



Assessment of Sky's profitability and cost of capital

Annex 3 to Pay TV Statement

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Section 1

Introduction

- 1.1 This annex set out the results of our analysis of Sky's profitability. We have carried out this analysis in order to inform our assessment of competition issues. Profitability analysis can inform both our views of price levels and our assessment of market power. As we have previously set out, evidence of companies earning returns above their cost of capital for a sustained period may indicate that there are barriers to entry and the exploitation of market power through charging high prices to consumers¹.
- 1.2 This annex also draws on further work we have commissioned from Oxera in response to specific consultation responses. Oxera's second report can be found in an appendix to this annex.

Our position in the Third Pay TV Consultation

- 1.3 In our Third Pay TV Consultation we explained that analysis of Sky's profitability in our First and Second Pay TV consultations was inconclusive, in particular due to the difficulties around establishing an appropriate asset base for Sky and selecting an appropriate time period for analysis². We estimated an operating margin for Sky's premium wholesale business but noted that there were many uncertainties with establishing the level of capital attributable to this part of Sky's business so estimating an economic return was difficult³.
- 1.4 We commissioned consultants Oxera to carry out an assessment of Sky's profitability at an aggregate and disaggregate level. Oxera considered the profitability of Sky as a whole and also at the level of retail and wholesale, premium and basic channels and sports and movies channels⁴. Oxera is a recognised expert in the field of economic profitability and has direct experience of carrying out this type of analysis in the context of market investigations for both the OFT and the CC.
- 1.5 Oxera's focus for this work was on establishing an appropriate asset base by looking at intangible assets and addressing the challenges involved in selecting an appropriate time period⁵.
- 1.6 In assessing Sky's profitability at an aggregate level, Oxera used the truncated IRR methodology, in which the initial asset value is treated as a cash outflow and the residual value at the end of the period is treated as a cash inflow⁶. In valuing assets, Oxera used the value to the owner principle⁷. We explained that "in a competitive market with freedom of entry and exit, we would not expect the IRR of a particular project to substantially exceed the cost of capital in the long run. An IRR substantially

¹ For example, Annex 12 to the First Pay TV Consultation, paragraph 1.1 and paragraph 6.176 of the Third Pay TV Consultation.

² Ibid paragraph 6.161.

³ Ibid paragraphs 6.162 - 6.163.

⁴ Annex 9 to Third Pay TV Consultation.

⁵ Third Pay TV Consultation, paragraph 6.173.

⁶ Ibid, paragraph 6.177. In its first report, Oxera said "In the context of economic profitability analysis, the conceptually appropriate approach under several conditions is to apply the internal rate of return (IRR) and net present value (NPV) measures. The IRR reflects the way in which firms make decisions in competitive markets", page 4.

⁷ Assets are valued at the lower of the replacement cost and economic value. Economic value is the higher of the NPV of future cash flows or the net realisable value from selling the assets.

above the cost of capital could indicate the existence of barriers to entry and market power.”⁸

- 1.7 To determine the asset base, Oxera included off balance sheet intangible assets. The largest of these was Sky’s subscriber base, which it valued on the basis of capitalised subscriber acquisition costs which were depreciated each year. Oxera also considered other intangibles such as future programming contractual obligations⁹.
- 1.8 Oxera’s base case scenario valued Sky’s subscriber base by capitalising marketing acquisition costs from Sky’s management accounts and employing two different methods of valuation – a year of investment approach and an annual revaluation approach¹⁰.
- 1.9 Oxera stated that its “aggregate profitability analysis suggests that over the last five years [2004-2008] under the base case scenario the returns appear to be around 20%. Over the longer term the returns appear higher, up to 28% on the IRR basis¹¹”. Oxera also found that its estimates of ROCE supported the IRR results, particularly in the period 2004-2008¹².
- 1.10 We explained that the cost of capital was the relevant benchmark for Oxera’s estimates of Sky’s profitability under the IRR approach. Our forward looking cost of capital was 10.3%, which we also thought was a reasonable estimate of Sky’s cost of capital in the last few years, including the 2004-2008 period. We observed that Sky’s returns as measured using the IRR methodology were higher than its cost of capital, and we believed that this would continue if the market was left unchanged¹³. We refer to the difference between the IRR and the cost of capital as the “profitability gap”.
- 1.11 Oxera also considered Sky’s disaggregate profitability in order to provide an indication of the sources of profitability at an aggregate level. This analysis suggested that profitability is higher for Sky’s wholesale business than for its retail business¹⁴. We recognised that further disaggregation needed to be treated with caution, but we noted that Oxera’s results suggested that wholesale margins for movies were higher than wholesale sports channels and this result held even under the most extreme revenue allocation assumptions which we considered reasonable¹⁵.
- 1.12 We also asked Oxera to benchmark Sky’s results against appropriate comparators. Oxera found that Sky in aggregate, and Sky’s wholesale operations in particular, had a higher ROCE than comparator businesses over the period 2003-2007. Sky’s retail operations had a similar ROCE to comparators, although Sky’s retail margins appeared lower than comparators¹⁶.

⁸ Third Pay TV Consultation, paragraph 6.176. See Also Oxera’s first report, page 5.

⁹ Ibid, paragraphs 6.180 – 6.183.

¹⁰ See section 3.4.1 of Oxera’s first report.

¹¹ Third Pay TV Consultation, paragraph 6.186.

¹² Ibid paragraph 6.188.

¹³ Ibid paragraphs 6.190 – 6.194.

¹⁴ Ibid paragraph 6.195.

¹⁵ Ibid paragraphs 6.206 – 6.207.

¹⁶ Ibid paragraph 6.200.

Responses to our consultation

- 1.13 The Three Parties said that they could not comment in detail on Oxera’s analysis of Sky’s profitability due to a lack of access to the underlying data. They did, however, agree with the approach used by Oxera and considered it to be conceptually appropriate in the context of a competition investigation¹⁷. Virgin Media noted that Oxera’s analysis was conducted carefully and conservatively using the appropriate conceptual framework. It said that the study made sensible use of scenarios to test the sensitivity of results to key assumptions and also cross-checked the results using alternative measures¹⁸.
- 1.14 [X] agreed that Sky was likely to be making excessive profits in its wholesale business in light of its monopoly over Core Premium channels¹⁹.
- 1.15 [X] and [X] noted the difficulty in assessing the Oxera findings due to extensive redactions. They thought, however, that Oxera’s analysis was likely to be reliable, as it was based on the default profitability analysis methodology used by UK competition authorities²⁰. The BBC welcomed Ofcom’s analysis of Sky’s profitability as an important indicator of the competitive situation in pay TV but said it was unable to usefully comment on the assessment of Sky’s profitability.
- 1.16 The Premier League believed that our document did not contain any evidence to support a finding of high wholesale prices or high retail prices. It said that Ofcom only raised theoretical concerns that were unsupported in reality and its analysis did not include the historical element of risk to Sky²¹.
- 1.17 Sky made a series of challenges to the profitability analysis and the conclusions that Ofcom drew. In particular it argued that²²:
- Ofcom had shifted its position on Sky’s profitability.
 - The IRR was not an appropriate methodology for assessing profitability. Sky refers in particular to the two papers submitted by its advisor, Professor Grout²³.
 - The IRR calculation was not robust, in particular Sky mentions uncertainty around the valuation of intangible assets and sensitivity of the IRR to the time period selected.
 - The cost of capital could lie within a range and Ofcom has ignored the Brattle discussion about Sky’s equity beta.
 - There are many reasons why the IRR could be greater than the cost of capital. In particular Sky argues that Ofcom has not considered the range of investments Sky has undertaken and the risk associated with them.

¹⁷ Three Parties response to Third Pay TV Consultation, paragraph 8.

¹⁸ Virgin Media response to Third Pay TV Consultation, paragraph 5.11.

¹⁹ [X]

²⁰ [X]

²¹ FA Premier League response to the Third Pay TV Consultation, paragraphs 1.3.4 and 7.38.

²² Sky June 2009, submission Section 4, Parts B-G.

²³ “A brief note on the use of the truncated IRR methodology for assessing profitability”, 11 May 2009 and “A report on Profitability”, September 2009

- Oxera’s analysis was backwards looking and Ofcom could not rely on Oxera’s report in support of its assertion that any alleged historic excessive profits are likely to persist into the future.
- Alternative measures of profitability did not support a finding that Sky’s returns had been abnormally high. Sky referred in particular to Professor Grout’s analysis of shareholder returns and comparisons of Sky’s ROCE with ROCEs of firms investigated by the CC.
- The comparators Oxera used in its benchmarking analysis were not appropriate and so the analysis had limited value. Sky referred to a report by PwC which suggested that the comparators used by Oxera were not relevant²⁴.

Our position on Sky’s profitability to date

1.18 Sky argued that Ofcom had shifted its position on Sky’s profitability. It raised three points in particular:

- Ofcom did not rely on its analysis of shareholder returns and enterprise to book value ratios from the First Pay TV Consultation.
- Ofcom said in its Second Pay TV Consultation that a truncated IRR analysis was unlikely to produce reliable results but then commissioned Oxera to carry out a truncated IRR analysis for its Third Pay TV Consultation.
- Ofcom based its conclusions on profitability on the truncated IRR analysis and ignored other measures of profitability.

1.19 We looked at shareholder returns and enterprise to book value ratios in our First Pay TV Consultation²⁵. Regarding shareholder returns we noted that Sky’s shares had underperformed some market indices since flotation, but we also noted that there were other periods where investors would have observed very high returns²⁶. We also said that it was possible that the opening share price included expectations of future super normal profits and so the analysis might only have captured changes in shareholder expectations²⁷. We also looked at Sky’s enterprise to book value ratio (Tobin’s Q), where we said a high ratio would indicate the presence of supernormal profits. This analysis highlighted the difficulty in estimating Sky’s intangible assets. Our conclusion from these two measures was that “we [did] not see this analysis as providing sufficient evidence to support a claim that Sky is earning excessive profits”²⁸. We consider further the evidence on shareholder returns in Section 6 of this annex.

1.20 Sky argued in its response that we should have relied on this analysis, but as we explained in our Second Pay TV Consultation, the analysis was inconclusive. We said “the analysis did not overcome a number of estimation problems and highlighted the lack of suitable comparators for Sky”²⁹. We also recognised responses from third parties, such as Setanta and Top Up TV, which argued that Ofcom’s total

²⁴ “Evaluation of the selection of comparators used in Annex 9 of Ofcom’s pay TV phase three document”, 18 September 2009.

²⁵ Annex 12 to First Pay TV Consultation

²⁶ Ibid paragraph 3.9.

²⁷ Ibid paragraph 3.10.

²⁸ First Pay TV Consultation, paragraph 4.71.

²⁹ Annex 9 to Second Pay TV Consultation, paragraph 1.6.

shareholder returns (“TSR”) assessment did not measure Sky’s financial strength or market position but rather how the company had performed against expectations and the assessment of its market position at flotation³⁰.

- 1.21 The same respondents advocated the use of a truncated IRR approach in assessing Sky’s profitability. We considered the estimates provided to us, but, as Sky pointed out, we said “Ofcom considers that a profitability assessment based on a truncated IRR approach is unlikely to yield a robust conclusion about Sky’s profitability”³¹. The principal reasons for our view were that when adjusting Setanta/Top Up TV’s calculations we found that the results were “highly volatile to different assumptions regarding the appropriate asset values and scope and the time period selected for analysis”³². We said in our Second Pay TV Consultation that the evidence on Sky’s aggregate profitability remained inconclusive³³.
- 1.22 In our Third Pay TV Consultation we stated again that the evidence and analysis that we had presented in our previous consultation documents had not allowed us to conclude on whether Sky was earning monopoly profits either in aggregate or in its wholesale business³⁴. As a result we commissioned Oxera to carry out an analysis of Sky’s profitability. We explained that Oxera’s work had attempted to address the specific difficulties we had identified previously, that is, its work focused on establishing an appropriate asset base by looking at intangible assets and addressing the challenges involved in selecting an appropriate time period³⁵. The framework Oxera used for this analysis was the truncated IRR and the “value to the owner” principle in valuing assets which enabled it to determine the value of Sky’s intangible asset base. We considered that Oxera had managed to overcome the various difficulties we had identified by virtue of its expertise in having previously carried out this type of analysis for the OFT and CC and the availability of more detailed financial data such as management accounts.
- 1.23 Sky argued that we gave no reasons for our “change of heart about the reliability of a truncated IRR approach”³⁶. However, we said in our Third Pay TV Consultation that “Oxera’s analysis looked at a number of time periods, and has found similar results regardless of time period, which gives us greater confidence in the results.”³⁷ Furthermore, Oxera considered a range of other measures in addition to IRR. The IRR results were, for example, also supported by ROCE estimates, which we said provided us “with a strong degree of comfort around the IRR estimates.”³⁸ Critically, Oxera’s report also included a detailed discussion on the appropriate approach to valuing Sky’s intangible assets. Taking these factors into account, we considered that Oxera had been able to address the difficulties we had previously identified relating to the application of an IRR approach to Sky’s business.
- 1.24 The third of Sky’s points regarding our position on profitability was that we placed a lot of weight on our IRR results and ignored other measures of profitability. As stated above, we consider that Oxera’s approach has addressed the concerns we had about the use of IRR in our Second Pay TV Consultation and that the estimated returns are robust to a number of sensitivities and time periods. In addition the results

³⁰ Ibid, paragraph 1.9.

