures. The real IRR should be benchmarked against the real cost of capital.

THE TRUNCATED NPV

4.28   As explained in Chapter 3, the NPV is also an appropriate measure of profitability, and it can also be calculated over a truncated period. The NPV of an activity is expressed formally in Equation 4.3, where C_1, C_2, ..., C_t refer to the stream of cash flows generated by that activity, A_0 is the cost of the asset (the initial outlay) and d is the discount rate:

$$NPV = -A_0 + \sum_{t=1}^{t=N} \frac{C_t}{(1 + d)^t} \qquad \text{(Equation 4.3)}$$

4.29   The discount rate that should be used is the minimum rate of return required by investors — i.e. the cost of capital (see Chapter 7). An NPV greater than zero would be an indication of excessive profitability (see Box 4.2 for other applications of the NPV test).

4.30   As in the case of the IRR, for investment appraisal purposes the NPV of an activity takes into account the cash flows of the entire lifespan of that activity. However, where information is available for only a segment of the activity's lifespan, and where a competition policy analysis is concerned with only a limited time period, a truncated NPV can be estimated if the assets at the beginning and end of that segment are correctly valued. The truncated NPV can be estimated using the following formula:

$$NPV = -A_0 + \sum_{t=1}^{t=N} \left(\frac{C_t}{(1 + d)^t} \right) + \frac{A_N}{(1 + d)^N} \qquad \text{(Equation 4.4)}$$

where A_0 is the opening value of assets at the start of the period in question, A_N is the closing value of assets at the end of the period, and d is the cost of capital (discount rate). The logic of the value-to-owner principle applies here as well, and, as discussed above, in investigations on excessively high profitability assets should be valued on an MEA basis.

4.31   In the case of the post-tax NPV for the entire activity, post-tax cash flows before interest payments are discounted by a post-tax WACC of debt and equity. Conceptually, this NPV value would give the value of debt and equity involved in that activity. The post-tax NPV for equity-holders, on the other hand, is calculated using post-tax cash flows (after interest payments) discounted using the post-tax

equity cost of capital (see paragraphs 7.5–7.30). In principle, this would give the value of equity of that company. Both variants of the NPV can also be calculated using pre-tax cash flows. In this case, the cash flows must be discounted with either the pre-tax WACC or pre-tax equity cost of capital, as appropriate.

4.32   Finally, like the IRR, the NPV can be calculated for a particular investment project, for a particular line of business or for the whole company.

BOX 4.2 – NPV TESTS FOR PREDATION AND MARGIN-SQUEEZE INVESTIGATIONS

The NPV approach has been used in competition policy to assess predatory pricing, cross-subsidy and margin squeeze. For example, when assessing cross-subsidies in the telecoms sector under the Competition Act 1998, the Office of Telecommunications (Oftel), the sector regulator, has indicated that a cross-subsidy is likely to be found if an undertaking does not cover the long-run incremental cost (LRIC) of an activity over its economic lifetime. For this purpose Oftel would apply a DCF test:[1]

> In assessing whether the revenue from providing a service would exceed the LRIC it may be useful to perform a DCF analysis. This is a forward-looking analysis of the incremental cash flows (in terms of both costs and revenues) that are expected to arise from a service. It may be particularly useful to perform a DCF analysis in relation to new services or for a service in its start-up phase, when it is often reasonable to expect initial losses to be incurred. A DCF analysis is one of the standard methods of investment appraisal. It should be based on assumptions that are consistent with those made in an undertaking's business plan in relation to, for example, the competitive conditions to be expected in the market (see Oftel, 2000, para 7.23).

Likewise, when assessing margin squeezes by mobile network operators (MNOs), Oftel considered the profitability of an MNO's retail service provider, taking the NPV over the lifetime of a subscriber as the relevant profitability measure (thus measuring whether the, often high, subscriber acquisition costs are offset by discounted future revenues).

A fundamental problem with this approach is that a positive NPV (or an IRR in excess of the competitive benchmark) does not necessarily mean that the losses in the early stages are not anti-competitive. After all, short-run losses from predation and margin-squeeze practices can also be seen as investments in long-run profits. Consider the recoupment test for predation—currently the primary test for predation in US case law (see Box 6.1)— which states that below-cost pricing in the short run is only harmful if the predator is likely to recoup its losses through monopoly pricing in the long run:[2]

$$\sum_{t=1}^{t=N} q_t(p_t) \times (p_t - p^{comp}) \times (1 + d)^{-t} > 0$$

where p_t is the price charged by the predator in period t, q_t the demand in period t; p^{comp} the competitive price (e.g. at marginal cost); d the discount rate; t_p the number of periods of pricing below cost; and t_r the number of periods in which the predator can recoup losses through monopoly pricing. This recoupment test also comes down to an NPV analysis, but it draws exactly the opposite conclusion. If the initial losses are exceeded by the NPV of future gains, the recoupment test would indicate the feasibility of predation and hence advocate intervention. In contrast, in Oftel's approach described above, a positive NPV would indicate the absence of anti-competitive pricing.

This potential flaw in the application of the NPV has been explicitly recognised by the Competition Appeals Tribunal (CAT) in *Napp* (CAT, 2002, para 260), and by the OFT in the BSkyB inquiry (OFT, 2002*b*, para 384ff.). To overcome the flaw, a competition authority would have to identify the reasons why the NPV is positive. If this is mainly because the firm in question excludes its competitors, the recoupment logic seems to apply. If there are other, more 'benign', reasons, such as an increase in total market demand or a decrease in unit costs, then the initial losses seem more justified. In practice, distinguishing between these reasons is far from straightforward.

Notes: [1] The only difference between DCF and NPV is that the former does not subtract the initial outflow (investment) in the calculation itself—i.e. NPV = DCF – initial outflow. [2] The formula is based on Elzinga and Mills (1989).

OPTION VALUES

4.33 Some investment expenditures are irreversible and cannot be recovered if, for example, there is an unanticipated downturn in demand; such expenditures are sunk. Irreversibility normally arises when the capital invested is industry- or firm-specific, such that it cannot be used in a different industry or by a different firm. When investment is irreversible and future demand or cost conditions are uncertain, an investment made today involves the exercising of an option to invest at some time in the future. The investor gives up the possibility of waiting for new information which may arise in the future and which could affect the desirability or timing of that investment. The investor cannot disinvest should market conditions take a turn for the worse.

4.34 From an economic point of view, this lost option value should therefore be included as part of the initial cost of the investment.[18] In other words, an investment is profitable only if the discounted stream of cash flows is at least equal to the value of keeping open the firm's option to invest elsewhere. Industries where irreversibility of investment may be of importance include telecoms networks, road and rail transport systems, pharmaceuticals, oil exploration and power generation.

4.35 The value of options can be incorporated into the profitability assessment in two ways. The first is to adjust the cost of the initial capital outlay accordingly to include the cost of exercising the option. Alternatively, the cost of the option can be taken into account by adjusting the discount rate upwards — i.e. a hurdle rate is applied which is equal to the cost of capital plus the increment reflecting the option. This second approach is less precise, but is often used in practice by companies on a rule-of-thumb basis (see Graham and Harvey, 2001).

4.36 In the corporate finance literature there is debate about how significant option values really are in firm valuation. On the one hand, calculations by some authors show that, in many cases, projects should be undertaken only when their NPV is at least double their direct costs (McDonald and Siegel, 1985; Brennan and Schwartz, 1985; and Majd and Pindyck, 1987). Others, however, argue that the value of the options depends on the competitive interactions between firms. While standard real option models emphasise that a valuation that includes an 'option to invest' leads companies to invest only at high positive NPVs, the impact of competition can significantly erode the value of the option to wait, and leads to investment at very near the zero NPV threshold (see, for example, Grenadier, 2002).

4.37 Finally, there is an additional mechanism through which an option value could change the NPV (see OXERA, 2000). This is relevant for investment projects in new, dynamic markets with high uncertainty where investing now means having an option to be 'in' the market if and when demand really takes off (or to 'exit' the market if demand does not take off). This option has a value in itself, and increases the NPV of the investment project (as opposed to the application of option values described above, which has the effect of decreasing the NPV).

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[18] This 'real option theory' is based on Dixit and Pindyck (1994).

Other measures of profitability

4.38   As can be seen from Equation 4.2, the practical estimation of the truncated IRR requires data about the cash flows of the activity in question over the relevant time period, and the asset values at the start and end of that period. In some cases, accounting data (from both the statutory reports and management accounts) may be adequate. In other cases, however, it may be difficult to obtain the relevant data or there may be uncertainty about its quality. Under such circumstances, proxy measures may be usefully applied.

4.39   The circumstances under which the relevant data may not be available are discussed in paragraphs 4.66–4.75. The following describes two broad categories of profitability measures, some of which can be used as proxy measures for the IRR and NPV in certain circumstances:

● *accounting ratios* (ROCE, ROE, return on sales, or ROS, and gross margins) are essentially snapshots of a company's performance at particular points in time, and can be obtained from accounting reports, and

● *market valuations* (the Tobin's q, the market-to-book ratio and total returns to shareholders, TRS) are based on investors' expectations of future returns.

4.40   Besides these, other profitability measures sometimes used or proposed for competition policy analysis include the cash flow return on investment, economic value added, and the certainty-equivalent accounting rate of return.[19] These are not discussed further in this paper.

4.41   Proxy measures can have some advantages over the IRR or the NPV. First, they are often easier and more convenient to obtain than the IRR. Second, there are certain circumstances under which it would be difficult to estimate the IRR due to imperfect information (discussed in paragraphs 4.66–4.75). In such cases, the application of the proxy measures is useful, but only to the extent that they do not significantly and systematically diverge from the IRR; and that they provide additional information about a company's profitability where it is not possible to

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[19] The cash flow return on investment was introduced by Madden (1999). Economic value added was introduced by the company Stern Stewart (see Bennett Stewart III, 1999). The certainty-equivalent accounting rate of return was proposed in Graham and Steele (1997).

obtain reliable estimates of the IRR.[20] As explained in Box 4.3 and paragraphs 4.42–4.44, not all profitability measures discussed here satisfy both these conditions. Specifically, the ROCE and the ROE will not always satisfy both these conditions.

RETURN ON CAPITAL EMPLOYED

4.42   The return on capital employed (ROCE) is a commonly used accounting measure of profitability, and is calculated as follows:[21]

$$ROCE_t = \frac{EBIT_t}{A_t} \qquad \text{(Equation 4.5)}$$

where A_t is total capital employed in period t.

4.43   Although ROCE is a widely used indicator of profitability, the ROCE for any year can give results that are significantly different from the IRR. This is primarily because ROCE is highly sensitive to the specific underlying accounting principles, while the IRR is much less so. In particular, the IRR is calculated from actual cash inflows and outflows each year. ROCE diverges from cash inflows and outflows because of the spread of investment costs over a large number of periods (through depreciation) and because of the accounting principles of recognition and accruals (further discussed in Part III).

4.44   A divergence between the ROCE and the IRR will be greater when there are substantial fluctuations in the asset values during the period under assessment. Such fluctuations affect each (annual) ROCE estimate, but only the opening and closing asset values affect the IRR; the IRR is not affected by changes in asset values within the period (see also Box 4.3).

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[20] For a discussion on the biases between the accounting rates of profits and the IRR, see, for example, Franks and Hodges (1996).

[21] In principle, ROCE can be calculated based on pre- or post-tax earnings. Using pre-tax earnings provides a measure of total returns to capital employed, including those that are apportioned to equity-holders, debt-holders and government. Using post-tax earnings would provide a measure of returns to equity- and debt-holders only.

BOX 4.3 – USE OF ROCE IN PROFITABILITY ASSESSMENTS

As discussed in Box 4.1, there has been a long debate about the usefulness of accounting rates of profit, such as ROCE and ROE, as proxies of the IRR. As shown by Fisher and McGowan (1983), the conditions under which the ROCE for a particular year would equal the IRR are very strict and unlikely to hold in practice. In particular, ROCE must be constant over the entire lifespan of an investment; the mix of investments must remain constant over the lifespan of the activity; and the ROCE (and the IRR) must equal the growth rate of the activity.

In general, the individual ROCE estimates tend not to equal the IRR of the period. The ROCE is particularly affected by accruals (see Part III), by the choice of depreciation schedules and by uncertainties in asset values (perhaps more so than the IRR). Accruals can cause a significant wedge between actual cash inflows and outflows in a period and the costs and revenues (and hence profit levels) assigned to that period. The choice of depreciation schedule affects both the profit levels in the numerator of the ROCE calculation and the asset values in the denominator. By contrast, the IRR is estimated using actual cash flows, which are not affected by accruals or depreciation.

With regard to asset values, any errors in valuation would affect the ROCE in each period. The IRR, however, is estimated using asset values at the start and end of the period in question only. Estimates of the IRR are relatively more dependent on cash flows than on asset values, as compared to the ROCE. Hence, the effects of any errors in asset valuation, for example, those arising from valuing intangibles (see Chapter 5), may be less severe than in the case of the ROCE.

Nevertheless, the average ROCE over the period in question may be used as a proxy for the IRR if each of the following conditions is met:

● the correct asset valuation is used (i.e. based on the value-to-the-owner principle)

● the accounts are fully articulated such that all changes in the book value of assets flow through the profit and loss account (i.e. the clean surplus relation holds, see paragraph 13.17)

● the annual ROCE estimates are used to calculate the weighted average ROCE using Kay's formula to obtain the IRR (see Box 4.1).

Under these conditions, there is a direct correspondence between the ROCE and the IRR using the value-to-the-owner rule over truncated periods (i.e. this weighted average ROCE is in fact the IRR). However, if the information is available to estimate the IRR using the ROCE in this manner, this implies that the IRR can also be estimated directly using cash flow data. In this sense, the ROCE does not provide useful **additional** information to the IRR methodology.

RETURN ON EQUITY

4.45 ROCE can be decomposed into various components which themselves are sometimes used as measures of the profitability of an activity. In particular, EBIT can be decomposed into net earnings after taxes (Π), interest payments (I), and tax (T), while capital employed (A) can be decomposed into equity- and debt-funded capital (E and D, respectively) — see also Part III. ROCE can therefore be re-expressed as follows:

$$ROCE = \left(\frac{\Pi}{E} \times \frac{E}{A}\right) + \left(\frac{I}{D} \times \frac{D}{A}\right) + \frac{T}{A} = \left(ROE \times \frac{E}{A}\right) + \left(\frac{I}{D} \times \frac{D}{A}\right) + \frac{T}{A} \quad \text{(Equation 4.6)}$$

where ROE is the return on equity (i.e. Π divided by E), another measure of profitability. The relation between ROCE and ROE is shown in Figure 4.1.

FIGURE 4.1 – ROCE AND THE ROE
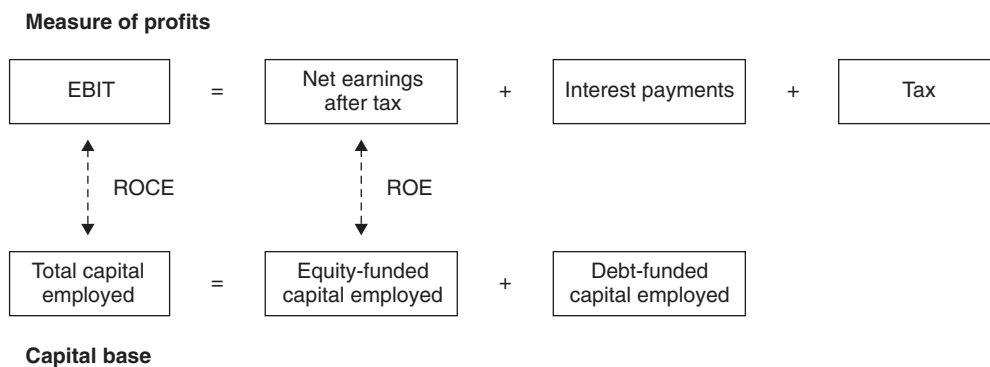
4.46 When estimating the ROE, consideration must be given to preference shares, if any, in the company (see also Part III of this paper). Depending on the particular form of preference shares, they may be classified as either equity or debt to the company. If, for example, the preference shares have guaranteed rights to a fixed dividend, this would mean that the shares are, in nature, more similar to bonds (which contain entitlements to fixed returns) than ordinary shares. In this case, the preference shares should be considered as more akin to debt than equity capital. The particular terms in preference shares can differ widely; hence, each case should be considered individually.

4.47 Finally, the numerator — earnings after tax — diverges from the actual cash flows for the same reasons as the numerator in the ROCE discussed above — i.e. depreciation and accruals. Consequently, similar to the ROCE, the ROE can diverge from the IRR.

RETURN ON SALES

4.48   ROCE can also be re-expressed as follows:

$$ROCE = \frac{EBIT}{Q} \times \frac{Q}{A} = ROS \times \frac{Q}{A} \qquad \text{(Equation 4.7)}$$

where Q is sales (turnover) and A is total capital employed. ROS (the ratio of earnings to sales) is another measure of profitability, which essentially measures how profitable an activity's sales are from an operating perspective.

4.49   As can be seen from Equation 4.7, the ROS measure eliminates the need to estimate the total capital employed. Hence, while its conceptual foundations may be weaker than those of the IRR or the NPV, given that there is no direct link between the ROS and a benchmark, the ROS has the advantage that it is often easier and more convenient to obtain than the IRR, particularly in cases where it is difficult to estimate the assets employed. For example, in its profitability analysis of BT Yellow Pages, the MMC considered ROCE and ROS (MMC, 1996).[22] It recognised that periodical and book publishers tend to have high ROCEs because they are not capital-intensive activities. Not surprisingly, the company's ROCE was very high — up to 134% in 1994. This could partly be attributed to the fact that only fixed tangible assets are included in the calculation of ROCE; intangible assets, which are likely to be relatively important, have been left out. The MMC therefore also used the ROS, which did not require a valuation of assets.

4.50   When using the ROS as a measure of profitability, results could be cross-checked using implicit asset values, as follows. The first step is to impute an asset value for the company in question. The methods depend in part on the company's particular characteristics. For example, a trading company may have relatively low levels of fixed capital. However, its ability to continue operating depends on its working capital, since it often has to pay its suppliers before it receives payment from its customers. In this context, the required working capital can be treated as part of its assets and the implicit asset value could be estimated using, for

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[22] The assessment was carried out over the period 1990–95. In this particular case, BT Yellow Pages, with an average ROS of 36.9%, was found to be making very high profits. The MMC report recommended that it be subject to a price control.

example, option pricing techniques. Such estimations may not always coincide with the amount of working capital that the business actually has at any particular point in time.

4.51   For other companies, the implicit asset value could be imputed using the Tobin's q of similar comparator companies operating in competitive markets (see paragraphs 4.56–4.62). Multiplying the Tobin's q of such comparators with the company's book value of assets would provide an estimate of its implicit asset value.

4.52   Having imputed the implicit asset value, the competition authority can then apply the company's cost of capital to the asset value to obtain the level of operating profits that would be made if the company were making normal (non-excessive) rates of return. This imputed level of returns can then be compared with the company's actual level of operating profits. If it were making normal returns, its ROS should not be significantly in excess of the ROS of its comparators; and its imputed and actual level of operating profits should be roughly the same. Conversely, if the company were making excessive returns, both its ROS and actual operating profits should be higher than comparator companies' ROS and imputed operating profits respectively. In this way, the results of the assessment using the ROS as a proxy can be cross-checked using implicit asset values.

GROSS MARGINS

4.53   Another proxy measure which is closely related to the ROS is gross margins, which can be obtained from the decomposition of ROS as follows:

$$ROS \ = \ \frac{EBIT}{Q} \ = \ \left(\frac{Q - \text{cost of goods sold}}{Q} \right) - \left(\frac{\text{other costs}}{Q} \right)$$

$$= \ \text{Gross margins} - \left(\frac{\text{Other costs}}{Q} \right) \qquad \text{(Equation 4.8)}$$

where Q is sales; the cost of goods sold usually includes direct costs such as raw materials or the wholesale costs of the goods; and other costs include overheads such as selling, and general and administrative expenses. Different companies may include different items in the category of 'cost of goods sold' in their

accounts. Hence, before making comparisons of gross margins across companies, the competition authority should check to ensure that the classification is consistent.

4.54   The relationship between ROCE, ROS and gross margins is shown in Figure 4.2.

FIGURE 4.2 – RELATIONSHIP BETWEEN THE ROCE, ROE, ROS
                    AND GROSS MARGIN
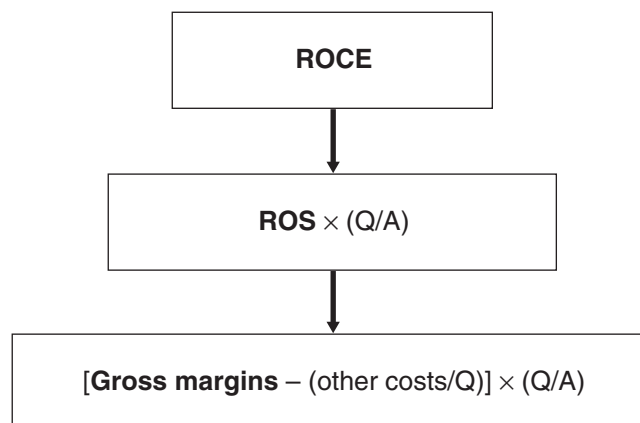
Note: Q = turnover; A = assets employed

4.55   Gross margins may be a useful indicator when it is difficult to allocate overheads between different activities of a company (this issue is further discussed in Chapter 6). However, when gross margins are used for a profitability assessment, it is important that they are compared against the appropriate benchmark — i.e. gross margins of comparator companies that have a roughly similar cost structure in terms of the relative importance of direct and common costs.

THE TOBIN'S q AND THE MARKET-TO-BOOK RATIO

4.56   The Tobin's q is a market-based indicator of profitability. Market-based indicators essentially use valuations provided by the stock market. They are based on the assumption that stock markets operate in accordance with rational-pricing models which suggest that the higher the expected stream of future returns, the higher the market valuation of the business. In this way, the indicator provides information about the underlying returns that a company is expected to make — i.e. it provides a proxy for future profitability. The Tobin's q is the market value of a company's debt and equity, divided by the replacement value of the assets — specifically, the MEA value (see Tobin, 1969):

$$\text{Tobin's q} = \frac{\text{Market value of assets}}{\text{MEA value}} \qquad \text{(Equation 4.9)}$$

4.57 A closely related measure is the market-to-book ratio. This is the ratio of the market value of a company to the book value of its common stock (i.e. equity):

$$\text{Market-to-book ratio} = \frac{\text{Market value of assets}}{\text{Book value of equity}} \qquad \text{(Equation 4.10)}$$

4.58 In estimating the Tobin's q, both equity- and debt-funded assets should be included and valued on a market basis. The market valuation of equity for listed companies can be obtained relatively easily, by multiplying the current share price by the number of shares (i.e. market capitalisation). Equity market capitalisation can fluctuate considerably due to share-price movements, so it may be appropriate to measure market value as the average value in the year. However, the market value of debt is less easy to obtain because it is not known for many debt securities (e.g. bank loans and privately placed debt). In practice, therefore, debt is often measured at book value and only equity is measured at market value.

4.59 In theory, firms have an incentive to invest when the Tobin's q is greater than 1 (i.e. when the value generated by the capital equipment is higher than the cost of replacing it) and will stop investment only when the ratio is less than 1 (i.e. when the value generated by the equipment is lower than its MEA value). When the ratio is less than 1, it may be cheaper to acquire assets through a takeover than to buy new ones. Based on this, if markets are competitive, the ratio of the industry should approximate 1.

4.60 The Tobin's q is only available at the level of the entire listed company. This can pose a problem for a competition authority, which often faces the task of assessing profitability of particular lines of business within a company. In some cases, however, the Tobin's q of a particular line of business can be estimated. Consider, for example, a listed company with two activities, electricity and gas distribution. The competition authority is interested in the company's electricity activities only. Accounting reports would contain separate book asset values for the two lines of business. In order to estimate the Tobin's q for the electricity business only, the competition authority could:

- identify other listed companies that operate a gas distribution business only and obtain their Tobin's q

- apply the Tobin's q of these other companies to the book value of gas assets of the company in question. This gives the imputed Tobin's q of the gas distribution business of the company

- deduct the imputed market value of the gas distribution business from the total market value of the company. The remainder is the imputed market value of the electricity distribution business, or

- divide the imputed market value of the electricity distribution business to the book value of assets to obtain the imputed Tobin's q for the electricity distribution business.

A similar estimation can be carried out for the market-to-book ratio using equity assets only.

4.61 However, there are a number of potential issues that arise when using market valuations. First, these valuations rely on the assumption of rational, forward-looking stock markets. However, the market may not always be rational and may, for example, exhibit 'herd-like' behaviour, where traders follow the actions of each other rather than making decisions on economic fundamentals. This can lead to over- and under-valuation of companies at any specific point in time.

4.62 In addition, company valuations are affected by factors such as takeover bids, announcements made by the firm, and changes in management, which may not be directly related to realistic expectations of future profitability. Consequently, it is common to see short-term fluctuations in companies' market valuations. It is therefore important to consider company valuations over a period of time in order to eliminate the effects of such fluctuations.

TOTAL RETURNS TO SHAREHOLDERS

4.63 Another market-based indicator is the TRS, which measures the wealth generated by that activity to shareholders over a period of time. The TRS is the sum of dividends and share-price appreciation over that period. Similar to the Tobin's q, the TRS can be useful for assessing expected future profitability.

4.64 The rationale for using TRS as a proxy measure of profitability is as follows. Returns from a company are either paid as dividends to shareholders or

reinvested in the activity. Reinvestments are expected to yield future returns. The market valuation of these expected returns would be reflected in changes in the share price. Hence, the sum of both the dividend payouts and share-price appreciation reflects the current and expected future returns from the activity.

4.65 TRS estimates can be obtained from financial data providers, such as Thomson Financial Datastream, Reuters and Bloomberg. Datastream, for example, contains a return index for individual equities. This index shows a theoretical growth in value of a shareholding over a specified period, assuming that dividends are reinvested to purchase additional shares in the company's equity at the closing price applicable on the ex-dividend date.

Implications for competition policy: application of the IRR and proxy measures

4.66 The relevant measure of profitability for the purposes of a competition analysis is the IRR (or the NPV) of the activity. As discussed above, the theoretical literature has shown that it is possible to estimate a truncated IRR using accounting data, which can provide useful information on profitability over the period in question. Where a profitability assessment is carried out in a competition analysis, therefore, the IRR should be the profit measure used, to the extent that its estimation is feasible.

4.67 Estimating the IRR requires reliable data on cash flows and opening and closing asset values. The IRR is therefore relatively easy to implement where such data is available over a sufficiently long period and where there are robust estimates of MEA values. This is more likely to be the case when assessing past performance in industries that are established, with long historical datasets, such that MEA values are estimated with some degree of accuracy. Sectors that fall into this category may include, for example, manufacturing, retailing, utilities, banking, pharmaceuticals and telecommunications.

4.68 Where reliable data on cash flows and MEA values can be obtained, the profitability of a company or sector should be assessed using the IRR. The estimated IRR should then be benchmarked against the WACC and the IRR of comparator companies. While uncertainties may arise — for example, in asset valuation or the allocation of costs and revenues to the relevant line of business

— the competition authority can take any such uncertainties into account by carrying out sensitivity tests on the estimated IRR (see paragraphs 5.33–5.45).

4.69 In other cases, however, good data may not be available; for example because of a lack of reliable data on cash flows, reliable estimates of MEA values, or both. These three situations are described below, together with the implications for the application of the IRR and its proxy measures.

4.70 *Lack of reliable data on cash flows* — there are two main reasons why reliable cash flow data may not be available.

● One reason is if the product or business in question is relatively new. Calculating the IRR over the (short) historical period would not provide useful information, and hence forecast cash flow data is required. Such forecasts are inherently uncertain. The companies themselves are probably best placed to make forecasts, but they may have incentives to bias these forecasts upwards if the information is prepared for investors, or downwards if the information is prepared for competition authorities.[23]

● The second reason for the lack of reliable cash flow data is if the competition authority is interested in the profitability of a company's activities in a particular line of business only. Companies are commonly involved in multiple activities and publicly available accounting reports normally provide data primarily at the company or group level, with only limited disaggregated information. The authority would therefore have to obtain more disaggregated information and seek to allocate the costs and revenues of the company across the different lines of business. To the extent that disaggregated data is poor and the cost- and revenue-allocation exercise is difficult (see Chapter 6), the resulting cash flow data may be poor.

4.71 Where cash flow data is not reliable, obtaining a robust and meaningful estimate of the IRR may be more difficult. The competition authority may therefore choose to rely on proxy measures in addition to the IRR, particularly the ROS, gross margins and market valuations. ROS and gross margins can be useful indicators of past performance. If the source of the data problem is the difficulties of cost and revenue allocation then ROS is useful, to the extent that costs and revenues can be reliably allocated; ROS is not affected by the allocation of capital

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[23] This is why it is generally useful for competition authorities to seek to obtain information that companies have prepared for investors as well, as a cross-check on other information provided to the authority. Analyst reports may also provide relevant information on forecasts.

employed (although it will be affected by depreciation profiles). Gross margins are more robust indicators than the ROS where overheads are difficult to allocate. Market valuations can be useful indicators of expected future profitability, and hence can provide additional information where forecast data is required.

4.72 *Lack of reliable estimates of MEA values* — the second possibility is that it may prove difficult to obtain a robust estimate of the MEA values (see discussion in Chapter 5). The possible range of asset values may be very wide. Typical sectors where this may be the case include those characterised by rapid technological change, such as information technology. Sectors with high levels of intangible assets, relative to fixed assets, that are difficult to value could also fall into this category — for example, professional services firms. A relatively low fixed capital intensity often (but not always) goes together with high intangibles. In some cases, it is possible to estimate the true MEA value, even if the fixed assets are low, by using other available indicators. For example, the MEA value of trading companies, which have low fixed assets, can often be estimated on the basis of their working capital, as discussed in paragraph 4.50.

4.73 Where MEA values are difficult to determine, it will also be difficult to obtain a robust and meaningful estimate of the IRR. Again, the competition authority may choose to rely on the ROS, gross margins and market valuations in addition to (or instead of) the IRR. In this case, the Tobin's q has an additional use — the Tobin's q of comparator companies operating in competitive markets can provide useful information to assess the MEA value of the company in question.

4.74 *Lack of reliable cash flow data and MEA values* — finally, the third possibility is where neither reliable cash flow data nor robust MEA values are available. In this case, the competition authority is unlikely to obtain any meaningful estimates for the IRR or the proxy measures. A profitability assessment under such circumstances may not yield useful results.

4.75 The application of the IRR and proxy measures under various scenarios of data availability is illustrated in Figure 4.3. Table 4.2 summarises the key features of the different profitability measures discussed in this chapter.

FIGURE 4.3 – APPLICATION OF THE IRR AND PROXY MEASURES UNDER VARIOUS SCENARIOS

Data required to estimate IRR:
• cash flow data over sufficiently long period
• MEA values

Data availability

| Good cash flow and MEA data | Poor cash flow data | Poor MEA data | Poor cash flow and MEA data |

Industry or product-line characteristics

| Likely to hold in established industries with historical data over long periods (e.g. retailing, manufacturing, utilities, pharmaceuticals and banks); may not hold for new product lines in established industries | In new businesses in dynamic stage of growth without much historical data; where forecasts are required; or where cost and revenue allocation is difficult | In industries with high intangibles and low fixed assets (e.g. trading companies and knowledge-based sectors); or where it is not possible to allocate capital between lines of business | |

Profitability measure

| Estimate IRR | Estimate IRR and proxies (ROS, gross margins or market valuations) | Estimate ROS, gross margins or market valuations | Difficult to obtain meaningful estimates of IRR or proxy measures |

Benchmark

| Benchmark against WACC and IRR of comparator companies | Benchmark IRR against WACC and IRR of comparator companies; benchmark proxies against corresponding measures of comparator companies | Benchmark against corresponding measures of comparator companies | Profitability assessment not likely to provide meaningful results |

TABLE 4.2 – SUMMARY OF THE FEATURES OF THE IRR AND OTHER MEASURES OF PROFITABILITY

Measure	Definition	Comments
IRR (r)	$A_0 = \Sigma(C_t/(1 + r)^t)$	Theoretically correct measure of profitability. Should be used where possible. Key area of difficulty is the valuation of opening and closing assets.
NPV	$NPV = -A_0 + \Sigma(C_t/(1 + d)^t)$	Correct measure of profitability, together with the IRR. The IRR has the advantage that it is expressed as a percentage and therefore easier to benchmark, whereas the NPV gives an absolute amount.
ROCE or ROE	EBIT/A or EBIT/E	Does not mitigate any practical shortcomings of estimating the IRR. In addition, it is more sensitive than the IRR to accruals and to choice of depreciation schedules, and more susceptible to uncertainties in the measurement of, and fluctuations in, asset values. Does not provide additional information in cases where the IRR is difficult to estimate. However, under certain circumstances (see Box 4.3), a weighted average ROCE calculated using Kay's formula can give the same results as the IRR.
ROS	EBIT/Q	No theoretical foundation. Nonetheless, this eliminates the need to estimate asset values and may therefore be useful when the IRR is very sensitive to the range of asset values — for example, when there are substantial intangible assets. The ROS can therefore be used in industries where few fixed (tangible) assets are employed, such as trading companies or knowledge-based sectors.
Gross margins	(Q – cost of goods sold)/Q	Closely related to the ROS. Useful when cost allocation between lines of businesses is difficult. It can be applied when the IRR is difficult to estimate. May also be useful in cases of predation (excessively low profits). Different companies may have different definitions of 'cost of goods sold'. Data across companies should therefore be checked for consistency.

(cont'd)

| Tobin's q | (market value of assets)/(MEA value) | Provides a measure of forward-looking profitability. Vulnerable to fluctuations in stock market. Not available for unlisted companies, or for lines of businesses of listed companies. The Tobin's q of comparator companies is particularly useful to provide an estimate of MEA value of the company in question. |
| TRS | Dividends + share-price appreciation | Provides a measure of forward-looking profitability. Vulnerable to fluctuations in stock market. Not available for unlisted companies, or for lines of business of listed companies. |

5 ASSET VALUATION

5.1 Assets form the income-generating capacity of a business. Conceptually, they include any part of an activity that is generating, or has the potential to generate, income streams. Assets can take various forms. They can be fixed and tangible, such as land and buildings, plant and machinery, fixtures, fittings and tools, vehicles, and office and computer equipment. Alternatively, they can be intangible, such as knowledge, skills in the workforce, patent rights and customer goodwill. All business activities require assets, even if they are intangible; without assets, by definition, an activity could not generate a stream of positive returns.