³¹ Ibid paragraph 1.55

³² Annex 9 to Second Pay TV Consultation, paragraph 1.55

³³ Ibid, paragraph 1.64.

³⁴ Third Pay TV Consultation, paragraph 6.170.

³⁵ Ibid paragraph 6.173.

³⁶ Sky response to Third Pay TV Consultation, paragraph 4.15.

³⁷ Third Pay TV Consultation, paragraph 6.173.

³⁸ Ibid, paragraph 6.188.

are supported by a cross check against ROCE and the benchmarking analysis carried out by Oxera in its first and second reports which suggests that Sky's returns have been greater than those of comparators. We do not consider that an analysis of total shareholder returns is an appropriate way to assess Sky's economic profitability for the reasons given in Section 6 of this annex.

- 1.25 In the remainder of this annex we set out the conclusions from our assessment of Sky's aggregate profitability and our position in respect to the other challenges made by Sky as summarised in paragraph 1.17. Informed by further analysis by Oxera, we have considered the arguments Sky made around the appropriateness of IRR as a measure of profitability and the robustness of the calculated returns. We also asked Oxera to help us assess whether the difference between the returns and cost of capital (if any) could be explained by Sky's continuous successful risk-taking and innovation. Finally we asked Oxera to consider the evidence on shareholder returns and benchmarking, and to update its aggregate profitability analysis for 2009. Oxera's report can be found as an appendix to this annex.

Section 2

The use of IRR in profitability analysis

Summary

- 2.1 In this section we consider the challenges put forward by Sky and Professor Grout concerning the use of IRR in profitability analysis. In its first report, Oxera stated “in the context of economic profitability analysis, the conceptually appropriate approach under several conditions is to apply the internal rate of return (IRR) and net present value (NPV) measures. The IRR reflects the way in which firms make decisions in competitive markets”³⁹. Sky and Professor Grout suggested that the IRR is not well suited to assessing the question of whether returns are persistently and significantly above the cost of capital and that there were issues with asset valuation which meant the IRR could be biased. Sky also questioned the robustness of the IRR calculation.
- 2.2 Informed by Oxera’s second report, we consider the IRR an appropriate methodology for assessing profitability, and that the issues which Ofcom and Sky have previously identified with the use of IRR, such as the uncertainties associated with valuing intangible assets, have been reasonably addressed. We also note that the Competition Commission has previously used IRR analysis when assessing profitability⁴⁰. We consider that Oxera’s second report demonstrates that there is no evidence to suggest that the IRR estimates are biased due to issues with asset valuation or the choice of IRR as a measure of profitability.
- 2.3 We also consider that the IRR calculation carried out by Oxera has undergone sufficient sensitivity testing and that the IRR estimate is reasonable, conservative, and towards the bottom of a potential range assessed over multiple time periods

Does the IRR provide an appropriate methodology for assessing profitability?

- 2.4 Sky and Professor Grout argued that “the IRR is not ‘designed for’, or well suited to assessing the question of whether returns persistently and significantly exceed the cost of capital”⁴¹. The example given by Sky and Professor Grout is that the measured IRR can be affected by the way a firm chooses to structure its business or the timing of payments, i.e. it is theoretically possible to change the profile of cash flows to retain the same NPV but change the IRR⁴².
- 2.5 In its second report, Oxera considers this argument from a conceptual and practical perspective. Oxera argues that, conceptually, the suggestion made by Sky and Grout “does not invalidate the profitability analysis. This is because...the company would not be expected to be able to change the profile of cash flows and retain the same NPV.”⁴³ For example, it would not be straightforward for a firm to change its pricing policy and retain the same NPV because the new pricing policy could reduce

³⁹ Oxera first report, page 4.

⁴⁰ For example, in the Classified directory advertising services market investigation, 21 December 2006, (the “CC Classified Directory Advertising Report”). See section A4.1 of Oxera’s second report for more examples of the role of profitability analysis in competition investigations.

⁴¹ Sky response to Third Pay TV Consultation, paragraph 4.45.

⁴² See Sky response to Third Party Pay TV Consultation paragraph 4.25 and Grout: “A report on profitability”, September 2009 section 1.3.

⁴³ Oxera’s second report, page 32.

- demand and increase the payback period and risks, which would in turn affect the discount rate.
- 2.6 From a practical perspective, the significance and persistence of the profitability gap based on the IRR can be crosschecked using other measures. Oxera's report shows that in terms of significance, the IRR result is consistent with the modified IRR and ROCE⁴⁴. In terms of the persistence of the results using IRR, the stability of the observed market premium suggests that the observed profitability gap was stable over time⁴⁵.
- 2.7 Professor Grout's argument is based on a technical feature of the IRR concerning the reinvestment and borrowing rate assumptions. The potential distortion generated by this feature of the IRR will be greater when a high proportion of interim cash flows occur early in the period over which the IRR is determined or if the interim cash flows are relatively large compared to the opening and closing cash flows. The cash flows used in Oxera's calculation of Sky's IRR are concentrated at the start and end of the periods that Oxera considers because of the large cash outflow associated with the initial asset value and the large cash inflow at the end of the period representing the residual value of assets. The interim cash flows are consequently relatively small and as a result we would not expect the IRR in this case to be distorted and unrepresentative of Sky's profitability. This is confirmed in Oxera's report by the consistency between the IRR and the modified IRR⁴⁶ - the modified IRR is approximately 1% lower than the IRR⁴⁷.
- 2.8 Sky and Professor Grout also argued that Oxera's estimates of Sky's returns were biased due to issues with asset valuation. Professor Grout suggested that such biases may arise because Oxera's analysis underestimates the asset value by omitting certain types of assets, such as the skills, knowledge and experience acquired by Sky over time⁴⁸.
- 2.9 Oxera's second report suggests that "Professor Grout's comments could be interpreted in two ways. One interpretation may be that Professor Grout is arguing that Oxera's analysis omitted certain specific costs that should have been capitalised. Alternatively, he may be arguing that there are assets that were acquired by Sky without incurring up-front cash costs and that they should be included in the asset base when estimating economic profitability"⁴⁹.
- 2.10 Oxera has not found any evidence that its IRR estimates could be significantly biased by the omission of certain cost lines from its analysis. It carried out a detailed analysis of costs in its first report, and Professor Grout did not provide evidence to suggest that this analysis omitted any costs. Oxera also notes that the inclusion of additional costs would not necessarily decrease the estimates of the IRR – it would depend on the relative impact on opening and closing asset values. Oxera has also considered further sensitivity analysis in its report which indicates that the estimates

⁴⁴ Oxera's second report, Table 4.3. The modified IRR ("MIRR") assumes that cash flows are reinvested at a rate other than the IRR, as is assumed in the standard IRR calculation. In this case Oxera has assumed a reinvestment rate of 15%.

⁴⁵ Oxera's second report, Figure 4.1.

⁴⁶ The difference between the MIRR and IRR is the assumed rate of return on re-invested cash flows. Under the IRR approach, all generated cash flows are assumed to be re-invested at a rate equal to the IRR of the project. Under the MIRR, the cash flows are assumed to be re-invested at a different rate. Oxera has assumed a reinvestment rate of 15%.

⁴⁷ Oxera's second report, Table 4.3.

⁴⁸ A report on profitability, September 2009 page 2.

⁴⁹ Oxera's second report, page 28.

of returns are robust with respect to a number of alternative estimates of Sky's subscriber acquisition costs⁵⁰.

- 2.11 Oxera's report comments that including assets in the analysis which were created without incurring costs would imply that Sky was entitled to a return on something that did not require an investment of capital. In competitive markets, it would be reasonable to expect that the benefits of knowledge and experience acquired in this way would be passed through to consumers over time. Oxera's analysis also suggests that any hidden assets, for example any benefits of high efficiency, would have to be implausibly large for them to explain the profitability gap⁵¹.
- 2.12 We have considered the points made by Sky and Professor Grout on the use of IRR in profitability analysis. We consider the IRR an appropriate methodology for assessing Sky's profitability and we note that Oxera's analysis indicates that the use of IRR does not introduce bias into the analysis of returns. It also seems implausible, based on Oxera's analysis, that the presence of hidden assets could explain the profitability gap.
- 2.13 Informed by Oxera's further analysis, we consider the IRR an appropriate methodology for assessing profitability, and that the issues which Ofcom and Sky have previously identified with the use of IRR have been reasonably addressed. We also note that the Competition Commission has previously used IRR analysis when assessing profitability (see footnote 40 above). We consider that Oxera's second report demonstrates that there is no evidence to suggest that the IRR estimates are biased due to issues with asset valuation or the choice of IRR as a measure of profitability.

Is the IRR calculation robust?

- 2.14 Sky made a number of further challenges to the robustness of the IRR calculation published in the June consultation. In particular it mentioned⁵²:
- Uncertainty around the valuation of intangible assets.
 - Sensitivity of the IRR to the period selected.
 - Insufficient testing of other sensitivities.
 - A lack of range provided for the IRR.
- 2.15 Ofcom has previously acknowledged the issues arising when trying to value Sky's intangible assets and Oxera's analysis has considered an appropriate way to take these into account. In its first report for example, Oxera says that "estimating the replacement costs of intangible assets is inherently uncertain and care needs to be taken to address such uncertainty adequately. To minimise the impact of uncertainty on the analysis, two scenarios have been considered here to value the subscriber base"⁵³.
- 2.16 We consider that Oxera has reasonably addressed this issue in its analysis using different scenarios and valuation methods. Furthermore, Oxera's second report

⁵⁰ Oxera's second report, section 4.1.2.

⁵¹ Oxera's second report, Table 4.2.

⁵² Sky response to Third Pay TV Consultation Section 4 part C, page 53.

⁵³ Oxera first report, June 2009, page 14.

considers this issue based on specific comments raised by Sky and Professor Grout, and finds no evidence that its IRR estimates are biased due to issues with asset valuation.

- 2.17 Sky said that “different approaches and estimates of Sky’s assets at the beginning and end of the time period selected would have a material impact on the estimate of Sky’s truncated IRR”⁵⁴. Oxera discussed the estimates of returns under different approaches to asset valuation in its first report, and said “according to the value to the owner principle, the appropriate asset valuation approach in this context seems to be replacement costs given that they are below market values”⁵⁵. The purpose of the profitability analysis was to understand how prices relate to costs and the replacement cost basis is an appropriate way to understand this relationship. Under the replacement cost scenarios, the IRR estimates of returns were consistent in the 2004-2008 period at around 20%, and over the longer period Oxera said that “a reasonable range appears to be 20-25%”⁵⁶.
- 2.18 Oxera also considered the sensitivity of the estimated IRR to different time periods. For example it stated “the IRR under the replacement cost valuation approach ranges from 19% to 28%, depending on the starting date of the period chosen and the specific scenario adopted for estimating the replacement costs. Given the variation and frequency of occurrence of different estimates (as can be seen from Table A1.2), a reasonable range appears to be 20-25%. Returns over a longer period would be towards the upper end of the range, while if measured over a more recent time period they would be towards the lower end of the range”⁵⁷.
- 2.19 In addition to supporting its calculations with ROCE estimates and assessing the impact of using different time periods, Oxera included a range of sensitivities on its IRR calculations. These included:
- Sensitivities around the treatment of current liabilities, cash and past losses⁵⁸.
 - An asset valuation based on comparator market values. Oxera concluded that this suggests that the IRRs based on a bottom up analysis of replacement costs were not out of line with returns based on the analysis of comparators.
 - Applying the modified IRR to assess the impact of implicit assumptions in the IRR about reinvestment rates. This marginally reduced the 2004-2008 IRR by approximately 1%⁵⁹.
- 2.20 Oxera has considered further sensitivities in its second report. Table 4.1 for example shows that the estimate of the IRR is robust to alternative estimations of SAC costs, one of the key drivers of the intangible asset valuation. Updated sensitivities with respect to the definition of capital employed are also included in table A1.1 of its second report.
- 2.21 We believe that the uncertainties associated with using an IRR in the presence of intangible assets have been reasonably addressed. We also consider that the IRR calculation carried out by Oxera has undergone sufficient sensitivity testing and that

⁵⁴ Sky response to Third Party Pay TV Consultation, paragraph 4.22.

⁵⁵ Oxera’s first report, page 29.

⁵⁶ Oxera’s first report, June 2009, page 30.

⁵⁷ Oxera’s first report, June 2009, page 30.

⁵⁸ Oxera’s first report, June 2009, page iii.

⁵⁹ Ibid, footnote 19.

the IRR estimate is reasonable, conservative, and towards the bottom of a potential range assessed over multiple time periods.

Section 3

Have Sky's returns exceeded its cost of capital?

Summary

- 3.1 In this section we present Oxera's updated estimates of Sky's IRR and ROCE, reflecting its 2009 financial results. We then consider Oxera's estimates of Sky's profitability gap, that is, the difference between its returns and cost of capital, since Sky floated in 1994.
- 3.2 This analysis indicates that Sky's profitability gap over the last five years has been approximately 9 percentage points, and this observed difference is persistent over time. We consider that the size of the gap is significant. Evidence that Sky has a persistent and significant profitability gap based on the difference between its ex post returns (measured by the IRR) and its ex ante cost of capital is a strong indicator of the existence of barriers to entry. In a well-functioning competitive market, we would expect the entry of new firms to drive prices down and reduce returns. We therefore conclude on the basis of this evidence that Sky's profitability suggests that it benefits from significant barriers to entry.

Updated IRR and ROCE estimates

- 3.3 In the Third Pay TV Consultation, we said that in a competitive market with freedom of entry and exit, we would not expect the IRR of a particular project to substantially exceed the cost of capital in the long run. An IRR substantially above the cost of capital could indicate the existence of barriers to entry and market power⁶⁰.
- 3.4 In the Third Pay TV Consultation, Oxera estimated that Sky's returns under the IRR methodology were around 20% in the period 2004-2008. We compared this to our estimate of Sky's forward looking cost of capital of 10.3% and observed that Sky's returns exceeded its cost of capital.
- 3.5 Since that consultation Sky has published its 2009 results so we asked Oxera to update its analysis of Sky's aggregate profitability. As in its first report, Oxera has estimated Sky's returns using IRR, with the ROCE being used as a cross check. Figure 1 shows the updated estimates of IRR under different approaches to asset valuation. The depreciated replacement costs (DRC) values in this table range from 21% to 28% depending on the period looked at. The relevant scenario in this case is the IRR based on the replacement cost asset valuation approach.

⁶⁰ Third Pay TV Consultation, paragraph 6.176.

Figure 1 Updated estimates of the IRR

Measure	1995-2009	1998-2009	2005-2009
IRR (market value)	9.0%	6.5%	4.7%
IRR (DRC, year of investment)	✂	✂	✂
IRR (DRC, annual revaluation)	✂	✂	✂
IRR (DRC opening, MV closing)	✂	✂	✂
IRR (Book value)	54.2%	27.5%	30.1%

Source: Oxera second report Table 2.1

- 3.6 The updated estimates suggest that over the past five years (2005-2009) under the base case DRC scenarios, the IRR was around 21%. This is slightly higher than the returns presented in Oxera's first report, where returns over the period 2004-2008 were around 20%. This is driven by a combination of strong cash flows and an increase in the replacement cost of the asset value in 2009.
- 3.7 Oxera cross checked its estimates of the IRR using ROCE. Figure 2 shows the updated estimates of ROCE under different approaches to asset valuation.

Figure 2 Updated estimates of ROCE

Measure	1995-2009	1998-2009	2005-2009
ROCE (DRC, year of investment)	✂	✂	✂
ROCE (DRC, annual revaluation)	✂	✂	✂
ROCE (Book value)	25.5%	16.9%	29.8%

Source: Oxera second report Table 2.2

- 3.8 Theoretically, in a steady state, we would expect IRR and ROCE to produce broadly similar answers, as is the case over the period 2005-2009, where the IRR under the base case DRC scenarios is around 21% and the ROCE is between 19-22%.

Sky's profitability gap

- 3.9 We asked Oxera to consider Sky's profitability gap (the difference between returns and cost of capital) since it floated in 1994. Oxera has estimated IRRs for Sky in three different time periods and compared this to its estimate of Sky's cost of capital over the period⁶¹.
- 3.10 Figure 3 shows estimates of the profitability gap with the IRR based on depreciated replacement cost asset values. Oxera considered two scenarios. The base case estimates the profitability gap as the difference between the IRR and the average cost of capital over the IRR period, weighted by the amount of investment each year. The sensitivity check considers the impact of using a single cost of capital at the beginning of the period rather than an average over the period. In the base case, the profitability gap ranges from 8% to 15% over the periods looked at.

⁶¹ See section 2.2 and Appendix A2 of Oxera's second report for an explanation of how it estimated the ex ante cost of capital. This report can be found as an appendix to this annex.

Figure 3 Estimates of the profitability gap (percentage points)

Profitability gap	1995-2009	1998-2009	2005-2009
Base case	✂	✂	✂
Base case – range	✂	✂	✂
Sensitivity check	✂	✂	✂
Sensitivity check - range	✂	✂	✂

Source: Oxera second report Table 2.4

- 3.11 The analysis indicates that the profitability gap over the last five years has been approximately 9 percentage points, and this observed difference is persistent over time. The relatively low profitability gap in the period 1998-2009 is driven by significant investments incurred by Sky over this period in the transition to digital television and the acquisition of customers. Returns in this period therefore capture investments, but not the full value of future cash flows.
- 3.12 The sensitivity check shows that a lower profitability gap results if the cost of capital is estimated at the beginning of the time period. This is because Sky's cost of capital was decreasing over time. However the estimate for the period 2005-2009 remains approximately 9 percentage points.
- 3.13 Oxera's report explains that these estimates of the profitability gap are likely to underestimate the true profitability gap because they do not take into account the impact of tax. Returns based on the pre-tax WACC do not take into account the fact that Sky's actual tax rate was lower than assumed in the pre-tax WACC calculation. As shown in Table 2.6 of Oxera's second report, the post-tax profitability gap is higher than the pre-tax profitability gap by between 0.5 and 2 percentage points.
- 3.14 We consider that this analysis indicates that Sky's returns have been persistently and significantly above its ex ante cost of capital and this supports our conclusion from the Third Pay TV Consultation that Sky is earning returns above its cost of capital. In addition, the observed profitability gap is significant when compared to previous cases where the Competition Commission concluded that returns were high⁶². For example in the classified directory advertising services market enquiry, the Competition Commission estimated Yell's profitability gap in the range -2% to 12% based on a comparison of truncated IRRs and ROCEs to the cost of capital. The CC said "we conclude, based on the truncated IRR estimates, that Yell's profits were high over the five years to 31 March 2006 and in excess of its WACC"⁶³. Also, in the Competition Commission's inquiry into the supply of banking services to SMEs, a profitability gap of 9%, 10% and 12% in 1998, 1999 and 2000 respectively for the four largest clearing groups was considered to indicate excessive profitability. The CC said "In our view, such a level of excess profits is unjustified and must be regarded as excessive"⁶⁴.

⁶² See section A4.1 of Oxera's second report for further details of these examples.

⁶³ 'CC Classified Directory Advertising Services Report, paragraph 7.110.

⁶⁴ Competition Commission (2002), 'The supply of banking services by clearing banks to small and medium-sized enterprises: A report on the supply of banking services by clearing banks to small and medium-sized enterprises within the UK', Volume 1 summary and conclusions, paragraph 2.490.

- 3.15 In addition, when the OFT assessed BSkyB's profitability in its 1996 inquiry, an "excess return" of 10.3% was considered high and, according to the OFT, could not be sustained in a competitive market⁶⁵. Oxera's analysis suggests that this gap has indeed been sustained. The OFT also said "it was possible...to conclude with a reasonable degree of confidence that there was evidence of supra-normal profitability consistent with the existence of barriers to entry in the UK Pay TV market"⁶⁶.
- 3.16 Evidence that Sky has a persistent and significant profitability gap based on the difference between its ex post returns (measured by the IRR) and its ex ante cost of capital is a strong indicator of the existence of barriers to entry. In a well-functioning competitive market, we would expect the entry of new firms to drive prices down and reduce returns. We therefore conclude on the basis of this evidence that Sky's profitability suggests that it benefits from significant barriers to entry.

⁶⁵ The Director General's Review of BSkyB's Position in the Wholesale Pay TV Market, 1996, paragraph 7.11.

⁶⁶ Ibid, paragraph 7.13.

Section 4

Why have Sky's returns exceeded its cost of capital?

Summary

- 4.1 In this section we consider the argument put forward by Sky that its returns have exceeded its cost of capital because it has a track record of being an innovator and successfully executing risky investments⁶⁷.
- 4.2 It is possible for investments in innovations to result in returns above the costs of capital as compensation for downside risks taken at the time of investment. We consider the characteristics of markets where observing such returns could be consistent with a well functioning competitive process. We then assess whether Sky exhibits these characteristics.
- 4.3 In line with Oxera's conclusions, we recognise that Sky took substantial risks in the past, most notably in the early stages of satellite pay TV in the UK. On this basis, we agree with Sky that the riskiness of its early investments will have demanded returns in excess of its cost of capital for a period. However, we do not agree that such returns would be required on an ongoing basis unless there was evidence of continued significant risk-taking.
- 4.4 Oxera's analysis suggests that more recent investments and innovations have involved considerably less risk. Nonetheless, Sky has continued to earn returns materially above its cost of capital. Consequently we consider that the more recent profitability gap between Sky's IRR and its cost of capital is likely to go beyond the necessary rewards for significant risk-taking.

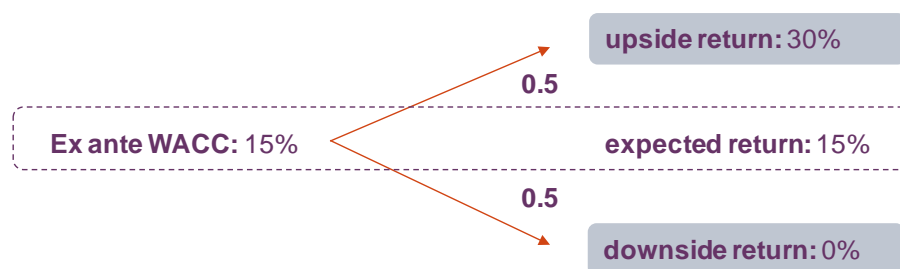
Could Sky's profitability gap represent the necessary reward for risk taking and innovation?

- 4.5 When considering the reasons for differences between ex post returns and a firm's cost of capital, an analogy can be drawn with the patents which are available to firms who make certain high-risk investments (e.g. in pharmaceuticals). These patents protect new products from competition for a period, in effect to compensate investors for the risk that many of their investments will fail. The patent is a means of creating a barrier to entry that enables a firm to take risks that ultimately benefit consumers. The firm that is protected by the patent clearly has market power, but that market power is appropriate as a means of incentivising investment.
- 4.6 Sky's performance suggests that it has benefited from barriers to entry absent any such patent protection. This benefit is demonstrated by the gap between its ex post returns and the ex ante cost of capital. In our Third Pay TV Consultation we said that, when looking at Sky's historic returns, we needed to be aware that returns may appear above the cost of capital, but this could reflect an outcome where ex post actual returns are above ex ante expected returns purely because a risky business has succeeded. We said that in the early part of the period we looked at (1995-2008), Sky's business model was unproven and there may have been substantial downside risks for which investors needed to be compensated. We said that when

⁶⁷ Sky response to Third Pay TV Consultation, paragraphs 4.60 – 4.61.

thinking about more recent returns, for example the 2004-2008 time period, concerns about potential failure are less relevant⁶⁸.

- 4.7 Sky argued that it had a strong and consistent track record of being an innovator and successfully executing risky investments. Sky said that Ofcom had not considered the risks associated with Sky's past investments, the suggestion being that doing so would explain why Sky's returns are observed to be above its cost of capital. Sky gave examples of investments which it considered particularly risky, and which could help explain why observed returns have been above its cost of capital. These included, for example, the launch of a digital TV service in 1998 and its more recent investment in HD⁶⁹.
- 4.8 We asked Oxera to consider the extent to which the difference between Sky's returns and its cost of capital could be explained by Sky's continuous successful risk-taking and innovation. The objective of this analysis was to assess whether Sky's returns in recent years and in the future could be expected to be driven by risks taken in the past.
- 4.9 Investments in innovations could generate returns above the cost of capital because, if successful, they may generate high ex-post returns as a compensation for downside risks taken at the time of investment. The following example from Oxera's report shows how successful risk taking could lead to high returns. Consider a risky investment with the following characteristics:
- In the successful (upside) scenario the company earns a high return (30%)
 - In the unsuccessful (downside) scenario, it would earn a low return (0%)
 - The expected return (the average of the two scenarios) is 15%
 - The expected return is assumed to be in line with the ex ante cost of capital (15%)



- 4.10 If the upside scenario was observed ex post then the profitability analysis would show a significant profitability gap of 15% (30% ex post return less 15% ex ante WACC). However, given that ex ante returns were in line with the cost of capital, high ex post returns in this example provide compensation for bearing risks at the time of investment. This is the argument that Sky makes in its response, that its returns are driven by investments in risky projects, which turn out to be successful, and therefore provide rewards for risks taken at the time of investment.
- 4.11 In certain markets therefore, observing returns above the cost of capital could – if not sustained over the longer term – be consistent with a well functioning competitive

⁶⁸ Third Pay TV Consultation, paragraphs 6.191 - 6.192.

⁶⁹ Sky response, to Third Pay TV Consultation, paragraphs 4.60 – 4.74.

process. Certain markets driven by innovation have a number of common characteristics, as summarised in Figure 4. However, Oxera concludes that these features do not appear to apply in the case of Sky over the last ten years or so.

Figure 4 Characteristics of markets where returns above cost of capital could be consistent with a well functioning competitive process, and comparison with Sky.