5.2 The truncated IRR methodology described in Chapter 4 requires the valuation of assets employed in the activity at the start and end of the truncated period. As highlighted in Figure 4.3, without robust estimates of asset values, it would be difficult to obtain meaningful estimates of the IRR. Indeed, the discussion in paragraphs 4.66–4.75 and Figure 4.3 alluded to the conditions under which it may be difficult to obtain robust estimates of MEA values — for example, where there is rapid technological change or high levels of intangible assets.

5.3 This chapter turns to asset valuation. Paragraphs 5.6–5.8 describe briefly various approaches to asset valuation. Following the discussion in Chapters 3 and 4, the appropriate valuation for profitability assessments in competition analyses is the MEA basis. The most readily available estimates of asset values are from audited accounts. However, these normally provide asset values based on historical costs, which may bear no resemblance to the MEA value. Furthermore, such book values of assets may omit intangible assets, which can sometimes be a substantial part of a company's capital base. Paragraphs 5.9–5.18 therefore describe various techniques that could be used to cross-check the validity of the book value of assets and, if necessary, to adjust these values to obtain an estimate of the MEA value. Paragraphs 5.19–5.32 consider the question of identification and valuation of intangible assets.

5.4 The adjustments described in paragraphs 5.9–5.32 will attempt to provide an estimate of the MEA value. The question arises, however, as to how accurate and robust these estimates are, and, to the extent that the estimated MEA value is still erroneous, how the estimated IRR would be affected by such uncertainties.

Paragraphs 5.33–5.45 consider the sensitivity of the estimated IRR to potential uncertainties in asset valuation and describe an approach that can be used to test the extent of the sensitivity. Under some conditions, the estimated IRR is robust to potential uncertainties in asset valuation. In this case, even if the MEA value is not estimated with a great degree of accuracy, the IRR methodology can still be applied to the profitability assessment. If, however, the potential uncertainties are so large — i.e. the range of estimated MEA values is wide — that no meaningful estimate of the IRR can be obtained, the competition authority may well need to consider using proxy measures. In extreme cases, uncertainties in asset valuation may imply that a profitability assessment cannot be meaningfully applied.[24]

5.5   Finally, paragraphs 5.46–5.47 conclude with a summary of the recommended approach for a competition authority in applying the IRR methodology and other profitability measures.

Approaches to asset valuation

5.6   Asset valuation can be based on various approaches. The approach commonly used in accounts is the historical-cost approach, which values assets based on the original purchase cost, less accumulated depreciation. Alternatively, assets could be valued according to the replacement-cost approach, which asks the question: how much would this asset cost if it were purchased today? In other words, it is the cost that would be incurred if the assets were replaced today. There are two types of replacement cost:

- the cost of replacing the assets with new ones that are of exactly the same form, and

- the MEA valuation, which is the cost of replacing the existing assets with new ones that, even though they are not exactly the same in form, are able to produce the same output or provide the same set of services (see paragraphs 4.4–4.37). This approach poses the question: if the same 'output' were to be produced by a modern asset using the best available methodology, what is the cost of providing that asset? Effectively, this approach allows technical efficiency to be built into the valuation as the company is not forced to replace like with like and so is not barred from using the latest technology.[25]

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[24] Both these scenarios relate to the third and fourth branches in Figure 4.3.

[25] A further distinction is possible. The MEA could either be applied to the existing configuration of assets (in telecoms, known as the 'scorched node' approach), or, if possible, to a more optimal configuration of assets ('scorched earth'). The second approach involves a greater degree of engineering judgement and discretion.

5.7 Assets could also be valued according to the PV of the future earnings that the asset is expected to generate under continued use, or according to their net realisable (disposal) value (see paragraphs 4.12–4.22). A related approach is one based on 'fair value', which is the amount at which an asset could be exchanged in an arm's-length transaction between informed and willing parties. In the UK companies are allowed to value assets based on the 'fair value' approach (see also Part III).

5.8 Different approaches would give different asset values and, consequently, different profit estimates. It is therefore important to establish the appropriate asset valuation approach. This in turn depends on the particular aim of the profitability assessment. As noted in Chapter 4, for the purposes of a competition analysis, the MEA approach is an appropriate starting point for asset valuation.

Estimating the MEA value

5.9 The question arises as to how MEA estimations can be obtained. As already noted, where there is rapid technological change or high levels of intangibles or long-lived assets, the historical-cost values used in accounts may bear little resemblance to the MEA value. In such cases, adjustments need to be made or alternative estimates may have to be obtained from other sources, although with varying degrees of difficulty.

5.10 In practice, the audited accounts should be taken as a starting point — the main advantage of using accounts data is that it is objective and audited, and based on actual data rather than estimates. Under certain circumstances, the historical costs might not be too different from the concept of MEA value. Historical costs would be close to the MEA value where:

● assets are not subject to significant technological change

● assets have not seen significant price inflation or deflation

● intangible assets are not significant.

5.11 In particular cases where at least one of these conditions is not met, the historical costs should be cross-checked by comparing them with estimates based on a number of other methods, including modified historical costs, industry benchmarks, and bottom-up cost models. Each is discussed in paragraphs 5.13–5.18.

5.12 In some cases, such adjustments will be sufficient to obtain reasonably good estimates of the MEA value. In others, however, the competition authority may

have to conclude that the MEA estimates (even after the adjustments suggested here) are not sufficiently robust to allow a meaningful application of the IRR methodology (see the third and fourth branches in Figure 4.3).

MODIFIED HISTORICAL-COST ACCOUNTING

5.13   The modified HCA method adjusts the historical cost of assets to take into account the effect of price changes. Two types of revaluation can occur, using either a general price index (e.g. the retail price index, or RPI), or specific price indices that relate most closely to the assets in question.

5.14   The advantage of using the RPI is its simplicity, even though it may not bear any discernible relation to the specific assets employed in the business. A modified HCA approach using specific indices allows for the divergence of price movements for specific assets. Different types of asset could be revalued separately using asset-specific price indices. The Office of National Statistics (ONS) publishes specific price indices for certain categories of sector and asset, although there may be a degree of judgement involved in the choice of price indices as the ONS statistics would not necessarily match the assets being investigated.

MARKET VALUATIONS AND INDUSTRY BENCHMARKS

5.15   A second way of modifying historical costs is to use a range of other companies in the same or similar industries as a benchmark. The comparator companies should operate in reasonable competitive markets. As explained in paragraphs 4.51 and 4.56–4.62, if markets were competitive, the market value of assets in the industry would, in principle, approximate the replacement value. This would mean that, for example, the Tobin's q of companies in the same or similar activities in the same country or abroad could be taken as a proxy for the adjustment of historical costs to MEA values.

5.16   An industry benchmark can be applied as follows. First, the appropriate comparator companies should be chosen. As market valuations are available for entire companies only, activities of the chosen companies must primarily be in the same business as that under investigation. Otherwise, the valuation may be clouded by the value of assets in unrelated activities. Next, the Tobin's q of each of these comparator companies is obtained. Finally, the Tobin's q is then applied to the book value of assets of the company in question. The result is an imputed MEA asset valuation.

5.17   There is a critical limitation to using the market valuation of the company under investigation itself to obtain its MEA values. In principle, market valuations capture the market's expectations of future earnings of the company/activity and would reflect the PV of such earnings. To the extent that these expected future earnings comprise monopoly profits, using the Tobin's q would inflate the estimated value of the asset above the MEA value. Hence, the Tobin's q of a company under investigation should not be used as a basis for estimating its MEA value of assets.

BOTTOM-UP COST MODELLING

5.18   Alternatively, the competition authority could undertake a detailed bottom-up cost modelling approach (i.e. an engineering approach). This would require a detailed study of the activities in question so as to gauge the types of MEA required and to provide an estimate of their costs. This method can, but does not always, give a more precise estimate of the MEA value. There may be different views as to which of the existing technologies is the most suitable and should form the basis of the MEA value. Furthermore, bottom-up modelling can be time-consuming and costly and, hence, depending on the relative importance overall to the investigation in question, may not be practical. An example can be found in the telecoms sector, where Oftel has used a bottom-up cost model of fixed-line telephone networks for the regulation of interconnection charges (see Oftel, 1997). Bottom-up cost modelling is also discussed in paragraphs 6.50–6.51.

Intangible assets

5.19   As already noted, the assets of a business can be either tangible or intangible. While tangible assets are more familiar and easily identified, intangible assets can be just as, if not more, important to a business. Intangible assets may be accumulated at substantial cost and, if ignored, can lead to an overestimate of the rate of return of that business.

5.20   In general, accounting standards adopt a cautious view in the measurement of assets: if there is great uncertainty as to whether an asset exists or has value, the asset will be omitted from the report or valued conservatively. Traditional accounting systems therefore often do not reflect the underlying economic value of intangible assets. Under the UK accounting principles, the only categories of intangible asset that normally appear on the firm's balance sheet are the following (see also Part III):

- *rights* — for example, licences, concessions, patents and trademarks

- *purchased goodwill* — defined as the difference between the purchase value of an acquired entity and the aggregate of the fair values of that entity's identifiable assets and liabilities (see also Box 5.1)[26]

- *capitalised research and development (R&D) costs* — which are included only under certain circumstances. According to the UK accounting principles, R&D may be capitalised to the extent that its recovery can reasonably be regarded as assured, but should normally be written off in the year in which it is incurred.

BOX 5.1 – WHAT IS GOODWILL?

Although there is no universal definition of goodwill, there are three generally accepted principal components of goodwill (see Reilly and Schweihs, 1998). The first component is the going-concern-value element—i.e. the value of the company exceeds the sum of its components. The fact that all the elements of a business enterprise are in such a configuration that the business can produce products or services creates value. The second component of goodwill is the existence of excess economic income—i.e. income that is greater than the company's cost of capital. The third component is the expectation of future events that are directly related to the current operation of the business. Investors assign a goodwill value to a business if they expect the NPV of the income associated with the future events to be positive. Examples are expectations of future mergers or acquisitions, and future products or services.

From an economic point of view, goodwill is the capitalisation of all of the economic income from a company that cannot be associated with any other (tangible or intangible) assets of the company. Goodwill is only recognised in accounting when a business is purchased. The amount attributed to it is the difference between the value of the whole business and the net amount attributed to recognised assets less liabilities—i.e. it is a balancing figure.

A high value of goodwill could indicate the presence of certain intangibles that have not been identified. However, goodwill is normally determined by an assessment of the NPV of the company's future net cash flows and could therefore be a reflection of the expectation that the company will be able to make excessive profits in future—i.e. it is a premium for future cash flows. In other words, including goodwill in the asset valuation may not be appropriate in a profitability analysis. In valuing the assets of the company under investigation, any goodwill on its balance sheets should normally be excluded unless it can be attributed to specific assets and associated with specific costs incurred.

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[26] Until the end of 1998, in the UK, the normal way of dealing with purchased goodwill was to write it off immediately against reserves. Under current rules implemented in 1998, purchased goodwill and intangible assets must be capitalised and either amortised over their useful economic lives, or, where the useful economic lives exceed 20 years or they are not amortised, their value must be reviewed annually and must not be recorded in the balance sheet at more than their recoverable amount — i.e. the higher of the NRV and the PV of cash flows that the asset is expected to generate. These rules are FRS 10, 'Goodwill and Intangible Assets', and FRS 11, 'Impairment of Fixed Assets and Goodwill'. See Part III for an explanation of UK accounting principles, including the Financial Reporting Standards (FRSs).

5.21 The inclusion and treatment of intangibles in the balance sheet under accounting rules are therefore not always satisfactory from an economic perspective. The range of intangibles allowed under accounting rules is limited. Human resources, intellectual property, brand value and customer networks are examples of items that may be considered as intangible assets but are excluded under the accounting rules. While they may be incorporated as part of purchased goodwill, this would not become obvious unless the business is bought or sold.

5.22 A profitability assessment therefore needs to consider the scope of intangible assets, beyond what is provided for in the accounting reports. The following steps can be distinguished:

- identifying intangible assets

- estimating the lifetime of the intangible assets, and

- valuing intangible assets.

These are examined in paragraphs 5.23–5.31.

IDENTIFYING INTANGIBLE ASSETS

5.23 There are numerous legal, accounting, or taxation-related definitions of the term intangible asset, although these are usually purpose-specific. The economic rationale for defining any item (tangible or intangible) as an asset is its potential for generating future profits. From an economic perspective, therefore, intangible assets to a company can be defined as non-physical sources of probable future economic benefits to a company that have been acquired, purchased or developed internally at identifiable costs, have a finite life, have market value outside that specific company, and are owned or controlled by the company.

5.24 This definition is reflected in the criteria used by the Competition Commission (2002*a*) when considering intangibles in a recent inquiry into banking services (see also Box 5.3). Specifically, the Commission used the following principles when considering whether certain types of what it called revenue costs should be capitalised:

(a)   whether the expenditure on any given intangibles should be capitalized will depend on the nature of the specific intangible identified and the context; and

(b)   if the revenue cost of a specific identified intangible is to be capitalized for the purposes of our inquiry, it must meet three conditions:

   (i)   it must comprise a cost incurred now, primarily to obtain earnings in the future;

   (ii)   this cost must be additional to those necessarily incurred at the time in running the business; and

   (iii)   it must be identifiable as creating such an asset separate from any that arises from the general running of the business.

5.25   The application of these principles may be clear for some categories of intangibles, such as patents, trademarks and copyrights, but may be less straightforward in the case of other categories, such as marketing- and customer-related intangible assets, as well as assets related to the workforce. For example, should advertising and marketing expenditure be considered capital expenditure, based on the argument that they bring in customers, which would result in higher earning streams in future? Does staff training increase the income-generating capacity of a business — in which case it could be considered an asset — or does it merely maintain the smooth running of daily operations — in which case it would not be an intangible asset? The classification of such expenditures into assets or operations is not always obvious.

ESTIMATING THE LIFETIME OF AN INTANGIBLE ASSET

5.26   Just like tangible assets, intangible assets possess a certain lifetime, both physically and economically. The physical life extends from the date of the asset's operation to the date of its final destruction. The economic life of an asset is the period over which it can be profitably utilised. The life of assets such as proprietary technology and know-how also depends on technological factors.

5.27   Some types of intangible asset may fit into more than one group of life determinants and in such cases the shortest lifetime should be taken. For example, although the lifetime of a patent may be legally determined to be 20 years, the economic life of the patent may be shorter if, for example, new technological development renders the patent technologically obsolete before the end of the patent protection period.

5.28   There are basically three methods for determining the lifetime of an asset,[27] the choice of which depends on the nature of the asset in question:

- *definite analysis* — for intangible assets such as patents, copyrights, contracts and licences, the lifetime is definite and legally determined. However, as explained above, the lifetime of these assets may be shorter if, for example, new technological development renders the asset technologically obsolete

- *qualitative analysis* — life-cycle analysis is one of the most commonly used qualitative methods for estimating the remaining useful life of intangible assets. For example, this method can be used for estimating the lifetime of a certain technology or the economic life of a patent. Life-cycle analysis incorporates qualitative consideration of future technological and marketplace conditions with quantitative considerations of existing and historical environments, and

- *quantitative analysis* — for certain types of intangible assets (such as customer-related ones), age data is often available on customer or contract renewals. It is then possible to perform quantitative analysis using actuarial techniques to estimate the life characteristics of the assets in question.

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[27] For a more extensive discussion of the concepts and techniques to estimate the lifetime of an asset, see Reilly and Schweihs (1998).

VALUING INTANGIBLE ASSETS

5.29   As discussed above, the economic principles behind profitability assessments in competition policy suggest that the value-to-the-owner approach is the appropriate way of valuing assets. This holds for intangibles as well as tangibles. In cases of excessive profitability, therefore, the intangible assets should be valued on an MEA basis. The same methods of obtaining MEA estimates for fixed assets as discussed in paragraphs 5.9–5.18 also apply.

5.30   If MEA estimates or historical-cost data are not available, the asset values of comparator companies in similar (but competitive) industries could be taken as a benchmark. The Tobin's q of such companies could be applied to the book value of the company under investigation to obtain an estimate of the value of intangible assets. Note that if market valuations of comparators are used to estimate the MEA values, there should be good reason to believe that the comparator companies operate in competitive environments. Market valuations of the company under assessment itself should not be used due to the possibility of circularity problems (see paragraphs 5.15–5.17).

5.31   Finally, if costs are capitalised into intangible assets, these costs have to be excluded from the operational cost base in order to avoid double-counting. Box 5.2 provides a brief description of brand valuation as an example of the problem of valuing intangible assets.

BOX 5.2 – BRAND VALUATION

An established brand can have a value in the sense that a company is worth more with such a brand than without it. However, there are major practical problems in establishing what a brand is worth.[1] In most cases it is difficult, if not impossible, to separate the value of the brand from that of the rest of the business.

The historical-cost approach would involve aggregating the costs of all marketing and R&D expenditure that has been devoted to the brand over a stipulated period. The MEA approach would involve determining the costs required to recreate the level of brand loyalty, consumer and trade awareness, or product recognition currently enjoyed by the brand. It is questionable whether such an analysis is practically possible. One of the major problems with the historical-cost approach is that it is often difficult to identify and allocate all relevant costs to particular brands and/or products. Moreover, there is a risk of double counting, as marketing costs may already have been capitalised for the

estimation of the value of other intangible assets such as the value of the customer base. Determining the lifetime of the brand is also complicated. Similarly, market valuations may not be available because of the thinness of the markets in brands. See Box 5.3 for a discussion on the Competition Commission's treatment of brand value in the inquiry of financial services supplied to small and medium-sized enterprises (SMEs). In this case, the Commission did not allow for the capitalisation of brand value.

Note: [1] For a discussion on accounting for brands, see Barwise et al. (1989).

INTANGIBLE ASSETS: A SUMMARY

5.32 The above discussion can be summarised into a series of practical steps that a competition authority could adopt when considering intangibles. See Figure 5.1.

FIGURE 5.1 – PRACTICAL STEPS IN VALUING INTANGIBLE ASSETS

Identify sources of intangibles
These could include, for example, brand value, skills and human resources, customer goodwill, intellectual property and patents

↓

Identify ways of valuing these assets
Intangible assets could be valued based on the accumulated expenditure incurred (e.g. the amount spent on marketing, staff training, etc.), less any economic depreciation over the economic life of the asset. Adjustments may be required, as the operating costs may overstate the capitalisation value

↓

Ensure that there is no double-counting
Where operating costs are capitalised, they should be excluded from the operational cost base

↓

Identify economic life of the assets
Approaches include definite, qualitative and quantitative analyses. Where assets have reached the end of their economic life, they should be written off. For example, if a staff member was no longer employed, the expenditure incurred in training them should no longer count towards the asset base

↓

Add estimated MEA value of intangible assets to estimated MEA value of fixed assets

BOX 5.3 – TREATMENT OF INTANGIBLES IN COMPETITION COMMISSION INQUIRY
INTO BANKING SERVICES SUPPLIED TO SMES

In its inquiry into banking services supplied to SMEs, the Competition Commission (2002*a*) considered the arguments put forward for categorising the following assets as intangibles: corporate reputation (also referred to as corporate brand); a trained workforce; the bank's customers; and information technology (IT) system development costs. The Commission applied the value-to-the-owner principle (which the Commission referred to as the 'deprival value') and the other principles discussed in paragraphs 5.19–5.32 of this paper.

With regard to corporate reputation or brand, the Commission argued that no capitalisation was necessary. First, the banks had valued the brands on the basis of future earnings, thus including the capitalisation of any excess profits. Second, corporate brands are attached to each bank in its entirety and not specifically to SME services, and could therefore not be allocated to SME services. Third, brand value ultimately derives from the recruitment, training and skills of the workforce, and the marketing and sales activities carried out, which together provide the service and customer recognition thereof. Accordingly, if the costs of such services are capitalised, no further capitalisation relating to brands is necessary.

The Commission concluded that intangible employee-related costs could include both initial and subsequent training costs, as well as recruitment and associated costs. Costs related to informal on-the-job training were only partly included, given the fact that it was considered uncertain whether these costs would meet the primary definition of a capital investment (expenditure now for benefit later). A lifetime for employee-related intangibles of about five years on average was considered reasonable.

With regard to IT system development costs, the Commission allowed software and hardware expenditures to be capitalised. One of the difficult issues was distinguishing between maintenance and capital investment. Another issue was determining the life of IT systems. One bank argued that its software should be regarded as having an indefinite life. The Commission considered this unrealistic, and that the life of IT systems was in the range of 4–5 years.

In terms of the customer base, the Commission adjusted the cost figures (mainly advertising and marketing costs) as submitted by the banks. The capitalisation of certain customer-acquisition expenditures were disallowed for three reasons: the Commission saw some of the expenditure as neutralising the expenditure of other banks, some of the remainder as wasted and some as retaining existing customers rather than attracting new ones.

These three reasons for this disallowance have been questioned by Carsberg (2002), who raised other considerations. On the question of expenditure to neutralise the

expenditure of other banks, Carsberg noted that, although this may be regarded as having no value for the economy as a whole, it is a cost of having competitive markets. An individual bank is (presumably) better off spending the money to neutralise the expenditure of other banks than not spending it and losing business. Carsberg concludes that spending this money is a valid business practice in pursuit of shareholders' interest and can be expected to yield a return for the individual bank concerned. The same applied to expenditure to retain customers.

With regard to the wasted expenditure, Carsberg refers to the debate on the treatment of the costs of oil exploration. Some contributors to the debate have advocated a 'successful efforts' approach—i.e. the costs of abortive exploration should be written off immediately against profits and not capitalised as assets. Others have advocated a 'full costs' approach—capitalising the full costs of the exploration programme. The advocates of this approach argue that, because it is impossible to know in advance with certainty which efforts will be successful, the cost of the entire research programme is necessary to obtain the assets (the productive oil wells) and all should therefore be regarded as creating an asset. Carsberg indicates that he has some sympathy for the full-costs approach in the context of the Commission's investigation. Overall, he considered that the Commission's approach was reasonable and that in any case the points he raised would not have led to a significantly different result.

Sensitivity of the IRR estimate to uncertainties in asset valuation

5.33   Obtaining the MEA value of assets employed is not straightforward. Book values of assets from accounting reports are usually based on historical costs. As explained in paragraphs 5.9–5.18, these book values can be used as a starting point and cross-checked with estimates obtained by using a number of other methods, and if necessary, adjusted accordingly. Furthermore, intangible assets need to be identified and valued as well, as discussed in paragraphs 5.19–5.31.

5.34   Taking these steps, the competition authority obtains an estimate of the MEA value, which is then used to estimate the truncated IRR, as explained in Chapter 4. The estimated IRR can then be compared with the benchmark — the cost of capital and the estimated IRR of comparator companies — to assess whether excessive returns have indeed been made. The estimation of the WACC and the choice of suitable comparator companies are discussed in Chapter 7.

5.35   Paragraphs 5.36–5.45 address the following question: how confident can the competition authority be in drawing conclusions from the estimated IRR in relation to the cost of capital? This is crucial, as there are often reasons to

question the reliability of the estimated IRR, particularly in light of potential errors in estimating the MEA value. If the estimated IRR is robust to potential asset valuation errors, the IRR methodology can be meaningfully implemented (see the first branch of Figure 4.3), barring any other uncertainties and difficulties. If, however, there are large potential errors in estimating the MEA value, it may not be possible to obtain a robust estimate of the IRR. The IRR methodology may therefore not produce meaningful results (see the third and fourth branches of Figure 4.3).

5.36   The objective of paragraphs 5.37–5.39 is to consider the issue of testing the sensitivity of the estimated IRR to uncertainties in asset valuation. The question posed is as follows: if the competition authority had undervalued or overvalued assets by, say 25%, how would this have affected the estimated IRR, in relation to the cost of capital?[28]

IMPACT OF UNCERTAINTIES IN ASSET VALUATION ON THE IRR

5.37   If there are errors in asset valuation, the expression for the IRR in Equation 4.2 can be rewritten as follows:[29]

$$0 = -V_0 + \sum_{t=1}^{t=N}\left(\frac{C_t}{(1+r)^t}\right) + \frac{V_N}{(1+r)^N} - E_0 + \frac{E_N}{(1+r)^N} \qquad \text{(Equation 5.1)}$$

where V_0 and V_N refer to estimated asset values and E_0 and E_N are the errors in the opening and closing asset values. In other words $(V_0 + E_0)$ equals the true opening asset value and $(V_N + E_N)$ equals the true closing asset value.

5.38   As can be seen from Equation 5.1, the errors in asset values would lead to a divergence between the estimated and the true IRR, as reflected in the term $(-E_0 + E_N/(1+r)^N)$. The extent of the divergence depends on the size of this error effect. If, for example, the term $(-E_0 + E_N/(1+r)^N)$ approximates zero, the net

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[28] Similar discussions and analyses on errors in asset valuations can be found Franks and Hodges (1996), Steele (1995) and (2002).
[29] Equation 5.1 is derived as follows. The true opening and closing asset values are denoted as A_0 and A_N. V_0 and V_N denote the estimated opening and closing asset values (e.g. reported book values), while E_0 and E_N are the errors in the estimates of the opening and closing assets. In other words, $A_0 = V_0 + E_0$ and $A_N = V_N + E_N$. Substituting these into Equation 5.2 and rearranging gives $0 = -(V_0 + E_0) + \Sigma(C_t/(1+r)^t) + (V_N + E_N)/(1+r)^N$.

effect of the errors in asset valuation in the IRR estimates can be negligible, even if the individual error terms, E_0 and E_N, were significant. In other words, if:

$$E_0 - \frac{E_N}{(1 + r)^N} = 0 \qquad \text{(Equation 5.2)}$$

the magnitude of error in the opening assets cancels out the error in the closing assets, and therefore these errors do not affect the estimated IRR.

5.39   This is a potentially useful result. Consider, for example, the issue of intangible assets. As has been noted above, there has been substantial debate about the inclusion of intangible assets in profitability assessments (see also Box 5.3). The above result implies that, whether intangible assets are included or not could be immaterial, as long as the (discounted) value of the intangible assets remains relatively constant over the period of assessment. If this condition were to hold, the error in the valuation of the opening assets (due to the omission of the intangibles) would not be significantly different from the equivalent (discounted) errors in the valuation of the closing assets. Hence, the net effect on the IRR of excluding intangible assets would be quite small.[30]

SENSITIVITY TESTING OF THE IRR ESTIMATE

5.40   In practice, however, Equation 5.2 may not hold. Uncertainties in asset valuation will therefore result in some divergence between the estimated and the true IRR. What implications would this have for the ability of the competition authority to draw any firm conclusions from the estimated IRR?

5.41   Even though the exact error levels are not known — otherwise the problem would not arise — the competition authority can test the sensitivity of the IRR estimate to variations in the asset values. The range may be established based on various factors. The competition authority may, for example, be uncertain whether there are indeed intangible assets in the form of staff skills and human resources in a company; and whether that can be approximated based on accumulated expenditure on staff training. The competition authority may therefore consider

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[30] This result is shown by Steele (2002), who provides an assessment of the Competition Commission inquiry into the supply of banking services to SMEs. Whereas the Commission assessed profitability using the ROCE and the ROE (see Table 8.1), Steele offers an alternative analysis based on the IRR methodology and using the Tobin's q to adjust for asset valuation errors for each bank.

both estimated MEA values — with and without the estimated value of staff skills — and consider the accumulated expenditure on staff training as the possible margin of error in asset valuation.

5.42 The Tobin's q of similar comparator companies can be used to derive an estimate of the error that may occur (see paragraphs 5.15–5.17). This adjustment is only meaningful, however, if the comparator companies operate in competitive environments. If the comparator company has market power such that it makes supernormal profits, the market valuation, and consequently the Tobin's q, would be inflated above its MEA value. If not, this could be provide a meaningful adjustment to the estimated IRR.

5.43 Figure 5.2 provides an illustration of the effect of uncertainties in asset valuation on the estimated IRR. Different values of E_0 and E_N are then assumed (for illustrative purposes only). E_0 and E_N could be interpreted, for example, as intangible assets that have been omitted. The percentage difference between the true IRR (r^*) and the estimated IRR (r) (i.e. $(r - r^*)/r^*$) is then calculated. This would provide an indication of the margin of error that may arise in the estimated IRR (i.e. it gives a range of IRR estimates).

5.44 The difference between E_0 and E_N, between E_0 and V_0, and by implication between E_N and V_N can vary widely. Figure 5.2 illustrates two scenarios. In the first scenario, $E_0 = E_N$ (i.e. the absolute level of error stays constant between the opening and closing assets). Figure 5.2 illustrates the effect as E_0 as a percentage of V_0 increases. For example, based on hypothetical data, if the competition authority is certain that the opening assets are undervalued by at most 25%, and $E_0 = E_N$, then r (here estimated at 10.34%) would be overstated relative to r^* (here 8.46%). Therefore, if the cost of capital is 7%, the competition authority may be reasonably confident that returns in excess of the cost of capital are being made. This is because, even if the MEA asset values were adjusted upwards to reflect the potential under-valuation, the estimated IRR would still exceed the IRR. On the other hand, if the cost of capital lies in between r and r^* (at, say, 9%), the results in isolation are inconclusive.

In the second scenario, $E_0/V_0 = E_N/V_N$. In other words, the error, as a percentage of asset values, remains constant between the opening and closing assets. Figure 5.2 again illustrates the effect on $(r - r^*)/r^*$ as E_0 as a percentage of V_0 increases. A similar assessment of the IRR and its potential margin of error against the cost of capital can be carried out.

FIGURE 5.2 – EFFECTS OF ERRORS IN ASSET VALUATION ON THE ESTIMATED IRR
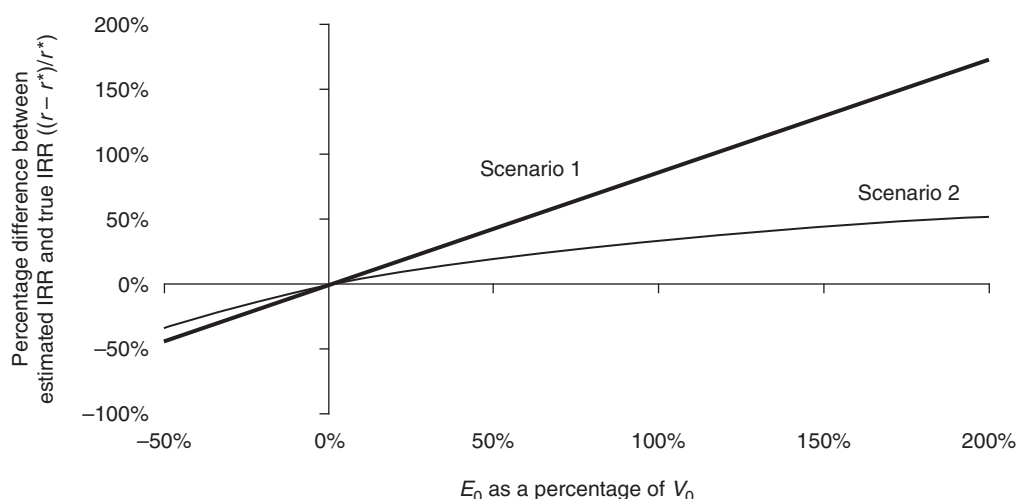
STATISTICAL ANALYSIS USING COMPARATORS

5.45   In addition to testing the sensitivity of the IRR relative to the cost of capital to changes in the asset values, the competition authority may also test the robustness of the evidence by means of a statistical analysis. In particular, it may undertake a statistical analysis of the divergence, if any, of the estimated IRR of the company in question, relative to the IRR of comparator companies. Under this approach, the competition authority would:

- estimate the truncated IRR of the company in question. As above, a range should be estimated, making reasonable allowances for uncertainties in asset valuations (as described in paragraphs 5.40–5.44)

- estimate the truncated IRRs of a sample of comparator companies. It is important that these companies be appropriately chosen (see paragraphs 7.31–7.37) and that they have similar characteristics to the company in question, and operate in competitive markets, and

- given the distribution of the estimated IRRs of these comparator companies, carry out a statistical analysis to test whether the difference between the

estimated IRR of the company in question and those of the comparators is statistically significant. If the estimated IRR of that company is consistently statistically higher than those of the comparators, regardless of the assumptions made about potential errors in asset valuation, the competition authority can be confident that there is an indication of excessive returns.

Implications for competition policy

5.46   The methods described in this and the preceding chapters on using the truncated IRR of a company are summarised in Figure 5.3. As reflected in Figure 5.3, the crucial point is to obtain estimates of MEA values that are as robust as possible. This can be done by starting with the book value of assets in audited accounts and then cross-checking with the various methods described in paragraphs 5.9–5.18, making any adjustments where necessary. Intangible assets should then be identified and valued (see Figure 5.1) and added to the estimated MEA value of the fixed assets.

5.47   If a reasonably robust estimate of the MEA is obtained, the IRR can be estimated using Equation 4.2. The robustness of the estimated IRR against potential uncertainties in measurement should still be tested, using sensitivity tests or statistical analyses as described in paragraphs 5.33–5.45. However, if no robust estimate of the MEA is obtained (e.g. the range of possible MEA estimates is wide), it is unlikely that a meaningful estimate of the IRR could be achieved. The range of estimated IRRs would most likely be wide, such that no firm conclusions can be drawn from the IRR methodology. In this case, the competition authority should consider using other proxy measures of profitability.

FIGURE 5.3 – STEPS IN ASSET VALUATION AND ESTIMATING THE IRR

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┌─────────────────────────────────────────────────────────┐
│  Use asset values in published accounts as starting estimate │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
┌─────────────────────────────────────────────────────────┐
│  Make adjustments according to modified historical costs,  │
│  or, where feasible, bottom-up cost models                 │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
┌─────────────────────────────────────────────────────────┐
│  Identify and value intangible assets                      │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
┌─────────────────────────────────────────────────────────┐
│  Estimate the MEA value of assets by adding the estimated  │
│  MEA value of tangible and intangible assets               │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
┌─────────────────────────────────────────────────────────┐
│  Cross-check using information from comparator companies   │
│  (eg, Tobin's q)                                           │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
                 Robust estimate of
                    MEA values?
           NO                          YES
            │                            │
            ▼                            ▼
┌──────────────────────┐      ┌──────────────────────┐
│  May not be possible to │    │  Estimate the IRR      │
│  obtain meaningful      │    └──────────────────────┘
│  estimate of IRR        │               │
└──────────────────────┘               ▼
            │               ┌──────────────────────┐
            │               │  Compare against cost of │
            │               │  capital or comparator   │
            │               │  IRRs (sensitivity tests │
            │               │  and statistical analysis)│
            │               └──────────────────────┘
            ▼                            ▼
┌──────────────────────┐      ┌──────────────────────┐
│  Consider using proxy  │     │  Conclude profitability │
│  measures of profitability│  │  assessment            │
└──────────────────────┘      └──────────────────────┘
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6   COST AND REVENUE ALLOCATION

6.1   A company often supplies more than one product and operates multiple lines of business. In many cases, however, a competition authority is interested in assessing the profitability of a company's activities in one or a subset of the products only and not of the company as a whole.

6.2   The profitability assessment of a specific line of business requires an allocation of a portion of a total company's costs (both operating and capital) and revenues to that line of business in order to obtain data on its cash flows and asset values. The steps in estimating the IRR, as described in Figure 4.3 and 5.3, can then be applied to the data on that specific line of business.

6.3   The allocation of costs and revenues to the particular line of business can be difficult. Publicly available company accounts often prove insufficient, as information is aggregated up to the company level across all the different lines of business. At best, only limited sectoral breakdowns are provided.

6.4   In addition, while some costs can be easily identified and traced to a particular line of business, others may not, particularly for costs that are joint or common across multiple lines of business. Similar issues arise on the revenue side in relation to bundled products — which raises the question of how much revenue should be allocated to each product — and to transfer pricing of goods between different departments or subsidiaries within the same company.

6.5   The competition authority therefore faces the challenge of determining the appropriate methods and drivers to allocate costs and revenues across these lines of business. Costs and revenues may also have to be allocated across different time periods as well as across different lines of business. The competition authority will often have to make some judgement as to what is the most appropriate method. The allocation exercise is crucial to obtaining the cash flow data and estimates of asset values for the line of business in question. To the extent that the allocation exercise is complicated or is subject to a high level of uncertainty, the resulting cash flow data and MEA values may be of poor quality. This could affect the ability of the competition authority to implement the IRR methodology in a meaningful way, as highlighted in Figure 4.3.

6.6   This chapter addresses the question of how the competition authority can deal
       with cost and revenue allocation. Paragraphs 6.7–6.10 introduce a categorisation
       of the types of cost faced by a company, and paragraphs 6.11–6.13 discuss their
       relevance for competition policy. Paragraphs 6.14–6.23 describe various methods
       of cost allocation. Revenue allocation is considered in paragraphs 6.24–6.41.
       Some other relevant issues regarding allocation are considered in paragraphs
       6.42–6.51, including non-related assets, costs and revenues, and efficiently
       incurred costs. Paragraphs 6.52–6.55 summarise the key implications for
       competition authorities. Some of the cost and revenue concepts discussed in this
       chapter are also dealt with in Part III of this paper.
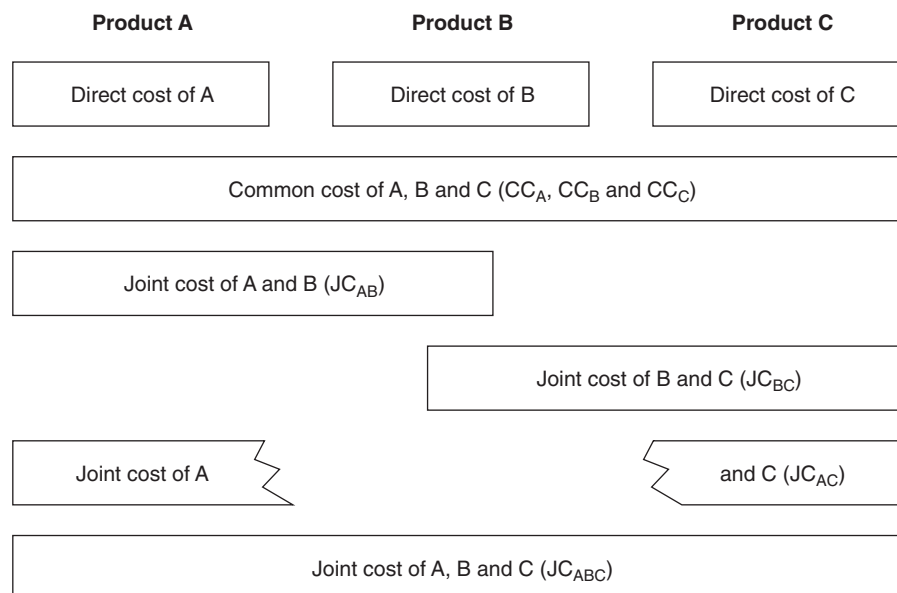
Types of costs

6.7   The costs incurred in a line of business can be classified into the following three
       categories: direct, joint and common costs. Joint and common costs are often
       referred to collectively as indirect costs. Each is described in the following.

   ●   *Direct costs* — refer to costs, including capital costs and other expenses,
       which can be directly and exclusively attributed to the particular line of
       business and market in question.

   ●   *Joint costs* — strictly speaking, these are costs incurred when the production
       of one product simultaneously involves the production of one or more other
       products. Joint costs arise in settings in which the production costs of the
       outputs of two or more products cannot be separated. In other words, they
       are incurred when production facilities simultaneously produce two or more
       products in fixed proportions, such that an increase in the output of one
       product will necessarily mean a corresponding increase in the output of the
       other product. The cost of cattle livestock, for example, would be a joint cost
       in the production of beef and leather. The cost of building an information
       database that, once created, can be used for multiple purposes, is another
       example of joint cost.

   ●   *Common cost*s — these arise when two or more products are produced
       together, even though they could be produced separately. In contrast to joint
       costs, common costs can vary to some degree with the quantity of
       production of each product, even though they are not directly attributable to
       a single product. An example of common costs would be the cost of
       equipment that is used to produce different types of, say, pharmaceutical
       products. The equipment could be used either to produce one type of drug
       only or different types of drug. In the case of the latter, the production of one
       drug requires the reduction in the production of another type of drug —

increasing batch runs of one drug implies reducing the number of runs on other drugs. (This contrasts with joint costs, where the increase in the production of one product necessitates the simultaneous increase in the production of the other.) This feature of common costs implies that they can eventually be traced back to units of output.

Other typical examples of common costs include salaries and other costs of the firm's management, and legal and audit expenses. All these examples vary with outputs of various products, even though it can be difficult to discern the extent to which they vary with the volume of production of any particular product.

6.8 Whether a cost is classified as direct, joint or common depends in part on the numbers of lines of business, and the particular line of business in which the competition authority is interested. For example, all the costs of a company with one line of business — i.e. it produces a single product sold in a single market — can be classified as direct. In contrast, a multi-product/-market firm is likely to incur a combination of direct, joint and common costs for each of its lines of business. An example is shown in Figure 6.1 for the production of three products by a single firm.

FIGURE 6.1 – TYPES OF COSTS IN A MULTI-PRODUCT FIRM

6.9   Based on the three types of cost described above, three useful cost concepts can be defined.

- *Incremental cost* — the increase in cost associated with producing a specified increment of output. In this context, the increment of output may be the line of business that is of interest. The incremental cost would then refer to the costs that are incurred by the line of business in question, given that the company is already active in its other lines of business.[31]

- *Stand-alone cost* — the cost that would be incurred if the company undertook the line of business in question only. The stand-alone cost of a service exceeds the incremental costs to a multi-product firm if there are common or joint costs.

- *Fully distributed costs (FDC)* — the costs attributed to a line of business when all costs have been fully distributed (allocated) between the relevant lines of business. (Methods for distributing costs are discussed in paragraphs 6.14–6.23.) The FDC of a line of business may therefore include its direct costs as well as some common and joint costs that may not be directly attributable to the service. The lower and upper limits of the FDC are the incremental cost and the stand-alone cost respectively.

6.10   The relationships between incremental cost, stand-alone cost and FDC, and direct, joint and common costs can be seen from Figure 6.1:

- the incremental cost of a line of business would include its direct costs and possibly an identifiable portion of common costs; joint costs are excluded

- the stand-alone cost of a line of business would include the direct costs, most of the common costs and all joint costs, and

- the FDC would include direct costs, an allocated portion of common costs and an allocated portion of the joint costs.

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[31] A related cost concept to incremental cost is avoidable cost, which is defined as the reduction in cost associated with ceasing the production of a specified quantity of output. In this context, it would be the decreases in cost associated with the termination of the supply of the product in question, while the firm continued producing its other products. Whereas incremental cost refers to expansion of an activity, avoidable cost refers to contraction of that activity. Although the two concepts are closely related, there can be an asymmetry between output expansion and output contraction, for example, due to the existence of product-line-specific assets which constitute sunk costs. In particular, sunk costs would be part of incremental cost (since it would not yet be incurred), but not part of avoidable cost (since it would already have been sunk and would no longer be avoidable).

Application of cost concepts in a profitability assessment

6.11   In a profitability assessment in competition policy, the FDC is often the relevant starting point. If costs are allocated on the basis of FDC, and the estimated IRR exceeds the cost of capital, this can be taken as an indication of excessive profitability. The exact level of FDC depends on the particular cost-allocation method employed (see paragraphs 6.14–6.23). Indeed, the competition authority may obtain a range of FDC, rather than a point estimate.

6.12   The stand-alone cost can be used as the upper limit of the FDC to test the robustness of the results. In particular, if the allocation is carried out on the basis of the stand-alone cost, and the estimated IRR still exceeds the cost of capital, this represents *prima facie* evidence of excessive profits. This is because the stand-alone cost is the maximum amount of cost that would be borne by the business.

6.13   Conversely, if the allocation is carried out on the basis of incremental cost and the estimated IRR is lower than the cost of capital, this may be an indication of excessively low profits (see also Box 6.1). The relation between the various cost concepts and profitability assessment in competition analysis is illustrated in Figure 6.2.

FIGURE 6.2 – ALLOCATED COSTS
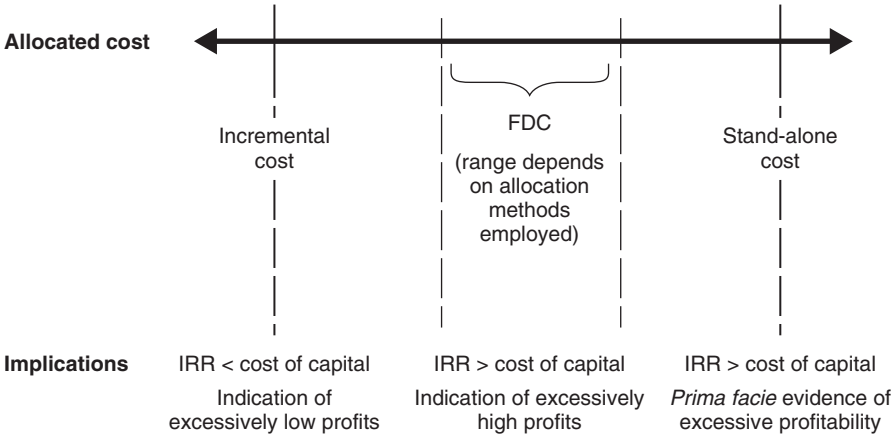
BOX 6.1 – COST FLOORS IN PREDATORY PRICING AND CROSS-SUBSIDY CASES

Predation can be defined as a two-stage pricing strategy. In the first stage the dominant firm prices below cost in order to drive competitors from the market, recouping its losses in the second stage by charging monopoly prices. Determining at which point a given aggressive low-pricing strategy becomes predatory is a contentious matter, and general agreement on how to distinguish fierce but legitimate price competition from true predatory pricing has been hard to find both in theory and in practice. One common criterion that seems to have evolved is that predation requires some form of below-cost pricing. Different periods and jurisdictions have used different measures to determine the cost floor for predatory behaviour, as discussed in the following (see Niels and ten Kate, 2000, for a more detailed overview).

AVC—this was the primary measure used in US cases in the 1970s and 1980s, following a seminal paper by Areeda and Turner (1975), who argued that marginal cost pricing leads to 'a proper resource allocation and is consistent with competition on the merits'. They also suggested that AVC was a practical (more measurable) substitute for marginal cost, and many US courts adopted or built upon this test (for example, in *Hanson v Shell Oil*[1] and *Janich Bros v American Distilling*[2]). Other decisions of the period, following *William Inglis and Sons v ITT* Continental Baking,[3] held that prices between AVC and average total cost (ATC) could also be predatory, but shifted the burden of proof for this price range to the plaintiff.

In its *Akzo* judgement (1993),[4] the ECJ established specific pricing rules for assessing predation. Predation should be presumed where prices are below AVC. Prices above this level, but below ATC, could still be predatory if set so as to eliminate a competitor. Prices above ATC should not be considered predatory. In the original *Akzo* decision (1985),[5] the European Commission had explicitly rejected the Areeda–Turner test and held that even prices above ATC could be predatory (although, in this case, there was evidence of pricing below AVC anyway). AVC was also considered in the *Napp* case (CAT, 2002) in the UK, as further discussed in Part II (paragraphs 9.12–9.13) of this paper.

Incremental cost—more recently, in the *Deutsche Post* case,[6] the Commission determined that a price below the level of additional or incremental cost is predatory. The economic rationale for using this measure is similar to that of the marginal cost test (i.e. it is consistent with efficient resource allocation). However, there is a debate on whether short-run incremental costs (SRIC) or LRIC should be used. The longer the time period, the more costs will be considered incremental. LRIC takes into account the total long-run costs of supplying a specified additional unit of output, and should therefore be calculated on a forward-looking basis. LRIC may be more appropriate in industries characterised by high fixed costs. Prices based on LRIC should also enable potential new entrants to make informed pricing and investment decisions (see Oftel, 2000).

Finally, in US case law, predatory pricing investigations now centre on the possibility of recoupment (or the feasibility of predation), rather than on cost floors. In *A.A. Poultry Farms v Rose Acre Farms*[7] a lower court determined that no evidence of intent or below-cost pricing should be admitted if the possibility for recoupment has not been demonstrated. In *Brooke Group v Brown & Williamson Tobacco*,[8] the Supreme Court established recoupment as the primary standard for predatory pricing cases in the USA, relegating intent and price–cost relationships to a second stage. In contrast, the OFT has indicated that it does not consider it necessary to demonstrate that predation is feasible when a dominant undertaking predates in the market where it is dominant (see OFT, 1999*c*).

Source: [1] *Hanson v. Shell Oil Co*., 541 F.2d 1352 (9th Cir. 1976). [2] *Janich Bros. Inc. v. American Distilling Co*., 570 F.2d 848 (9th Cir. 1977) cert denied, 439 U.S. 829 (1978). [3] *William Inglis and Sons Banking Co. v. ITT Continental Baking Co*., 688 F.2d 1014 (9th Cir. 1981), cert. Denied, 459 U.S. 825 (1982). [4] Case C-62/86, *AKZO Chemie BV v Commission*, E.C.R. I-03359 (1993). 5 CMLR 215. [5] Case No IV/30.698, *ECS/AKZO* (85/609/EEC), OJ L 374, 31/12/1985. [6] Case COMP/35.141, *United Parcel Service/Deutsche Post AG* (2001/354/EC), March 20th 2001, OJ L 125, 05/05/2001. [7] *A.A. Poultry Farms, Inc. v. Rose Acre Farms, Inc*., 881 F.2d 1396 (7th Cir. 1989), cert. Denied, 494 U.S. 1019 (199). [8] *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp*., 509 U.S. 209 (1993).

Cost-allocation methods

6.14   As noted above, FDC is often the appropriate starting point for a profitability analysis within the context of competition analysis. Estimating the FDC of a particular line of business involves the following steps:

- identify all direct costs relating to the line of business in question

- identify all indirect costs that are relevant to that line of business

- determine a cost-allocation method to allocate these indirect costs, and

- add the allocated indirect costs to the direct costs to obtain the FDC.

6.15   There are various cost-allocation methods that can be used for distributing indirect costs (see also Cave and Mills, 1992, p. 20). In theory, there is not a single correct method for cost allocation. Depending on the circumstances, some methods may be more appropriate than others — particularly, for competition policy (as discussed below).

6.16   Broadly, three types of cost driver can be used (either separately or in combination):

- *input-based cost drivers* — indirect costs can be apportioned to a particular line of business based on other known inputs employed in the production of that line of business. Such inputs could include labour employed (number of employees, time spent or wage bills), raw-material costs or floor space used. A combination of input indicators can also be used (e.g. the total direct or incremental costs of the line of business)

- *output-based cost drivers* — indirect costs can also be allocated using output indicators, such as production or sales volumes, and

- *value-based cost drivers* — here indirect costs are allocated based on demand factors, such as the prices, revenues or consumers' willingness to pay. One variant is to allocate costs using the Ramsey pricing principle, which states that it is economically efficient to recover a relatively larger part of common or joint costs from those customers whose demand is relatively more inelastic (i.e. less sensitive to price).[32]

6.17   Input- and output-based drivers can be applied to the indirect costs through:

- *a direct approach* — this refers to the relatively straightforward application of the chosen driver (or drivers) to the indirect costs. For example, if directly employed labour (headcount) is the chosen driver, indirect costs would be allocated proportionally across the various lines of business based on that driver

- *equi-proportionate mark-up* (EPMU) — an EPMU is applied across all products based on the direct costs of each product. In other words, if £50 of indirect costs had to be allocated across two products, each with £40 and £60 of direct costs respectively, a mark-up of 50% would be applied to each product, so that £20 would be allocated to the first product and £30 to the other, and

- *activity-based costing* (ABC) — this is a more refined version of the above two methods. Under ABC, the indirect costs are first segregated by activity and then assigned to particular lines of business based on the cost drivers of the activities. For each activity, the cost assigned to each line of business is then allocated using the most suitable indicator. ABC is further explained in Box 6.2.

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[32] The efficiency of Ramsey pricing lies in the fact that it generally leads to higher total output, and hence generates higher surpluses for consumers.

BOX 6.2 – ACTIVITY-BASED COSTING

ABC is a method of linking costs to processes (or activities) rather than to outputs in the first instance. The costs are then traced back to outputs based on the link between activities and output. By focusing on processes, some costs that may initially not be obviously directly related to particular outputs can be traced to the relevant outputs. ABC can be applied as follows.

Direct-cost tracing—the first step is to trace direct costs to their relevant activities. One feature of ABC is that some indirect costs can be reclassified as direct costs. This is achieved by segregating indirect costs into separate activities. Some of these costs may qualify as direct costs.

Indirect-cost activities—the number of indirect cost activities is expanded until each is 'homogeneous' (i.e. all the costs in that activity have the same cause-and-effect relationship with the cost-allocation indicator). For example, an activity that includes both machine costs and distribution costs, and for which machine hours is used as an indicator, is not homogeneous because increases in machine hours raise machining costs but not distribution costs. This suggests that these two costs should be segregated into two activities, with machine hours being the indicator for the machining activity, and number of shipments the indicator for the distribution activity. Indeed, the identification of the relevant activities requires detailed knowledge about the business, and the competition authority may need to rely on interviews with the staff of the company in question to obtain the relevant information.

Cost drivers—for each activity, a measure of that activity must be identified as the cost driver. This will be used to allocate the cost of that activity to different lines of business.

The steps involved in a typical application of ABC are summarised as follows:

● identify the different lines of business

● identify the direct costs of each line of business

● select the activities to use for allocating indirect costs to the line of business

● select the appropriate cost-allocation indicator for each activity

● identify the indirect costs associated with each activity

● compute the per unit rate of each cost-allocation indicator, and

● compute the indirect cost allocated to each line of business based on the indicator.

In effect, ABC assumes that resources can be allocated directly to particular outputs, where output is now defined as the output of processes rather than final goods. ABC's

strengths therefore lie in allocating costs that, although not directly linked to final good outputs, can be directly linked to particular processes. These processes, in turn, are linked back to final good outputs. In this way, ABC reduces the number of cost categories that need to be classified as 'overheads'.

Note: For more details on ABC, see, for example, Cooper and Kaplan (1999) and Horngren et al. (2003).

6.18   For competition policy purposes, value-based cost drivers should be used with caution, as a circularity problem may arise. For example, if revenue is used as a cost driver, excessively high profits tend to be overlooked since higher prices lead to higher levels of cost allocated to that line of business and, consequently, lower estimates of profitability. Likewise, excessively low profits tend to be overlooked as the lower prices mean that lower costs are allocated to the particular line of business, and hence profits appear to be higher.

6.19   To the extent that the competition authority is interested in whether prices are cost-reflective, the cost-allocation method used should embody the cost-causality principle, which means that costs are allocated to the source that caused those costs to be incurred. Input-based — and, to a lesser extent, output-based — cost drivers are most in line with the cost-causality principle. Value-based cost drivers, in particular Ramsey pricing, are often inconsistent with cost causality.[33]

6.20   However, cost causality cannot be applied to all common costs, nor, by definition, to any joint costs. That is to say, for joint costs and certain common costs, allocation on the basis of cost causality is not possible, and other types of cost driver, including value-based ones, must be used. Again, there is no single correct allocation method in these cases. A sensible cross-check would be to test the sensitivity of the FDC figure to different methods of allocation, and also how it relates to the incremental and stand-alone costs as depicted in Figure 6.2.

6.21   One test that is sometimes applied in the cost-allocation exercise is the combinatorial test, which is based on the principle that the floor and ceiling of an FDC are the incremental cost and stand-alone cost respectively. According to this

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[33] The principle of cost causality was also embraced by the Competition Commission (2003*a*) in its mobile telephony inquiry (discussed in detail in section 10 of this paper). The Commission expressly rejected the Ramsey approach.

test, the FDC of any one activity should be at least as high as its incremental cost. In addition, the FDC of any group of activities that share common costs should cover their incremental and common costs. In this way, the FDC of larger groups of activities will approach the stand-alone cost.[34]

6.22　Finally, two points should be noted with regard to cost allocation.

- First, implicit in the allocation of joint or common costs is an assumed technology underlying the cost structure. The allocation will only make sense if it reflects the underlying technology — i.e. drivers (determinants) — of the costs. Effectively, refined allocation methods, such as ABC, are attempts to capture the underlying technology as closely as possible in the allocation.

- Second, there is the implicit assumption that the allocated cost level will vary smoothly with the level of activity of the line of business in question. In other words, if the competition authority assesses the profitability of a company's activities based on an allocation of £10,000 of machinery costs to the production of product *A*, there is the implicit assumption that, should production of product *A* double, the machinery costs would also double. This assumption may not always hold, however. For example, if there is spare capacity, doubling production may not lead to a doubling of machinery costs. If the plant is already running at full capacity, increasing production of product *A* may only be possible by expanding or building a new plant. Depending on the technological characteristics of the new plant, the cost of increasing production may not be a smooth and proportionate increase over existing allocated costs levels.

6.23　Hence, the competition authority should be aware that any allocation only makes economic sense to the extent that it reflects the current technology underlying the costs incurred. Furthermore, any projections on the basis of the current allocation are made on the assumption that the technological relationships between inputs and outputs will remain constant.[35]

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[34] The combinatorial test is applied, for example, by Oftel in the regulation of network charges. Based on the test, BT's price for any one service should be higher than its incremental cost, and the combined price of services in groups that share common costs cover both the incremental and common costs of supplying these services. Oftel and the OFT have also indicated that they would use the combinatorial test when examining cross-subsidy and pricing in the context of the Competition Act 1998 as applied to the telecoms sector. (See Oftel 2000 and 2001*b*.)

[35] Bromwich (1997), for example, analyses the structure imposed by technology on different types of input, which helps to determine how and with what indirect costs vary. He argues that the allocation of indirect costs should reflect the technologies underlying costs.

Revenue allocation

6.24   Similar allocation issues arise on the revenue side of a business, particularly in the context of bundled products and transfer pricing. Both are considered in the following.

BUNDLED PRODUCTS OR SERVICES

6.25   It is a common business practice to sell certain products or services in a bundle or package. In particular, in sectors with high fixed and low marginal costs, bundling is often used as a form of price discrimination to recover fixed costs — products are bundled and priced such that the incremental price of the add-on product is very low or even zero (bundling can of course also be used for anti-competitive purposes).

6.26   From a competition policy perspective, three types of bundling can be distinguished:[36]

- *pure bundling* — in a pure bundle, two goods, A and B, are only sold together. They are not available for individual purchase. Furthermore, in a pure bundle, the goods A and B are offered only in some fixed proportion (for example, left and right shoes are sold in pairs)

- *mixed bundling* — in mixed bundling, goods A and B are sold as an A–B package in addition to being sold individually. The package is sold at a discount to the individual prices. (If the price of the A–B package simply equals the individual prices of A and B, this is not classified as bundling), and

- *tying* — tying is a special case of mixed bundling. In the tied sale, the customer who wants to buy A must also buy B. It is, however, possible to buy B without A, which explains why this is a tie and not a bundle. Thus, the items for sale are B alone or an A–B package.[37]

6.27   Just as in the case of cost allocation, there are parallel concepts of stand-alone, incremental and fully distributed revenues (or prices). Stand-alone revenues would refer to the prices that would be reaped if the good were sold as a single

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[36] These definitions are taken from Nalebuff (2003), who provides an analysis of bundling from a competition policy perspective.

[37] Tying can also be a dynamic form of pure bundling: in order to purchase good A, the customer is also required to purchase good B. What makes this different from the standard pure bundle is that the quantity of good B may vary from customer to customer. Thus the items for sale are A–B, A–2B, A–3B, … packages. See Nalebuff (2003).

(stand-alone) product instead of in a bundle. Incremental price would be the additional price that the company reaps by bundling the product with another. The incremental price of product A, for example, would be the total price of the A–B bundle less the stand-alone price of product B. The fully distributed price would be the price allocated on a particular basis and would lie between the incremental and stand-alone price of the good.

6.28   Under mixed bundling, stand-alone and incremental prices for the goods in question are available. Under tying, the stand-alone price of the tying good is available. For the tied good, however, only the incremental price is available; the stand-alone price is not known. For goods in a pure bundle, neither the stand-alone nor incremental prices are known.

6.29   If the competition authority is investigating just one product line, the revenues of the bundle need to be allocated between the various products in the bundle. In principle, revenues could be allocated between the two products based on the implicit price paid (i.e. the consumer's willingness to pay for each of them). In practice, however, this is not easy to determine, as the implicit price or information about the willingness to pay is often not observable. Various proxy methods can therefore be used instead.

- *Allocation based on the ratio of stand-alone prices* — if the bundled products or services are also sold separately (mixed bundling), the ratio of the sales price of the individual products or services (i.e. the stand-alone prices), could be taken as a proxy for determining the implicit prices. In other words, the ratio of the sales price of the unbundled products would be used to allocate the revenues.

- *Allocation based on stand-alone and incremental prices* — revenue can also be allocated based on the stand-alone price of one good and the incremental price of the other. In the case of tying, this would imply allocating revenues on the basis of the stand-alone price for the tying good (product B in the above example) and the incremental price for the tied good (product A in the above example). However, to the extent that the bundle includes a discount, this method would allocate the entire discount to the goods with an incremental price allocation resulting in too low an estimated price for product A and too high an estimated implicit price for product B.

- *Allocation on the basis of cost* — the ratio of the costs of the individual products can be taken as a proxy for the allocation of the revenues. To do this, costs must first be allocated between the various products (the methods described in paragraphs 6.14–6.23 would therefore apply). To the extent that

competitive prices are, in principle, cost-reflective, such an allocation has some conceptual appeal. However, this method would rely heavily on cost allocation. To the extent that cost allocation is difficult, for example, in cases with high joint costs, this approach would also be difficult to apply.

6.30   There is not necessarily a relation between these proxy allocations and the true implicit price of each product in the bundle, as this depends on the consumer's willingness to pay. In the case of stand-alone prices, for example, consumers who purchase the bundled good are likely to have different preferences and hence exhibit different levels of willingness to pay for each good, as compared with consumers who purchase the products separately. There is little theoretical basis for inferring the implicit price of the first group of consumers from the preferences of the second.

6.31   While, in general, the stand-alone and incremental price can be used to determine the boundaries of the implicit prices of the goods, in some cases, the range between this two extremes can be very wide. In such cases, the revenue allocation may be difficult as there may be few objective reasons to choose an allocation between incremental and stand-alone revenues, or indeed a cost-based allocation, without further information about consumers' willingness-to-pay. Indeed, in cases of pure bundling, information on stand-alone and incremental prices is not available at all.

6.32   The issue of revenue allocation in the case of bundled products was addressed by the OFT in its investigation into BSkyB (2002*b*). This concerned the allocation of revenues between basic and premium channels. There were 72 different packages, broadly those containing only basic channels and those containing basic channels and one to four premium channels. In its analysis, the OFT adopted the approach that the allocation of revenues should be cost-based. One of the parties involved in the case suggested that the price for premium channels is the increment between the retail prices for the premium and basic channels. The OFT rejected this suggestion, arguing that the increment between premium and basic package prices could only be taken as the total revenue attributable to premium channels if the costs incurred in the provision of a basic-only package relate solely to basic channel provision. However, significant proportions of the costs associated with basic channel packages are common to the provision of packages including premium channels. Implicit in the cost of any BSkyB package is, effectively, a 'platform access charge'. In other words, inferring that the

incremental price is the revenue that should be allocated to premium channels would understate the share of revenues that should be allocated to premium channels, as none of the premium revenue would be allocated to the recovery of this 'platform access charge'. The OFT did not estimate the platform access charge and did not allocate the revenues. In assessing profitability, the OFT focused on the whole bundle of channels.

TRANSFER PRICING

6.33   A transfer price is the price that one sub-unit (department, division or subsidiary) implicitly or explicitly charges for a product or service supplied to another sub-unit that is part of the same company.[38] An example would be where a Dutch parent company (e.g. a manufacturer) charges a transfer price for a product supplied to its 100% UK subsidiary, which undertakes the distribution activities in the UK.[39] The transfer price creates revenues for the selling sub-unit and purchase costs for the buying sub-unit, affecting each sub-unit's profit. A transfer price may also be charged by one sub-unit to another for the use of certain assets owned by the former and used by the latter. In some cases, companies may internally impute transfer prices as a management control system to coordinate the actions of the sub-units.

6.34   If a competition authority is assessing the profitability of one of these sub-units only, it needs to assess the appropriate transfer price of the goods transferred between the two sub-units; or for the services of the assets used. The latter would require, first, the allocation of assets from the owner to the user, and then an imputation of the appropriate price for the use of these assets.

6.35   In practice, three methods for determining transfer prices are used: market-based, cost-based, or negotiated. For the purposes of a profitability analysis, market-based transfer prices are often the appropriate ones to use. A transfer price above the market price would result in a shifting of profits from the buying sub-unit to

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[38] For a comprehensive overview of transfer-pricing techniques (written mainly for business and fiscal purposes), see Feinschreiber (2001).

[39] In practice, transfer prices may also occur in more complicated relationship structures. For example, a situation could be envisaged whereby a Dutch parent company with a 100% UK subsidiary sells goods to a third (unconnected) party in the Netherlands. That third party sells the goods to its own Taiwanese subsidiary, which finally sells them to the UK subsidiary of the original vendor. The fact that there is no transaction directly between the Dutch company and its subsidiary does not prevent the use of transfer prices.

the selling sub-unit of the company, while a transfer price below the market price would result in a shifting of profits from the selling sub-unit to the buying sub-unit of the company.

6.36 There are several ways of checking whether the transfer prices are market-based, including the following (see, for example, Ofwat, 2000):

● *competitive bidding* — if the supply of goods and services has been subject to competitive tender by independent contractors, the prices paid between the two sub-units are likely to be market-based, and

● *comparison against published list prices* — list prices for equivalent services may be available in the market. Equivalent services may be provided either by the supplying sub-unit to other independent customers, or by other suppliers in the market.

6.37 Where no market exists such that it is difficult to impute market-based transfer prices, the next best alternative would be cost-based transfer prices, including a reasonable return to the supplying sub-unit. Cost-based prices can be imputed based on the inputs used and, where necessary, on the cost-allocation methods discussed in paragraphs 6.11–6.23.

6.38 Issues of transfer pricing arise particularly where the units involved do not operate at arm's length, where there is no explicit transfer price, or where the transfer price does not reflect market conditions. Under such circumstances, the competition authority should apply the arm's-length principle and adjust revenues so that they reflect market-based transfer prices as closely as possible.[40]

6.39 Companies may have incentives to set transfer prices according to principles other than market principles in order to allocate revenues and profits in a particular way — for example, to allocate profit to jurisdictions with the lowest taxes, or for reasons of regulatory arbitrage as may arise in the context of regulated utilities. For this reason, regulators and fiscal authorities usually insist that transfer prices reflect economic reality and market conditions.

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[40] The arm's-length principle is also recommended by the Organization for Economic Cooperation and Development (OECD) (para. 1 of Article 9 of the OECD Model Tax Convention): '[When] conditions are made or imposed between two [associated] enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly.' See OECD (1995).

6.40   If the company under investigation engages in (international) trade with related companies and their results are substantially dependent on the transfer prices at which they buy and sell their products, finding market- or cost-based prices may be very difficult for the purpose of profitability assessment in the context of competition analysis. For example, in its inquiry into the supply of new motor cars in the UK, the Competition Commission (2002*b*) concluded that, since it had not been able to obtain data concerning the relationship between transfer prices and manufacturing costs, it had also been unable to establish whether the car suppliers' reported results were a fair reflection of the profitability of their respective UK operations.

6.41   Another application of these principles in competition policy analysis is in the transfer pricing between vertically related lines of business of a company. This can be of relevance, for example, in margin-squeeze investigations, as discussed in Box 6.3.

BOX 6.3 – PROFITABILITY AND COST AND REVENUE ALLOCATION IN MARGIN-SQUEEZE INVESTIGATIONS

Margin squeeze occurs where a vertically integrated company with a dominant position in the upstream market has the opportunity and incentive to foreclose its competitors in the downstream market by setting high prices for the upstream input it controls, leaving little or no room for profits for the downstream operators. An example would be a network operator that also competes in the retail market. The vertically integrated firm is indifferent in principle between taking its profits upstream, or passing them on to its downstream operations (see, for example, European Commission, 1998, and Oftel, 2000). By exerting a margin squeeze, it can exploit its market power in network provision while offering a non-discriminatory tariff downstream (and thus avoiding allegations of undue discrimination).