Market characteristic	Explanation	Observations on Sky	Evidence that characteristic is present in case of Sky over last 10 years?
Persistence of high returns	Ex post returns converge to the cost of capital over the medium/long term	Observed returns seem to persistently exceed the cost of capital over a long time period	No
Nature of investments	Companies undertake large scale non-scalable investments characterised by significant demand risk	The evidence suggests that Sky invests in short lived assets and its investments could be seen as scalable; there is no evidence that Sky has faced significant demand risks over the past 10 years	No
Expected profitability	Returns above the cost of capital are not expected at the start of the investment, but could be observed ex post due to successful risk taking	The evidence suggests that the expected returns exceeded the cost of capital consistently and continuously over time and that ex post returns did not exceed ex ante returns	No

Source: summary of Oxera's second report sections 5.1 to 5.4

Persistence of returns

4.12 We said in paragraph 3.16 that Sky's profitability gap has been significant and persistent over time. In well functioning markets, returns would be expected to converge to the cost of capital in the medium to long term, and this would apply equally to innovative markets since high ex post returns would provide an incentive for other companies to enter the market. Oxera's analysis suggests that there is no evidence that the profitability gap observed in the period 2005-2009 represents a short term deviation from a long-term equilibrium where returns are in line with the cost of capital⁷⁰.

Nature of investments

4.13 Oxera's report considers whether the nature of Sky's investments over the last 10 years or so is consistent with markets driven by innovation. It considers two factors in particular – the scalability of investments and the presence of significant demand risk.

⁷⁰ Section 5.3 of Oxera's second report.

- 4.14 Companies with scalable investments would not be expected to experience a persistent profitability gap because capital is not at risk for long periods of time and therefore the impact of demand shocks would be lower. Evidence that Sky's investments are not scalable (i.e. payback periods are long) therefore would suggest that its investments had characteristics consistent with ex post returns being driven by successful risk taking. Oxera compares Sky's asset intensity⁷¹ to some benchmark samples and finds that its asset intensity based on DRC values of assets is lower than 61% of the companies in the FTSE 350 Index and lower than 88% of companies in Oxera's samples of innovators. This suggests that Sky has a low amount of capital invested relative to the size of operating cash flows and that the payback period on investments is likely to be relatively short.
- 4.15 This evidence is also consistent with observations from equity analysts, where a significant number of reports suggest that the payback period on Sky's investments is relatively short⁷².
- 4.16 Observing that Sky's investments are characterised by scalability and short payback periods suggests that downside risks are relatively low because Sky could scale back its investments in response to a demand shock. Therefore, a significant profitability gap would not be required to compensate for downside shock⁷³.
- 4.17 The second factor to consider in terms of the nature of Sky's investments is the significance of demand risk. The higher the level of demand uncertainty, the more likely it is that high ex post returns could be observed compared to ex ante expected returns. Therefore evidence that demand uncertainty of Sky's investments was high would be consistent with the characteristics of markets where high ex post returns could be driven by successful risk taking.
- 4.18 Oxera's report considers the volatility of the growth in Sky's subscriber numbers⁷⁴ and compares it to the volume growth in a number of other industries. Over the period 2004-2008 the volatility for Sky was one of the lowest in the sample at 1%, and lower than some utility companies. Volatility was higher over the period 1998-2008 at 9%, but still lower than the volatility for Stansted Airport and Nokia's handset sales⁷⁵.
- 4.19 Oxera also considered the volatility of Sky's revenue growth in the period 2000-2008 and finds that 89% of companies in the FTSE 350 had greater revenue volatility than Sky. Across the four sample comparators that Oxera looks at, at least 73% of companies had higher revenue volatility than Sky⁷⁶.
- 4.20 Measures of volatility suggest that Sky does not appear to have experienced a particularly high demand risk compared to other companies. In addition, demand uncertainty appears to have decreased. This is consistent with a reading of equity analyst reports, which have perceived Sky's subscriber base as being increasingly stable. While it is possible for the volatility of outturn revenue and customer numbers to be low even if ex ante demand uncertainty was high, we would expect that, over a five to ten year time period, a degree of volatility in the ex post numbers would be

⁷¹ Asset intensity is defined as total assets divided by total operating costs. In general, the higher the asset intensity the less scalable investments are to changes in demand.

⁷² See Table 5.2 and pages 38-40 of Oxera's second report.

⁷³ Section 5.2.1 of Oxera's second report.

⁷⁴ Volatility is used as a measure of uncertainty and is calculated by measuring the standard deviation on the annual growth rates of the number of subscribers.

⁷⁵ Oxera's second report, Table 5.3.

⁷⁶ Ibid, Table 5.4

realised. We consider that the evidence on demand risks does not support an argument that high ex post returns over recent years represent compensation for high risks taken in the past, or that returns going forward need to compensate Sky for past risks, although we recognise that a pure analysis of ex ante demand uncertainty is very difficult and that systematic elements of demand uncertainty may already be reflected in a firm’s cost of capital.

- 4.21 Oxera’s analysis focuses on evidence of demand risks over the last five to ten years. Oxera suggests that “it would not be expected that investments made more than ten years ago would significantly influence recent returns because the payback period on most of Sky’s investments is relatively short (and appears to be shorter than five years). It is possible that demand risks faced by Sky more than ten years ago were higher than those faced recently, but the compensation for any such high risks would be expected to have been already recovered by Sky.”⁷⁷

Expected profitability

- 4.22 The third characteristic of markets where a significant profitability gap could be consistent with a well functioning market is that returns above the cost of capital are not expected at the start of the investment, but could be observed ex post due to successful risk taking.
- 4.23 Oxera’s report has compared Sky’s actual IRR returns against the IRR based on expected cash flows across four time periods, as reflected in reports by equity analysts. Figure 5 summarises this analysis.

Figure 5 IRR based on expected cash flows

	1995-2009	1998-2003	2000-2009	2001-2009	2004-2009
Actual IRR (DRC, year of investment)	✂	✂	✂	✂	✂
Expectations in 1998		✂	n/a	n/a	n/a
Expectations in 2000			✂	✂	✂
Expectations in 2001				✂	✂
Expectations in 2004					✂

Source: Oxera’s second report Table 5.5

- 4.24 The estimates presented in Table 5 suggest that Sky has generally been less profitable than expected by equity analysts. Oxera has also qualitatively reviewed equity analyst reports⁷⁸ and these indicate that Sky has been consistently expected to deliver strong growth and be able to maintain its subscriber base.
- 4.25 We consider that this evidence indicates that Sky’s expected returns have exceeded the cost of capital and does not support the conclusion that Sky’s actual performance has been better than market expectations. Consequently, the evidence does not suggest that high ex post returns are driven by successful risk taking.
- 4.26 Oxera concludes that “the evidence shows that over the last ten years or so Sky’s pay-TV activities do not exhibit features that are typical of markets with successful

⁷⁷ Ibid, page 40.

⁷⁸ Oxera’s second report, Section 5.4.2.

innovations and risk-taking (i.e., uncertain demand, long payback periods and large upfront costs being invested). In other words, the profitability gap observed over the period 2005 to 2009 cannot be explained by such factors during this period or during the period since its flotation”⁷⁹.

- 4.27 We recognise that Sky took substantial risks in the past, most notably in the early stages of satellite pay TV in the UK. Similarly, the upgrade to digital in 1998-2000 was potentially risky (although Sky’s performance appears to have been broadly in line with investor expectations at the time of that investment) though less so than its original market entry. Since then Sky has continued to innovate, most recently through its investment in HD, but these investments have involved substantially less risk. Sky has made a substantial commitment to HD, but the amount of capital at risk has been considerably smaller than was the case historically. Furthermore, much of its expenditure has been on set-top-box subsidies which are incurred at the point of sale and therefore scale directly with the number of subscribers that take the service.
- 4.28 On this basis, we agree with Sky that the riskiness of its early investments will have demanded returns in excess of its cost of capital for a period. However, we do not agree that such returns would be required on an ongoing basis unless there was evidence of continued significant risk-taking.
- 4.29 Oxera’s analysis suggests that more recent investments and innovations have involved considerably less risk. Nonetheless, Sky has continued to earn returns materially above its cost of capital. Consequently we consider that the more recent profitability gap between Sky’s IRR and its cost of capital is likely to go beyond the necessary rewards for significant risk-taking.
- 4.30 Sky also argued⁸⁰ that our position in the Third Pay TV Consultation on the relevance of its returns in excess of the cost of capital was inconsistent with our subsequent PPC Determination published on 14 October 2009⁸¹. It highlighted paragraph A11.43 of that document in which we said “The existence of returns in excess of the cost of capital in markets where a charge control is in operation therefore is consistent with the charge control operating correctly, rather than necessarily being symptomatic of a problem”.
- 4.31 By contrast, we do not see any inconsistency between the position in the PPC Determination and our view that returns persistently and significantly in excess of a firm’s cost of capital may be a source of concern. The PPC Determination relates to the principles underlying charge controls and the incentive properties of charge controls. It is well established (as we explain at length in that Determination) that a charge control regime may enable a firm to earn returns above its cost of capital *within a charge control period* if the firm is able to deliver efficiency improvements. As we state in paragraph A11.41, any profitability gap would be closed in the next charge control period so that the benefits are then shared with consumers. As such, the regulatory regime ensures that where a firm is able to earn excess profits, it can only do so for a short period – not on a persistent basis.
- 4.32 Sky also submitted a paper by CRA, “The (mis)use of profitability analysis in competition law cases” (2003). This paper highlights the difficulty of carrying out profitability analysis and allocating common costs, and raises issues relating to the treatment of risk, all of which we and Oxera have taken account of in the analysis of

⁷⁹ Oxera’s second report, page iii.

⁸⁰ January 2010 Sky Submission, Section 3.

⁸¹ http://www.ofcom.org.uk/consult/condocs/draft_deter_ppc/PPC_final_determination.pdf

Sky's profitability. CRA also argues that the theorem that in a long run, perfectly competitive equilibrium firms will earn zero economic profits only applies to the marginal firm – if other firms are more efficient, they will earn higher profits. We naturally accept the concept of Ricardian rents that CRA describes. Ricardian rents typically arise where one firm is more efficient for a period but in a competitive market they would be competed away, as CRA appears to recognise. Later in the same paper CRA states:

“[A] new lower cost production technique available to all participants in a market will likely lead to the participants earning positive profits in the short run, until the market settles down to a new equilibrium. In many of the dynamic markets of the new economy...we are unlikely to find firms consistently earning zero economic profits”.

- 4.33 If we had found that Sky's profitability gap was short-lived, we might have attributed it to Ricardian rents. However, Sky's profitability gap has persisted for many years and therefore is in a very different category to the example cited by CRA.

Section 5

Are Sky's returns likely to continue to be above the cost of capital?

Summary

5.1 In this section we consider whether it is appropriate to believe that Sky's returns will continue to exceed its cost of capital. Taking into account Oxera's second report, analyst forecasts, our updated estimate of Sky's forward looking cost of capital and the assumptions we would need to make for Sky's returns to fall towards its cost of capital over the next few years, we have not found any evidence to suggest that Sky's returns are likely to reduce in the next few years. We continue to believe that if the market is left unchanged, Sky's future returns are likely to materially exceed its cost of capital.

Are Sky's returns likely to continue to exceed its cost of capital?

- 5.2 In our Third Pay TV Consultation we considered that it was appropriate to compare the IRR that Oxera had calculated with our forward looking cost of capital. We said that we believed that Oxera's analysis of Sky's IRR provided evidence that if the market was left unchanged, Sky's future IRR would be likely to exceed its cost of capital⁸².
- 5.3 Sky argued that Oxera's analysis was not forward looking and that therefore Ofcom could not rely on Oxera's report in support of its assertion that any profitability gap was likely to persist into the future.
- 5.4 Oxera has updated its analysis of Sky's aggregate profitability for 2009, and the estimated IRR for the period 2005-2009 of around 21% is consistent with the estimate presented in the Third Pay TV Consultation of around 20%.
- 5.5 In the Third Pay TV Consultation we calculated a forward looking cost of capital of 10.3%. Since then we have asked Brattle to update their report on Sky's equity beta. Taking into account Brattle's updated report and other changes in the market, we continue to consider that 10.3% is a reasonable estimate of Sky's forward looking cost of capital. See Appendix 1 to this annex for further details of our estimate of Sky's forward looking cost of capital, including Brattle's updated report on Sky's equity beta.
- 5.6 We have considered what assumptions would need to be made for Sky's returns in the five years to 2012 to fall significantly towards its cost of capital. Our analysis suggests that significant changes would have to occur to Sky's business for this to occur. For example, we estimate that cash flows would have to fall considerably, consistent with an [>] annual reduction in ARPU or, alternatively, Sky would have to see its subscribers fall by more than [>].
- 5.7 When we consider analyst forecasts of Sky's profits, we do not find any evidence that Sky's profitability in aggregate or in its pay TV business is expected to reduce from current levels. Sky's total EBITDA is forecast to grow by around 10-15% per annum

⁸² Third Pay TV Consultation, paragraph 6.194.

over the next three to four years⁸³, with operating profits in Sky's pay TV business forecast to grow by 6%-11%⁸⁴ per annum in the same period.