There are basically two methods of assessing whether a dominant firm is imposing a margin squeeze.

● *Assessing whether a reasonably efficient downstream operator can make a normal profit* — this is the theoretically optimal approach to detecting margin squeeze, although difficult to apply in practice. It considers directly the margin between the dominant firm's upstream and downstream prices, and then compares this with the operating costs of a reasonably efficient downstream competitor.

● *Assessing whether the downstream business makes a profit* — this approach is a more practical proxy for the first method. If the downstream operator makes

excessively low profits, given current prices for the upstream input, this could be viewed as evidence of a margin squeeze.

This methodology has been used by the European Commission in *Napier-Brown*, by Oftel (1996) in the mobile telephony market, and recently by the OFT in the BSkyB investigation (OFT, 2002*b*). Oftel used to assess whether the downstream (retail) operations of the two UK MNOs with market power were making sufficient profit, given the network access prices they charged to independent service providers. The 'Oftel formula' used an NPV approach, whereby the profitability of the downstream operations was assessed over the life of a subscriber (taking into account the cost of acquiring that subscriber) (Oftel, 2001*c*). In contrast, the European Commission and the OFT considered profits only in the period of the investigation, rather than the NPV over the life of a customer. Assessing margin squeeze in this manner requires accounting separation with an appropriate allocation of costs and revenues between the upstream and downstream businesses. The OFT's analysis in the BSkyB decision provides an example of such cost and revenue allocation. In this case, the allocation was carried out in accordance with the cost-causality principle and with BSkyB's own understanding of its cost drivers.

Other allocation issues

USING MANAGEMENT ACCOUNTS TO ALLOCATE COSTS AND REVENUES

6.42 Publicly available financial reports provide little information at the disaggregated (lines of business) level. Management accounts are potentially more useful than statutory accounts, as they provide more detailed information, allowing more precise analysis, particularly with regard to cost allocation.

6.43 There are no standards relating to management accounts, and their usefulness differs greatly between companies. With regard to cost allocation, in the best case, there is an adoption of ABC. In such a case, links can be drawn between costs and operating-activity levels, which illustrate why a level of cost was incurred. In other cases, however, management accounts can be less detailed and may, for example, simply show when and where the cost occurred. In this case, the competition authority would have to carry out the cost-allocation exercise from scratch, based on the principles in paragraphs 6.14–6.23 above.

6.44 It can sometimes be difficult to reconcile both the management and financial accounts, even though they are both constructed using the same financial data. Reasons for divergence can include the following (see also Part III of this paper).

- *Depreciation* — fully depreciated equipment would not lead to further costs items in the financial accounts, but may still incur a charge in the management accounts, so as to allow an equal comparison between the use of equipment of differing ages.

- *Valuation of stocks and work in progress* — in the management accounts, these will be valued at cost. However, prudence may dictate a lower figure.

- *Notional costs* — some costs can be included in the management accounts that would not be seen in financial accounts (e.g. a notional rent for owned property or a charge to reflect the use of capital).

- *Non-trading costs* — non-trading items, such as profit and loss on the sale of investments, or charitable donations, would not normally appear in the management accounts.

EXCLUSION OF UNRELATED ASSETS, COSTS AND REVENUES

6.45 The aim of a profitability assessment in the context of competition analysis is typically to assess past or current performance, normally for a specific period. In such a case, there may be some cost or revenue items that are not relevant to the performance in that period, or to the line of business of interest, and should therefore be excluded from the assessment.

6.46 Companies may, for example, have certain assets on their balance sheet that are not used for the production of the products or services subject to the profitability analysis. These could include interest revenues on loans or capital gains on investments not related to the main operations of the company. The revenues generated by these assets may have been included in the company's overall profit and need to be excluded if the profitability of its products or services is assessed.

6.47 Another case is the allocation of capital expenditure over time. If the competition authority wishes to assess the profitability of a company between, say, 1995 and 2002, then a capital investment that was made at the end of 2002 that is not yet operational would not be relevant to the assessment. This investment, when operational, would contribute to profits in the future. For the period under

assessment, however, it only appears as an expense. If the investment were included in the asset base, the asset base would be increased disproportionately to the earnings measure, as that asset has not contributed any earnings within the assessment period. The estimated IRR would be biased downwards. To the extent that the competition authority wishes to assess the profitability of **current** activities, adjustments to exclude investments that are not yet operational may be justified.

6.48 An example can be found in the Competition Commission inquiry into mobile call termination charges (2003*a*) — discussed in detail in Chapter 10. In that inquiry, the MNOs argued that high call termination charges were required to finance the roll-out of future third-generation services. The Commission took the view that third-generation services are an incremental investment and should not be subsidised by second-generation services; third generation should stand and fall on its own merits. Hence, the Commission did not allow the costs of rolling out third-generation services to be taken into account when assessing the level of current second-generation call termination charges.

EFFICIENTLY INCURRED COSTS

6.49 If market power exists then costs may be higher than in a more competitive company or industry, as the company in question may have few incentives to innovate. As such, an estimated IRR, based on actual cash flows, might understate the extent to which market power exists. Thus, the competition authority may wish to make reference to an efficient cost level — i.e. the estimated cost inefficiency could be added to the estimated profitability to provide an estimate of the excess profitability.

6.50 Assessing an efficient cost level requires an appraisal of the efficiency in transforming inputs into outputs. There are a number of approaches to assessing an efficient cost level, as outlined above. A full description of each is beyond the scope of this paper.

- *A theoretical efficient model* of the company could be constructed, for instance, by engineering consultants. This would identify the theoretical minimum cost level. This method is most appropriate when no other readily available comparators (or data) exist. It can, however, be quite time-consuming, and it may be difficult to prove its practical applicability.

- *Bottom-up process benchmarking*, whereby comparisons of the efficiency of individual processes are undertaken using benchmarks within or external to the industry under examination. Thus, the efficient cost level for individual processes would then need to be aggregated up to the company level to identify the overall efficient cost level. This approach is data-intensive, as it requires data at the activity (process) level. Bottom-up cost modelling has been used in the regulation of fixed-telephony networks in various countries, including the UK (see Oftel, 1997).

- *Top-down comparative-efficiency approaches*, such as data envelopment analysis, which compare companies' performance within the industry (for a brief overview, see Thanassoulis, 1999). The efficient cost level is identified using information on other companies and constructing a cost frontier. A company's efficient cost level, given its characteristics, can then be estimated by reference to this frontier. Such comparisons can include:

  - unit cost comparisons — where the lowest unit cost in the industry represents the efficient unit cost level

  - econometric cost modelling using ordinary least squares regression. Related techniques of corrected ordinary least squares and modified ordinary least squares can also be used

  - a non-parametric approach — based on data envelopment analysis

  - stochastic frontier analysis.

6.51   The appropriate approach depends on data availability and the structure of the industry being examined. In general, no one technique is superior, and it may be useful (where feasible) to use several approaches in order to ensure as robust an assessment as possible. The data requirements, however, are substantial for each of the methods, and may not be practical for a 'routine' competition policy analysis.

Implications for competition policy

6.52   Competition authorities will frequently face cost- and revenue-allocation issues in their investigations, as they are often interested in a particular line of business only, while companies commonly run multiple lines of business. When selecting a cost-allocation method, it may often be appropriate to apply the principle of cost causality to the extent possible. Value-based cost drivers should be used with caution because they may give rise to the circularity problem where excessively

high prices (profits) are understated as they lead to higher costs allocated to that line of business.

6.53   With regard to revenue allocation for bundled products, in principle the objective is to assess the implicit price of each good in the bundle. Without direct information on consumers' willingness to pay, this is difficult, although a number of proxy methods are available. With regard to transfer prices, the competition authority should, if possible, use market-based prices as the basis for determining the appropriate transfer price between related activities within the same company.

6.54   The estimated IRR will depend on the costs and revenue allocated to the line of business in question. Differences in allocation approaches can therefore lead to different results, and there may be no single method of allocation that is obvious or correct. The competition authority should therefore consider using a range of methods. The estimated IRR should be sensitivity-tested within this range, in the same way as it should be tested for uncertainties in asset valuation, as described in paragraphs 5.33–5.45. The incremental cost and the stand-alone cost can be used as the boundaries of costs allocated to the line of business in question.

6.55   If, using a range of plausible allocation methods, the estimated IRR is consistently above the cost of capital, then the competition authority can be confident that the evidence points to excessive profits. Indeed, if the estimated IRR exceeds the cost of capital even on the basis of stand-alone cost, this can be taken as *prima facie* evidence of excessive profits. If, on the other hand, using reasonable alternative methods of cost and revenue allocation still leads to a wide range of FDC, it may be that no meaningful IRR estimate can be obtained. The results from comparing the IRR with the cost of capital may vary greatly, such that no hard conclusions can be drawn. Such a scenario would relate to the second, third or fourth branches in Figure 4.3.

7 THE COST OF CAPITAL AND INDUSTRY BENCHMARKS

7.1   As noted in Chapter 3, the determination of whether a company is making excessive returns requires the estimated IRR, or the proxy measures used, to be compared against a suitable benchmark. In particular, the estimated IRR can be compared against the WACC or the estimated IRRs of appropriate comparator companies. The estimated returns of comparator companies are especially useful as they allow the competition authority to take into account the fact that unexpected and exogenous factors may cause the company to over- or indeed underperform, relative to the cost of capital.

7.2   Proxy measures of profitability (e.g. ROS, or gross margins) should be benchmarked against the corresponding measures for comparator companies. They are not directly comparable to the WACC.

7.3   Table 7.1 summarises the choice of benchmarks for the IRR and its proxy measures. If the estimated IRR or proxies are consistently above the benchmark, taking into account possible errors in asset valuation and uncertainties in cost and revenue allocation, the competition authority may be confident that the evidence points to excessive returns.

TABLE 7.1 – TYPES OF BENCHMARK TO BE USED

Profit measure	Benchmark
IRR	Cost of capital, industry comparators
ROS, gross margins	Industry comparators
TRS	Cost of (equity) capital, industry comparators
Market-to-book	Industry comparators

7.4   This chapter addresses the choice and measurement of the benchmark. In particular, paragraphs 7.5–7.30 examine the cost of capital benchmark. Paragraphs 7.31–7.37 look at the selection and use of industry comparators. This chapter provides only a basic discussion on the topic; it does not cover the full range of complexities involved, as this would be beyond the remit of this paper.[41]

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[41] For a more detailed discussion, the reader is referred to other sources, such as the joint regulators' cost of capital study published in February by Wright et al. (2003).

Cost of capital

7.5 The cost of capital is an estimate of the price the company must pay to raise the capital that it employs. This could take the form of an interest rate on debt, or a dividend and capital gain rate on equities, or, more commonly, a combination of both, depending on the forms of capital used. Broadly speaking, the cost of capital reflects the return required by investors to invest in the company's activities rather than elsewhere.

7.6 The required return will reflect the level of risk associated with the investment. Given that investors are in general risk-averse, the greater the risk accepted, the greater the required rate of return. For instance, investors may require a higher rate of return in a competitive industry where technological development is rapid, such as the IT sector, rather than a regulated monopoly such as the water sector, where returns are more certain.

7.7 The required return will also depend on the nature of the investment instrument. For example, investors in equity, who accept the residual risk of a business, will tend to have a higher required return than investors in the debt of the same company, who have first call on the cash flows of the company in case of bankruptcy.

7.8 In an investment appraisal, therefore, an activity would only be undertaken if the rate of return at least covers the cost of capital (see paragraphs 3.3–3.8). Profit levels cannot be considered excessive if they are required to compensate investors for the risk they assume. Only rates of return on invested capital that are significantly above the cost of capital may be indicative of excessive profits.

7.9 In profitability assessments of realised rates of return, the relevant cost of capital is the *ex ante* cost of capital — i.e. the cost of capital that was used in assessing the project at inception. This is particularly important for risky projects that carried a high likelihood of failure. The *ex ante* cost of capital has to be adjusted upwards to capture the inherent risk (the result is commonly known as a hurdle rate). When a competition authority is assessing returns that have been realised, a comparison of the realised rate of return with an *ex post* cost of capital that does not reflect the risk of failure of the project could lead to an overstatement of profitability.

7.10 The following outlines the main approaches used to estimate the cost of capital.

MEASUREMENT OF THE COST OF CAPITAL

7.11 The methodology used in calculating the cost of capital is now well established and, while not without some contention, it is generally accepted. The cost of capital of a company is calculated as a weighted average of the cost of debt finance and the cost of equity finance. The WACC can be written as:

$$g \times r_d + (1 - g) \times r_e \qquad \text{(Equation 7.1)}$$

where g is the gearing level (i.e. debt divided by the sum of debt and equity), *r_d is the return required on debt investments, and r_e* is the return required on equity investments.

7.12 The most common method of determining the cost of equity is the capital asset pricing model (CAPM),[42] which states that:

$$r_e = r_f + \beta \times \text{ERP} \qquad \text{(Equation 7.2)}$$

where r_f is the risk-free rate, ERP is the equity risk premium and β is the company-specific risk parameter (the 'equity beta').

7.13 The cost of debt (r_d) is calculated as the sum of the risk-free rate (r_f) and the debt premium (dp):

$$r_d = r_f + dp \qquad \text{(Equation 7.3)}$$

7.14 In its purest form, the CAPM framework is a forward-looking one, in the sense that it defines the expected return on a portfolio of assets (here, debt and equity) based on investors' appetite for risk. Measurement of investors' current expectations of future returns is therefore one of the most important questions in implementing the CAPM. However, as employed by most practitioners, including UK regulators and the Competition Commission, CAPM parameters are generally calculated using historical data.

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[42] The study by Graham and Harvey (2001) among 392 CFOs, referred to in Chapter 3, shows that CAPM is by far the most frequently used method to estimate the cost of equity capital, with 74% of CFOs always or almost always using it.

7.15   The following summarises the main parameters that need to be estimated to derive the WACC: the risk-free rate of return, the ERP, the equity beta, the debt premium, and gearing. It also briefly considers WACC adjustments required to account for taxation and inflation.

7.16   *Risk-free rate* — this is the rate of interest required by an investor on an investment with a certain return. The risk-free rate is not directly observable, so practitioners have to resort to a proxy. Typically, the yield on UK government index-linked bonds, which are priced as virtually default-free and inflation-proof securities, is used for the measurement of the risk-free rate.[43]

7.17   *ERP* — this is the *expected* additional return demanded by investors for holding equities as opposed to risk-free assets. From the point of view of implementing the CAPM, the ERP is one of the most difficult parameters to estimate, despite it being fundamental to investment and project appraisal. The difficulty with estimating the ERP is that it is inherently unobservable, and, as such, any method to estimate this parameter is subject to considerable interpretation.

Several approaches have been applied for measuring the ERP, varying in the degree to which they are forward-looking and consistent with the theoretical underpinnings of modern finance. The three main methodologies are:

●   *historical averages* — the use of historical averages to estimate current expectations of the ERP

●   *survey methods* — the use of surveys of finance professionals, academics, and other practitioners to provide direct measures of future expectations, and

●   *semi-ex ante methods* — the use of market valuation models to give partly forward-looking estimates of equity returns.

7.18   *Equity beta* — in the CAPM, it is assumed that the riskiness of a company is captured by the equity beta. Beta measures the degree to which the returns of the company's equity move in line with returns to the market as a whole. In contrast

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[43] There are a number of methodological issues when determining the risk-free rate; for example, whether to use the current spot yields or also to attach weight to historical averages; which bond maturities should be used; and whether observed rates on index-linked gilts should be adjusted for an inflation risk premium reflecting the prevalence of nominal bonds in companies' debt structure. See, for example, Brooke et al. (2000).

to the risk-free rate and ERP, it is therefore a company-specific parameter. Beta is not measurable directly from market data, but can be estimated by regressing total returns of the particular stock or portfolio of stocks on total returns of the market. However, the appropriate method for estimating beta has been subject to considerable debate. Issues that commonly arise include, for example, the definition of the 'market'; the length of the estimation period; whether daily or monthly return data should be used; and the treatment of outliers in the data. Different methods adopted can produce very different beta estimates.

7.19 *Debt premium* — the real cost of debt is the sum of the risk-free rate and the debt premium, which is the additional return demanded by debt investors for holding companies' debt. The debt premium can be measured by comparing the redemption yields on companies' bonds relative to risk-free government bonds of similar maturity and coupon.[44]

7.20 *Gearing* — this measures the capital structure of the company and determines the relative weights attached to the cost of debt and equity in the WACC calculation. In general, gearing is the level of net debt divided by total value, which is the sum of equity, debt, and net current liabilities.[45]

7.21 *Taxes* — the WACC calculation described above has ignored taxation and the different tax treatment of corporate equity and debt. Interest payments on debt are deductible for corporation tax purposes, whereas returns on equity are not. There are two main approaches to take tax into account in the WACC.[46]

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[44] A number of additional issues need to be considered in the estimation of the debt premium — for example, whether an inflation risk premium should be included when companies issue nominal debt and whether the level of bankers' fees in negotiating debt costs with the market should be added to the debt premium.

[45] Value can be either book- (accounting-) based or market-based. Since the cost of capital measures returns that investors require on the current value of their investments, market-value measurement might be preferable. On the other hand, market values are difficult to obtain for debt, so only equity can be measured at market value. In some cases, it may be preferable to use book valuation even for equity in order to ensure that the gearing parameter is not unduly affected by share-price movements and is more stable.

[46] In practice there may be certain reasons to use either the pre- or post-tax calculations. For example, for state-owned firms, it may be more appropriate to use pre-tax figures (see Brealey et al., 1997). These reasons are not discussed here. The important point is that the approach needs to be consistent — i.e. the measure and the benchmark need to be assessed on the same basis.

- *Pre-tax WACC* — this is the WACC grossed up by the tax wedge. The tax adjustment is made using the following formula:

$$\text{pre-tax WACC} = g \times r_d + (1 - g) \times r_e \times \left(\frac{1}{1 - t_c}\right) \qquad \text{(Equation 7.4)}$$

The tax wedge $1/(1 - t_c)$, is calculated with reference to t_c, the corporation tax rate. Intuitively, the pre-tax WACC shows the level of returns that the company has to make before corporation taxes are paid, in order to generate the minimum returns required by investors.

- *Post-tax WACC* — this is the WACC after taxes, taking account of the differential tax treatment of debt and equity. It is calculated using the formula:

$$\text{post-tax WACC} = g \times r_d \times (1 - t_c) + (1 - g) \times r_e \qquad \text{(Equation 7.5)}$$

7.22 *Inflation* — the WACC can be measured on a real or nominal basis. If the risk-free rate is calculated on a real basis, as suggested above, the calculated WACC is a real rate. In order to obtain the nominal WACC, the real risk-free rate can be adjusted using an estimate of the annual inflation rate.

7.23 For illustrative purposes, Table 7.2 reports the individual cost of capital components and resulting WACC estimated in two recent Competition Commission determinations: London airports (Competition Commission, 2002*b*) and mobile telephony (Competition Commission, 2003*a*).

TABLE 7.2 – COST OF CAPITAL EXAMPLES —
RECENT COMPETITION COMMISSION DETERMINATIONS

Parameter	Definition	Airports	Mobile telephony
Risk-free rate	r_f	2.50–2.75 (real)	5.1–5.3 (nominal)
Equity risk premium	ERP	2.50–4.50	2.6–4.6
Equity beta	β	0.8–1	1–1.6
Cost of equity	$r_f + \beta \times \text{ERP} = r_e$	4.5–7.25 (real)	7.6–12.7 (nominal)
Debt premium	dp	0.9–1.2	1.0–4.0
Cost of debt	$r_f + dp = r_d$	3.4–3.95 (real)	6.1–9.3 (nominal)
Gearing	g	25%	10%
Tax wedge	$1/(1 - t_c)$	1.429	1.429
Pre-tax WACC	$g \times r_d + (1 - g) \times r_e \times$ $[(1 - t_i)/(1 - t_c)]$	5.67–8.76 (real)	10.4–17.3 (nominal)

Source: Competition Commission, 2002*b* and 2003*a*.

ENSURING CONSISTENCY BETWEEN THE PROFITABILITY MEASURE AND
THE COST OF CAPITAL BENCHMARK

7.24 The output of the WACC calculation is a cost of capital estimate (or range) measured in percentage terms that can be compared with the IRR, also measured in percentage terms. It is therefore important to ensure consistency and comparability between the profitability measure and the benchmark. All dimensions should be considered, including the following.

- *Definition of capital employed* — the WACC is the appropriate benchmark if company profits are measured in relation to the full asset base, financed by both debt and equity. Hence, it is comparable to the IRR measured over both debt and equity. If the IRR on equity only is used, the equity cost of capital (i.e. only the equity element of the WACC calculation) should be the benchmark, not the WACC.

  Similarly, in an NPV calculation, the WACC should be used as the discount rate to calculate the NPV of both debt and equity assets. However, if equity NPV only is estimated, then the equity cost of capital is the appropriate discount rate.

- *Taxation* — if the IRR is measured using pre-tax cash flows, the appropriate comparator is the pre-tax WACC. If, on the other hand, earnings are measured net of tax, the appropriate benchmark is the post-tax WACC.

- *Real versus nominal rates* — if the IRR is measured at current prices, without adjustment for inflation, the appropriate benchmark is the nominal WACC. Inflation-adjusted rates of return should be compared with the real WACC.

- *Time period* — another relevant issue relates to the time period of assessment. Ideally, the time period used for measuring the profitability of an activity should also be used to obtain the cost of capital benchmark. Both rates of return and cost of capital may change over time, depending on various factors, such as economic cycles and market conditions. To control for such variations, it is therefore preferable to measure both the rate of return and the benchmark over as long a time period as possible (see also paragraphs 8.7–8.17).

The same consistency arguments apply if profitability is estimated by using proxy measures of the IRR.

OTHER ISSUES TO CONSIDER WHEN USING THE COST OF CAPITAL

7.25   Notwithstanding the apparent simplicity of comparing percentage terms for rates of return and cost of capital, there are a number of issues that need to be taken into account when using this benchmark approach, as discussed below.

7.26   *Precision of estimation* — for various reasons, it is difficult to estimate the cost of capital with precision. For example, while the CAPM framework is a forward-looking measure of required returns, for practical reasons the parameters are calculated using historical data that may not reflect market expectations. The results of the calculation are highly dependent on the approach adopted, including the period and frequency of data used to calculate the individual parameters. It is therefore common to use a range of estimates, rather than point estimates of the cost of capital.

7.27   *Alternative methods of estimating the cost of capital* — although widely used by practitioners, the CAPM framework has been questioned extensively in academic circles. In particular, the past ten years have seen a burgeoning academic literature that calls into question the empirical robustness of the CAPM.[47] Other methodologies have been put forward to estimate required stock returns and the cost of capital. These include the dividend growth model, where the cost of equity is estimated as the dividend yield plus the future dividend growth rate; the Fama–French three-factor model, which extends the CAPM to control for the size of the stock and its book-to-market valuation; and more general arbitrage pricing models, which explain stock returns by a wide range of stock-specific or macroeconomic factors.[48]

7.28   *Hurdle rates* — it is common to see companies marking up the cost of capital when setting 'hurdle rates' (i.e. required returns) to appraise individual projects or investment plans (see Graham and Harvey, 2001). This premium accounts for project-specific risks, which are not reflected in the company's cost of capital generated by the CAPM approach or other asset pricing models. One clear example where a mark-up is applied is for large investment projects with a high

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[47] For example, the CAPM predicts that the expected excess return on the stock has a linear relationship with the expected excess return on the market portfolio, which is measured by the stock's beta. However, evidence suggests that beta alone cannot explain stock returns.

[48] For a review of alternatives to the CAPM, see Brealey and Myers (2002) and Wright et al. (2003).

degree of asymmetric risk, i.e. when there is a relatively large downside risk of failure compared with the likelihood of success. The CAPM and other models do not capture such asymmetric risk.

7.29 *Availability of a cost of capital benchmark* — the cost of capital estimation as described above requires market data, in particular to calculate the equity beta. In some cases, market data is not available because the company's stock is not listed on an exchange. In other cases, the company may be listed, but market data refers to the consolidated operations of the company, and may not be available for the particular line of business that is subject to the profitability assessment. This raises the question of how to apply the cost of capital benchmark if the cost of capital cannot be calculated directly. The approach that is commonly taken is to adopt as a benchmark the cost of capital of a suitable comparator (i.e. other companies). When selecting comparator benchmarks for a company without a stock-market listing, it is important to select benchmarks that resemble the target firm in terms of the underlying business risk.[49] Factors that determine business risk include the type of industry, size, geography, volume risk and operational gearing. Similarly, if the assessment concerns the profitability of a particular business activity within a wider group, some means of determining the cost of capital for that activity would need to be derived. This may be done by examining the measured betas of 'pure play' companies — i.e. companies whose business is, as far as possible, dominated by the activity in question (for example, payment card services are frequently offered by multi-product banks, but there are also a number of 'pure' card-issuing banks which could be used as benchmarks).

7.30 *Small-company premium* — according to the pure capital structure theory, the cost of capital depends only on the systemic or market risk of the cash flows of the firm (see Modigliani and Miller, 1958). The size of the company and the method of financing used should have no impact, once market risk, as measured

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[49] The equity beta is composed of two elements, which may be isolated from each other: business risk and financial risk. Under the assumption that there is a linear relationship between financial risk and the level of gearing, the business risk element of beta may be isolated into what is known as an asset beta, using the formula $\beta_a = \beta_e \times (1 - g)$ or $\beta_a = \beta_e \times (1 - [1 - t] \times g)$, where β_e is the equity beta, β_a is the asset beta, g is the level of gearing, and t is the corporate tax rate. Thus, provided that the target and benchmark companies have similar business risk characteristics (i.e. a similar asset beta), the target's equity beta can be obtained from the comparator's beta, using appropriate adjustments for gearing differences. For a discussion, see Brealey and Myers (2002).

by the company's beta coefficient, is taken into account. However, numerous studies of the returns to firms according to various characteristics, including size, suggest that other factors may play an important role in determining investors' expectations (see Banz, 1981). It is therefore often appropriate to apply a small-company premium to the cost of capital of small companies. Small companies may have a higher cost of equity and cost of debt for a number of reasons, including the following:

- *economies of scale* — these will tend to make equity more expensive for smaller companies. Similarly for debt, borrowing in small amounts means that the transaction costs account for a higher proportion of the amount raised

- *liquidity* — trading in equity of small companies tends to be less liquid, leading to higher transaction cost and potentially making small-company shares less attractive to institutional investors. With regard to debt, many forms of cheaper longer-term debt finance (such as public bond issues) are not available to small companies. This implies that smaller companies will have to rely on other forms of financing, such as bank borrowings, which are typically more expensive because of illiquidity, and

- *information asymmetry* — there may be greater agency costs for small companies, given that investors and lenders are less likely to have good information on them.

Industry comparators

7.31 The profitability assessment can also be based on benchmarking profitability against the level of profitability achieved by comparable firms or industries. In principle, each of the profitability measures described in Chapter 4 can be benchmarked across firms or industries.

7.32 Furthermore, as noted in Table 7.1 above, in certain cases it is necessary to adopt the comparator benchmark approach instead of, or in addition to, the cost of capital approach. This arises particularly when profitability measures such as ROS and gross margins are used, as these measures are not capital-based and therefore not directly comparable to the cost of capital. In addition, when an *ex post* capital-based measure of profitability (e.g. the IRR) is estimated, the performance of other firms should also be considered, to take into account *ex post* exogenous factors, such as economic cycles and unexpected windfalls.

7.33 The critical issue in using the comparator benchmark is the selection of suitable comparators. The aim of the assessment would be to compare the profit measure of an activity with that which would have been achieved in a fully competitive environment.

7.34 When selecting comparators, it is common to use either:

- other companies in the same industry in the same region, or

- other industries with similar characteristics operating in the same region, or

- the same industry in other regions, or

- the activities of the same company in other regions.

7.35 The selection should be based on good reasons to believe that the comparators are subject to some degree of competitive pressure. Therefore, factors such as market structure (concentration) or regulatory regime, which may have an impact on the competitiveness of the industry, should be examined. It would be meaningless to benchmark the profitability of an activity against the profitability of a monopolistic company in another market.

7.36 It is essential that the companies or industries used as benchmarks have considerable similarity with the company or industry under investigation, since profitability can be expected to vary across companies, independently of whether or not profits are excessive. The main characteristics which may affect profitability, and which should therefore be taken into account include the following.

- *Risk* — unlike the cost of capital benchmark, comparing rates of return across firms or industries does not encapsulate the risk–reward balance. Returns may simply be higher because investors need to be rewarded for bearing greater risks. For the comparison to be meaningful, comparators should therefore be of similar risk to the firm or industry under investigation. Both business and financial risk characteristics should be considered.

- *Capital intensity* — capital-intensive businesses normally require higher margins on turnover than businesses of low capital intensity, so as to meet the higher capital expenditure required to maintain operations. Benchmarking of ROS or gross margins therefore requires the capital intensity of the investigated business and comparators to be similar.

- *Stage in life cycle* — rates of return can vary considerably over the life cycle of a firm. For example, in industries that require large investment outlays up front, returns are low in the investment phase but increase over time as the investment starts to generate income. Unless full life-cycle returns are compared, it is therefore important to select comparators that are in the same stage of the life cycle as the firm or industry under investigation.

- *Efficiency factors* — the simple comparison of rates of return assumes that both the investigated business and comparators are efficient (i.e. their costs are at the lowest level possible for the output produced). If differing rates of return are due to cost inefficiencies, they cannot be used to determine whether profits of the investigated business are excessive. The benchmarking exercise may therefore require adjustments to the benchmark to allow for any cost inefficiencies identified.

- *Time period* — as with the cost of capital, if comparators are used as a benchmark, their profits should be measured over the same time period as the firm or industry under investigation.

7.37 When international comparators are used, an additional issue arises with regard to the differences in accounting standards employed in different countries (see also Part III of this paper). Accounting differences may make it difficult to compile financial data to a common specification. While some efforts can be made to minimise potential problems of incompatibility of data, the outcome of data adjustments may not always be satisfactory. If accounting differences are too material, or data adjustments too difficult, the usefulness of international comparators may be limited.

Implications for competition policy

7.38 Benchmarking is the final step in the analysis. The objective is to compare the estimated IRR with the cost of capital and the IRR of appropriate comparator companies. Similarly, proxy measures of profitability (e.g. ROS, gross margins, the Tobin's q or TRS) should be benchmarked against the corresponding measures for comparator companies.

7.39 The cost of capital is an estimate of the price the company must pay to raise the capital that it employs. In profitability assessments of realised rates of return, the relevant concept is the *ex ante* cost of capital — i.e. the cost of capital used at the start of the project in question. The required return will reflect the level of risk

associated with the investment and the nature of the investment instrument (e.g. debt or equity).

7.40   In addition to adopting the cost of capital benchmark, the profitability assessment can also be based on benchmarking profitability against the level of profitability achieved by comparable firms or industries. Using the returns of comparators as benchmarks has some advantages; for example, it allows the competition authority to check whether the estimated returns of the company in question are affected by economic cycles and industry-specific factors that may be unrelated to market power or competition problems.

7.41   The critical issue in using the comparator benchmark is the selection of suitable comparators. The aim of the assessment would be to compare the profit measure of an activity with that which would have been achieved in a fully competitive environment. The selection should be based on good reasons to believe that the comparators are subject to some degree of competitive pressure and operate in industries with similar cost structures and risk profiles.

8 POLICY IMPLICATIONS

8.1 As explained in Chapter 2, the objectives of this discussion paper are to:

- define an appropriate conceptual framework for profitability assessments in competition policy analysis — specifically, the IRR methodology, and

- translate this theoretical framework into a practical approach in a structured way, by assessing how, and in what circumstances, potential measurement issues (for example, those associated with the use of accounting data) and interpretation issues can be dealt with.

8.2 Chapters 3–7 (in conjunction with Parts II and III) have addressed these objectives. This chapter draws together the main implications for competition policy. First, with respect to the appropriate conceptual framework, paragraphs 8.3–8.6 signal that the truncated IRR methodology described in this paper has not been commonly applied in past competition investigations in the UK — most have used other measures of profitability. Next, paragraphs 8.7–8.17 discuss the policy implications of dealing with potential measurement and interpretation issues, respectively. Paragraphs 8.18–8.29 assess how the methodology described in this paper can be used for the various competition policy applications of profitability assessment identified in Chapter 2. Paragraphs 8.30–8.32 conclude.

The IRR versus other profitability measures

8.3 As explained in this paper, economic theory indicates that the IRR and the NPV are the appropriate measures of profitability for the purpose of competition policy analysis. The academic literature has also developed a sound theoretical framework that allows the IRR to be estimated using data over a truncated period of time (as opposed to the full lifetime of an activity). This suits the needs of competition policy particularly well — competition authorities are normally concerned with assessing returns over limited periods and the required accounting data is normally available for such periods.

8.4 Competition authorities in the UK have frequently undertaken profitability assessments — in contrast to competition authorities elsewhere, as discussed in Chapter 2 — but relatively few investigations have used the IRR (or the NPV). As illustrated in Table 8.1, other profitability measures — in particular, ROCE and ROS — have been used more often.

TABLE 8.1: PROFITABILITY MEASURES USED IN PAST UK COMPETITION CASES

Profitability measure	Cases
IRR	Supermarkets[1]
ROCE	Banking services to SMEs,[2] supermarkets, new cars,[3] impulse ice creams,[4] classified directory advertising services,[5] contraceptive sheaths, [6] fine fragrances,[7] and soluble coffee[8]
Return on net operating assets (RONOA)	Scottish milk,[9] supermarkets and Companies House[10]
ROE	Banking services to SMEs and Scottish milk
ROS	Impulse ice creams, supermarkets, Scottish milk; foreign package holidays,[11] recorded music,[12] classified directory advertising services, historical online database services,[13] contraceptive sheaths, fine fragrances, soluble coffee and BSkyB[14]
Gross margins	Supermarkets, new cars and NAPP[15]
Net margins	Impulse ice creams

Sources: [1] Competition Commission (2000*c*); [2] Competition Commission (2002*a*); [3] Competition Commission (2000*b*); [4] Competition Commission (2000*a*); [5] MMC (1996); [6] MMC (1994*a*); [7] MMC (1993); [8] MMC (1991); [9] Competition Commission (2000*d*); [10] OFT (2002*a*) [11] MMC (1997); [12] MMC (1994*c*); [13] MMC (1994*b*); [14] OFT (2002b); [15] OFT (2001).