- 5.8 We have also considered the evidence from Oxera's report in paragraph 4.20, which suggested that Sky has not faced significant demand risks in the past and that therefore returns in the future do not need to include an element of compensation for past risks.
- 5.9 Having concluded that Sky is currently earning returns above its cost of capital, we have not found any evidence to suggest that this is likely to change in the next few years. We continue to believe that if the market is left unchanged, Sky's future returns are likely to exceed its cost of capital.

⁸³ Source: Bloomberg (consensus of analyst reports), 22 March 2010.

⁸⁴ Source: recent analyst forecasts from JP Morgan (24/08/09), Morgan Stanley (04/11/09), Cazenove (10/12/09), RBS (01/02/10) and Investec (29/01/10).

Section 6

What do alternative measures of Sky's profitability tell us?

Summary

- 6.1 In this section we consider the two pieces of analysis which Sky's advisor Professor Grout carried out which, Sky argued, suggest that Sky's profitability is normal⁸⁵. Professor Grout analysed Sky's total shareholder returns (TSR) and accounting ROCE returns in previous Competition Commission investigations.
- 6.2 We originally considered TSR in our first consultation but as set out in our Second Pay TV Consultation we ultimately considered it inconclusive⁸⁶ and we have taken into account the further analysis and arguments put forward by Sky and Professor Grout. However, informed by further work by Oxera in response to that analysis, we do not think that TSR is an appropriate way to assess Sky's economic profitability. This is because TSR can only measure returns based on shareholder expectations at two points in time, rather than the economic returns earned by Sky which is the relevant measure for our competition assessment. We also note that TSR suffers from practical limitations related to the choice of appropriate time period and benchmark which means it is not a robust measure of returns.
- 6.3 In addition, we do not consider that the analysis of the ROCEs of firms investigated by the Competition Commission is relevant to the assessment of Sky's profitability. Oxera points out that "a high ROCE based on historical cost asset values is not the only indicator that a company may be operating against the public interest. Therefore a strong relationship between the level of ROCE and the conclusions of the CC with respect to profitability would not be expected"⁸⁷. Oxera also notes that the analysis does not attempt to control for factors that could reduce the comparability of ROCE as a measure of economic profitability between different competition cases. For example, Oxera's calculation of Sky's ROCE was based on a definition of capital employed equal to total assets rather than a common definition of capital employed which deducts current liabilities⁸⁸. Sky's calculated ROCE would have been considerably higher if current liabilities had been removed from the definition of capital employed – 45% over the period 2004-2008 rather than 29% excluding current liabilities⁸⁹. Finally, even if the ROCEs were all comparable and based on the same definition of capital employed, we do not agree with Professor Grout that it is possible to conclude from the data that Sky's book value ROCE is comparatively small.
- 6.4 We also consider Sky's argument that Oxera's benchmarking analysis in its first report had no value because the comparators it used were not relevant. We note further benchmarking analysis from Oxera which indicates that the difference between Sky's ROCE and cost of capital is greater than 95% of the companies in the

⁸⁵ A Report on Profitability, Paul A Grout, September 2009 (Annex 2 of Sky's response to the Third Pay TV Consultation).

⁸⁶ Second Pay TV Consultation, Annex 9, paragraphs 1.58-1.62 and 1.64.

⁸⁷ Oxera's second report, page 25.

⁸⁸ Oxera's first report, Section 4.1.1.

⁸⁹ Oxera's second report, section 3.5.

FTSE 350 Index over the period 2004-2008. Oxera's view is that this analysis addresses Sky's concerns around the choice of comparators.

- 6.5 We also note that Oxera's approach to selecting comparators in its first report is similar to the approach adopted in the CC Classified Directory Advertising Services report⁹⁰.
- 6.6 Overall we consider that the evidence on benchmarking supports the conclusions from our central analysis on Sky's IRR, although we recognise the difficulties with benchmarking of this kind.

Total shareholder returns

- 6.7 Professor Grout undertook an assessment of Sky's profitability based on shareholder returns and concluded that "approaching Sky's profitability through this stock market evidence does not support a case that Sky is abnormally profitable"⁹¹.
- 6.8 The analysis carried out by Professor Grout is similar to the analysis Ofcom carried out as part of its First Pay TV Consultation⁹². In that analysis we calculated annual shareholder returns of between 6-8% since flotation in 1994, and noted that this was below returns to the FTSE 100, 250 and All Share Indices. We noted however that there were other periods during which investors would have observed high returns and outperformed the market. We also said that this analysis only measures post flotation returns. In the event that at or before flotation Sky was, or was expected to be, in a position to make returns in excess of cost of capital, the returns would have been incorporated into its valuation at the time of float⁹³.
- 6.9 In our Second Pay TV Consultation we noted the response from Setanta/Top Up TV, saying that "they argued that total shareholder returns (TSR) is not an appropriate measure for assessing a company's financial strength in the context of a competition inquiry and pointed out that the OFT advocates the use of Internal Rate of Return (IRR) as a profitability measure."⁹⁴ They also argued that Ofcom's TSR assessment did not measure Sky's financial strength or market position but rather how the company has performed against expectations and the assessment of its market position at flotation⁹⁵.
- 6.10 Professor Grout also compared Sky's shareholder returns to the FTSE 100, 250 and All Share Indices since flotation and also in three other sub-periods. He noted that Sky's performance has been worse than each index in all four periods looked at. He also compared Sky's share performance against the performance of other companies and found Sky's performance to be towards the lower end of the range, even after adjusting for risk and thinly traded shares.
- 6.11 We have considered whether the evidence on share price returns supports a case that Sky's returns have been normal.

⁹⁰ See Oxera's second report, page 25.

⁹¹ Paul A Grout, September 2009 page 28.

⁹² Annex 12 to First Pay TV Consultation.

⁹³ Ibid, section 3.

⁹⁴ Second Pay TV Consultation, paragraph 7.75.

⁹⁵ Second Pay TV Consultation, Annex 9, paragraph 1.9.

- 6.12 In the Third Pay TV Consultation we included a chart which showed the value of Sky's asset base under different valuation approaches⁹⁶. This is shown in Figure 6 below, with values updated for 2009.

Figure 6 Value of Sky's asset base under different valuation approaches (£m)

[X]

Source: Oxera second report Figure 3.1

- 6.13 As noted in the Third Pay TV Consultation, Oxera said in its first report that "from flotation up to 2008, the estimated market value of Sky's assets was significantly higher than the estimated replacement cost value"⁹⁷. It appears that the market perceived that the value of Sky's future cash flows would substantially exceed the underlying replacement cost of the assets. This illustrates the difference between IRR analysis and TSR analysis which is that IRR helps assess the relationship between prices and costs, while TSR captures the relationship between prices and expectations.
- 6.14 Professor Grout argued that because total shareholder returns since flotation had underperformed the market, this is evidence that Sky was not "abnormally profitable". However, the reason why the IRR is greater than the TSR in Sky's case is because the value of the assets used in the TSR analysis is significantly greater than the value of the assets in the IRR analysis. This reflects the difference in what the two measures are capturing. TSR estimates returns to shareholders, so the asset value reflects the market value of assets, which is the NPV of present and future investments. The IRR on the other hand estimates returns relative to the costs incurred by Sky in building its asset base and uses the replacement cost value of assets.
- 6.15 This observed difference between the market and replacement cost value of assets is consistent with the economic characteristics of Sky's investments. Oxera's report demonstrates that the costs to Sky of acquiring additional subscribers are significantly lower than the value of additional cash flows generated by these subscribers over their lifetime. Oxera says that its analysis shows that "it is reasonable to expect that the market valuation at flotation incorporated this significant expected difference between the lifetime cash flows of subscribers and their acquisition costs."⁹⁸
- 6.16 We said in paragraph 4.25 of this annex that Sky's actual performance since 1998 has been below market expectations. This result would be consistent with total shareholder returns appearing low because the market has consistently expected Sky to generate strong returns.
- 6.17 In its second report, Oxera also draws attention to a discussion of the use of total shareholder returns in the Competition Commission's 2002 investigation into competition in UK banking. For example, the Competition Commission did not put any weight on the measure of total shareholder returns:

"In fact, the Cruickshank report calculated that total returns to banks' shareholders including the gains from increases in share prices over the 12 years to 1999 were excessive, but the banks objected that

⁹⁶ Third Pay TV Consultation, 2009, Figure 58.

⁹⁷ Oxera's first report, page 26.

⁹⁸ Oxera's second report page 18.

this measurement method is very sensitive to the time period adopted and, in any event, reflected changes in expectations between the start and end dates. We have not, as a result, used this approach to identify profitability but, by the same token, do not regard it as the correct way to seek to identify the value of intangibles.”⁹⁹

- 6.18 As well as not being a conceptually appropriate measure of returns, TSR also has practical limitations which mean it is not a robust measure of returns. Oxera considers that there are four reasons for this:
- Sensitivity to the choice of period
 - Ability to reflect the performance of UK pay TV activities
 - Choice of benchmark
 - Survivorship bias
- 6.19 The TSR measure is sensitive to the choice of time period because it is based on share prices at the start and end of the period of interest and dividends paid during this period. Share price changes are the main drivers of TSR in the case of Sky since its dividends have been relatively low historically.
- 6.20 Oxera’s report demonstrates how TSR could lead to inappropriate conclusions about the existence of market power. For example, measured from flotation to 6 March 2000, the difference between Sky’s returns and returns for the FTSE 350 Index was 647 percentage points, whereas from 6 March 2000 to 30 June 2009 the difference was -70 percentage points¹⁰⁰. Therefore the TSR measure is very sensitive to changes in expectations. This is in contrast to the IRR which is not sensitive to changes in expectations and less sensitive to changes in the time period.
- 6.21 TSR assesses performance of the quoted entity, but our analysis is focused on Sky’s UK pay TV activities. The IRR can take into account the profitability of the relevant activities separately from the rest of the group. Oxera has assessed the sensitivity of the TSR by adjusting it to exclude two investments not related to UK pay TV - the acquisitions of stakes in Kirch Pay TV and ITV. Making this adjustment suggests that Sky has outperformed several indices across three different time periods¹⁰¹.
- 6.22 The third practical limitation to the use of TSR is that conclusions depend on the choice of benchmark. Oxera identifies the cost of equity, a risk adjusted returns index and returns of comparator companies in the same or similar sectors as potential benchmarks, and notes that in its annual report, Sky compares its shareholder performance to the FTSE 100, FTSE 350 Media and NYSE TMT indices. Oxera’s analysis shows that comparing the unadjusted TSR with the relevant risk adjusted returns indices (FTSE 100, FTSE 350 and FTSE All Share) suggests that Sky has underperformed. However, relative to companies operating in the same or similar sectors (proxied by the FTSE 350 Media and FTSE 350 Fixed Line Telecoms Indices) Sky appears to have outperformed. In the First Pay TV Consultation we also

⁹⁹ Competition Commission (2002), “The supply of banking services by clearing banks to small and medium sized enterprises: A report on the supply of banking services by clearing banks to small and medium-sized enterprises within the UK”, Volume 1 summary and conclusions, paragraph 2.261.

¹⁰⁰ Oxera’s second report page 20 and Figure 3.2.

¹⁰¹ Oxera’s second report, Table 3.5.

recognised the difficulty in choosing an appropriate benchmark for comparing Sky's shareholder returns and said that there are no specific media companies which share the operational or geographical characteristics of Sky sufficiently closely and comparisons to a media index would not circumvent this problem¹⁰².

- 6.23 The final issue with the use of TSR relates to the choice of benchmark, and that is the potential for survivorship bias within the index. The membership of the FTSE 350 Index, for example, changes over time – of the 350 companies in the index in 1996, only 128 (37%) were still in the index in 2009. Oxera notes that Professor Grout's analysis of Sky's TSR therefore benchmarked Sky against a sample of surviving companies and the interpretation of this analysis depends on the extent to which the performance of surviving companies is different from that of the companies in the index at the start of the period.
- 6.24 TSR was a measure we originally considered in our First Pay TV Consultation, but as set out in our Second Pay TV Consultation we ultimately considered it inconclusive.¹⁰³ We have taken into account the analysis and arguments put forward by Sky and Professor Grout. However, informed by further work by Oxera, we do not think that TSR is an appropriate way to assess Sky's economic profitability. This is because TSR can only measure returns based on shareholder expectations at two points in time, rather than the economic returns earned by Sky which is the relevant measure for our competition assessment. We also note that TSR suffers from practical limitations related to the choice of appropriate time period and benchmark which means it is not a robust measure of returns.

Accounting returns in competition investigations

- 6.25 Professor Grout also compared Sky's book value ROCE to the ROCEs of firms investigated by the Competition Commission between 1970 and 1998 which were either found to be operating against the public interest or not. His rationale was that this might give some sensible benchmark for ROCEs which might be associated with a cause for concern¹⁰⁴.
- 6.26 Professor Grout said that Sky's book value ROCE appears comparatively small when compared to the average ROCE figures he calculated from firms investigated by the Competition Commission, and he suggested that the ROCE may have to be extremely high relative to the cost of capital to signal a cause for intervention¹⁰⁵.
- 6.27 The analysis by Professor Grout assumed a direct correlation between a firm's ROCE and whether it is found to be operating against the public interest or not. Oxera points out that "a high ROCE based on historical cost asset values is not the only indicator that a company may be operating against the public interest. Therefore a strong relationship between the level of ROCE and the conclusions of the CC with respect to profitability would not be expected"¹⁰⁶.
- 6.28 Oxera also points out that the analysis does not attempt to control for factors that could reduce the comparability of ROCE as a measure of economic profitability between different CC cases. These factors could include different definitions of capital employed and accounting standards. Oxera notes that its calculation of Sky's

¹⁰² Second Pay TV Consultation, Annex 9, paragraphs 1.60-1.62.