8.5   As discussed in this paper, it is valid to use other profitability measures — in particular the ROS, gross margins and market valuations — as proxy measures for the IRR, either in addition to or instead of the IRR itself. This applies in particular where reliable data on cash flows and asset values are not available, making it difficult, and sometimes impossible, to measure the IRR.

8.6   However, as discussed in Chapter 4, these measures are useful to competition policy only insofar as they do not significantly and systematically diverge from the IRR, and if they provide additional information when the IRR is difficult to estimate. In this regard, it was noted above that annual estimates of the ROCE and ROE do not in general meet these criteria. While, in theory, an appropriately weighted average ROCE or ROE can be used to obtain the IRR (if accounts are fully articulated and assets are valued according to value-to-the-owner rule — see

Box 4.3), ROCE and ROE estimates have not been applied in this way in practice. These measures therefore have to be interpreted with caution.

Measurement issues

8.7   As discussed in Chapters 4–6 and in Part III, the measurement of profitability can be subject to uncertainties. First, the accounting information needed to carry out the profitability assessment is often not readily available in the required format, and usually does not provide any information on future performance (as opposed to past performance). Second, estimates of the IRR over a truncated period rely on estimates of the MEA values at the beginning and end of the period (although, as explained in Chapter 4, the IRR methodology is less sensitive to errors in asset valuation than the ROCE and other proxy measures). Third, similar measurement uncertainties may arise where common costs and revenues need to be allocated between different lines of business of a company (see Chapter 6).

8.8   Part III discusses how the available accounting data can be used and interpreted (and potentially adjusted) in order to provide meaningful information for the profitability assessment. Chapters 5 and 6 of this paper explain that, while there is a wide variety of valuation and allocation methods, some methods and criteria are more appropriate than others for the purpose of competition policy analyses.

8.9   Nevertheless, the competition authority should check the robustness of the results of the profitability analysis before drawing any conclusions. Chapter 5 of this paper has outlined a number of approaches that could be taken to test the robustness. The more robust the results (i.e. the smaller the variance in measurement), the smaller the absolute (percentage-point) difference between the estimated IRR and the relevant benchmark needs to be in order for the authority to conclude that there is, indeed, a divergence. These approaches have been discussed in the context of asset valuation, but can also be applied to cost and revenue allocation. In particular, the authority should estimate the IRR for a range of possible asset values. If the relationship between the estimated IRR and the relevant benchmark is not sensitive to changes in the estimated asset value within this range, the competition authority can be reasonably confident of the results. Similarly, the authority could assess the effect on the estimated IRR of variations in the allocation method or criteria.

8.10   In addition, the robustness of the results is influenced by the length of the period considered, with a rule of thumb that the longer the period, the better. For the truncated IRR and NPV, this is because a longer period means that the calculation is less sensitive to the valuation of the opening and closing assets (although, for the IRR and NPV, taking too long a period can sometimes be problematic[50]). When using the proxy measures, taking a longer period provides insight into whether the estimated profit levels are persistent.

8.11   Once the competition authority is satisfied that the profitability estimates are robust, and that their divergence from the relevant benchmark is *statistically* significant, the question of **economic** significance arises — how excessive is excessive; by how much must the measure differ from the benchmark? A clear-cut answer to this question cannot be given — it depends partly on the statistical robustness of the estimates.

Interpretation issues

8.12   Profitability assessments also raise interpretation issues. Three situations are discussed below:

●   where different benchmarks are used, and the measured profitability rate diverges from one benchmark but not from the other

●   where there is evidence of high profits, and it is not clear whether these profits are due to a lack of competition, or whether they reflect superior efficiency or temporary high profits in a dynamic market

●   where profitability does not seem to exceed the benchmarks, but it is not clear whether this is due to a lack of efficiency (X-inefficiencies).

8.13   First, if different benchmarks are used (which, as discussed in Chapter 7, is often appropriate), a situation may arise where the measured profitability is in excess of one benchmark but not another. For example, the estimated IRR of the company in question may exceed the cost of capital but not the IRRs of comparators. In this situation the competition authority should, in the first instance, check the underlying information to assess whether there are any explanations for the

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[50] For example, as discussed in Box 4.2, for an assessment of predation or margin squeeze, the NPV over a longer period can sometimes produce misleading results. In these cases it may be more appropriate to use proxy measures of profitability and to consider other competition indicators, rather than to shorten the truncated period.

differences in results. For example, it may be that the IRR of the comparators incorporates a survival bias, excluding companies that have exited the market because of underperformance (e.g. through takeovers or bankruptcy). This may be particularly relevant in markets with a high rate of entry and exit. In this case, the authority could check whether such bias exists (for example, have companies exited the market in the period analysed?). If it does, the comparator benchmark may provide a more accurate indication than the cost of capital (see also Chapters 3 and 7).

8.14 Another reason for high profits may be a macroeconomic upturn during the period under investigation, benefiting all companies, including the comparators. If possible, the IRR and benchmark analysis could, in this case, be extended to longer periods (although the length of business cycles is difficult to assess). The authority should also assess to what extent the high profitability found can be attributed to the upturn as opposed to other factors, such as a lack of competition in the market. For example, if all the comparators also operate in highly concentrated markets, they do not provide an appropriate benchmark for the competitive profit level.

8.15 This last point leads to a conclusion that is of general relevance to profitability assessments (as discussed in Chapter 2) — profitability should always be assessed in conjunction with other competition indicators, such as structural and behavioural market conditions. In the situation described above, it may not always be possible to reconcile the different indicators. Sometimes the two benchmarks may still yield contradictory results after the adjustments and checks described above. If this is the case, the competition authority needs to make a judgment as to which is more accurate, and which is more in line with the other competition indicators.

8.16 Second, where the assessment indicates that profits are in excess of the benchmark(s), the competition authority may need to verify whether these profits are due to a lack of competition, or whether they reflect superior efficiency or temporary profits in a dynamic market. In these last two cases there is not necessarily a competition problem to be concerned about. Again, in this situation, a number of cross-checks could be made, as follows.

- The profitability assessment could be extended over a longer period. Temporary positions of market power and high profits are commonplace in well-functioning markets, and may provide appropriate price signals and incentives to firms. However, in a competitive market, it is to be expected that profits will be eroded over time by new entrants. Therefore, if the high profits persist for a very long period, this could be a signal that the market is not functioning properly.

- The authority could analyse whether the high profits are due to superior efficiency. One way is to consider whether other companies in the same market are selling at the same price, but are making lower profits at that price. Another, more complicated, way would be to analyse whether the costs of the firm in question are efficiently incurred (relevant techniques for such an analysis are discussed in paragraphs 6.49–6.51).[51]

- If profits are high due to superior efficiency or temporary positions of market power, there may not be an immediate competition problem. However, superior efficiency does not exclude the exercise of market power,[52] and the authority should again address profitability in conjunction with other competition indicators, such as entry barriers and strategic behaviour, in order to ensure that the market can function efficiently and other firms can enter the market if they match or exceed the efficiency of the incumbent firm.

8.17   Third, if the estimated profits are not significantly in excess of the benchmark, the hypothesis of market power or of a lack of competition can still not be discarded. It may be that a company is enjoying the 'quiet life of monopoly' and is incurring 'X-inefficiencies'. The profitability assessment may not detect such behaviour. Where feasible and relevant, the presence of X-inefficiencies may be determined by assessing profitability with reference to an 'efficient' level of cost, as discussed in paragraphs 6.49–6.51. Again, this third interpretation issue can also be dealt with by assessing profitability in conjunction with other competition indicators.

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[51] An example of such an exercise is Oftel's analysis of the profits made by Vodafone (Oftel, 2001*a*, Annex 9). Vodafone was found to be making high profits, but was also known to be more efficient than the other operators for a number of reasons, including scale. Thus, Oftel tried to assess what proportion of Vodafone's profits was due to efficiency by estimating its costs at a (hypothetical) lower scale of operations.

[52] In the industrial organisation literature, there has been a debate on whether high profits reflect market power or efficiency. According to one school of thought, efficiency and market power can go hand in hand. If one company in the market is found to make high profits and this is attributable to efficiency, the fact that there are still other, higher-cost firms in the market means that the first company must be restricting output, and hence that it is exercising market power. For an overview of this debate, see Martin (1993), Chapter 17.

Application of the IRR methodology in competition policy analysis

8.18   As discussed in Chapter 2, profitability assessment has a wide range of applications in competition policy analysis. The conceptual framework described in Chapters 3–7 of this paper can be used directly for a number of these applications, but may be less straightforward to use for others. Paragraphs 8.19–8.29 assess how the IRR methodology can be applied in each of the applications listed in Chapter 2.

ASSESSING MARKET POWER AND EXCESSIVE PROFITS

8.19   The application of the IRR methodology is straightforward if good data on cash flows and MEAs is available, and if the objective is to establish the existence of market power or excessive profits, or the lack of competition. As explained in Figure 4.3, good data is likely to be available for mature industries with historical data over a long period of time. In these circumstances it is possible to obtain meaningful insights into whether profits are above the competitive level, and hence whether there is a competition problem that needs to be addressed.

8.20   Therefore, a profitability assessment using the IRR methodology described in this paper can be useful as one competition indicator, among others, for the following types of competition analysis:

●   to analyse, based on past data, whether an individual firm has market power currently, or whether competition in a market with few suppliers is effective. The market power assessment can be of relevance to any Competition Act 1998 case. Assessing the degree of competition in an oligopolistic market can be of relevance to any merger case or market investigation under the Enterprise Act 2002, and

●   to analyse, based on past data, whether a dominant firm has been charging excessive prices, thereby allowing it to make excessive profits, in breach of the Chapter II prohibition of the Competition Act 1998.

8.21   The IRR methodology is less straightforward to apply in situations where the available data on cash flows and MEA values is less good. Yet, as discussed in Chapter 4, profitability assessments can still provide useful insights into market power, the degree of competitiveness, and excessive pricing, by using proxy measures of profitability in addition to, or instead of, the IRR itself. This may be relevant for the following types of competition investigation:

- to analyse, based on forecasts (or on a combination of forecasts and past data), whether in the immediate future an individual firm will (continue to) have market power, or whether competition in a market with few suppliers will (continue to) be effective

- to analyse, based on forecasts (or on a combination of forecasts and past data), whether a pricing strategy recently introduced, or about to be introduced, constitutes excessive pricing under the Chapter II prohibition of the Competition Act 1998

- to analyse market power, the degree of competitiveness, or excessive pricing in dynamic markets without much historical data, or for companies or industries where cost and revenue allocation is particularly difficult[53], and

- to analyse market power, the degree of competitiveness, or excessive pricing in industries with high intangible assets or few fixed assets, or where asset allocation is particularly difficult.

8.22   As illustrated in Figure 4.3, for the first three of the above types of investigation, the IRR should be used in conjunction with proxy measures — in particular the ROS, gross margins, or market valuations. For the fourth type, the ROS, gross margins, or market valuations should be used rather than the IRR. With these adjustments, profitability can still be used as one indicator among other competition indicators, although, possibly, a less decisive one than in investigations where the quality of the available data is high.

8.23   For each of the above applications, the competition authority may sometimes wish to determine the absolute amount of the excessive profits made, in addition to the IRR and benchmark findings. Knowing the absolute amount of profits may be useful in assessing the detriment to consumers. This in turn may provide the basis for damages claims by affected parties, or for policy decisions by the competition authority as to how much priority a case merits when enforcing the competition laws.

8.24   The average amount of yearly supernormal profits throughout the truncated time period can be quantified as follows:

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[53] The difficulty of assessing profitability in dynamic markets has also been highlighted in another OFT discussion paper, namely CRA (2002, paras 5.121ff.). However, part of the criticism of profitability assessments in that discussion paper is based on the issues raised by Fisher and McGowan (1983), which are addressed in Box 4.1.

$$(\text{IRR} - \text{WACC}) \times \frac{\sum\limits_{t=0}^{N} A_t}{N} \qquad\qquad\qquad \text{(Equation 8.1)}$$

where $\left(\sum\limits_{t=0}^{N} A_t / N\right)$ is the average capital invested each year throughout the period.

8.25   As with other calculations discussed in this paper, it is important to ensure consistency in Equation 8.1 between the estimated IRR, the cost of capital and the asset base used. Thus, if the pre-tax (post-tax) IRR is used, the WACC should be pre-tax (post-tax) as well. If the IRR to both debt and equity is used, the total asset base should be used. If the IRR to equity only is used, then equity assets are the relevant asset base.

8.26   As can be seen from Equation 8.1, the greater the difference between the IRR and the cost of capital, the larger the supernormal profits. Another feature of the equation is that the amount of excessive profit increases with the value of the assets. Sometimes firms under investigation try to demonstrate that their asset base is very high — for example, by including a large amount of intangible assets. This has the effect of reducing the ROCE. However, if the IRR methodology and Equation 8.1 are used, rather than the ROCE, inflating the asset base could sometimes lead to higher estimates of total supernormal profits.[54]

ASSESSING EXCESSIVELY LOW PROFITS

8.27   As discussed in this paper, competition policy is sometimes also concerned with whether profits are excessively low — for example, for predation, margin squeeze, state aid and the failing-firm defence. For these investigations, the IRR methodology discussed in the paper is still relevant, but its application is less straightforward than for assessments of excessively high prices. This is for a number of reasons.

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[54] This point was made by Steele (2002) in the context of the review of the UK banking system, in which the banks argued for their capital employed to be expanded to allow for intangibles which their accounting policies did not include. As Steele noted, 'the Banks' incentives for arguing for an increase to their capital employed would be changed once it was appreciated that the amount of profits to disgorge is estimated as the capital employed multiplied by the excess profit rate … Under [the IRR] approach, the Banks would want to minimise their capital employed and adhere to their original conservative balance sheets.'

- First, as discussed in Chapter 5, in order to estimate the IRR over a segment of an activity's lifetime, assets should be valued according to the value-to-the-owner principle. Based on this principle, assets should be valued on the basis of replacement cost in cases where the IRR is equal to, or greater than, the cost of capital. However, where returns are excessively low — i.e. the IRR is less than the cost of capital — assets should be valued on the basis of the lower of PV or NRV. Thus, when assessing excessively low returns, the asset valuation basis may have to be modified. In any case, it may still be useful to start with the MEA basis. If the IRR is less than the cost of capital on this basis, the competition authority could go further and consider the PV and NRV of assets. This adjustment is relevant for all investigations involving excessively low profits, including predation, margin squeeze, state aid, and failing firms.

- Second, predation and margin-squeeze cases have a number of characteristics that complicate all aspects of the investigation, not just the assessment of profits. For example, predation and margin-squeeze cases often require a detailed cost-allocation exercise since they are typically concerned with specific lines of business. Moreover, cases of margin squeeze involve an often-complicated revenue-allocation exercise between upstream and downstream activities (see Box 6.3).

8.28   In addition, as discussed in Box 4.2, when assessing predation or margin squeeze, an IRR at or above the competitive benchmark (or a positive NPV) may not always provide conclusive evidence of the absence of anti-competitive low pricing. This is because a positive NPV would also be obtained in a situation of exclusionary pricing in the beginning of the period followed by monopoly pricing in the rest of the period. One possibility would be to assess the IRR or NPV over a shorter truncated period in order to exclude the period of monopoly pricing, but this would affect the robustness of the estimate. Another approach would be to take the low prices in the beginning of the period and, through an IRR or NPV analysis, assess whether these low prices would be sustainable (profitable) over the longer run. However, this may overlook the fact that pricing strategies involving initial loss-making prices are common, and often efficient, in dynamic markets or for new products.

8.29   For predation, the usual approach is not to consider profitability over a longer period, but rather to compare prices directly against a certain cost floor (usually variable or incremental costs — see Box 6.1). Negative margins would indicate predation. However, here, as with full profitability assessments, the question of

persistence arises again. How long do prices have to be below the relevant cost floor in order to establish predation? This question can only be answered by assessing margins or profits in conjunction with other competition indicators. For example, the length of the predation period is relevant for the feasibility of predation. Generally, the shorter the period, the less likely it is that competitors will exit the market, but the longer the period, the more costly the predatory strategy is likely to be. However, feasibility is also influenced by factors such as market shares and entry barriers. The higher the market share of the predator, the shorter the predatory period needs to be in order for competitors to be driven from the market.

Summary

8.30 The key policy implication is that profitability assessments using the methodology outlined in this paper — based on the IRR and proxy measures — are both relevant and feasible. There is a robust conceptual framework for assessing profitability which is based on economic theory and which can be used in competition policy analysis. This paper has defined the conceptual framework and developed a practical approach to profitability assessment in a structured way.

8.31 For some investigations the methodology can be used in a straightforward way, while in others some adjustments may need to be made. There are also situations where the availability of data is so limited that a profitability assessment is not possible.

8.32 Caution should always be exercised when undertaking profitability assessments and drawing conclusions from them. However, this holds equally for most of the other indicators and techniques commonly used in competition policy. Profitability analysis should be seen as one among a number of complementary economic indicators and techniques that can be used together in a competition policy analysis.

PART II: CASE STUDIES

9 OFT INVESTIGATION INTO NAPP PHARMACEUTICAL HOLDINGS

Background

9.1 This case arose following a complaint that Napp Pharmaceutical Holdings Limited and its subsidiaries (together referred to as Napp), through the use of discounts of over 90% on sales to hospitals, were preventing competitors from successfully entering the market for the supply of sustained-release morphine to hospitals and to pharmacies. The case raised a number of issues involving allegations of predatory pricing and excessive pricing by a dominant undertaking in the context of an industry subject to a form of profit regulation by the Department of Health under the Pharmaceutical Price Regulation Scheme (PPRS).

9.2 The decision to impose a penalty on Napp (OFT, 2001) was the first by the OFT to penalise an undertaking in relation to an abuse of a dominant position under the Competition Act 1998. Subsequent to the OFT's decision, it also became the first case to appear before the Competition Appeals Tribunal (CAT). The CAT largely upheld the OFT's decision and rejected the appellant's case (CAT, 2002).

9.3 This case study outlines the basic framework of the case, and the role that assessments of profitability played in the OFT's and the CAT's analyses.

Napp's dominant position

9.4 The investigation concerned the supply of pain-relief products designed to be administered to patients suffering from severe and chronic pain. For the purposes of the decision, the relevant market was found to be the supply of sustained-release morphine tablets and capsules in the UK. There are two main groups of customers within this overall market: hospitals and pharmacies which administer the prescriptions made by general practitioners (referred to in the decision as 'the community'). The hospital segment was particularly important, not in terms of volumes of sales, but because sales to the hospital sector positively influence

sales to the community sector, and entry into the hospital segment is generally seen as a prerequisite for entering the community segment of the market.

9.5　Until 1992, Napp held the patent for MST, the original sustained-release morphine tablet marketed in the UK. Despite the expiration of the patent in 1992, Napp had maintained a market share of over 95% in both market segments, in terms of both volume and value, for 1997, 1998, 1999 and the first half of 2000. For the same period Napp's share of supply to hospitals was approximately 80–90% by volume and 85–95% by value.

9.6　These high market shares led to a presumption of dominance, which was reinforced by the OFT's conclusion that there were high barriers to entry resulting from regulation, Napp's first-mover advantage, high sunk promotional costs, and strategic barriers to entry resulting from Napp's pricing strategy in the hospital segment.

9.7　A potentially relevant characteristic of the market is that the PPRS regulates the profit that companies may make from their sales of branded prescription medicines supplied to the National Health Service (NHS). More precisely, the PPRS sets a limit on the percentage ROCE that a company can earn on its sales of branded prescription medicines to the NHS. The limit in the current PPRS is a target ROCE of 21%, with a cap of 29.4% (calculated as the target rate plus 40%). The limit is applied across all the products that a company sells to the NHS, not individual products. Companies earning profits in excess of 29.4% are required to repay the excess to the NHS.

9.8　Napp used the profit regulation that is incorporated in the PPRS to refute the OFT's allegations that Napp held a dominant position. In particular, Napp argued that the control on profit effectively constrained its autonomy to set prices and maximise profits and therefore denied it the opportunity to possess a dominant position in relation to its supply of MST. However, given that the PPRS does not apply to specific products, but to aggregate profits on sales to the NHS, the OFT concluded, and the CAT concurred, that the PPRS did not constrain Napp's behaviour in such a way as to deprive the company of its dominant position (see, OFT, 2001, paras 122–137, and CAT, 2002, paras 161–168).

Napp's abusive pricing behaviour

9.9 The OFT concluded in its decision (para 236) that Napp was:

● supplying the hospital segment at discounts which aimed to hinder competition in the market. In particular, Napp was supplying hospitals at excessively low prices and targeting competitors both by supplying at higher discounts to hospitals where it faced or anticipated competition and by supplying at higher discounts on those strengths of tablets and capsules where it faced competition, and

● charging excessively high prices to customers in the community segment of the market.

9.10 Figure 9.1 is taken from the OFT's decision, and shows the significant fall in prices charged to the hospital sector between 1991 and 1996, compared with the stability observed in prices to the community sector over the entire period 1991–2000.

FIGURE 9.1 – HOSPITAL AND COMMUNITY INDEXED PRICES OF MST TABLETS (100 MG) Q1/91 = 100
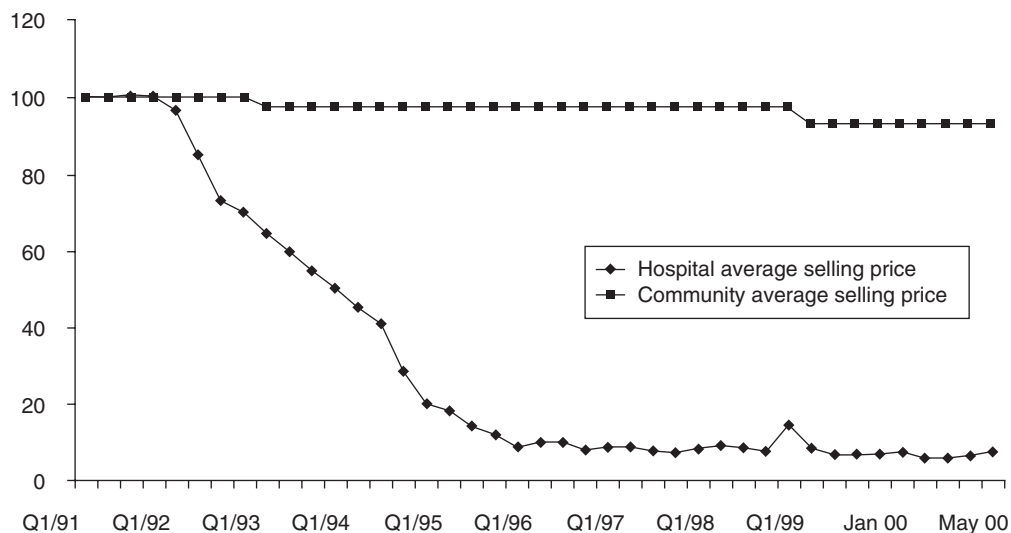
Note: Figures for 2000 are given monthly, not quarterly.
Source: OFT calculation based on data from OFT (2001), Chart 1.

9.11 The OFT undertook an analysis of profitability in order to reach the conclusions that Napp's pricing was at the same time excessively low in the hospital segment of the market and excessively high in the community segment.

Excessively low pricing

9.12   In the hospital segment, the OFT calculated the average price for seven different strengths of MST tablets, and compared these with the direct costs. Direct costs were defined in accordance with Napp's accounting systems as materials and direct labour, which the OFT took to be a 'close, but conservative approximation to average variable cost' (OFT, 2001, footnote 88). Labour costs were considered to be an avoidable cost in relation to the term of a (fixed-price) hospital contract of two years. Direct costs were considered to be a conservative estimate of AVC, as they did not include those production costs and overheads that would also be variable over a two-year period.

9.13   Where the hospitals were to be offering a sole regional contract, Napp's average prices for the period March to May 2000 were found to be 30–50% below direct costs, and even below the raw-material costs. The significance of this finding is that, following European jurisprudence (notably the tests set out in the *Akzo* judgement), prices below AVC, through which a dominant undertaking seeks to eliminate a competitor, must be regarded as abusive.[55] This is discussed further in Box 6.1.

9.14   Napp did not contest the finding that its prices to the hospital segment were around 30–50% below direct costs and did not even cover material costs (CAT, 2002, para 223). The company's counterargument was that it was not relevant to examine sales to hospitals alone. This is because sales to hospitals trigger subsequent sales to the community segment, either directly through brand loyalty, or indirectly through positive reputational effects. Napp's research found that 15% of patients receiving sustained-release morphine in the community have their brand determined by a hospital doctor. Given that the volume of sales to the community segment is considerably larger than the hospital segment, Napp argued that one unit sold to hospitals results — mechanistically — in 1.35 units being sold in the community segment. Napp therefore argued that it was necessary to look not just at the margins to hospital prices, but also at 'net revenue', which includes the compensating margins that Napp would obtain from the follow-on sales to the community segment.

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[55] Case C-62/86, *AKZO Chemie BV v Commission*, E.C.R. I-03359 (1993).

9.15   The OFT rejected this net-revenue argument for a number of reasons:

- the link between hospital sales and community sales was not mechanistic

- the price differentials between hospitals and the community had not increased overall sales of sustained-release morphine tablets. This was relevant because price discrimination that leads to increased sales is generally considered to increase consumer welfare, and

- Napp's net-revenue argument was circular — i.e. the reason Napp was able to earn such high margins in the community sector was because its discount policy in the hospital segment had hindered competition in the community segment (OFT, 2001, paras 193–5).

9.16   The CAT examined Napp's net-revenue argument in great depth (CAT, 2002, paras 171–333), but rejected it as insufficient to rebut the *AKZO* presumption that pricing below cost is abusive. In rejecting the argument, the CAT concluded that the net-revenue test suffers from a conceptual weakness and cannot distinguish between a dominant company's abusive behaviour and its legitimate competitive behaviour. This is because a dominant company may increase its net revenue and maximise its profits by pricing in a predatory manner in order to foreclose the market. Simply showing that the pricing behaviour is profitable in terms of net revenue does not prove that pricing below cost in the short term is not predatory and therefore abusive (see also Box 4.2).

Excessively high pricing

9.17   As a general principle, to reach the conclusion that prices are excessive and abusive, the OFT stated that it had to show that prices were higher than would be expected in a competitive market and that there is no effective competitive pressure, actual or potential, to bring those prices down to competitive levels (OFT 2001, para 203). Two methods for determining whether prices are excessive were set out in the OFT's decision:

- comparing prices — in particular, by estimating the likely competitive price of MST and comparing this with actual prices. For this, the OFT compared the prices of competitors with those that Napp charged elsewhere to ascertain whether the actual prices would enable Napp to earn a reasonable profit, and

- comparing profit margins on sales — assessing whether the difference between costs actually incurred and the price actually charged is excessive. The OFT sought to do this by showing that the profit margins earned by Napp on community sales compared with those that it earned on the sales of other products and on sales of MST to other markets.

COMPARISONS OF PRICES

9.18   The OFT's decision gives a number of price comparisons: between MST tablets and those of Napp's competitors; comparisons of MST prices over time; and between Napp's hospital prices, community prices and export prices.

9.19   Comparisons of prices with those of competitors showed that Napp's community prices were between 33% and 67% higher than those of the nearest competitor. The comparisons over time showed that, while Napp's hospital prices have fallen by over 90% since the entry of the first competitor in 1991, community prices had remained unchanged. Comparisons between Napp's prices for the community, hospitals and for export also showed significant differences between prices for the hospital and export markets, on the one hand, and those for the community market, on the other. By itself, this does not prove that prices to the community were excessive, especially given the finding that sales to the hospital segment were loss-making.

9.20   The OFT recognised that this analysis does not prove that prices were excessive, but stated in the decision that, on the basis that export prices were profitable, the 'size of the differentials is sufficiently large to suggest that Napp's profits on sales to the UK community are supra-normal' (OFT, 2001, para 221). These factors led it to conclude in the decision that Napp's prices to the community segment were excessive given the absence of effective competition. In preparing defence to Napp's appeal, the OFT estimated that Napp's prices were 'at least 15 per cent higher than they would be under competitive conditions' (CAT, 2002, para 370).[56]

9.21   In its appeal, Napp challenged the findings of excessive pricing on the grounds that its prices were in accordance with the principles of the PPRS and that the powers available under the PPRS would have prevented any attempt by Napp to

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[56] This estimate had not appeared in the OFT decision and there is no explanation given in the CAT judgment as to how this figure was calculated.

charge excessive prices for its products. It also challenged the findings on the grounds that the OFT should have been considering competition in a dynamic, rather than a static model, and should therefore have taken into account the relationship between high prices for innovative products and the incentives to innovate.

9.22   The CAT rejected Napp's appeal. In concluding on the issue of excessive pricing, the CAT conceded that the comparisons made by the OFT were reasonable, and that these comparisons supported the conclusion that Napp's prices were well above what would have been expected in competitive conditions (CAT, 2002, paras 397 and 442).

COMPARISON OF PROFIT MARGINS

9.23   Profitability was measured by gross profit margins, calculated by subtracting the average cost of goods sold from the average price, and then dividing by the average price. The OFT compared gross profit margins for 1996, 1997, 1998, 1999 and March–May 2000 between five categories of Napp's sales: MST to the community segment; MST to hospitals; total MST, all NHS sales; and NHS sales other than MST.

9.24   Data was obtained from data provider, IMS, and from PPRS returns. Some differences between the data were identified; for example, the cost of MST sold included distribution costs which were not included in the PPRS figures.[57] Therefore, other things being equal, the MST gross margin would be lower than if calculated under the PPRS methodology (OFT, 2001, footnote 135). Despite this and other adjustments which may have been made by the NHS to the PPRS figures, the OFT considered that the fact that the two sets of data come from different sources is less likely to lead to a lack of comparability between gross margins than between other measures of profitability. The OFT argued that this is because gross margins rely only on the turnover and cost of goods sold figures, and as such are less susceptible to variations resulting from, for example, different cost-allocation methods being adopted. This is valid if the cost of goods sold includes only direct costs incurred.

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[57] Further details of the costs included were not given in the decision.

9.25 The analysis showed that Napp earned a gross profit margin of more than 80% on sales of MST to the community, compared with a gross margin of between 30% and 50% on all other NHS sales.[58] Napp's next most profitable competitor earned a gross profit margin of less than 70%.

9.26 The above comparisons between Napp's profit margin on sales of MST and its competitors' sales do not allow for the fact that Napp manufactures MST tablets itself while its competitors contract out the manufacturing. Other things being equal, Napp is arguably entitled to earn a return on these manufacturing activities, which would lead to higher overall returns than earned by its competitors. The OFT therefore refined its calculations to incorporate a fair return. This involved recalculating Napp's gross margins using the average cost of goods sold of its next most profitable competitor (OFT, 2001, paras 226–9 and Table 9). The results of this comparison are given in Table 9.1.

TABLE 9.1 – NAPP GROSS PROFIT MARGIN FOR MARCH TO MAY 2000 FROM COMMUNITY SALES WHEN USING THE COSTS OF ITS NEXT MOST PROFITABLE COMPETITOR

Napp's average selling price[1]	£15.47
Average cost of goods sold (based on the next most profitable competitor)[2]	£3.01
Average gross margins	80.5%

Note: [1] Napp's average selling price to the community for those tablets where its next most profitable competitors sells tablets of the same strength. [2] Applies Napp's sales volumes to the community to the costs of goods sold per tablet strength of the next most profitable competitor to obtain the average cost of sales.
Source: OFT (2001), Table 9.

9.27 The revised calculation showed that Napp's gross margin (80.5%) remained significantly higher than the next most profitable competitor (less than 70%). The OFT concluded that, even allowing for a fair return on manufacturing, Napp's margins were significantly higher than those of its competitors. However, given the large difference in scale between Napp and its competitors, extreme caution should be exercised when making comparisons of this nature, as they apparently

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[58] For confidentiality reasons, precise figures were not disclosed in the OFT's decision and the CAT's judgement; hence, the figures presented here are in ranges only.

do not take into account the possibility that Napp may manufacture its products more efficiently than its competitors (given its larger scale).

Conclusion

9.28   This case raised a number of interesting issues and the OFT's analysis of Napp's profitability was central to the case. Not only was the profitability analysis used to prove that Napp's pricing to hospitals was predatory, but also analysis of gross margins was used as evidence that pricing to the community segment was excessive.

9.29   Importantly, the OFT did not rely on any single measure of predation or excessive pricing, but presented a range of indicators, all of which supported the OFT's overall conclusions that Napp had abused its dominant position.

10 COMPETITION COMMISSION INQUIRY INTO CALL TERMINATION CHARGES

Background

10.1   In 2002, following a referral by the Director General of Telecommunications, the Competition Commission carried out an inquiry into call termination charges by the four MNOs in the UK (Vodafone, Orange, O_2 and T-Mobile) to each other ('off-net' calls) and to fixed-network operators (fixed-to-mobile calls).[59]

10.2   The Commission found that, for the purpose of call termination, each network constitutes a separate relevant market and, hence, that each MNO has a monopoly on its own network. Competitive pressures on the MNOs at the retail level did not constrain the levels of termination charges. Instead, vigorous competition at the retail level for customer acquisition led to practices such as payment of incentives and discounts to retailers and handset subsidies to customers, which were funded by excess returns from termination charges. Therefore, the Commission had two main concerns:

● that callers to mobiles from fixed-line telephones or payphones who themselves do not own a mobile phone are subsidising mobile customers with no reciprocal benefit, and

● that the high prices of fixed-to-mobile calls, and the low prices of on-net calls tend to skew usage from the lower-cost fixed technology to the higher-cost mobile technology.

10.3   The main features of the Commission's findings, explained in detail in this chapter, are as follows.

● Termination charges should in principle be cost-reflective.

● The most appropriate method for determining the costs of termination is the LRIC approach.

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[59] See Competition Commission (2003a). A termination charge is a wholesale charge made by one operator to another for connecting calls to a telephone on its network. An MNO does not charge itself for calls made between two people who subscribe to its network ('on-net' calls). The Commission inquiry was therefore concerned with the level of call termination charges made by the four MNOs for fixed-to-mobiles and off-net calls. At the time of the review, both Vodafone and O_2 were already subject to price caps on their termination charges by Oftel.

- There are costs that are fixed and common to other services provided by MNOs — e.g. incoming and outgoing calls and data. These costs were allocated according to the cost-causation principle, such that the Commission only allowed costs that the caller causes. (However, the Commission only recognised a very small amount of fixed and common costs.) The Commission rejected arguments that Ramsey pricing should be applied (see paragraph 10.15). In any case, as the Commission determined that the proportion of fixed and common costs was relatively low, the rejection of Ramsey pricing did not make a significant difference to the results.

- A mark-up to the cost of call termination was allowed for relevant non-network costs, and

- A small mark-up over the LRIC of call termination was allowed for the externality effects in a telephony network.

10.4 Based on its cost assessment, the Commission concluded that current termination charges are 30–40% in excess of a 'fair charge', this being based on the LRIC of call termination, including relevant network and non-network fixed and common costs, plus a small allowance for externalities. RPI – X price caps were therefore recommended.[60] The Commission allowed for a slightly lower X factor (i.e. a smaller price reduction) on 1,800 MHz operators (Orange and T-Mobile) than for the combined 900/1,800 MHz operators (Vodafone and O_2), on the grounds that the costs of the former would be higher than those of the latter.

Costs of call termination

10.5 The costs incurred in providing a call termination service are of two types:

- network costs — the costs directly associated with enabling calls to be made, which cover site acquisition, base stations and other network infrastructure to provide coverage, and

- non-network costs — the costs not directly associated with enabling calls to be made, which cover, for example, customer acquisition and retention, customer-care services and administration.

10.6 Termination of incoming voice calls is only one of a number of services provided by MNOs, alongside outgoing voice calls, incoming and outgoing data

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[60] Under an RPI – X price cap, the MNO's prices must not rise by more than the increase in the retail price index (RPI) less the X factor, which represents achievable efficiency gains. In particular, the Commission determined that Vodafone and O_2 should lower prices by RPI – 15% each year until 2006 and Orange and T-Mobile by RPI – 14%.

transmission, and messaging services. Most equipment in a network is used to provide more than one service, hence there has to be some allocation of costs across the individual services.

10.7 In determining the cost of call termination, the Commission assessed the following:

● the network costs of call termination

● the non-network costs of call termination, and

● a mark-up to take into account the network externality effects in telephony services.

Network costs: the bottom-up LRIC model

10.8 The Commission considered that LRIC was the appropriate basis for estimating the network costs of call termination, as it identifies costs that are directly caused by a particular service. Under the LRIC approach, the additional costs that the MNO incurs in the long run by providing a service are considered, and then the costs that are not incremental to any individual service (i.e. common costs) are allocated in an appropriate manner. The LRIC includes an allowable rate of return, based on the cost of capital estimated by the Commission using the CAPM.

10.9 The Commission considered the LRIC of providing call termination on a second-generation network only.[61] The Commission rejected the MNO's arguments that higher termination charges should be allowed to finance the roll-out of third-generation services. Instead, it took the view that third-generation services are an incremental investment and should not be subsidised by second-generation services (Competition Commission, 2003a, paras 2.417–42).

10.10 The Commission used the Director General of Telecommunication's bottom-up cost model as the basis for determining the LRIC of call termination. Five issues had to be addressed when specifying the model:

● the time period over which cost behaviour would be considered

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[61] Second generation refers to the spectrum within the 880–915 MHz, 925–960 MHz, 1,710–1,785 MHz or 1,805–1,880 MHz bands. Third generation refers to spectrum within the 1,900–1,980 MHz, and 2,110–2,170 MHz bands. Third-generation mobile communications systems have a much larger capacity to provide an enhanced range of services (e.g. high-speed Internet access).

- the definition of the increment

- the definition of common costs, and how they should be recovered

- the level of efficiency to be assumed, and

- the depreciation method to be used.

These are examined below.

10.11 *The time period over which cost behaviour would be considered* — the Commission decided that the long run is the appropriate period for considering costs. The long run, in this case, refers to the period that the MNO has complete flexibility with regard to how the network is configured. Flexibility refers to both a technical aspect (i.e. it is technically feasible), and an economic aspect (i.e. an efficient level of cost can be achieved and recovered). If a shorter period were to be considered, some cost components would be incremental while others may be fixed.

10.12 *The definition of the increment* — there are two ways to determine the cost of the call termination service:

- define the increment as the call termination service and calculate the LRIC of that service in isolation, or

- define the increment as the traffic on all services (e.g. incoming and outgoing voice calls, incoming and outgoing data transmission and short messaging services) and then allocate some of the cost of the increment to the call termination service using the appropriate routing factors. Routing factors are measures of the relative use that each service makes of each type of network equipment.

Since the timeframe of analysis was the long run, all equipment costs could vary within that time period. Therefore, the Commission decided that the difference between the two methods above would be small. Hence, it decided to use the second method, which had already been adopted in the Oftel LRIC model.

10.13 *The definition of common costs and how these should be recovered* — as the increment was defined as the traffic on all services, it would include costs that are directly attributable to call termination, together with costs that are common across the various services included in the increment. The question then arises as to how common costs are defined, as this would determine the costs that are

fully allocated to a particular service and those that would be allocated across a range of services.

10.14 The Commission defined common costs as those that could not be scaled down if one service ceased. As such, it considered that, strictly speaking, the only common costs are those relating to site acquisition and the lease costs of the minimum number of base stations required to provide coverage across the UK and the network management system. Equipment costs were not allowed, as the Commission argued that the amount of equipment needed could be scaled down if one activity ceased, particularly since the period of assessment is the long run.

10.15 The MNOs argued that common costs should be allocated according to Ramsey pricing.[62] However, according to the Commission, in the circumstances under investigation the regulation of termination charges on a Ramsey basis would only be efficient if the retail market was competitive such that retail prices were also set at Ramsey levels. The Commission, however, concluded that the retail market was not fully competitive. The Commission therefore rejected the Ramsey approach because it was inconsistent with the cost-causation principle. Further, it also saw the following difficulties had it sought to pursue Ramsey pricing:

- setting Ramsey-based termination (wholesale) charges would require other relevant prices (e.g. retail prices) to also be set at Ramsey levels, and the Commission did not consider that the MNOs would do so

- it would be difficult to obtain reliable estimates of elasticities of demand, and

- it would lead to distributional inequities.

10.16 Instead, the Commission concluded that common network costs should be allocated based on a cost-causation approach.

10.17 *The level of efficiency to be assumed* — the Commission took the view that the costs should ideally be based on a reasonably efficient operator. However, it also recognised that, in using a bottom-up LRIC model, there was a risk that the model

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[62] As explained in Chapter 6, according to the Ramsey pricing principle, it is economically efficient to recover a relatively larger part of common costs from those customers whose demand is relatively more inelastic (i.e. less sensitive to price changes). In other words, under Ramsey pricing, costs would be allocated according to the customers' willingness to pay. It could be argued that, in competitive markets, departures from cost-reflective pricing would not matter as, overall, no persistent excess profits would be made.

had created an unrealistic hypothetical network. In addition, the unit costs of termination could vary between MNOs, depending on their relative market shares — smaller MNOs might have higher unit costs. The Commission therefore allowed an adjustment to reflect the differences in market shares. This adjustment applies until 2006 only, by which time the Commission assumed that the market shares of all the MNOs (including the fifth new entrant, H3G) would roughly equalise.

10.18 *The depreciation method to be used* — the depreciation schedule would affect the time profile of costs and charges. For example, using a schedule in which depreciation was higher towards the end of the asset's lifetime would imply that relatively higher costs (and therefore charges) are incurred in the later years. In this case, the Commission applied economic depreciation in the LRIC model. Economic depreciation is calculated as the change in the MEA value of the asset over the period in question.[63] This amount of depreciation is then allocated across the years based on the utilisation of assets. In other words, there is relatively little depreciation in years where utilisation is low and relatively high depreciation where there is full utilisation.

10.19 The Commission checked the accuracy of the LRIC model by comparing its cost predictions to actual costs using the MNOs' 2001 data. The model was then adjusted to reflect any differences between its predictions and actual data. In applying the adjusted LRIC model to predict future costs, forecasts were required on cost trends, such as the cost of new equipment and site rental and lease costs.

Non-network costs and network externalities

10.20 Turning to non-network costs, the question arises as to whether any of these should be allocated to call termination service. In its assessment, the Commission considered the following criteria:

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[63] The total amount of depreciation over, for example, ten years, of an asset bought for £100 and with an MEA value of £20 at the end of period 10 would be £80. This £80 would then be spread across the ten years based on the relative utilisation of assets over those years. The concept of economic depreciation was first introduced by Hotelling (1925) in terms of changes in the PV of the income generated by the asset — i.e. economic depreciation was defined as the period-by-period change in the PV of income generated. In competitive markets, however, entry will occur until the PV of income equals the MEA value of assets.

- is the cost common to termination and other services in the long run — if so, on what basis should it be allocated to the services?

- if it is not common, should it be allocated to terminating calls for either of the following two reasons:

    - callers to mobiles cause the MNOs to incur the costs — i.e. the costs are caused by call termination services, or

    - callers to mobiles benefit from the cost incurred?

10.21 The Commission decided that most non-network costs were not common costs, nor was there any evidence that the callers to mobiles either caused the costs or benefited from the costs. It therefore refused to allow many of these costs (e.g. handset subsidies, customer care and billing) to be recovered from call termination. Only administration costs (e.g. head office functions, corporate IT, human resources and property costs) were allowed. The Commission decided to allocate these across all business areas, as it considered the purpose of these costs to be to support all areas of business. The allocation was in proportion to the incremental cost of each business area.

10.22 With regard to externalities, the Commission recognised that, in telecommunications, there are 'network effects' — the more people who join a particular network, the more benefits there are to everyone on the network, because each subscriber can call, or be called by a larger pool of people. Such network externalities could justify a surcharge on call termination services, which would be used to provide a subsidy to encourage more subscribers to join the network. The Commission allowed a (small) mark-up on the termination charge to take into account of the network externalities.

Summary

10.23 There are two conclusions arising from the Commission's decision that are particularly relevant to profitability assessment.

- First, for the purposes of the inquiry into mobile phone termination charges, the Commission clearly rejects the principle of Ramsey pricing as the basis for allocating common costs (although the regulation proposed would allow the MNOs to set Ramsey-type prices in the termination market). It relies instead on the principle of cost causation, where costs are allocated according to their originating cause.

- Second, the recommendation of a price cap implies that the Commission found current prices to be excessive — i.e. that the MNOs were making excessive returns from call termination. This is particularly relevant given the potential for inconclusive results in estimating costs and the uncertainty in future market conditions (from both a cost and a demand perspective).

10.24 According to the Commission's recommendation, each MNO would be required to reduce its average termination charge by 15% in real terms by July 2003. For three years thereafter (up to March 2006), O_2 and Vodafone are required to reduce charges further by RPI – 15 annually. Orange and T-Mobile are subject to a cap of RPI – 14 in each year. With these reductions, the MNOs call termination charges are expected to be cost-reflective by 2006 (see Table 10.1). The Commission opted for a gradual (glide) path towards cost-reflective pricing instead of an immediate and complete adjustment, as it considered that the latter approach could be disruptive and create an unacceptable range of adjustment costs to customers.

TABLE 10.1 – SUMMARY OF CALL TERMINATION COST AND ALLOWABLE CHARGES (2000/01 PRICES, PENCE PER MINUTE)

	Year ending			
	March 2003	**March 2004**	**March 2005**	**March 2006**
Combined 900/1,800MHz				
Total cost	6.2	5.6	5.1	4.7
Allowable charge	9.0	6.8	5.6	4.7
1,800 MHz				
Total cost	7.0	6.3	5.7	5.3
Allowable charge	9.6	7.3	6.1	5.3

Source: See Competition Commission (2003*a*) Tables 2.11 and 2.12. The total cost is calculated assuming an 11.25% cost of capital.

11 COMPETITION COMMISSION INQUIRY INTO SUPERMARKETS

Background

11.1   In April 1999 the OFT made a referral to the Competition Commission relating to the supply of groceries from supermarkets ('multiple stores') in the UK.[64] The Commission was asked to ascertain whether a situation of complex monopoly existed in the industry, and, if so, whether it was operating against the public interest. The referral followed an eight-month investigation by the OFT into the grocery industry, which had been prompted by a general perception that prices charged by multiple stores in the UK for groceries were significantly higher than those charged by comparable stores in the rest of the EU.

11.2   One of the sources of concern that triggered the OFT's referral to the Commission related to some preliminary evidence of excessive profitability in the industry.[65] Profitability analysis played a major role in the inquiry, as the Commission undertook its own profitability study to validate the OFT's preliminary findings. This case study outlines how the Commission employed profitability analysis at the different stages of the investigation.

11.3   The inquiry was conducted in two stages. The first focused on assessing whether the main supermarkets were able to exercise any degree of market power (either as a seller or a buyer). At this stage, the analysis of the sector-wide profitability was instrumental to the assessment of their degree of market power. This was based on a detailed analysis of three areas: the combined profitability of a selected number of major supermarkets; the level of profitability of selected grocery suppliers; and international comparison of grocery prices.[66]

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[64] For the purposes of the investigation, multiple stores ('the reference stores') were defined as supermarkets with 600m^2 or more of grocery sales area, where the space devoted to the retail sale of food and non-alcoholic drinks exceeds 300m^2, and which are controlled by a party that has at least ten stores. The Commission identified 24 multiple grocery retailers. The following products were included in the definition of groceries: food, alcoholic and non-alcoholic drinks, cleaning products, toiletries and household goods. All the other products commonly sold in multiple stores (e.g. newspapers and pharmaceuticals) were excluded from the investigation, on the basis that they tend to be bought from specialists or local shops as well.

[65] The OFT looked at the profitability of the four largest supermarket chains (Tesco, Sainsbury, Safeway and Asda) over five years (1993–98).

[66] In its international price comparison exercise, the Commission covered the UK, France, Germany and the Netherlands, all of which have well-developed grocery markets and widespread penetration of multiple stores.

11.4 The aim of the second stage was to identify whether some of the main supermarkets were exploiting market power by engaging in anti-competitive practices. This involved analysing the supermarkets' conduct in relation to their pricing practices (e.g. local 'price flexing', focused price competition, umbrella pricing and below-cost selling) and their relationship with grocery suppliers.[67]

Assessment of sector-wide profitability

11.5 In assessing the profitability of multiple retailers, the Commission looked at the overall financial performance of 11 of the UK's main supermarkets (excluding discount stores and cooperatives) and compared their sector-wide profitability with the following benchmarks:

- other UK food and drug retailers

- 19 food producers and processors, and

- the aggregated results of over 650 UK industrial and commercial companies.

11.6 For this particular analysis the Commission focused on two measures of profitability: ROS and RONOA.[68] As shown in Table 11.1, the average ROS of the 11 main supermarkets analysed was found to be slightly higher than that of the other food and drug retailers and that of the food producers and processors, but significantly lower than that of the commercial and industrial group. The average RONOA for the 11 multiple stores was found to be slightly lower than the level of the benchmarks.

11.7 The Commission also undertook a profitability analysis using overseas multiple stores as an alternative benchmark. For this, the following three measures of profitability were computed: gross margins, ROS and ROCE. The Commission considered ROCE to be a more appropriate measure of profitability than RONOA for the purposes of international comparability, on the basis that the ROCE

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[67] Local price flexing refers to the extent to which any of the parties were able to exploit their market power by charging higher prices in areas characterised by limited competition. Price focusing is defined as the practice of focusing price competition on a limited range of high-selling products, on which consumers' perception of the general level of pricing in a store is based. Umbrella pricing refers to the practice of setting the price of own-label products in relation to their corresponding branded products instead of their underlying costs.

[68] RONOA is operating profits over net operating assets, where net assets are defined as operating working capital plus total long-term assets, minus interest-bearing long-term liabilities.

captures total investment, including intangible assets such as goodwill, which turns out to be a significant component of the balance sheet of the non-UK companies covered.

11.8 The average gross margins of the UK main supermarkets were found to be higher than those of their European counterparts. According to the Commission, the difference could be partly explained by the much higher penetration of own-label products in the UK.[69] For the international comparison, operating profits of UK companies were restated for depreciation to reflect differences in the estimated useful life of assets, in particular buildings and construction-related assets.[70]

11.9 The Commission also examined the IRRs achieved by the grocery businesses of the five major supermarkets for the periods 1993–99 and 1996–99, and compared these with their WACC.[71] The Commission pointed out that a degree of caution should be exercised in relation to this measure of profitability, given that there is no presumption that, in a competitive environment, companies' returns should equal their cost of capital, owing to the potential for 'survivor bias'. Survivor bias relates to the fact that, in an industry where some companies earn more than their cost of capital and others less, if some of the latter companies cease to operate, the average IRR of the surviving companies will exceed their cost of capital, even if they operate in a fully competitive environment (see also paragraphs 3.12 and 8.12–8.17 for other reasons for IRR exceeding cost of capital). Notwithstanding this caveat, the Commission pointed out that the IRR measure is appropriate to capture any evidence of market power in the industry.

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[69] Gross margins on own-label products are generally higher than those of branded products, given that retailers need to cover certain costs which, in the case of branded products, are borne by the supplier. In many cases supermarkets seek to achieve a cash margin on own-label products that is similar to that achieved on the branded equivalent, because the supermarkets' operating costs relating to both are similar. As the purchase cost of own-label products and the resulting price are typically lower, the same cash margin converts to a higher percentage margin.

[70] The UK multiple stores depreciate buildings and construction-related assets over an average period of 40 years, compared with an average of 18 and 20 years for other European and US retailers.

[71] The Commission also considered whether any upward adjustments to the IRR estimate were required to account for possible inefficiencies in the industry. For example, it had found evidence that two of the major parties had higher costs than the others. In one case, these higher costs were due to a cost disadvantage, attributable to smaller stores and higher distribution costs; in the other, the Commission estimated that there was a potential annual cost saving to be made of around £150m. In both cases, there was evidence that profitability had suffered accordingly, so that shareholders rather than consumers were bearing the consequences. However, the Commission found that the effect of these inefficiencies on the estimated industry profitability was minimal.

11.10 The IRR for each of the five supermarkets was calculated by treating the 1993 asset valuation as a cash outflow and the 1999 valuation as an inflow, which is consistent with the truncated IRR methodology described in Part I of this paper. The Commission then derived a weighted average based on a combination of turnover and fixed asset weightings.

11.11 In light of the available evidence, the Commission concluded that, whether compared with other UK industries, overseas grocery retailers or the cost of capital, there was no indication of excess profitability in the industry for the period 1996 to 1999. Moreover, the fact that some companies performed far better than others was considered a reflection of the success of individual companies' strategies, and, thus, an indicator of intense competition in the market. On the other hand, the Commission also found some evidence that profitability had been higher in the industry before 1996.

11.12 Table 11.1 (overleaf) presents a summary of the results of the profitability analysis. Where the analysis has been conducted over a certain time period, the results reported are the average for the period. Lowest and highest sector-wide profitability levels over the period are also reported.

Profitability of grocery suppliers

11.13 The perception that grocery retailers were able to exercise buyer power over suppliers was one of the concerns that triggered the referral of the investigation to the Commission. As part of the assessment of the degree of buyer power held by the major supermarkets, the Commission computed the gross margins earned by 19 large suppliers selling most of their products to the main supermarkets. The analysis indicated that all suppliers, irrespective of their size, were able to achieve higher margins from small retailers than from the major buyers. The exercise also showed a negative relationship between gross margins and volume of sales, in particular for branded goods. On the basis of this evidence, the Commission concluded that at least all the major supermarkets were able to exercise a significant amount of buyer power by controlling their relationship with their suppliers to their advantage.

TABLE 11.1 – SUMMARY OF RESULTS OF PROFITABILITY ANALYSES IN THE SUPERMARKETS INQUIRY

Method and timeframe	Companies	Results (%)	Benchmark	Benchmark results
Gross margins				
1997–99	Five major supermarkets[1]	Average: 24.8 Lowest: 24.5 Highest: 25.1	Overseas multiple stores[2]	Average: 23.2 Lowest: 22.5 Highest: 23.8
ROS[3]				
1995	Multiple stores (except hard discounters and retail cooperative societies)[4]	5.4	11 other UK food and drug retailers	5.2
			19 UK food producers and processors	4.3
			650 UK commercial and industrial companies	11.5
1997–99		Average: 5.0 Lowest: 5.0 Highest: 5.1	Overseas multiple stores	Average: 4.3 Lowest: 4.0 Highest: 4.7
RONOA[5]				
1995	Multiple stores (except hard discounters and retail cooperative societies)	17.4	11 other UK food and drug retailers	16.2
			19 UK food producers and processors	18.1
			650 UK commercial and industrial companies	19.1
ROCE[6]				
1997–99	Five major supermarkets	Average: 15.5 Lowest: 15.4 Highest: 15.8	Overseas multiple stores	Average: 19.1 Lowest: 16.8 Highest: 20.3
IRR				
1993-99	Five major supermarkets	17.0	Average pre-tax nominal WACC	13.0
1996-99		13.7		12.6

Notes: [1] Tesco, Safeway, Sainsbury, Asda and Morrison. [2] Wal-Mart, Safeway Inc, Ahold, Delhaize, Carrefour. Two other overseas multiple stores, Metro and Promodes, were excluded from the analysis because a large proportion of their business was wholesale activities, which could have distorted the profitability assessment. [3] Operating profits of UK multiple stores were adjusted for depreciation so as to obtain figures that are comparable with the international benchmarks. [4] Tesco, Safeway, Sainsbury, Asda, Morrison, Somerfield, Iceland, M&S, Waitrose, Booth and Budgens. [5] RONOA was calculating using the average of beginning- and end-of-year net operating assets. [6] ROCE was calculated using the average of beginning- and end-of-year capital employed.

Summary

11.14 In the supermarket case, the Commission employed a range of measures to assess the profitability level in the supply of grocery products. It was satisfied that, overall, all the profitability measures did not show evidence of excessive profitability in the industry. Although the Commission did not rely on one particular measure of profitability to draw its conclusions, it did point out that some measures may be more reliable than others, depending on the characteristics of the industry and the nature of the comparators. In particular:

- the IRR, although sensitive to the chosen timeframe of the analysis and to the 'survivor bias', was considered an appropriate indicator of market power. Indeed, the supermarket inquiry has been the only competition investigation thus far that has used the truncated IRR method described in this paper, albeit in conjunction with other profitability measures

- in contrast to the IRR, operating margins, ROCE and RONOA are all sensitive to the profile of depreciation, and

- gross margins can be a useful indicator of profitability for companies with a similar cost base. Otherwise, higher gross margins may be an indicator of higher overheads rather than higher profitability. Table 11.1 shows that higher gross margins for UK companies did not translate into significantly higher operating margins or ROCE, probably due to the higher capital costs associated with food retailing in the UK, which in turn reflected higher land prices or construction costs.

12 MMC INQUIRIES INTO CONTRACEPTIVE SHEATHS

Background

12.1   The MMC has undertaken three monopoly investigations into the supply of contraceptive sheaths in the UK (MMC 1975, 1982 and 1994*a*). In all three investigations the same company, LRC Products Limited (LRC), a subsidiary of LRC International Ltd,[72] was found to be in a position of a scale monopoly.[73] The MMC's objective was to investigate whether a monopoly position existed in relation to LRC, whether LRC's behaviour was against the public interest, and, if so, to make recommendations on how the adverse effects could be remedied.

12.2   Assessments of profitability played an important role in each of these investigations and were used to gauge whether, in the light of prevailing and expected competitive conditions in the market, LRC's behaviour as a monopolist was against the public interest. In other words, the MMC investigated whether LRC's position gave it market power that it was able to exploit in order to earn excessive profits on its supply of condoms in the UK.

12.3   Since 1939, LRC has been the principal — and at times the only — supplier of condoms in the UK, selling mostly under the Durex brand name. LRC consistently accounted for well over 90% of the UK market until the advent in 1987 of a new competitor, Mates (MMC, 1994*a*, para 3.5). By 1992/93 the MMC estimated that LRC's share of the UK market had fallen to 75%.

12.4   LRC also produces a wide range of other products, from balloons to cough syrups. The focus of the MMC's investigations was on LRC's Protectives business, which included the manufacture and sale of condoms in the UK (the reference business), as well as a small diaphragm and spermicidal jelly and lubricant business.

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[72] Before 1982, LRC Products Ltd was known as LR Industries Ltd. For simplicity, this case study refers to LRC in all cases. By 1994, the parent company, LRC International Ltd, had changed its name to London International Group plc.

[73] Under the Fair Trading Act 1973, a scale monopoly situation is considered to exist when at least 25% of the goods in a market are supplied by a single entity. The first of the MMC's investigations into contraceptive sheaths was made under the Monopolies and Restrictive Practices (Inquiry and Control) Act 1948, which defined a scale monopoly as a situation where a single entity supplied at least a third of the relevant goods. (These provisions have now been replaced by the provisions on market investigations under the Enterprise Act 2002 — see section 1.3.)

12.5   There are three main supply channels for condoms in the UK:

- NHS family-planning clinics

- over the counter, including pharmacies, garages, mail order, and, in the earlier period of investigation, barber shops, and

- vending machines — in, for example, railway stations, hotels, restaurants and public houses.

12.6   Condoms have also been imported into, and exported from, the UK. LRC's Chingford plant produced condoms both for supply in the UK as well as for export. This plant was the only site in the group that manufactured condoms, although it also produced other items, such as surgical gloves.

12.7   The MMC's investigations relied principally on the ROCE as the measure of LRC's profitability in the condom business. Since the Chingford plant produced other products in addition to condoms, the costs incurred and capital employed at Chingford had to be allocated between the various lines of business.

Allocation of capital employed and costs

12.8   The calculation of the capital employed for the reference business involved the allocation of:

- certain costs of the parent group to LRC

- some of LRC's costs to the Protectives product group

- the Protectives product group's costs to condoms and other products, and

- condom costs between the reference business and exports.

12.9   In the 1975 report relatively little explanation was given as to how costs were allocated. In part, this reflects the fact that, while LRC cooperated with the MMC to produce ROCE figures for all condoms manufactured in the UK, the MMC stated that LRC was not prepared to assist in estimating the capital employed in the reference business, leaving the MMC to recommend its own estimation techniques (MMC, 1975, para 109). The MMC proposed two fairly basic methods for apportioning capital in order to estimate the capital employed in trading in condoms in the UK alone. These were to apportion capital on the basis of the ratio of:

- the variable costs of home trade sales to the variable costs of all condoms manufactured in the UK (method 1)

- home trade sales to all sales of condoms manufactured in the UK (method 2).

12.10 Method 1 was preferred since apportionment pro rata with sales would have reflected the much higher rates of profit earned in the UK trade and would therefore have unduly weighted the allocation of capital towards the UK business. In other words, using sales to allocate capital employed would have led to a measurement problem owing to circularity. As the company earned relatively higher returns on its UK sales than on its exports, allocating capital on the basis of sales would have caused a relatively high proportion of capital employed to be allocated to the UK business. In turn, this would have reduced the measured return on capital employed.

12.11 In the 1982 report, relatively more sophisticated allocation techniques were applied. To a large extent this was because LRC had begun to prepare ROCE information for the reference business on an annual basis in order to facilitate monitoring of the undertakings imposed following the 1975 report.

12.12 Costs were first allocated between the Protectives business and other businesses, as follows:

- *land and buildings* — costs were allocated on the basis of the area occupied by Protectives operations (57% usage of the total area in each of the years 1973–74 to 1981–82

- *plant and machinery* — certain types of plant and machinery were allocated on the basis of the area occupied (e.g. general plant, canteen, internal transport); other types were allocated on the proportion of Protectives turnover (e.g. warehouse general plant, company cars), and

- *fixed (overhead) costs* — costs that could not be directly assigned to individual product groups were allocated using allocation methods similar to those above. For departments generating common manufacturing costs, a related base was used. For example, the cost of the purchasing function was allocated according to the material value of each product group and the cost of the engineering department according to the historical pattern of routine maintenance jobs. Where a cost did not lend itself to a logical spread, LRC ascertained the opinion of the relevant manager. The final allocation methods included the following:

– sales and marketing, and group management costs were mainly allocated on the basis of sales

– administration and finance were allocated on the basis of sales and headcount, and

– R&D costs were allocated according to the views of the respective managers.

12.13 Within the Protectives business, approximately 55–60% of all costs could be directly charged to the reference business and therefore involved no allocation process. The remaining costs and capital employed needed to be allocated to the different lines of business. In this regard, one significant difference from the 1975 report was that the company provided its own calculations of the capital employed in the reference business. The methods LRC used to calculate the capital employed, detailed below, were closely related to the two methods the MMC used in the 1975 report (MMC, 1982, para 6.5). As was the case in 1975, the first of these was preferred.

● Capital employed was allocated on the basis of the variable costs of labour and materials on UK condoms in a financial year as a proportion of the total condoms variable cost of labour and materials in that year. This was a slightly narrower basis of variable costs than used by the MMC in 1975

● The second method was the same as the MMC's second method in its 1975 inquiry, apportioning costs on the basis of UK sales of condoms to total Protectives sales.

12.14 Finally, the allocation methods employed in 1994 closely mirrored that in 1982. The main difference was that no equivalent of the second method in 1982 was used in 1994. Instead, the fixed assets other than vending machines were allocated on the basis of UK cost of sales as a proportion of total cost of sales, and vending machines and all the working capital were allocated to the reference business.

12.15 The allocation procedure had to change in relation to the 1992/93 figures, as LRC reorganised its production facilities, with the result that the Chingford plant manufactured condoms only, and no longer manufactured surgeons' gloves. While this simplified the allocation procedure, it also meant that the capital employed allocated to the condom business increased, even though the underlying operations of the condoms business did not change, thereby reducing the measured ROCE, assuming other factors remained unchanged.

Estimation and interpretation of profitability measures

12.16 In each of the three reports, the MMC focused on the ROCE as a measure of LRC's profitability in the condom business. In each report, the ROCE for the reference business was compared with the LRC Group ROCE and the ROCE for all condoms manufactured at Chingford. Other comparators, such as the average returns for quoted companies in UK manufacturing industry and the ROCE of Mates, the new competitor, were also used. The ROCE was calculated using the trading profits figures submitted by LRC and estimates of capital employed in the reference business, following the allocation procedures described above.

THE 1975 REPORT

12.17 The 1975 report presented figures for 1969 to 1973 separately, and a five-year average (see Table 12.1).

TABLE 12.1 – ROCE MEASURES FOR LRC AND UK MANUFACTURING, 1969–73

ROCE (%)		1969	1970	1971	1972	1973
LRC International Group		20.2	17.8	22.2	19.6	20.7
Home condom trade	Method 1	152.2	130.8	149.2	113.4	130.8
(reference business)	Method 2	118.7	100.5	102.9	88.8	95.5
Overseas condom trade	Method 1	29.6	17.4	22.0	29.0	31.8
	Method 2	42.8	25.4	31.5	38.6	44.2
All LRC's condom trade		93.6	75.8	73.0	68.9	74.6
Group products other than condoms		5.7	7.7	13.7	12.8	13.9
UK manufacturing		12.5	11.5	12.6	14.8	n.a.

Source: MMC (1975), table following para 109.

12.18 The MMC's final stage in the profitability analysis was to analyse the financial performance of the UK vending-machine trade in relation to that through the two other supply channels (NHS and over the counter). This part of the analysis did not seek to estimate ROCE, but rather to establish whether the vending-machine activities were making a trading profit. For this, the MMC needed to apportion costs between vending machines and other outlets. LRC did not do this routinely.

This analysis showed that, in the decade up to 1972/73, the vending-machine business had been operating at a trading loss.

12.19 Following its assessment, the MMC came to the following conclusions:

- owing to its monopoly position, LRC was able to obtain excessive profits on the reference goods, leading to higher retail prices than otherwise

- LRC's vending-machine business was operating at a loss, leading the MMC to conclude that these activities were undertaken more with a view to defending LRC's monopoly position than for the purposes of making a profit in the vending-machines business (MMC, 1975, para 240), and

- LRC's average selling price should be reduced by 40%, or, in the face of increasing costs, there should be a 20% reduction in the ROCE. The final undertakings offered allowed for a maximum ROCE on a historical-cost basis of 35.5%.[74]

THE 1982 REPORT

12.20 In its 1982 report, the MMC compared the information it received with that provided to the OFT, which was responsible for monitoring LRC's compliance with the price caps imposed following the previous inquiry, in order to highlight the uncertainty involved when allocating costs to different parts of a business. The data differed largely because the information provided to the OFT included no charge for group management expenses. The MMC also calculated a current-cost accounting (CCA) ROCE, in addition to that calculated on a historical-cost basis.

12.21 The 1982 report presented results for 1974 to 1982 (see Table 12.2). In contrast to the 1975 report, and the subsequent 1994 report, no comparisons were made with the ROCE obtained in the UK manufacturing sector as a whole.

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[74] This figure of 35.5% came from the negotiations subsequent to the 1975 report between LRC and the relevant authorities. These enabled prices to be set to yield a profit of £525,000 for 1975/76, representing a ROCE of 35.5%. See MMC (1982), para 4.3.

TABLE 12.2 – ROCE MEASURES FOR LRC, 1976–81

%	1976	1977	1978	1979	1980	1981	1982
LRC International Group			15.4	12.4	13.5	15.5	15.0
Group products other than condoms			8.5	8.6	6.4	12.0	16.3
Home condom trade (reference business):							
HCA ROCE (MMC data)	36.5	13.8	17.4	14.8	26.0	32.9	31.8
HCA ROCE (OFT data)	64.2	29.2	28.5	19.6	30.1	40.1	
CCA ROCE						21.9	

Source: MMC (1982), Tables 6.1, 6.2, 6.4 and para 6.10.

12.22 The MMC made no public-interest finding in relation to the rates of return it calculated. It specifically stated that this did not imply any form of judgement on whether the rates of return found were generally acceptable. Nonetheless, following the removal of the 1975 price-cap undertakings, the MMC concluded that LRC would be able to charge excessive prices for the reference goods in the future, and that this would be against the public interest. Thus, the MMC recommended, and LRC offered, an undertaking such that its prices were subject to price regulation. Specifically, its prices should not increase by 1.5 percentage points less than a cost index designed to reflect LRC's costs. Unlike the 1975 recommendation, even though price regulation was recommended, this was not accompanied by a recommendation to regulate profits.