¹⁰³ Second Pay TV Consultation, Annex 9, paragraphs 1.58-1.62 and 1.64.

¹⁰⁴ Grout, A Report on Profitability (2009) page 30.

¹⁰⁵ Ibid page 33.

¹⁰⁶ Oxera's second report, page 25.

ROCE was based on a definition of capital employed equal to total assets rather than a common definition of capital employed which deducts current liabilities¹⁰⁷. Sky's calculated ROCE would have been considerably higher if current liabilities had been removed from the definition of capital employed – 45% over the period 2004-2008 rather than 29% excluding current liabilities¹⁰⁸.

- 6.29 In addition, even if the ROCEs were all comparable and based on the same definition of capital employed, we do not agree with Professor Grout that it is possible to conclude from the data that Sky's book value ROCE of 29% in the period 2004-2008 is comparatively small. For example, there were 52 firms in Professor Grout's dataset which had a finding against the public interest, approximately half of which were found to be operating against the public interest with a ROCE equal to or less than Sky's ROCE of 29%¹⁰⁹. If we consider a 45% ROCE figure for Sky for 2004-2008, two-thirds of the firms in the dataset were found to be operating against the public interest with a lower ROCE¹¹⁰.
- 6.30 Taking these points into account, we do not consider that this analysis of the ROCEs of firms investigated by the Competition Commission is relevant to the assessment of Sky's profitability.

Benchmarking

- 6.31 In the Third Pay TV Consultation we reported that Oxera had benchmarked Sky's results against companies with similar business characteristics to Sky. Oxera found that Sky in aggregate, and Sky's wholesale operations in particular, had a higher ROCE than comparator businesses over the period 2003-2007¹¹¹.
- 6.32 Sky argued that the group of firms identified by Oxera as relevant comparators were not in fact relevant. It said "the majority of the companies identified by Oxera are sufficiently different to Sky in at least some respects (and many are different to Sky in numerous respects) such that it is meaningless to compare the metrics identified for these companies against those of Sky"¹¹².
- 6.33 Sky commissioned PwC to evaluate the selection of comparators used in Oxera's benchmarking analysis. PwC concluded that none of the non-TV companies used by Oxera could be considered reliable comparators to Sky and of the 29 TV comparators, 26 could be considered unreliable. Because there were only three TV companies that they considered reliable comparators, PwC said that the sample was too small and that therefore Oxera's benchmarking analysis had limited value.
- 6.34 PwC also found that the pattern and degree of variation in returns within the set of Oxera's TV companies did not appear to differ from other randomly chosen sectors. Sky suggested that to the extent that one or more companies earned higher returns

¹⁰⁷ See Oxera's first report, Section 4.1.1.

¹⁰⁸ Oxera's second report, section 3.5.

¹⁰⁹ Derived from data supplied by Sky in response to Question 11 of Ofcom information request dated 29 October 2009.

¹¹⁰ Over the longer period 1995-2008 Sky calculated Sky's ROCE to be 26%. Approximately 40% of firms in Professor Grout's dataset were found to be operating against the public interest with a ROCE lower than 26%.

¹¹¹ Third Pay TV Consultation, paragraph 6.200.

¹¹² Sky response to Third Pay TV Consultation, paragraph 4.80.

than the average of the sector, this should be considered normal and not indicative of competition problems¹¹³.

6.35 Sky said that “Ofcom appears to place no weight at all on Oxera’s comparator analysis.”¹¹⁴

6.36 Ofcom has previously highlighted the difficulties in identifying appropriate benchmarks for the UK pay TV industry, and Sky in particular. For example, we said that:

“it is difficult to make like for like comparisons of profitability with other players in the UK market because of the significant differences in the composition of their businesses. Comparisons with international benchmarks may also be of limited value because of significant differences between markets”¹¹⁵

“the differences in composition of businesses between Sky and other UK pay TV companies hindered like-for-like comparisons of returns. Further, it explained that comparisons with international benchmarks might be of limited value because of significant differences between countries. On this basis, Ofcom considered that such comparisons would not, in this case, provide robust evidence of the presence or absence of excessive profitability or returns.”¹¹⁶

6.37 The benchmarking analysis that Oxera undertook was “designed to produce reasonable ranges of returns rather than accurate point estimates of profitability. This is because it is recognised that it may be difficult to identify firms with business characteristics identical to Sky’s pay TV business.”¹¹⁷ PwC also said in its report that “our analysis of the reliability of individual comparators should be considered in the context of the acknowledged difficulty of the task as a whole.”¹¹⁸

6.38 Oxera notes in its second report that the “Competition Commission seems to have set the threshold for a company to qualify as an appropriate benchmark at a lower level than the threshold requested in the PwC benchmarking report”¹¹⁹. Oxera gives the example of the Competition Commission’s investigation into the classified directory advertising services where the CC benchmarked Yell’s returns to a large sample of more than 4,000 publicly listed companies, and to smaller subsets of companies with similar activities and risk characteristics. Oxera also says that the approach the CC took in this case to benchmarking is similar to the approach it adopted in its first report. Oxera further notes that “the criticisms in the PwC report therefore appear to apply to the benchmarking approaches undertaken by the CC in past investigations, as well as the approach implemented by Oxera. As such, PwC’s position appears to challenge the value of benchmarking in general as much as the particular approach adopted by Oxera”¹²⁰.

¹¹³ Sky response to Third Pay TV Consultation, paragraph 4.82.

¹¹⁴ Ibid, paragraph 4.81.

¹¹⁵ Annex 12 to the First Pay TV Consultation, paragraph 2.2.

¹¹⁶ Annex 9 of the Second Pay TV Consultation, paragraph 1.4.

¹¹⁷ Oxera’s first report, page 41.

¹¹⁸ “Evaluation of the selection of comparators used in Annex 9 of Ofcom’s pay TV phase three document”, 18 September 2009, page 3.

¹¹⁹ Oxera’s second report, page 25.

¹²⁰ Oxera’s second report, page 25.

- 6.39 In its second report, Oxera benchmarks the difference between the ROCE and the WACC observed for Sky and the equivalent gap for companies in the FTSE 350 and FTSE 350 Media and Telecoms indices¹²¹ over the period 2004-2008. This analysis shows that the difference between Sky's accounting ROCE based on book values of assets and its cost of capital has been higher than 95% of companies in the FTSE 350 over this period. This result also holds for the period 1995-2008 suggesting that this performance has been persistent over time. Even when basing Sky's ROCE on depreciated replacement costs (i.e. including a large intangible asset value for Sky and no intangible asset values for all other companies) the profitability gap for Sky is higher than 70% of companies in the FTSE 350. This analysis suggests that Sky's profitability gap has persistently been near the top end of the distribution for FTSE 350 companies¹²².
- 6.40 Oxera also argues in its report that benchmarking the accounting profitability gap for Sky against a broad sample of comparators addresses the two concerns raised by Sky and PwC in relation to Oxera's benchmarking in its first report, namely the choice of comparators and the use of accounting data to measure returns¹²³.
- 6.41 All parties seem to agree that benchmarking analysis is difficult. Ofcom identified early on in the pay TV investigation that it was difficult to find appropriate benchmarks against which to compare Sky's returns. Oxera also recognised this difficulty in its first report and clearly set out its approach in trying to identify the comparators which it considered best able to produce reasonable ranges for returns for comparison with Sky.
- 6.42 In light of the difficulty in identifying comparators we did not put significant weight on the benchmarking evidence in our Third Pay TV Consultation although it supported our conclusions from the IRR analysis which suggested Sky's returns were greater than its cost of capital. In the Sky response to the Second Pay TV Consultation, Sky suggested a number of broadcasting firms which it suggested were good comparators for our estimate of the operating margin in Sky's premium wholesale business¹²⁴. Sky argued that the companies it identified could be used to benchmark the operating margin for Sky's premium wholesale business. In our second consultation we estimated this operating margin at 25%, and Sky said this did not appear high compared to its chosen comparators, which in 2008 ranged from 19%-38%¹²⁵. Some of these companies were also included in Oxera's dataset which Sky subsequently argued were not reliable comparators¹²⁶. We recognise that it is difficult to identify comparators for Sky and that there will be disagreements over the appropriate selection of companies, however we also note that Oxera's approach to selecting comparators in its first report is similar to the approach adopted by the CC Classified Directory Advertising Report¹²⁷.

¹²¹ In paragraph 6.22 above we recognise that it is difficult to identify appropriate benchmarks for Sky. In our Second Pay TV Consultation, paragraphs 1.60-161 we said that "there are no specific media companies which share either the operational or geographic characteristics of Sky sufficiently closely to make a direct comparison appropriate" and that "comparing Sky to a media index does not circumvent this problem".

¹²² Ibid, section 3.4.

¹²³ Oxera's second report, page 24.

¹²⁴ Sky response to Second Pay TV Consultation Table 5.3.

¹²⁵ The operating margins of the three Oxera TV comparators that PwC identified as reliable in its report (Direct TV, Dish and Canal+) ranged from 3%-18% in their 2008 financial years.

¹²⁶ For example Discovery and Mediaset.

¹²⁷ See Oxera's second report page 25.

- 6.43 Oxera has addressed Sky's concerns over benchmarking in its second report by comparing the difference between Sky's ROCE and cost of capital against the same metric for companies in the FTSE 350 Index. This analysis suggests that the difference between Sky's ROCE and cost of capital is greater than 95% of the companies in the FTSE 350 Index over the period 2004-2008, and that Sky's profitability gap has persistently been towards the top end of the distribution for FTSE 350 companies. This evidence is consistent with the profitability gap based on the IRR.
- 6.44 Overall we consider that the evidence on benchmarking in Oxera's first and second reports supports the conclusions from our central analysis on Sky's IRR, although we recognise the difficulties with benchmarking of this kind.

Section 7

Disaggregate profitability

Summary

- 7.1 In this section we consider Oxera's disaggregate analysis of Sky's profitability. This analysis was carried out in order to provide an indication of the sources of aggregate level profitability.
- 7.2 We concluded in section 3 that Sky was earning returns in excess of its cost of capital. Our conclusions from Oxera's analysis of Sky's disaggregate profitability are that these returns are likely to be concentrated in Sky's premium wholesale business and that Sky earns high margins from its premium sports and movies channels.

What we said in the Third Pay TV Consultation

- 7.3 The IRR analysis described in sections 1 to 6 relates to the aggregate profitability of Sky's business as a whole, rather than the profitability of particular products sold by Sky. In its first report, Oxera attempted to disaggregate its findings on profitability in order to provide an indication of the sources of aggregate level profitability.
- 7.4 In our Third Pay TV Consultation, we set out the results of Oxera's disaggregate profitability analysis¹²⁸.
- 7.5 We asked Oxera to consider the profitability of Sky's wholesale and retail business separately. Oxera concluded that "returns for Sky wholesale activities appear higher than for Sky retail activities. These results seem to hold under a number of cost allocation approaches and sensitivity checks"¹²⁹. Specifically, Oxera found that Sky's wholesale operation had an estimated IRR of [3%], higher than its retail operation of [2%], both based on replacement cost of assets¹³⁰. We said that this result was consistent with what we would expect from our economic analysis of the incentives that Sky faces, and Sky's own statements about the way in which it determines its wholesale rate card¹³¹.
- 7.6 We said that we recognised that further disaggregation of profitability beyond wholesale and retail activities needed to be treated with caution, because of the difficulties of attributing revenues to products that are sold in bundles, further challenges around cost allocation and the difficulty of allocating assets to particular lines of business. However, we believed that there was merit in looking at wholesale returns on sales for premium sports and movies channels because these products accounted for relatively few common costs and it was possible to identify the likely range of appropriate revenue allocations. Furthermore, a margin calculation did not rely on a view on asset allocation and could therefore provide an indication of the likely relativity between the two categories of product¹³².

¹²⁸ Third Pay TV Consultation, paragraphs 6.195 to 6.199

¹²⁹ Oxera's first report, page iii. Also see Table 5.1.

¹³⁰ These figures are based on Oxera's own "high level" cost allocation between wholesale and retail activities. They are also supported by calculations based on Analysys Mason's bottom up cost allocation which also showed that wholesale returns were higher than retail returns.

¹³¹ Third Pay TV Consultation, paragraph 6.204.

¹³² Third Pay TV Consultation, paragraph 6.206.

- 7.7 Oxera's results suggested that wholesale margins for movies channels were higher than those for wholesale sports channels. This result held under the most extreme revenue allocation assumptions that we would consider reasonable¹³³.
- 7.8 Oxera concluded that "estimates of returns [on sales] for sports/movies channels [did] not seem sufficiently robust to conclude on the profitability of movies and sports channels, although the analysis seem[ed] to provide some weak evidence that movies channels may have higher margins [over direct costs] than sports channels (given the adopted approaches to cost and revenue allocation)"¹³⁴.
- 7.9 We said that we agreed that it was difficult to be definitive on returns on investment. However, in our own view, because of the relatively low level of common costs in this area and the possibility of identifying reasonable limits for revenue allocation, we could be more definitive with respect to margins. We considered that the evidence pointed towards margins for movies being higher than those for sports¹³⁵. We said that this result accorded with our understanding of the way in which the market works, namely that, other things being equal, the rents associated with content aggregation are likely to accrue in large part to the content aggregator¹³⁶.

Responses to our consultation

- 7.10 In respect of the disaggregate profitability analysis the Three Parties said that "in view of the reliance of these calculations of cost and revenue allocations, Oxera makes appropriate use of sensitivity checks which are vital in assessing the robustness of its estimates to different cost allocation approaches. The result that returns for wholesale activities appear higher than retail activities holds under a number of costs allocation approaches including the same detailed cost allocation which Ofcom uses as part of its calculation of regulated wholesale prices"¹³⁷. Virgin Media also noted that "the result that movie channels have higher margins than sports channels holds even under the most extreme of revenue allocation approaches"¹³⁸.
- 7.11 [X] agreed that Sky was likely to be making excessive profits in its wholesale business in light of its monopoly over Core Premium channels.
- 7.12 Sky made a number of challenges to the disaggregate analysis and the conclusions that Ofcom drew. In particular it argued that¹³⁹:
- Ofcom failed to make any reference to the fact that Sky compared Ofcom's estimate of operating margins with that earned by a number of similar companies and found it to be at the low end of the operating margins earned by those companies.
 - Ofcom failed to accept that a proper assessment of operating margin shows that premium wholesale is not earning excessive operating margins. Ofcom then changed tack and returned to an approach of evaluating profits based on a truncated IRR, despite previously concluding that such an approach would not yield a robust conclusion about Sky's profitability.

¹³³ Ibid paragraph 6.207.

¹³⁴ Oxera's first report, page iii.

¹³⁵ Third Pay TV Consultation, paragraph 6.199.

¹³⁶ Ibid, paragraph 6.207.

¹³⁷ Three Parties response to the Third Pay TV Consultation, paragraph 8.4.

¹³⁸ Virgin Media response to the Third Pay TV Consultation, paragraph 5.10.

¹³⁹ Sky response, June 2009, Section 7, part B.

- Ofcom had misinterpreted Oxera's report. Oxera did not say that Sky was earning high wholesale margins. Oxera said that the analysis relied on assumptions about allocation of cost, revenues and assets and was therefore "inherently more uncertain", and the results should be interpreted in terms of the relative relationship between returns for different activities, as opposed to absolute levels of returns. Ofcom cannot use Oxera's analysis to conclude that Sky's wholesale prices, and particularly the price of its premium movie channels are unduly high and reflect a high margin.

7.13 We have set out in Section 2 that we consider Oxera has been able to address the difficulties we have previously identified relating to the use of an IRR approach. In paragraph 6.42 we referred to Sky's benchmarking of operating margins when discussing the difficulty of identifying appropriate comparators for Sky. In the following paragraphs we set out our position on Sky's disaggregate profitability and our interpretation of Oxera's disaggregate analysis.

Our position on Sky's disaggregate profitability

7.14 The IRR analysis described in Sections 1 to 6 relates to the aggregate profitability of Sky's business as a whole, rather than the profitability of particular products sold by Sky. It provides evidence that the average price charged by Sky, looking across all the products it supplies, is above the average of the competitive prices for all those products.

7.15 In its first report, Oxera attempted to disaggregate its findings on profitability in order to provide an indication of the sources of aggregate level profitability, and consequently, the products whose prices are likely to be above the competitive level. As part of this exercise, Oxera considered a number of different methods for allocating revenues and costs. Oxera's key conclusions were as follows:¹⁴⁰

- Returns for Sky wholesale activities appeared higher than for Sky retail activities. These results seemed to hold under a number of cost allocation approaches and sensitivity checks.
- At the wholesale level, returns for premium channels appeared higher than for basic channels. However, this should be interpreted with care, given the adopted allocation approaches.
- The evidence was not sufficiently robust to conclude on the profitability of movies and sports channels, although the analysis seems to provide some weak evidence that movies channels may have higher margins than sports channels¹⁴¹.

Profitability at the retail/wholesale level

7.16 Oxera's analysis suggested that returns for Sky's wholesale activities were higher than for Sky's retail activities. Figure 7 shows the results of this analysis for the

¹⁴⁰ Third Pay TV Consultation, Annex 9, page iii.

¹⁴¹ Oxera also stated that "[t]he evidence was not sufficiently robust to conclude on the relative returns on basic and premium channels at the retail level." This is not surprising given our understanding of the operation of the market – if the profitability of premium channels is effectively reflected in high wholesale prices, then there is no reason to expect that retail returns for premium channels would be materially different to basic returns.

period 2004-2008. This shows that returns based on IRR, ROCE and ROS were all higher for wholesale than for retail¹⁴².

Figure 7 Disaggregate profitability analysis between retail and wholesale, 2004-2008

Profitability based on Oxera high level cost allocation	IRR (annual revaluation)	ROCE	ROS
Retail	✂	✂	✂
Wholesale	✂	✂	✂

Source: Oxera first report, Table 5.1

- 7.17 We consider that this analysis indicates that the significant profitability gap we identified for Sky as a whole from our IRR analysis is likely to be driven by returns from Sky's wholesale business. Consequently we consider that Sky's wholesale returns are high.
- 7.18 The conclusion that wholesale returns are higher than retail returns is consistent with our understanding of the operation of the market: Sky determines the optimal retail price based on the demand conditions it faces. For its own retail consumers, it charges this price directly; for the retail consumers of its wholesale customers, it is able to enforce a higher retail price by setting a high wholesale price. (See also paragraphs 5.614 to 5.615 of the main document)

Profitability of basic and premium channels

- 7.19 In considering the relative profitability between basic and premium channels, the revenue allocation is straightforward, since Sky's wholesale prices and hence wholesale revenues for its premium channels exclude basic channels. For the allocation of costs common to basic and premium channels, Oxera adopted two alternative approaches¹⁴³:
- 'Cost Allocation Approach 1': Sky subscribers who buy basic/premium packages are treated as premium subscribers, and those who buy basic packages only are treated as basic subscribers. Common costs are allocated on a pro rata basis.
 - 'Cost Allocation Approach 2': all Sky subscribers were treated as basic subscribers. Those who buy basic/premium packages are also treated as premium subscribers. Common costs are allocated on a pro rata basis.
- 7.20 Oxera's analysis of the profitability of basic and premium channels suggested that at the wholesale level, the profitability of premium channels was higher than for basic channels, and this relationship was consistent under different approaches to cost allocation. Figure 8 shows the results of Oxera's ROS analysis in the period 2004-2008.

¹⁴² Figure 7 shows the results based on Oxera's high level cost allocation. Oxera also cross checked these results with the detailed cost allocation analysis carried out by Anlys Mason and the results were similar. See Table 5.1 of Oxera's first report.

¹⁴³ For more details of these approaches see section 5.3 of Oxera's first report.

- 7.21 Oxera also presented calculations for margins over direct costs. Oxera calculated this as (revenues – direct costs)/revenues. We have amended this so that the denominator is direct costs rather than revenues. This more accurately reflects the relationship between margins and direct costs. In addition, the numbers presented in Oxera’s first report for sports and movies margins over direct costs excluded advertising revenues while (consistent with all of the other figures presented here and in Oxera’s report) these are now included in all numbers presented below.
- 7.22 The margin over direct costs for the period 2004-2008 was consistent with the ROS results, with margins on premium channels estimated at [X]% compared to [X]% for basic channels¹⁴⁴.

Figure 8 Estimates of ROS for basic and premium channels, 2004-2008

Wholesale ROS	Common cost allocation	
	Approach 1	Approach 2
Basic	X	X
Premium	X	X

Source: Oxera’s first report, Table 5.2

- 7.23 Oxera also compared Sky’s wholesale ROS to the wholesale ROS of industry benchmarks. The industry benchmarks were based on firms that, in Oxera’s view, were the most appropriate comparators for Sky, although this meant that at wholesale level, the number of comparators was limited to just two TV companies and two non-TV companies. The median return on sales from 2003 to 2007 for these companies was -0.6% for the TV comparators and 8.4% for the non-TV comparators. Sky’s wholesale return on sales for the same period was [X]. Oxera concluded:

“On balance, it would seem appropriate not to draw firm conclusions about Sky retail’s profitability compared with the retail comparators. However, the evidence that Sky’s aggregate profitability may be driven by its relatively high wholesale returns is further reinforced in light of the above analysis.”¹⁴⁵

- 7.24 We recognise the difficulty in identifying comparator companies for Sky, but we consider that the profitability results are strongly supportive of the view that the retail and wholesale prices for Sky’s premium channels are above competitive levels.

Profitability of sports and movies channels

- 7.25 An analysis of profitability between sports and movies channels is complicated by the fact that a large proportion of Sky’s consumers purchase Sky Sports and Sky Movies together as part of a bundle. Revenues for these consumers therefore need to be disaggregated. In principle, there are two extreme approaches to this disaggregation:

- The first assumes that all subscribers purchase the bundles primarily for access to the Sky Sports channels. Under this approach, Oxera assumes all subscribers

¹⁴⁴ See Table 5.3 of Oxera’s first report. As set out above, we have amended the calculations for margins over direct costs so that the denominator is direct costs rather than revenues.

¹⁴⁵ Oxera first report, page 53.

effectively pay the standalone Sky wholesale price for Sky Sports channels and the incremental wholesale price for Sky Movies. Hence if Sports channels were available for £15 without movies and for £20 with movies, this approach would allocate 75% of revenues to the sports channels and 25% to the movies channels.

- The second approach assumes that all subscribers purchase the bundles primarily for access to the Sky Movies channels. If sky Movies channels were available for £15 without sports, and for £20 with sports, 75% of the revenues would be allocated to movies.

7.26 A middle ground is to look more closely at the preferences of subscribers. Oxera's "preference based" approach drew on the Ofcom consumer survey carried out as part of the Second Pay TV Consultation which assessed the weights consumers attached to sports and movies channels. In this survey, around 49% of subscribers purchasing both Sky Sports and Sky Movies stated that they purchased the bundle primarily for Sky Sports channels, so for these subscribers, revenues were allocated using the first of the two extreme approaches described above. Around 22% of subscribers stated that they purchased the bundle primarily for Sky Movies, so for these subscribers, revenues were allocated using the second of the extreme approaches. For the remaining 27% of subscribers, revenues were allocated equally between Sky Sports and Sky Movies.

7.27 Oxera's results are presented in Figure 9. The table sets out both the return on sales and margins over direct costs for the wholesale sports and movies business under different cost and revenue allocations. The first two columns show the results using the 'preference based' revenue allocation under two alternative cost allocation bases: first using Oxera's own high level cost allocation and second using the more detailed cost allocation carried out by Analysys Mason (AM). While the results of the allocations are similar at an aggregate level, we consider that the detailed assessment carried out by Analysys Mason (built up line by line from Sky's management accounts) is likely to be the more reliable measure. The final two columns show the results of an incremental prices approach to revenue allocation, under Oxera's high level cost allocation approach. We consider that this incremental approach provides the upper and lower ends of the range for the allocation of revenues between sports and movies channels.

7.28 The table indicates that at the wholesale level, Sky Movies channels are more profitable than Sky Sports channels.

Figure 9 Estimates of wholesale ROS and margins over direct costs for sports and movies channels under alternative cost and revenue allocations, 2004-2008

	'Preference based' allocation – Oxera high level analysis	'Preference based' allocation – AM analysis	Allocation to movies based on incremental prices	Allocation to sports based on incremental prices
Return on Sales				
Sports	✂	✂	✂	✂
Movies	✂	✂	✂	✂
Margins over direct costs				
Sports	✂	✂	✂	✂
Movies	✂	✂	✂	✂

Source: Oxera first report Table 5.6 and Oxera's analysis using AM cost allocation

- 7.29 Oxera interpreted its disaggregated profitability analysis cautiously, in the sense that it drew inferences about relative margins rather than absolute margins. We agree that this disaggregate analysis does not allow us to identify robustly what the precise margin on different Sky products is. In relation to sports channels, the range of estimates produced by Oxera is, in and of itself, inconclusive. Under the incremental prices approach from Figure 9, the lower estimate of the wholesale margin over direct costs for Sky Sports channels could be as low as [✂] (manifestly not above the competitive level) and the return on sales could be as low as [✂].
- 7.30 That said, to sustain the proposition that wholesale Sky Sports margins are negative, we would need to believe a very extreme allocation of revenues to Sky Movies – and as a consequence, believe that movies margins over direct costs were over [✂]. We therefore attach considerably more weight to the preference based allocation of revenues than to the other two measures which are, by construction, very much extreme figures. We consider that the most reliable measure of wholesale Sports margin over direct costs is likely to be the preference based figure using Analysys Mason's cost allocation of [✂]. This corresponds to a return on sales of [✂].
- 7.31 Figure 10 shows the evolution of wholesale ROS and margins over direct costs underlying the averages presented in Figure 9. The ROS and margins over direct costs for Sky Sports in particular have shown a general upward trend over time.