THE 1994 REPORT

12.23 In 1994, as well as presenting the ROS and ROCE figures for the reference business and other parts of the parent group, the MMC provided similar figures for LRC's competitor, Mates. It also built on the 1975 analysis of the trading profitability of the different supply channels, and provided a breakdown of LRC's reference business for each of the three supply channels (without calculating ROCE figures). As was done in the 1975 report, the ROCE figures were compared with those for UK manufacturing as a whole. In addition, they were compared with separate data for healthcare companies.

12.24 Other aspects of analysis were also developed. The report presented LRC's results on a PV basis, and compared these with estimated rates of return at current replacement costs for all industrial and commercial companies and for

manufacturing companies alone. LRC's PV figures were calculated according to the guidelines set out by the Accounting Standards Committee (1986).

12.25 Other than for the privatised utilities, comparative PV data was not generally available from companies' accounts. Therefore, figures from surveys by the Central Statistical Office were used for comparative purposes (see Table 12.3).

TABLE 12.3 – HISTORICAL AND CURRENT-COST ROCE MEASURES, 1989–93 (%)

	1989	1990	1991	1992	1993
The parent company	35.5	39.7	55.9	2.6	67.9
UK condoms — reference business					
HCA average capital employed	13.9	2.2	16.6	23.3	24.2
HCA year-end capital employed					21.1
CCA year-end capital employed					14.7
Export condoms	2.3	3.0	4.1	2.5	4.8
Mates vending	negative	negative	negative	negative	negative
Healthcare companies	26.2	28.0	26.0	17.9	24.8
UK manufacturing					
HCA	21.4	20.4	18.9	14.9	13.0
CCA	7.2	7.3	6.4	6.3	

Source: MMC (1994*a*), Tables 4.1, 4.10, 4.11, 4.12, 4.16.

12.26 These PV results showed LRC's ROCE to be relatively high. According to LRC, this was due to the age profile of the capital employed, which would be written off whatever basis of valuation was used. Consequently, the MMC asked LRC to reassess its ROCE, adjusting the age profile of its capital (MMC, 1994*a*, para 4.29). When the reassessed ROCE figures showed little change, the reason given by LRC was that plant and machinery represented only a small proportion of historical capital employed, a factor that would lead to relatively high ROCE data when compared with similar companies.

12.27 The MMC investigated further the effects on the company's ROCE of its use of relatively old and written-down equipment. This involved the preparation of an investment appraisal of the work that would need to be done at the Chingford factory to bring it up to 'modern manufacturing standards' (MMC, 1994*a*, para 4.24). This appraisal showed an IRR of 9%, well below the parent company's hurdle rate of 30%. LRC estimated that it would need to raise prices in the over-

the-counter channel by 17%, without losing volumes, in order to meet the group's investment criteria.

12.28 In light of the results of these analyses, the MMC concluded that LRC's returns were neither unreasonably low nor unreasonably high. Furthermore, the market was becoming increasingly competitive, both at the retail level, due to an increasingly active role of the supermarkets, and upstream, due to the entry of a credible alternative supplier (Mates). The MMC therefore found that, if the price control were removed, LRC's prices would rise, but the extent and timing of the increase would be constrained by market forces. As a result, the MMC recommended removing the price controls that followed the 1982 report.[75]

Summary

12.29 In its investigation, the MMC relied heavily on the ROCE as the measure of profitability. As noted in Part I of this report, there are several shortcomings of relying on ROCE. First, the ROCE calculations are highly sensitive to the specific accounting practices adopted, in particular accruals and depreciation schedules, and to uncertainties in asset valuation. Second, if the available information is such that these sensitivities can be dealt with accurately then it would also be possible to estimate the truncated IRR, which, as discussed in this paper, is the conceptually correct approach to assessing profitability for competition analysis.

12.30 The MMC was aware that the ROCE figures used in these inquiries were affected by a number of factors unrelated to the economic performance of the business. In particular, the following had the effect of increasing the capital base and thereby lowering the ROCE figures:

● the surgeons' glove manufacturing business (which had been co-located with the condom business at Chingford) was closed in 1992/93, therefore fixed assets at the site which had previously been shared could no longer be shared (MMC, 1994*a*, para 8.87), and

● in 1992/93 there was also an increase in working capital resulting from a high level of forward sales that had been made by LRC.

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[75] The MMC did find, however, that LRC's exclusive agreements with customers were against the public interest. It therefore recommended that LRC be required not to enter into exclusive agreements in relation to the reference goods.

12.31   The MMC treated these as exceptional changes, as they did not reflect the underlying reality of the reference business. On the other hand, the MMC concluded that it was justifiable to include increases in the capital employed resulting from increases in the value of the vending machines — even though the vending-machine business was converted to a franchise business with LRC retaining ownership of the vending machines, rather than a fully owned business. In reaching this conclusion, the MMC accepted LRC's argument that retaining control of the vending machines was necessary to protect its vending business and therefore that ownership of the machines should be reflected in the overall capital employed in its UK condom business.

12.32   These examples emphasise the importance of examining not only the basis on which the accounting figures are calculated, but also of assessing whether any changes in the reported accounts reflect changes in the underlying operations of the business in question.

12.33   Finally, as shown in the MMC's conclusions in each of these three investigations, assessments of profitability cannot be made in isolation from assessments of the prevailing and expected competitive conditions.

PART III: GUIDE TO USING ACCOUNTING DATA FOR PROFITABILITY ASSESSMENT

13 GUIDE TO USING ACCOUNTING DATA FOR PROFITABILITY ASSESSMENT

13.1 Company accounts are the starting point for most profitability analyses. These can be both published reports, and financial information used for internal purposes, such as management accounts, which competition authorities may require from the companies concerned. Hence, a first step for the competition authority is to understand and interpret the available accounting data for the purposes of assessing the IRR or the proxy measures. This part of the discussion paper aims to provide the basic knowledge and tools for such an exercise.

13.2 Paragraphs 13.4–13.6 discuss the main accounting principles applied in the UK — sometimes referred to as UK GAAP.[76] Paragraphs 13.7–13.11 describe the different types of financial reports and statements published by companies, and how they relate to each other. Paragraphs 13.12–13.16 explain the logical structure of financial reporting. Paragraphs 13.17–13.32 discuss three concepts at the heart of this logical structure — clean surplus, recognition and accruals — and explains how they affect profitability assessment in competition analysis.

13.3 Even with established accounting standards, companies have a degree of flexibility and discretion in implementing these standards. Paragraphs 13.33–13.37 discuss the quality of reported profits. Paragraphs 13.38–13.71 examine a range of other accounting concepts and issues to be aware of when assessing profitability.

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[76] For detailed overviews, see Wilson et al. (2001) and Holmes et al. (2002).

Accounting principles applied in the UK

13.4   The Companies Act 1985 forms the basis for the regulatory framework for accounting standards in the UK. Since 1990, the Accounting Standards Board (ASB)[77] has been responsible for issuing and updating accounting standards, known as Financial Reporting Standards (FRSs). Currently there are 19 FRSs. In addition, a number of Statements of Standard Accounting Practices (SSAPs), which determined standards until 1990, also remain in force.

13.5   The ASB is working with other national standard-setting bodies and with the International Accounting Standards Board (IASB) to enhance international harmonisation. In particular, an international 'convergence' process is under way whereby national standards, including the UK FRSs, are gradually updated or newly issued to bring them into line with the International Accounting Standards (IASs).[78] Furthermore, in June 2002 the EU adopted the IAS Regulation, requiring all listed EU companies to use IAS from 2005 onwards. To complement this Regulation, in May 2003 the EU Accounting Directives were amended to bring existing accounting rules into line with 'current best practice', allowing Member States which do not apply IAS to all companies to move towards similar, high-quality financial reporting. However, despite these initiatives important differences remain between UK GAAP and standards elsewhere (in particular outside the EU), and these must be considered in investigations involving companies reporting according to non-UK standards.

13.6   Underlying UK GAAP are a number of fundamental accounting principles. These are laid down in the ASB Statement of Principles for Financial Reporting, published in 1999, and in FRS 18, 'Accounting Policies' (December 2000). While the emphasis on different principles has been shifting somewhat over time, for this discussion paper the main principles can be summarised as follows.

● *Relevance and reliability* — the financial information presented must be relevant, i.e. it must be provided on time and allow the users of the information to base decisions on it. The information must also be reliable, i.e. it must be neutral (unbiased) and faithfully represent the substance of transactions and other events that have taken place. Relevance generally

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[77] The ASB reports to the Financial Reporting Council, which determines general policies.
[78] For an overview of this convergence process and the specific differences between IASs and UK GAAP, see Lawrence (2002).

takes priority over reliability where an accounting policy involves a conflict between these two principles.

- *Comparability* — users need to be able to compare a company's financial information over time, and across different companies. Comparability over time may be distorted if a company changes its accounting policies.[79] Comparability between companies may be distorted if each company uses different accounting policies (e.g. for the way assets are financed or depreciated). Any profitability assessment must take all such distortions into account.

- *Understandability* — according to FRS 18, financial information must be 'capable of being understood by users having a reasonable knowledge of business and economic activities and accounting and a willingness to study with reasonable diligence the information provided'. This principle is rather open-ended, and it is not clear whether it has the effect of reducing the group of users of accounts to a small set of professional analysts, accountants and academics.

- *Substance over form* — this is related to reliability. The way in which any items are accounted for must reflect their commercial substance rather than their legal form, if these differ. For example, where a company is technically not the legal owner of an asset, but in practice derives all the commercial benefits from it, this asset should be included in the company's balance sheet (e.g. lease finance). For the purpose of a profitability assessment in competition policy this principle is also appropriate.

- *Going concern* — accounts are compiled on the assumption that there is no intention or need to go into liquidation or to curtail the current level of operations significantly.

- *Materiality* — if any information is not material, it does not have to be included in financial statements. This may be problematic if information that is relevant to a profitability assessment in competition analysis is omitted.[80]

- *Prudence* — the prudence principle states that revenues and profits must not be anticipated, and provisions must be made for all known liabilities (expenses and losses), whether the amount is known with certainty or has to be estimated. However, this principle has been somewhat de-emphasised

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[79] Holmes et al. (2002) refer to the example of a company which revised the estimated useful life of one type of asset from 15 to 30 months, thereby increasing reported profits by 60%.

[80] For example, Holmes et al (2002) mention a company that was liquidated in the early 1990s and that treated its various activities as 'divisions', whereas in other companies they would have been subsidiaries. This enabled the company to treat quite significant items as immaterial because they represented less than 5% of the whole group.

recently, in particular because it may be used as a tool for profit-smoothing — for example, making excessively large provisional liability charges in periods of high profits and writing them off in periods of downturn — and may thus conflict with the requirement that the information be neutral (under the reliability principle). Therefore, where there is no uncertainty, the ASB has cautioned against exercising prudence.

Types of financial reports and statements

13.7   *Statutory accounts* — the Companies Act 1985 requires companies to publish statutory accounts, which should comprise a directors' report, an auditors' report, a profit and loss (P&L) account, and a balance sheet.[81] The last two items are of relevance to this discussion paper as they contain the quantitative financial information. Where a company owns parts of other companies, there is a need to publish information on both the parent company and the group, comprising the parent and the subsidiaries. In addition, FRS 1, 'Cash Flow Statements', requires all companies, other than small ones, to produce a cash flow statement. FRS 3, 'Reporting Financial Performance', also requires a statement of total recognised gains and losses. These statements are each considered in turn below.

13.8   *cash flow statement* — FRS 1 requires cash flows for the accounting period to be listed separately for operating activities, returns on investment and servicing of loans, taxation, capital expenditure and financial investment, acquisitions and disposals, dividends, investments in current assets that can be readily disposed, and financing (e.g. issue of share capital).

There are two methods of presentation for the cash flow statement. The direct method simply sums all the cash receipts from operating activities and then deducts payments to suppliers and employees to arrive at the net cash flow. The indirect method starts with the operating profit of the company and makes adjustment for non-cash items.

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[81] The Act provides that SMEs may submit abbreviated reports. An additional distinction is between a private limited company, indicated by 'Ltd', and a public limited company, indicated by 'Plc'. The latter usually has shares listed on a stock exchange and the exchange will place additional demands on disclosure. The requirements for the London Stock Exchange are determined by the UK Listing Authority, and summarised in the 'Purple Book' (FSA, 2000). The requirements are numerous. However, from the point of view of analysing accounts, the most relevant is the need to produce half-yearly accounting statements.

13.9 *Profit and loss account* — the P&L account is a monetary record of the activities of a company for the relevant accounting period. In the P&L, the revenues earned (even if not yet received) in a period are matched to the costs incurred (even if not yet paid for) in earning that revenue. It is necessary to allow for:

● accruals — i.e. revenues earned but not yet received and costs incurred but not yet billed (see paragraphs 13.20–13.32), and

● costs allowed against potential liabilities that have not yet materialised — i.e. provisions.

Many items included in the P&L account involve elements of judgement. This issue is addressed below and in Chapter 6.

13.10 *Balance sheet* — the balance sheet is a statement of the company's assets and liabilities at the close of business on a given day (i.e. on the balance-sheet date). It is customary to use a 'vertical format' for the balance sheet, which:

● details fixed assets, such as buildings and equipment

● adds current assets, such as stock that is held for resale, and

● deducts current liabilities — i.e. the debt obligations that the company must meet in the forthcoming year (or at least in the short term).

These form the net assets of the company, which must equal its capital and reserves, comprising:

● the share capital of the company, subscribed by shareholders

● the retained profits of the company, and

● long-term loans (or loan capital).

13.11 *Statement of total recognised gains and losses* — this is the least familiar accounting statement, and is a requirement of FRS 3. It was introduced to avoid the practice of classifying major losses as 'extraordinary' and therefore appearing 'below the line' on the P&L account, where they would not affect the earnings-per-share figure. Its effect is to highlight significant gains and losses the company has made, which would otherwise appear only as footnotes in the accounts.

Common entries in the statement include:

- surpluses or deficits on the revaluation of assets

- currency gains or losses, and

- the impact of any changes in accounting policies.

The total recognised gains and losses (along with the trading profit or loss) are then summarised. The resulting figure may sometimes differ from the reported profit.

The logical structure of financial reporting

13.12 Table 13.1 shows the logical structure of financial accounts — particularly the P&L account, cash flow statement and balance sheet — in the form of a matrix (adapted from Graham & Steele, 1997). Although the matrix is highly stylised (with each heading in reality comprising a, sometimes large, number of different headings from financial statements), it is a useful theoretical illustration of how various accounting concepts and statements are related. Any set of published financial statements is in principle based on the structure shown in the matrix.

13.13 The first row of the matrix gives the balances on the opening balance sheet. For expositional simplicity, these have been condensed to seven aggregate categories:

1. *fixed assets (FA)* — at net book value, being the gross book value minus cumulative depreciation. These include tangible assets, intangible assets and fixed-asset investments (e.g. in subsidiaries and joint ventures). Most fixed assets are normally related to operations of the company, although there may be exceptions (e.g. investment in art)

2. *working capital (WC)* — current assets, excluding cash and bank balances, net of current liabilities, held by the business for operational purposes. Working capital is stocks, work in progress and trade debtors, minus trade creditors

3. *cash (C)* — the operational balances, such as till floats, needed to operate the business. Where bank overdrafts are held for operational reasons, rather than to provide finance, they should be deducted

4. *other non-operational assets* that are not related to the principal operations of the company

5. *P&L account*

6. *shareholder funds (E)* — share capital and reserves. Share capital can be divided between preference shares, ordinary shares, deferred shares and warrants to subscribe for shares, and

7. *loan capital (D)* — normally defined as creditors due in more than one year.

13.14 The matrix contains the three main types of report that companies issue — the balance sheet, the P&L account and the cash flow statement — and shows the relationship between these reports and between items within each report. The shaded areas in the matrix reflect those items that can also be obtained for individual lines of business of the company (for example, through management accounts, to which competition authorities may require access).

13.15 The matrix has the opening balance sheet (at the start of the reporting year) in the top row and the closing balance sheet (at the end of the reporting year) in the bottom row, with a number of types of transaction in between (numbered 1 to 19 for illustrative purposes). All transactions have a 'double entry' — which is a common book-keeping practice — i.e. they are transfers between two balance-sheet categories.

13.16 Table 13.2 provides a more detailed explanation of some of the concepts, transactions and relationships in the matrix. The concepts of clean surplus, recognition and accruals, which are fundamental to the logic of financial reporting, are discussed in paragraphs 13.20–13.32.

TABLE 13.1 – THE LOGICAL STRUCTURE OF FINANCIAL STATEMENTS[1]

Item	Fixed assets	Working capital (WC) Current assets (CA)	Current liabilities (CL)	Cash	Other assets	P&L account	Share capital (E) Preferential (EP)	Ordinary (EO)	Loan capital
Opening balance sheet	FA_0	$WC_0 (=CA_0 - CL_0)$		C_0	OA_0	$= 0$	$E_0 (=EP_0+EO_0)$		D_0
1 Sales revenues		Q				$= Q$			
2 Sales receipts		$-QC$		QC		$=$			
3 Operating cost (incurred)		OCI	$-OCI$			$=$			
4 Operating cost (assigned to products sold)		$-OCS$				$= -OCS$			
5 Operating cost (expensed)			OCP	$-OCP$		$=$			
6 Other operating results				OR		$= OR$			
7 Sub-total (1–6)		ΔWC		CF		$= EBITDA$			
8 Depreciation	$-dFA$					$= -dFA$			
9 Sub-total (7–8)	$-dFA$	ΔWC		CF		$= EBIT$			
10 Net new investment	NI			$-NI$		$=$			
11 Revaluation fixed assets	R					$=$		R	
12 New equity and debt				$\Delta EO+\Delta D$		$=$		ΔEO	ΔD
13 Interest cost					$-I$	$= -I$			
14 Interest expenditure				$-IC$	IC	$=$			
15 Tax charged					$-T$	$= -T$			
16 Tax paid				$-TC$	TC	$=$			

TABLE 13.1 – THE LOGICAL STRUCTURE OF FINANCIAL STATEMENTS[1] (*cont'd*)

Item	Fixed assets	Working capital (WC) Current assets (CA)	Current liabilities (CL)	Cash	Other assets	P&L account	Share capital (E) Preferential (EP)	Ordinary (EO)	Loan capital
Sub-total (9–16)						Π			
17 Dividend proposed					–X	= –X			
18 Dividend paid				–XC	XC	=			
19 Transfer to reserves						= –$(\Pi - X)$		$\Pi(-X)$	
Closing balance sheet	FA1	$WC_1 (=CA_1 - CL_1)$		C_1	OA_1	= 0	$E_1 (=EP_1+EO_1)$		D_1

Notes: [1] Shaded areas reflect items that can also be obtained for individual lines of business. *Source*: Adapted from Graham and Steele (1997).

TABLE 13.2 – CONCEPTS, TRANSACTIONS AND RELATIONSHIPS IN ACCOUNTING

Concept/relationship	Explanation
$FA_0 + WC_0 + C_0 + OA_0 = E_0 + D_0$	Opening balance-sheet identity — this is a fundamental statement about ownership claims and wealth. Assets of the company are on the left hand; the sources of finance and claims against the assets on the right hand
$Q - QC$	Change in trade debtor balances due to difference between sales revenues, which go into the P&L account, and actual sales receipts in cash
$OCI - OCS$	Change in stocks and work in progress due to the difference between operating cost assigned to the sales made in the period (OCS), which go into the P&L account, and the operating costs actually incurred in the period (OCI)
$OCI - OCP$	Change in creditor balances due to difference between operating costs actually incurred in the period (OCI) and actual operational expenses in cash (OCP)
OR	Other profits (or losses) related to operations, for example, on disposals or through joint ventures. OR may also be classified as current assets or liabilities (if it is a loss), i.e. working capital, if the gains or losses have been recognised but not received or paid. OR would be classified as cash when it is received or paid
$\Delta WC = (Q - QC) + (OCI - OCS) - (OCI - OCP) + OR = (Q - QC) - (OCS - OCP) + OR$	Change in working capital due to operating transactions
$EBITDA = Q - OCS + OR$	Earnings before interest, taxes, depreciation and amortisation
$EBIT = EBITDA - dFA$	Earnings before interest and taxes (sub-total of the P&L account; due to operating transactions)
$CF = QC - OCP$	Operating cash flow
$CF = EBIT - (WC + dFA$	Relationship between operating cash flow and EBIT
NI	Net new investment in fixed assets (new investment minus disposal of fixed assets)
$\Delta EO; \Delta D$	Respectively, new equity and new loan capital raised (as cash)

(cont'd.)

I – IC	Difference between interest costs (in P&L account) and actual interest paid in cash. This difference is due to accruals, allocations to different time periods and capitalisation of interest
T	Tax charge is equal to corporate tax rate times (EBIT – I)
T – TC	Difference between tax charge and tax paid in cash, resulting in change in tax balances (included under other assets). This difference could be due, for example, to deferred taxation or timing of when taxes are actually paid.
X – XC	Change in dividend accrual
Π	Net income after interest and tax
Π – X	Retained profit which is transferred to reserves
FA_0 – dFA+NI+R=FA_1	Relationship between fixed assets at the start and end of the period
C_0+CF – NI+ΔE+ΔD – (IC+TC+XC)=C_1	cash flow statement
E_0+R+ΔE+Π – X=E_1	Relationship between shareholder funds at the start and end of the period

Clean surplus, recognition and accruals

THE CLEAN SURPLUS RELATION

13.17 The last row in Table 13.2 — showing the relationship between shareholder funds at the start and end of the period— can be rearranged as follows:

$$\Pi + R = X + (E_1 - E_0) - \Delta EO$$

where:

- Π is post tax net income

- R is revaluation of fixed assets

- X is dividend proposed

- $(E_1 - E_0)$ is change in shareholder funds over the period concerned, and

- ΔEO is new equity raised.

13.18 This is referred to as the clean surplus relation, where $\Pi+R$ is the clean surplus profit. If there are no revaluations ($R=0$) or new injections of equity ($\Delta EO=0$), the clean surplus relation states that profit after interest and tax (net income) equals the dividends plus the increase in shareholder funds (the retained earnings). The clean surplus relation implies that any change in wealth or value in the company is ultimately reflected in the balance sheet. In practice, not all the resources of a company flow through the P&L account. In such circumstances, the statement of total recognised gains and losses (as discussed above) is useful as it disaggregates the gains and losses into their component parts.

13.19 Without this clean surplus relation, the usefulness of accounting data for profitability assessments in competition analysis would be limited. As shown in Box 4.1, the underlying theory of profitability assessment relies on the clean surplus relation to hold.

RECOGNITION AND ACCRUALS

13.20 Accruals are closely associated with the matching principle in accounting, which states that the costs associated with operations should be matched to the revenue that results from them. In practice this means that revenues are accounted for (or 'recognised') as they are earned and costs are recognised as they are incurred, rather than when money is received or paid. With respect to recognition, the following questions arise.

- What sort of transactions should be recognised — i.e. when exactly is something an asset or a liability?

- When should the gain or loss from the resulting increase or decrease in the company's net assets be recognised?

13.21 For example, consider a firm of engineers that produces equipment to customer order. It has a number of choices as to when a sale should be recognised. For example, when:

- a telephone enquiry is received

- a written confirmation is received

- the contract is signed

- the equipment is made/dispatched/installed/accepted by the customer

- the invoice is sent

- the payment is due, or

- the payment is received.

13.22 With regard to the first question, accounting principles in the UK dictate that an asset or liability should be recognised (wholly or in part) if two conditions are met:

- sufficient evidence exists that the new asset or liability has been created, or that there has been an addition to an existing asset or liability, and

- the new asset or liability, or addition to an existing asset or liability, can be measured in monetary terms with sufficient reliability.

13.23 The application of these principles provides scope for subjective judgement of what is 'sufficient evidence' and 'sufficient reliability'. Nonetheless, a degree of subjectivity is unavoidable, as there is often an element of uncertainty in the business environment.

13.24 Furthermore, the recognition process requires all events that may have an effect on the elements of the financial statements to be identified and reflected, to the extent possible. In most cases, transactions (sales and purchases) are the most common of such events. However, there are other events as well that would require recognition (for example, the discovery of new assets, liabilities created by court-imposed penalties, the expiration of a patent or a right, or events such as fires that cause damage to assets).

13.25 With regard to the second question of recognition — i.e. when should the gain or loss be recognised — the matching principle is applied. According to this principle, expenditures associated with the generation of the gains or loss are recognised in the same period as the gains (or loss) are recognised, rather than in the period in which the cost is incurred. In other words, costs and revenues are accrued to the year in which the revenue arises, rather then when the cost is incurred. For example, expenditure on stocks which remain unsold at the balance-sheet date or on work in progress, is carried forward into the following period and set against the revenue from the stocks when it arises (i.e. when it is sold or consumed). Where the gains or loss are recognised over several accounting periods, then the expenditure will also be allocated across those periods.

13.26 There are, however, two conditions under which an expenditure will be immediately recognised as a loss in the period in which it was incurred: when it cannot be justifiably associated with a particular gain; and when the gains are too uncertain to warrant recognition.

13.27 The matching principle gives rise to a further question as to when gains (revenues) should be recognised. In principle, revenue is recognised when substantially all the risks and rewards of ownership have been transferred. Usually, but not always, this occurs when the payment has been made and the transaction completed. For example, where the majority of the obligations under an agreement have been met, barring a few minor arrangements, revenue may be recognised. Revenues may also be recognised when there is a high likelihood that a transaction will be completed.

13.28 Consequently, revenues may be recognised even if shipment or delivery of goods or services have not been completed. The converse may also be true — i.e. the fact that the goods have been delivered does not necessarily mean that the ownership has been transferred and that the revenue should be recognised.

13.29 Finally, the exercise of prudence in the recognition process means that more confirmatory evidence about the existence of an asset or gain is required than about the existence of a liability or a loss. Similarly, a greater reliability of measurement for assets and gains is required than for liabilities or losses.

13.30 From Tables 13.1 and 13.2, it follows that the matching principle has important implications for profitability assessments in competition analysis as it decouples profits from cash. Accruals are reflected in the change in working capital (ΔWC) and in interest, tax and dividend balances ($I - IC$, $T - TC$ and $X - XC$, respectively). Consider the relationship between operating cash flow, EBIT, working capital and depreciation, as shown in Table 13.1:

$$CF = EBIT - \Delta WC + dFa$$

13.31 Operating cash flow is a relatively 'hard' statistic, in the sense that it cannot be changed easily by altering accounting policies. Changes in working capital following from accruals, together with depreciation charges, drive a wedge between operating cash flow and EBIT.[82] A problem arises because accruals (in

particular, the valuation of stocks and work in progress, which form part of working capital) are often highly subjective. Only over the complete lifetime of a business do changes in working capital net to zero. In a limited segment of the life of a business, changes in working capital can be significant.

13.32 This is one of the reasons why EBIT is a relatively 'soft' statistic, and why EBIT data should be used with care in profitability assessments. It also reflects one of the advantages of the IRR methodology: this methodology uses 'hard' cash flow data.

Assessing the quality of reported profits

13.33 Financial statements give a view of a business. However, as companies have some degree of discretion in producing these statements, questions may be raised about the quality of the reported profits. Different industries have different sensitive areas that may be prone to manipulation. Table 13.3 shows these sensitive areas. Undoing such manipulations can improve the assessment of a business, but is often far from straightforward. (This discussion draws particularly on Penman, 2001.)

13.34 The circumstances where manipulation is more likely, and hence competition authorities should pay particular attention to the quality of reported profits, include:

- institutional conditions — for example, when the firm is raising capital or negotiating borrowing, debt covenants are likely to be violated

- when there are management changes

- when an auditor changes

- when management bonuses are linked to earnings

- when the governance structure is weak, or inside management dominates the board

- when regulatory ratio requirements are likely to be violated (such as capital ratios in banks and insurance companies)

- when transactions conducted with related parties are not at arm's length

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[82] Graham and Steele (1997), Chapter 4, argue that accruals and changes in working capital typically have a larger effect than depreciation on the wedge between cash flow and profit. Yet, the literature on the relationship between accounting and economic profits (for example, Fisher and McGowan, 1983) has focused mainly on the importance of depreciation.

TABLE 13.3 – SENSITIVE BUSINESS AREAS WHERE QUALITY OF REPORTING
MAY BE QUESTIONED

Industry	Sensitive areas
Banking	Credit losses, loan loss provisions
Computer hardware	Technological change; quality of inventory and debtors
Computer software	Quality of capitalised R&D
Retailing	Credit losses, inventory obsolescence, carrying value of inventory, rebate programmes, liabilities
Manufacturing	Warranties, product liability
Automobiles	Quality of depreciation allowances
Telecommunications	Technological change, quality of depreciation allowances
Equipment leasing	Lease values, carrying values, residual asset value risk
Tobacco	Liabilities for health effects of smoking
Pharmaceuticals	Quality of capitalised R&D, product liability
Real estate	Property values
Aircraft and ship manufacturing	Revenue recognition over long-term contracts
Subscriber services	Development of customer base, quality of capitalised promotion costs, subscriptions paid in advance and deferred revenue

- when there are special events, such as union negotiations

- when the firm has been a takeover target 'in play'

- when earnings barely meet analysts' expectations, and

- when the firm is subject to a competition law investigation.

13.35 Once a particular rule for treating a transaction has been chosen, it is usually applied consistently into future periods. However, for any transaction there is no single unique rule. For many transactions there can be two or more alternative rules, which are logical, internally consistent and equally acceptable. Some of these rules are conservative or prudent, making accounting profit as low as possible (although prudence is less important now than in the past). Other rules are liberal, having the effect of boosting accounting profit. On balance, accounting data is still more likely to tend towards the conservative. This applies in particular in relation to asset valuation. For competition analysis, it may be prudent to lean in the opposite direction. As observed by Carsberg (2002, para 7) in the context of the Competition Commission inquiry into banking services to SMEs:

> A deliberately conservative view is taken of asset measurement in reporting to shareholders. For assessment of the possible existence of excessive profits, in my opinion, it is appropriate to take a balanced view, avoiding any bias towards undervaluation.

13.36 Table 13.4 shows accounting methods, ranging from those that are too conservative to those that would be too liberal.

13.37 In accounting data, costs are usually preferred to values, unrealised wealth gains are not recognised, and changes in the purchasing power of money are ignored. Accounting profits are normally based on 'hard' data, which can be audited and checked very easily, instead of data that is more subjective, judgemental and difficult to verify. To a degree, accounting conventions favour the use of the data for 'stewardship' purposes (i.e. to provide information to questions such as 'what have you spent the money on?'), rather than performance purposes (e.g. 'how well have you done?') The rules permit some discretion in their application, and this makes the use of accounting data for profitability assessment in the context of competition analysis more difficult.

Other accounting issues

HISTORICAL- AND CURRENT-COST ACCOUNTING

13.38 In accounting, the prime principle is to use objective and verifiable data. The most common type of data is the amount of money that was paid for an item, i.e. its historical cost. According to the 'historical-cost convention', therefore, items are valued in the accounts according to what was paid for them less accumulated depreciation (see also Chapter 5).

13.39 This convention provides an objective basis for the preparation of accounts but can mislead when asset prices change over time. One common problem is that in periods of high inflation the cost of an asset acquired in the past is likely to become undervalued, providing an over-optimistic view of a company's performance. Attempts have been made in the accounting profession to introduce 'inflation accounting' in order to deal with the problem of changing values of assets or currencies due to inflation. However, the relevant accounting standards have been withdrawn (although some companies still issue current-cost accounts, which focus on changes in asset values).

TABLE 13.4 – RANGE OF ACCOUNTING METHODS

Methods that would be too conservative	Range of acceptable accounting methods (methods within this range conform with GAAP)		Methods that would be too liberal
	(Minimum limit)	(Maximum limit)	
P&L account			
Arbitrarily charging for costs that will not be incurred until later Charging to expense now the cost of a major long-lived asset that will be used for several future years	Revenue is recorded at lowest possible amounts, and expenses are recorded at highest possible amounts	Revenue is recorded at highest possible amounts, and expenses are recorded at lowest possible amounts	Not writing off the cost of fixed assets Depreciation of an asset over a much longer period than it will be useful to the business
Balance sheet			
Recording expenses for vague and non-specific contingency losses that probably will not happen Delaying the recording of sales that have been made in the ordinary course of business	Assets are recorded as low as possible because expenses are charged out at highest amounts or at earliest time, and thus the assets involved contain the smallest cost residuals Certain liabilities are recorded at highest amounts because the expenses involving these liabilities are recorded at the largest amounts possible	Assets are recorded as high as possible because expenses are charged out at lowest amounts or at latest time. Thus, the assets involved contain largest cost residuals Certain liabilities are recorded at lowest amounts because the expenses involving these liabilities are recorded at the lowest amounts possible	Failure to recognise the impending loss as a result of losing lawsuits, or other assessments the business will have to pay Recording sales before they are final, or failure to recognise the likelihood of large returns of unsold products or large bad debts

13.40 Other problems that can arise under HCA include the following:

- stock valuations may vary according to whether the company adopts the 'first in first out', 'last in first out' or the 'first in last out' method of valuation, and

- certain assets, especially intangibles, will appear differently if they are created internally (organically), as opposed to purchased externally. This applies in particular to brand values, where the expense of building a brand is not capitalised, yet purchasing a company with a strong brand will result in a capital item in the balance sheet (see also Chapter 5).

13.41 Assets are, traditionally, valued according to the historical-cost approach. In the UK, however, companies are also allowed to value assets based on the 'fair value' approach. The fair value is the amount at which an asset could be exchanged in an arm's-length transaction between informed and willing parties. Valuations must be kept up to date. For properties, an external valuation by a qualified auditor is required at least every five years (FRS 15, 'Tangible Fixed Assets').[83] Examples of valuation techniques include the NPV of estimated cash flows and option pricing models. Fair values are most commonly used for property assets and brands. Property assets, for example, are often valued according to their replacement value.[84]

DEPRECIATION METHODS

13.42 Companies can use a range of depreciation methods, which can have a significant impact on asset values in any given year, and hence on the assessment of accounting rates of profit (such as the ROCE). Indeed, a major advantage of the IRR approach discussed in this paper is that it is much less sensitive to the particular depreciation method used by the company or companies under investigation.

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[83] The USA and Australia are two other countries that allow for the use of a fair-value approach. In the USA, fair value is defined by the Financial Accounting Standards Board in terms of the amount at which an asset can be bought or sold in a current transaction between willing and well-informed parties. The Financial Accounting Standards Board considers quoted market prices in active markets as the best evidence of fair value. If quoted market prices are not available, the estimate of fair value will be based on the best information available in the circumstances.

[84] The Companies Act 1985 requires companies to disclose the difference between the market value of property assets and the balance sheet if, in the opinion of the directors, it is significant. UK companies thus face the choice: either to incorporate any revaluation in the accounts, or to disclose it in the directors' report. The revaluation of other assets is optional (FRS 15).

13.43 The most common method is the straight-line depreciation method — i.e. the asset is depreciated by a constant amount each year, based on the following formula:

$$\text{Annual depreciation} = \frac{\text{Cost} - \text{residual value}}{\text{Useful economic life}}$$

where cost refers to the original purchase price; residual value refers to the value that the company expects to obtain for the asset at the end of its useful economic life; and useful economic life of an asset refers to the period over which the company expects to derive economic benefit from the asset. A key advantage of straight-line depreciation is that it is easy to understand and to calculate.

13.44 Other methods include the following.

- *Reducing-balance method* — this has largely been supplanted in recent years by the straight-line method. Under the reducing-balance method, the annual depreciation charge represents a fixed percentage of the net book value brought forward (i.e. the cost less accumulated depreciation). The depreciation rate = 1 – (residual value/purchase value)1/n, where n is the useful economic life in years and depreciation rate is a decimal.

- *Sum of the years' digits method* — in this method, the purchase value less any residual value is divided by the sum of the years' digits to give what may be termed a unit of depreciation. For example, in the case of an asset with a lifetime of five years, the sum of the digit years is 15 (1+2+3+4+5). The depreciation in the first year is 5/15 of the purchase value, in the second year 4/15 of the purchase value, and so on.

- *Annuity method* — account is taken in this method of the cost of capital invested in the asset. Interest and depreciation combined will give an approximately constant charge to revenue, and depreciation is therefore low in the early years when the capital is high.[85]

13.45 As a result of depreciation, the book values of individual assets are gradually reduced. This could eventually lead to a very low book value of assets relative to their economic value (i.e. their ability to generate income), particularly if assets are long-lived. However, if the company has a well-balanced mix of assets of different ages, and this mix does not change much from year to year, then the

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[85] For a description of these depreciation methods, see Holmes et al. (2002).

distortion is likely to have little relevance overall. The net book value is then likely to be close to the average value of assets over the lifetime of the project.

TREATMENT OF PENSIONS

13.46 The treatment of retirement benefits is regulated by FRS 17, 'Retirement Benefits'. FRS 17 has had a significant effect on the delivery of the benefits because of its impact on operating profit: it specifies the means through which pension scheme assets and liabilities are measured, and the cost of servicing the pension will be set against operating profits. The key requirements of the FRS 17 are as follows:

- the balance sheet will include items for the pension fund asset (if in surplus) or liability (if in deficit), to the extent that the company expects to benefit, or suffer, from it

- the P&L account will show the ongoing service cost, interest cost and expected return on the asset

- the statement of total recognised gains and losses will record and reflect market fluctuations in interest rates and share prices, and

- a five-year history of actuarial gains and losses will be disclosed, to inform users whether the assumptions are consistently being met.

TREATMENT OF DEFERRED TAX

13.47 There are often differences between the annual depreciation charge on an asset (which is determined by company policy) and the annual capital allowance (which is determined by the Exchequer). The former determines the company's operating profit, while the latter determines its taxable trading profit. Where the two differ, companies are required, under FRS 19, 'Deferred Tax', to make a deferred tax provision that is equal to the difference between:

- the corporation tax actually payable on the company's taxable trading profit, and

- the tax that would have been payable if the taxable trading profit were equal to the operating profit.

13.48 In general, FRS 19 requires information to be disclosed about factors affecting current and future tax charges. It therefore requires deferred tax to be recognised on most types of timing difference, including those attributable to:

- accelerated capital allowances

- accruals for pension costs and other post-retirement benefits that will be deductible for tax purposes only when paid

- elimination of unrealised intra-group profits on consolidation

- unrelieved tax losses, and

- other sources of short-term timing differences.

DIVISIBILITY OF EARNINGS WITH REGARD TO TAX ALLOCATION

13.49   The division of the total earnings of a company into component categories is subject to manipulation. From the taxation point of view, the main issue is transfer pricing (the internal price charged between subsidiaries).

13.50   It is common for subsidiary companies within a group to trade with each other; for example, goods may be made in one region and sold in another through a foreign subsidiary. The price at which they exchange goods and services will determine where profit is taken within the group. Transfer pricing is therefore of great interest to the revenue authorities, where companies in high-tax regimes will seek to ensure that profits are booked in low-tax regimes, by means of setting transfer prices. This is also an issue competition authorities need to be aware of.

13.51   In some cases, companies have responded to challenges by national taxation authorities on transfer prices with the 'commissionaire' arrangement, whereby goods do not change title as they move between countries, but instead the selling country receives a commission on the sale in the receiving country (see also the discussion of revenue allocation in Chapter 6).

GROUPS AND CONSOLIDATION METHODS

13.52   The relevant statements for preparation of group accounts are FRS 2, 'Accounting for Subsidiary Undertakings', FRS 10, 'Goodwill and Intangible Assets', and FRS 11. The other source of reporting requirements is the Companies Act 1985, which defined the terms 'parent undertaking' and 'subsidiary undertaking'. The parent undertaking is frequently called the 'holding company' and the holding company and its subsidiaries are referred to collectively as the 'group'. Another distinction

is to differentiate between 'wholly owned subsidiaries' and 'partially owned subsidiaries'. Some of the specific reporting requirements for groups are as follows:

- the group must normally produce a consolidated balance sheet, eliminating inter-company balances in the group, and identifying minority interest and goodwill

- the group must normally produce a group P&L account, adjusting for inter-company trading, and deducting the profit due to minority interest, and

- the parent company's balance sheet must be shown, but not its P&L account if the balance sheet discloses the profit.

OFF-BALANCE-SHEET FINANCING

13.53 Off-balance-sheet financing refers to ways in which a company raises money that does not appear on the balance sheet. Typically, it refers to separate legal entities (separate companies of which the parent holds less than 100% ownership) or contingent liabilities, such as letters of credit or loans to separate legal entities that are guaranteed by the parent company.

13.54 Companies have used off-balance-sheet entities (sometimes also known as special purpose vehicles, or SPVs) for some time. These entities were permissible under UK GAAP and tax laws so that companies could finance business ventures by transferring the risk of these ventures from the parent to the off-balance-sheet subsidiary. This was also helpful to investors who did not want to invest in these other ventures. However, through the use of various techniques, manipulations and regulatory loopholes, off-balance-sheet entities have also been (mis)-used in some cases either to hide information from investors and improve the reported balance sheet, or to evade taxes.[86]

13.55 There are two main reasons to be aware off-balance-sheet financing within the context of a profitability assessment. First, the failure to take this into account,

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[86] Under the US accounting rules, for example, as long as a company owns less than 50% of an SPV's voting stock, the SPV's assets and debt do not have to be consolidated on its books. In fact, the SPV's nominal owner (usually an external investor) needs to put up only a small proportion (3%) of the SPV's equity. The company establishing it can contribute the remaining 97%, and it still qualifies for off-balance-sheet treatment. (In contrast, in the UK, the emphasis is on 'substance over form', which means that accounts should reflect the reality of the situation rather than the exact legal wording. This principle, contained in FRS 5, 'Reporting the Substance of Transactions', was developed in response to the problems arising from off-balance-sheet financing.

when it should be considered, could lead to an incorrect valuation of a company's true state of assets and liabilities. In considering off-balance-sheet financing, the competition authority may need to assess both the level of financing and any interest charges incurred, which could affect the earnings figures in the P&L statement. Second, certain forms of off-balance-sheet financing can also be an indicator of market power possessed by a company. This can be seen in the examples below. The main forms of off-balance-sheet financing are examined below.

13.56 *Unconsolidated companies* — companies or other legal entities (such as limited-liability partnerships) whose legal ownership structure is designed so as to exploit loopholes in regulations about which sets of accounts are consolidated or aggregated into the group accounts. If the company is unconsolidated, it may be used to hide losses and debt from the group accounts.

13.57 *Sale and lease-backs* — there are two primary types of leases: operating leases and financing leases. An operating lease is a true lease — i.e. a normal rental arrangement, and is treated as an operating expense in the P&L account. A financing lease is, in effect, a secured financing to purchase an asset and appears (or should appear) as such on the lessee's balance sheet. In financing leases, the economic benefits and risks in the asset are effectively transferred to the lessee, who will eventually obtain legal title to the asset.

In some cases, however, a financing lease is dressed up as an operating lease as if the lessee were merely renting the asset. By doing so, the company takes the asset purchase off the balance sheet. This may be done for various reasons, for example to reduce or spread out the taxes burden or to boost reported profit targets. This is a prime way of obtaining off-balance-sheet finance and is commonly offered by finance companies and vendors.

In the UK, historically, a company could enter into a finance lease instead of borrowing the money to purchase an asset, and neither the asset nor the commitment to pay leasing charges would appear in the balance sheet. This was an example of off-balance-sheet financing which led to hidden gearing (i.e. higher debt-to-equity ratios), as the company had effectively borrowed the money to purchase the asset, except that it had to pay leasing charges rather than paying interest and bearing depreciation charges.

Since SSAP 21, 'Accounting for leases and hire purchase contracts', was introduced in 1971 (now superseded by FRS 18), companies have been required to record finance leases in the balance sheet of the lessee as an asset and as an obligation to pay future rentals. The initial sum to be recorded both as an asset and as a liability is the PV of the minimum lease payments, derived by using the interest rate implicit in the lease. Furthermore, the value of all leased assets and rentals payable under leases must be disclosed, even if they are not accounted for as balance-sheet assets and liabilities, so as to allow analysts to decide their worth for themselves.

13.58 *Partnership joint ventures* — partnerships have, in the past, been collections of people working together for profit. For this reason, they are subject to different rules from those that apply to companies — the disclosure obligations on partnerships are significantly less than those on companies. With the advent of limited-liability partnerships (a sort of hybrid entity), however, there is greater scope for keeping items off the balance sheet.

13.59 *Take-or-pay contract* — this is a long-term contract whereby a customer agrees to pay for supplies, even if they do not avail themselves of the supply. Electricity utilities, for example, often structure their contracts in this way for various operational reasons (power generation plants, for example, cannot easily be switched on and off to match demand for electricity). However, such contracts may also represent very large assets or liabilities, which are not necessarily put on the balance sheet, even though they may be used as collateral for loans.

13.60 *Pay-to-play contract* — another method of off-balance-sheet financing is for a company to request that its supplier provides it with an upfront payment for the company to obtain its supplies from that supplier. In return, the company pays the supplier more than the market rate for the goods supplied. Effectively, the up-front payment is a loan from the supplier to the company. The ability of a company to negotiate such a contract with its supplier may be an indicator of its buyer power (depending on the terms of the contract). A related practice is where a company delays payment to the supplier outside the agreed contractual period such that the supplier is effectively extending credit to the company (this was found to be practised by supermarkets; see the case study in Chapter 11). Among the practices analysed in that case were the following: delaying payments to

suppliers outside agreed contractual periods and discriminating between suppliers in the length of credit period accepted.

13.61 *Most-favoured-nation contract* — this is similar to the pay-to-play contract, except that it is the customer, rather than the supplier, who makes the payment in return for the guarantee that the company in question will not offer any other customer a lower price for the goods. The ability of a company to negotiate such a contract with its customer may be an indicator of its market power (again, depending on the terms of the contract).

13.62 *No-compete contract* — this is when a payment is made to another company, normally a potential competitor, in return for the guarantee that the latter will not enter the market. Such contracts also have a direct bearing on competition, in addition to being of relevance for a profitability analysis.

TREATMENT OF STOCK OPTIONS

13.63 A stock option permits an employee to purchase stock at a given price, known as the exercise or strike price, at some point in the future, commonly known as the exercise or expiration date. The option is, typically, not transferable, and the employee is locked in until the exercise date. Stock-option compensation is intended to provide staff (often management) with incentives to maximise shareholder value, since they would also benefit from any increase in the stock price. Stock options have the advantages of providing staff incentives without incurring high capital and cash payroll costs. On the other hand, they can also cause a company to have negative values of book equity, especially for those in the start-up phase.

13.64 There has been fierce debate on the appropriate treatment of stock options in financial reports. Two questions stand out in this debate: how they should be valued? and when they should be expensed?

13.65 With regard to the valuation of stock options, the general consensus among economists is that options should be valued using a 'fair-value' method that, broadly speaking, reflects what the options would cost to buy in the market, if they were available.[87] Under this method, the fair value of the option is measured

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[87] Another method that has been adopted, for example in the US under the Accounting Principles Board (APB) Opinion No. 25, is the intrinsic-value method. This method values options based on the

at the grant date using an option pricing model, such as the Black–Scholes model (see Black and Scholes, 1973). The compensation cost is this estimated 'fair value' of the option and is recognised (amortised) over the vesting period.

13.66 The fair-value approach was recommended in the USA in the mid-1990s. It is also the proposed basis of an IAS called 'Share Based Payment', issued by the IASB. The fair-value approach is not without problems, for example, the treatment of out-of-the-money (forfeited) options; and whether the value should be adjusted to reflect changes in the value of the option during the lifespan of that option.[88] Such changes could be due to changes in the market price of the stock, its volatility or the risk-free interest rate.

13.67 The second issue surrounding the financial reporting of stock options is when they should be expensed. Here, various possibilities exist. They could, for example, be expensed at the grant date, at the exercise date, or amortised during the vesting period. One approach would be to expense the option fully at the grant date, but, in subsequent reports, this estimate would be adjusted to take into account any changes in their value. Upon exercise, the company would take on a final extraordinary gain or charge to match up with the option's actual value when exercised.

13.68 An example of the treatment of stock options in the UK is as follows. A company may establish trusts that hold shares for purchase by employees through various schemes, including executive stock option schemes. Such vehicles include employee share option plans, all employee share option plans, qualifying employee share trusts, and employee benefit trusts.

13.69 Under UITF Abstract 13, stock options held by an employee share option plan trust (or the other vehicles) are recognised as assets of the company until they are vested unconditionally in the employees (i.e. exercised). When an option is granted, the difference between the book value and the residual value (i.e. exercise value) is charged as an operating cost over the period of service of the employees in respect of which the options are granted. For example, on June 1st

difference, if any, between the exercise price and the market price at the grant date. However, in most cases, the exercise price is set according to the market price of the stock at the grant date, which gives an intrinsic value of zero. In other words, under this approach, there is normally no compensation expense associated with stock options.

[88] Out-of-the-money options refer to options that are not worth exercising. This occurs when the exercise price is higher than the market price.

2001, a company's shares are trading at £1 per share. The company grants an employee an option to acquire 1,000 shares of the company at 85p a share in three years time, subject to certain performance criteria being met. On the same day, it transfers £1,000 to the employee share option plan trust to purchase the 1,000 shares needed to satisfy the option if exercised. The company will record the shares as an asset of £1,000 and amortise this down to £850 (the exercise price) over the three-year period at £50 per year. This amortisation is charged as an operating cost. When the option is exercised, the £850 paid by the employee is offset against the carrying value of the asset.

TREATMENT OF PREFERENCE SHARES

13.70 Preference shares carry a fixed rate of dividend. They could, therefore, to a certain extent be considered similar to loan capital. The main difference is that, unlike the holder of loan capital, who can take action against a company in default of interest payment, preference shareholders have no legal redress if the board of directors decides to recommend that no preference dividends should be paid.[89]

13.71 The question is whether preference shares should be treated as equity or loan capital in estimating the WACC. For the purposes of a profitability assessment, preference shares could, in principle, be considered loan capital rather than equity capital. However, in particular when a company has a large proportion of preference shares, it is important to assess the sensitivity of the cost of capital analysis to the way preference shares are treated. Therefore, it is recommendable to do the calculation on both bases and analyse whether the result differs significantly.

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[89] If no preference dividend is declared, no dividend can be declared on any other type of share for the period concerned, and the preference shareholders usually become entitled to vote at shareholders' general meetings. Provided their dividends are paid, preference shares do not normally carry voting rights.

PART IV: REFERENCE INFORMATION

14   ABBREVIATIONS

ABC	activity-based costing	EU	European Union
ASB	Accounting Standards Board	FDC	fully distributed costs
At	total capital employed in period $t = 0, ..., N$	FRS	Financial Reporting Standard
		HCA	historical-cost accounting
ATC	average total cost	IAS	International Accounting Standards
AVC	average variable cost		
CAPM	capital asset pricing model	IASB	International Accounting Standards Board
CAT	Competition Appeals Tribunal		
CCA	current-cost accounting	IRR	internal rate of return
CFO	chief financial officer	IT	information technology
CFROI	cash flow return on investment	LRIC	long-run incremental costs
		MEA	modern equivalent asset
Ct	cash flow in period t where $t = 1, ..., N$	MMC	Monopolies and Mergers Commission (now the Competition Commission)
DCF	discounted cash flow		
EBIT	earnings before interest and taxes	MNO	mobile network operator
		NHS	National Health Service
EBITDA	earnings before interest, taxes, depreciation and amortisation	NPV	net present value
		NRV	net realisable value
EC	European Community	OFT	Office of Fair Trading
ECJ	European Court of Justice	Oftel	Office of Telecommunications
EPMU	equi-proportionate mark-up	ONS	Office of National Statistics
ERP	equity risk premium	P&L	profit and loss

PPRS	Pharmaceutical Price Regulation Scheme	SRIC	short-run incremental cost
PV	present value	SSAP	Statements of Standard Accounting Practice
R&D	research and development	SSNIP	small but significant and non-transitory increase in price
ROCE	return on capital employed		
ROE	return on equity	SPV	special purpose vehicle
RONOA	return on net operating assets	t	time period where $t = 0, ..., N$
ROS	return on sales / turnover	TRS	total returns to shareholders
RPI	retail price index	UK GAAP	UK Generally Accepted Accounting Practices
SME	small and medium-sized enterprise	WACC	weighted average cost of capital

15 GLOSSARY OF TERMS

TERM	DEFINITION
Accrual basis	An accounting method whereby income and expense items are recognised and entered into the books as they are earned or incurred, even though they may not have been received or actually paid in cash
Capital asset pricing model (CAPM)	A method of determining the cost of equity of a company
Clean surplus relation	A fundamental relationship in accounting which describes the articulation between the balance sheet, P&L account and cash flow statement. According to the clean surplus relation, the book value of equity should reflect the total value created by the firm measured as accounting earnings, less any dividends paid, plus (or minus) any new equity capital contributions (withdrawals)
Common cost	Cost that is shared by two or more products or lines of business
Cost of capital	The expected return that is forgone by investing in a project rather than in comparable financial securities
Current-cost accounting (CCA)	Convention where items are valued in the accounts according their current ('fair') value. The current value could be determined by reference to entry value (replacement cost), exit value (NRV) or value in use (PV)
Debt premium	The additional return demanded by debt investors for holding companies' debt
Direct cost	Cost that can be directly and exclusively attributed to a particular line of business or project
Equity beta	A measure of the riskiness of a company
Equity risk premium	The expected additional return demanded by investors for holding equities as opposed to risk-free assets
Fully distributed costs (FDC)	The cost attributed to a line of business when all costs have been fully distributed (allocated) between the relevant lines of business

Gearing	The level of net debt of a company divided by its total value, which is the sum of equity, debt, and net current liabilities
Gross margins	Turnover less cost of goods sold, as a proportion of turnover
Historical cost accounting (HCA)	Convention where items are valued in the accounts according to what was paid for them, less accumulated depreciation
Hurdle rate	Minimum acceptable rate of return on a project
Incremental cost	The increase in cost associated with producing a specified increment of output
Internal rate of return (IRR)	The discount rate at which an investment has zero NPV
Joint cost	Cost of a production process that yields multiple products simultaneously
Marginal cost	The increase in cost incurred in producing an additional (marginal) unit of a good or service option
Market-to-book ratio	The market value of a company as a proportion of the book value of its common stock (i.e. equity)
MEA value	The cost of replacing the existing assets with new ones which, even though they are not exactly the same in form, are able to provide the same set of services. MEA value is a specific type of replacement cost
Net present value (NPV)	An activity's net contribution to wealth — i.e. the present value of cash flows generated less initial investment
Net realisable value (NRV)	The current value of an asset if sold — i.e. the selling price minus the selling costs
Off-balance-sheet financing	Ways in which a company raises funds that do not appear on the balance sheet
Present value (PV)	Discounted value of future cash flows
Price–cost margin	In economics, defined as the difference between price and marginal cost, divided by price. Also known as the Lerner index, and used as an indicator of market power

Recognition	The identification and inclusion of events in the financial statements
Replacement cost	The cost of replacing an asset at current prices
Return on capital employed (ROCE)	EBIT as a proportion of total capital employed
Return on equity (ROE)	Equity earnings as a proportion of the book value of equity
Return on sales (ROS)	Earnings before interest and tax as a proportion of turnover
Stand-alone cost	The cost of an activity or line of business that would be incurred if the company undertook that activity only (all common costs are attributed to the activity in question)
Tobin's q	The market value of a company's debt and equity as a proportion of the replacement value of the assets — specifically, the MEA value
Total returns to shareholders (TRS)	The sum of dividends and share-price appreciation of a stock
$\displaystyle\sum_{t=1}^{t=N}$	The sum from period 1 to period N

16   BIBLIOGRAPHY

Accounting Standards Committee (1986), 'Accounting for the Effects of Changing Prices'.

Areeda, P.E. and Hovenkamp, H. (2000), *An Analysis of Antitrust Principles and Their Application*, Volume III, second edition, Aspen Law & Business.

Areeda, P.E. and Turner, D.F. (1975), 'Predatory Pricing and Related Practices under Section 2 of the Sherman Act', *Harvard Law Review*, **88**, 697–733.

Banz, R. (1981), 'The Relationship between Return and Market Value of Common Stocks', *Journal of Financial Economics*, **9**, 3–18.

Barwise T.P, Higson C.J., Likierman, J.A., Marsh, P.R. (1989), 'Accounting for Brands', Institute of Chartered Accountants in England and Wales/London Business School.

Bennett Stewart III, G. (1999), 'The Quest for Value: The EVA™ Management Guide', September, Stern Stewart & Co.

Black, F. and Scholes, M. (1973), 'The Pricing of Options and Corporate Liabilities', *Journal of Political Economy*, 637–54.

Brealey, R.A. and Myers, S.C. (2002), *Principles of Corporate Finance*, 7th edition, McGraw-Hill.

Brealey, R.A., Cooper, I.A. and Habib, M.A. (1997), 'Investment Appraisal in the Public Sector', *Oxford Review of Economic Policy*, **13**:4, 12–28.

Brennan, M. and Schwartz, E. (1985), 'Evaluating Natural Resource Investments', *Journal of Business*, **58**, 135–57.

Bromwich, M. (1997), 'Accounting for Overheads: Critique and Reforms', Acta Universitatis Upsaliensis, *Studie Oeconomiae Negotiorum*, **41**, Chartered Institute of Management Accountants.

Brooke, M., Clare, A. and Lekkos, I. (2000), 'A Comparison of Long Bond Yields in the United Kingdom, the United States, and Germany', Bank of England Quarterly Bulletin, May.

Carsberg, B. (2002), 'Report on Certain Issues Arising out for the Report by the Competition Commission on the Supply of Banking services by Clearing Banks to Small and Medium-sized Enterprises', commissioned by the HM Treasury and published on its web site.

Cave, M. and Mills, R. (1992), 'Cost Allocation in Regulated Industries', Centre for the Study of Regulated Industries, Regulatory Brief 3, London: Public Finance Foundation.

CAT (2002), *Napp Pharmaceutical Holdings Limited and subsidiaries v the Director General of Fair Trading*, Case: 1000/1/1/01 (final judgement), Competition Appeals Tribunal.

Competition Commission (2000*a*), 'The Supply of Impulse Ice Cream: A Report on the Supply in the UK on Ice Cream Purchased for Immediate Consumption', Cm 4510, January 10th.

Competition Commission (2000*b*), 'New Cars, A Report on the Supply of New Motor Cars', Cm 4660, April 10th.

Competition Commission (2000*c*), 'Supermarkets: A Report on the Supply of Groceries from Multiple Stores in the United Kingdom', Cm 4842, October 10th.

Competition Commission (2000*d*), 'Scottish Milk: A Report on the Supply of Fresh Processed Milk to Middle-ground Retailers in Scotland', Cm 5002, December 22nd.

Competition Commission (2002*a*), 'The Supply of Banking Services by Clearing Banks to Small and Medium-sized Enterprises: A Report on the Supply on the Supply of Banking Services to Small and Medium-sized Enterprises within the UK', Cm 5319, March 14th.

Competition Commission (2002*b*), 'BAA plc: A Report on the Economic Regulation of the London Airports Companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd)', November 29th.

Competition Commission (2003*a*), 'Report on References under Section 13 of the Telecommunications Act 1984 on the Charges Made By Vodafone, O_2, Orange and T-Mobile for Terminating Calls from Fixed and Mobile Networks', February 18th.

Competition Commission (2003*b*), 'Market Investigation References: Competition Commission Guidelines', March.

Cooper, R. and Kaplan, R.S. (1999), *The Design of Cost Management Systems*, Upper Saddle Rive, MJ: Prentice Hall.

CRA (2002), 'Innovation and Competition Policy', OFT Economic Discussion Paper 3, March, Charles River Associates.

Damodaran, A. (1999), *Applied Corporate Finance: A User's Manual*, Wiley.

Dixit, A. and Pindyck, R. (1994), *Investment Under Uncertainty*, Princeton University Press: NJ.

Edwards, J., Kay, J. and Mayer, C. (1987), *The Economic Analysis of Accounting Profitability*, Claringdon Press: Oxford.

Elzinga, K.G. and Mills, D.E. (1989), 'Testing for Predation: Is Recoupment Feasible?', *Antitrust Bulletin*, **34**, 869–93.

European Commission (1984), 'Communication to the Member States Concerning Holdings by Public Authorities in Company Capital', *EC Bulletin*, No. 9.

European Commission (1998), 'Notice on the application of the competition rules to access agreements in the telecommunications sector — Framework, Relevant Markets and Principles', OJ C 265/02, 22/08/1998.

European Commission (2002*a*), 'Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services', OJ C 165/03, 11/07/2002.

European Commission (2002*b*), 'Commission notice on the appraisal of horizontal mergers under the Council Regulation on the control of concentrations between undertakings', COMM(2002), December 11th.

Feinschreiber, R. (ed) (2001), *Transfer Pricing Handbook*, 3rd edition, New York: John Wiley.

Fisher, F.M. and McGowan, J. (1983), 'On the Misuse of Accounting Rates of Return to Infer Monopoly Profits', *American Economic Review*, **73**:1, March, 82–97.

Franks, J. and Hodges, S.D. (1996), 'The Meaning of Accounting Numbers in Target Setting and Performance Measurement: Implications for Managers and Regulators', in K.V. Peasnell and R. Brief (eds), *Clean Surplus: A Link between Accounting and Finance*, Garland Publishing.

FSA (2000), 'The Listing Rules' (The Purple Book), Financial Services Authority, May.

Graham, J.R. and Harvey, C.R. (2001), 'The Theory and Practice of Corporate Finance: Evidence from the Field', *Journal of Financial Economics*, **60**, 187–243.

Graham, M. and Steele, A. (1997), 'The Assessment of Profitability by Competition Authorities', OFT Research Paper 10, February.

Grenadier, S. (2002), 'Option Exercise Games: An Application to the Equilibrium Investment Strategies of Firms', *The Review of Financial Studies*, **15**, 691–721.

Holmes, G., Sugden, A. and Gee, P. (2002), *Interpreting Company Reports and Accounts*, 8th edition, Harlow: Prentice Hall.

Horngren, C.T., Datar, S.M. and Foster, G. (2003), *Cost Accounting: A Managerial Emphasis*, Upper Saddle River, MJ: Prentice Hall.

Hotelling, H. (1925), 'A General Mathematical Theory of Depreciation', *Journal of the American Statistical Association*, **20**, 240–53.

Ijiri, Y. (1980), 'Recovery Rate and Cash Flow Accounting', *Financial Executive*, March, 54–60.

Kay, J.A. (1976), 'Accountants Too, Could be Happy in a Golden Age: The Accountant's Rate of Profit and the Internal Rate of Return', *Oxford Economic Papers*, **28**, 447–60.

Lawrence, S. (2002), 'Convergence of UK GAAP to IAS', mimeo, University of East London.

Madden, B. (1999), *CRFOI Valuation: A Total System Approach to Valuing the Firm*, Oxford: Butterworth-Heinemann.

Majd, S. and Pindyck, R. (1987), 'Time to Build, Option Value and Investment Decisions', *Journal of Financial Economics*, **18**, 7–27.

Martin, S. (1993), *Advanced Industrial Economics*, Oxford: Blackwell.

Mayer, C. (1988), 'The Real Value of Company Accounts', *Fiscal Studies*, **9**, 1–17.

McDonald, R. and Siegel, D.R. (1985), 'Investment and the Valuation of Firms when there is an Option to Shut Down', *International Economic Review*, June, **26**, 331–49.

Merrett, J. and Sykes, A. (1963), *The Finance and Analysis of Capital Projects*, Longman.

MMC (1975), 'A Report on the Supply of Contraceptive Sheaths in the United Kingdom', HC 135, 1974–75, February 5th.

MMC (1982), 'A Report on the Supply in the United Kingdom of Contraceptive Sheaths', Cmnd 8689, November 4th.

MMC (1991), 'Soluble Coffee: A Report on the Supply of Soluble Coffee for Retail Sale within the United Kingdom', Cm 1459, March 8th.

MMC (1993), 'Fine Fragrances: A Report on the Supply in the UK for Retail Sale of Fine Fragrances', Cm 2380, November 11th.

MMC (1994*a*), 'Contraceptive Sheaths, A Report on the Supply in the UK of Contraceptive Sheaths', Cm 2529, March 30th.

MMC (1994*b*), 'Historical On-line Database Services: A Report on the Supply in the UK of Services which Provide Access to Databases containing Archival Business and Financial Information', Cm 2554, May 12th.

MMC (1994*c*), 'The Supply of Recorded Music: A Report of the Supply in the UK of Pre-recorded Compact Discs, Vinyl Discs and Tapes Containing Music', Cm 2599, June 23rd.

MMC (1996), 'Classified Directory Advertising Services', Cm 3171, March 21st.

MMC (1997), 'Foreign Package Holidays: A Report on the Supply in the UK of Tour Operators' Services and Travel Agents' Services in Relation to Foreign Package Holidays', Cm 3813, December 19th.

Modigliani, F. and Miller, M. (1958), 'The Cost of Capital, Corporation Finance and the Theory of Investment', *American Economic Review*, June, 261–97.

Nalebuff, B. (2003), 'Bundling, Tying and Portfolio Effects', DTI Economics Paper No. 1, February.

Niels, G.T. and Kate, A. ten (2000), 'Predatory Pricing Standards: Is there a Growing International Consensus?', *Antitrust Bulletin*, **45**:3, 787–809.

OECD (1995), 'Transfer Pricing Guidelines for Multinational Enterprises and Tax Administration', July.

OFT (1999a), 'Market Definition', OFT 403, March.

OFT (1999b), 'Assessment of Market Power', OFT 415, September.

OFT (1999c), 'Assessment of Individual Agreements and Conduct', OFT 414.

OFT (2001), 'Decision of the Director General of Fair Trading: NAPP Pharmaceutical Holdings Limited and Subsidiaries', No CA98/2/2001, March 30th.

OFT (2002a), 'Decision of the Director General of Fair Trading: Companies House', October 25th.

OFT (2002b), 'BSkyB Investigation: Alleged Infringement of the Chapter II Prohibition', No CA98/20/2002, December 17th.

OFT (2003a), 'Market Investigation References: Guidance about the Making of References under Part 4 of the Enterprise Act', March.

OFT (2003b), 'Mergers: Substantive Assessment Guidance', May.

Oftel (1996), 'Fair Trading in Mobile Service Provision — Consultative Document', May.

Oftel (1997), 'Long Run Incremental Costs: The Bottom-up Network Model', March.

Oftel (2000), 'The Competition Act 1998: The Application in the Telecommunications Sector', March.

Oftel (2001a), 'Effective Competition Review: Mobile', September.

Oftel (2001b), 'Guidelines on the Operation of Network Charge Controls from October', December.

Oftel (2001c), 'The Oftel Formula Returns', December.

Ofwat (2000), 'Transfer Pricing in the Water Industry — Regulatory Accounting Guideline 5.03', March.

OXERA (2000), 'Real Option Valuation', *The Utilities Journal*, June, 42–3.

Peasnell, K.V. (1982), 'Estimating the Internal Rate of Return from Accounting Profit Rates', *The Investor Analyst*, 26–31.

Penman, S. (2001), *Financial Statement Analysis and Security Valuation*, New York: McGraw-Hill.

Reilly, R. F. and Schweihs, R. P. (1998), *Valuing Intangible Assets*, McGraw-Hill, 381–2.

Ruuhela, R., Salmi, T., Luoma, M. and Laakkonen, A. (1982), 'Direct Estimation of the Internal Rate of Return from Published Financial Statements', *The Finnish Journal of Business Economics*, 31:4, 329–45.

Salamon, G.L. (1982), 'Cash Recovery Rates and Measures of Firm Profitability', *The Accounting Review*, **57**:2, 292–302.

Spence, A.M. (1977), 'Entry, Capacity, Investment and Oligopolistic Pricing', *Bell Journal of Economics*, **8**, 534–44.

Steele, A. (1986), 'A Note on Estimating the Internal Rate of Return from Published Financial Statements', *Journal of Business Finance & Accounting*, **13**:1, 1–13.

Steele, A. (1995), 'Further Notes on Estimating Economic Returns from Published Accounting Statements', *Journal of Business Finance and Accounting*, **22**:7, 923–38.

Steele, A. (2002), 'Adjusting Accounting Returns to Infer Monopoly Rents: An Application to the UK Banking Sector', mimeo, University of Warwick.

Thanassoulis, E. (1999), 'DEA and Comparative Efficiency', *The Utilities Journal*, August, 40–2.

Tobin, J. (1969), 'A General Equilibrium Approach to Monetary Theory', *Journal of Money, Credit and Banking*, **1**, 15–29, February.

Wilson, A., Davies, M. and Wilkinson-Riddle, G. (2001), *UK and International GAAP*, 7th edition, London: Butterworth Tolley.

Wright, S., Mason, R. and Miles, D. (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK', February.