Figure 10 Evolution of wholesale ROS and margin over direct costs, 2004-2008 (preference based allocation)

[✂]

Source: Oxera analysis using AM cost allocations

- 7.32 It is not immediately apparent whether the return on sales figures of [✂] and [✂] for Sky Sports and Sky Movies respectively could be considered high.
- 7.33 However, there is evidence that Sky's return on wholesale bundles is materially higher than would be expected in a competitive market. Sky's wholesale business is

relatively “asset-light”. A return on sales figure of [X] for Sky Sports and [X] for Sky Movies is a material return on assets for such businesses: Figure 7 above shows that Sky’s wholesale business in aggregate earned a return on sales of [X] consistent with an IRR of [X]. This view is reinforced by the level of the margins over direct costs (an average of [X] for sports over the past five years and [X] for movies) which appear substantial for businesses with few assets and relatively few common costs.

- 7.34 In addition, over the period 2003 to 2007, Sky’s preference based return on sales (using Analysys Mason’s detailed cost allocation) is [X] for sports and [X] for movies, compared with wholesale ROS figures for the wholesale comparators identified by Oxera of -0.6% to 8.4%. Even though these comparators are imperfect, they support the view that Sky’s return on the wholesale supply of Sky Sports is high¹⁴⁶.
- 7.35 We accept that the profitability evidence in relation to the wholesale supply of Sky Sports is less clear-cut than in the case of Sky Movies. However, on balance, our overall conclusion from Oxera’s analysis is that it indicates that prices are above the competitive level for wholesale Sky Sports channels
- 7.36 For the wholesale supply of Sky Movies channels, the profitability analysis points to a return on sales of [X] and a margin over direct costs of [X]. In line with our conclusions regarding sports channels, we believe that Sky earns high margins in both businesses, and that those margins are likely to be higher on Sky Movies than on Sky Sports.

¹⁴⁶ We note in Section 6 of this annex that identifying comparators for Sky is difficult and Sky has argued that the comparators chosen by Oxera in its first report were not relevant.

Section 8

Conclusions

- 8.1 In the Third Pay TV Consultation we concluded that Sky was earning returns above its cost of capital and that this was likely to continue into the future. Sky argued that the observed gap between its returns and cost of capital could be the result of its history of innovation and successful execution of risky investments.
- 8.2 We have subsequently commissioned Oxera to update its analysis of returns and assess the extent to which Sky's past investments and the risks associated with those investments could explain the level of Sky's returns compared to its cost of capital.
- 8.3 Oxera's analysis indicates that Sky's returns have persistently been above its cost of capital and we consider that the size of the gap is significant. Evidence that Sky has a persistent and significant profitability gap based on the difference between its ex post returns (measured by the IRR) and its ex ante cost of capital is a strong indicator of the existence of barriers to entry. In a well-functioning competitive market, we would expect the entry of new firms to drive prices down and reduce returns. We therefore conclude on the basis of this evidence that Sky's profitability suggests that it benefits from significant barriers to entry.
- 8.4 Responding to Sky's suggestion that its returns reflect the successful execution of risky investments, we recognise that Sky's historic returns may have represented the necessary reward for the significant risks the business took in its earlier stages of development. However, Oxera's analysis suggests that Sky's more recent investments have been considerably less risky and that the gap between Sky's returns and its cost of capital is likely to go beyond the necessary rewards for significant risk-taking.
- 8.5 Going forward, we have found no evidence that Sky's returns are expected to fall from their present levels, with analysts expecting Sky's profitability to grow in future.
- 8.6 We consider that this analysis supports our conclusion from the Third Pay TV Consultation that Sky is earning returns above its cost of capital and that this is likely to continue into the future if the market is left unchanged.
- 8.7 Our conclusions from Oxera's analysis of Sky's disaggregate profitability are that these high aggregate returns are likely to be concentrated in Sky's premium wholesale business and that Sky is earning high margins from its premium sports and movies channels.

Appendix 1

Sky's cost of capital

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Section 1

Executive Summary

- A1.1 Our approach to determining cost of capital is based on the capital asset pricing model (CAPM), which calculates the return that investors (both debt and equity) expect in return for bearing risk. Although not the only asset pricing model, it is the most widely used, particularly in the regulatory community, and is a model that Ofcom (and Oftel) has consistently used.
- A1.2 The CAPM expresses cost of capital in terms of an average of the returns expected by debt and equity holders, weighted by value. This is commonly termed a company's WACC (weighted average cost of capital).
- A1.3 This analysis relates to Sky's forward-looking cost of capital. For a discussion of Sky's estimated cost of capital in prior years, see the separate report produced for Ofcom by Oxera which is included as an appendix to this annex.
- A1.4 Figure 11 shows our estimates of Sky's WACC:

Figure 11 Changes in Sky's estimated WACC¹⁴⁷

Period	Estimate	Source
1995-2009	11.4 – 15.0%	Oxera analysis
1998-2009	11.3 – 14.9%	Oxera analysis
2005-2009	10.7 – 14.1%	Oxera analysis
2010 onwards	10.3%	Ofcom analysis

¹⁴⁷ Oxera's estimates of the cost of capital are pre tax nominal rates calculated as the average cost of capital over the period, weighted by investments. See section 2.2 and A2 of Oxera's second report (appendix to this annex) for more information on how Oxera estimated these ranges.

Section 2

Current cost of capital

- A1.5 In this section we set out our views on Sky's estimated forward-looking cost of capital, which can be used when considering Sky's future profitability.
- A1.6 International capital markets went through a period of very high volatility during 2008 and 2009, with a number of financial institutions failing or receiving substantial state funding, both in the UK and the rest of the world. This process was accompanied by a global recession.
- A1.7 The level of uncertainty and volatility in equity and credit markets has been very high, although this has abated in recent months, and cost of capital inputs have been affected by this volatility. Therefore analysing data from the last few years requires care.
- A1.8 Taking into account all the information available to us at this time, our estimated pre-tax nominal WACC is 10.3% for Sky. This is unchanged since our Third Pay TV Consultation.
- A1.9 Our calculations are based on the following estimates:

Figure 12 Sky's estimated WACC parameters

	Sky
Equity risk premium	5.0%
Equity beta	0.85
Risk-free rate	4.5%
Debt premium	1.5%
Gearing	30%
Pre-tax nominal WACC	10.3%

Equity Risk Premium ("ERP")

Key parameter in CAPM

- A1.10 The ERP is a key component of the estimate of a company's WACC.
- A1.11 Under the CAPM the ERP represents the extra return that investors require as a reward for investing in equities rather than a risk-free asset. It is market-specific, not company-specific.
- A1.12 Academics and other users of the CAPM have conducted a large number of investigations into the value of the ERP, using quantitative techniques and surveys. These have produced a range of widely differing estimates, which means that we (and other economic regulators) have to choose a value from within the plausible range implied by these studies.

A1.13 Our approach to estimating the ERP can be found in our 2005 Cost of Capital statement entitled “Ofcom’s approach to risk in the assessment of cost of capital”¹⁴⁸.

Our objectives in determining the ERP

A1.14 In determining an appropriate value for the ERP, we are mindful of previous decisions by ourselves, other economic regulators, and the Competition Commission.

A1.15 We have had regard to Section 3(4)(d) of the CA03 i.e. to the desirability of encouraging investment and innovation in relevant markets when exercising our duties.

A1.16 While setting rewards too low could lead to discretionary investment being discouraged, setting rewards too high could lead to consumers paying prices that are too high (or investments that are not fully justified by demand).

Alternative estimation methods and estimates

A1.17 A number of different methods are used to measure the return that investors will require for investing in equity markets. These may be based on historical investment returns (i.e. an ex-post approach), or on forward-looking considerations (i.e. an ex-ante approach).

A1.18 We consider the following estimation methods:

- Ex-post estimation.
- Extrapolating observed historical risk premia.
- Extrapolating adjusted historical risk premia.
- Ex-ante estimation: (i) using the dividend growth model, and (ii) using surveys of academic and user expectations.

Ex-post estimation – extrapolating historical risk premia

A1.19 We are mainly relying on work carried out by the London Business School’s Dimson, Marsh and Staunton (DMS)¹⁴⁹. DMS measure total returns over a relatively long period include a large sample of countries and make adjustments for survivorship bias¹⁵⁰.

A1.20 The estimates from DMS suggest it would be appropriate to give weight to historic premia between 4.0% and 5.5%.

¹⁴⁸ http://www.ofcom.org.uk/consult/condocs/cost_capital2/statement/

¹⁴⁹ Dimson, Marsh and Staunton, 2008, “Global Investment Returns Yearbook 2008”, ABN AMRO, London Business School, and 2009, “Credit Suisse Global Investment Returns Sourcebook 2009”, Credit Suisse.

¹⁵⁰ Survivorship bias describes an effect caused by looking at share prices over a long period of time, during which a certain percentage of any starting group would be expected to go into administration or be de-listed. The only shares that can be tracked over a long period of time are by definition those that have endured, and by implication, have been most successful. Therefore it is necessary to adjust for a natural level of wastage from the opening sample.

- A1.21 Note that these estimates are calculated using arithmetic means from historic data. Arithmetic means are our preferred measure of the historic premia, and we give more weight to arithmetic means than to geometric means from the same data¹⁵¹.
- A1.22 DMS themselves have suggested an arithmetic mean premium for the world index of around 4.5 – 5.0%¹⁵². They state that “this is our best estimate of the equity risk premium for use in asset allocation, stock valuation, and corporate capital budgeting applications.” In addition, for the UK, DMS’s estimated premium of equities over bonds (as measured by the arithmetic mean in the period 1900 – 2008) is 5.0%¹⁵³.

Ex-post estimation – extrapolating adjusted historical risk premia

- A1.23 Using DMS data implies a range for the adjusted ERP over bonds of 3 to 4.5%.
- A1.24 We note that the DMS adjustments are fairly subjective, and we place only a modest amount of weight on these adjusted returns.

Ex-ante estimation – estimates not based on historic returns

- A1.25 The ERP can be estimated without using historical data.
- A1.26 The dividend growth method is based on forecasts of future dividend growth. With this method it is possible to calculate an “implied” ERP using current market values and forecasts for earnings/dividends.
- A1.27 In the 2005 Cost of Capital statement we presented a range of ERP estimates based on this method of estimation with a midpoint of 3.5 to 4%.
- A1.28 In response to our consultation documents that preceded the 2005 Cost of Capital statement some stakeholders argued that approaches of this type are seriously flawed since they rely on highly subjective input parameters i.e. analyst expectations and an assumption of constant growth rates.
- A1.29 We agree that approaches of this type require the use of highly subjective parameters. As a result, we place relatively little weight on this type of analysis.

Ex-ante estimation – academic/user surveys

- A1.30 It is possible to estimate the ERP by using surveys carried out amongst academics and users of the CAPM. Participants are asked to quantify the returns that they expect from the equity market over a particular time horizon.
- A1.31 The first consultation that we published in January 2005¹⁵⁴ in relation to assessing BT’s cost of capital set out the range of views of academics as being from 3 to 7%, while the views of practitioners ranged from 2 to 4%.
- A1.32 A study of US finance academics, carried out by Ivo Welch, suggested that an estimate of the ERP based on academic views might be around 5% on a geometric

¹⁵¹ See our 2005 Cost of Capital statement for further discussion of this issue:
http://www.ofcom.org.uk/consult/condocs/cost_capital2/statement/final.pdf

¹⁵² DMS 2009, page 34.

¹⁵³ DMS 2009, page 146.

¹⁵⁴ http://www.ofcom.org.uk/consult/condocs/cost_capital/cost_capital.pdf

mean basis, or 6% on an arithmetic mean basis. This is based on a sample of about 400 finance professors' views on the 30-year geometric equity premium¹⁵⁵.

A1.33 A more recent study from 2008 by Pablo Fernandez¹⁵⁶ suggests that UK finance professors used ERP estimates with an arithmetic mean of 5.5%.

A1.34 We would afford this analysis relatively little weight since participant surveys do not provide the same quality of evidence as market-based measures.

Regulatory benchmarks

A1.35 The range of ERP estimates adopted by the UK's economic regulators and competition authorities is in the range of 3% to 5%, for example.

Figure 13 Regulatory benchmarks of ERP

Source/year	ERP	Comment
Ofcom, 2009	5.0%	May 2009, Openreach Financial Framework Review
Ofwat, 2009	5.4%	For period 2010 -2015
Ofgem, 2009	3% - 5%	For period 2010 - 2015
CC/CAA, 2008	3% - 5%	5-yr review of cost of capital for BAA Stansted Airport

Source: Ofwat 2009¹⁵⁷, Ofgem 2009¹⁵⁸, CC/CAA¹⁵⁹

¹⁵⁵ http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1084918

¹⁵⁶ Fernandez, Pablo: Market Risk Premium Used in 2008 by Professors: A Survey with 1,400 Answers (April 16, 2009). Available at SSRN: <http://ssrn.com/abstract=1344209>

¹⁵⁷ See http://www.ofwat.gov.uk/pricereview/pr09phase3/det_pr09_finfull.pdf, page 128.

¹⁵⁸ See

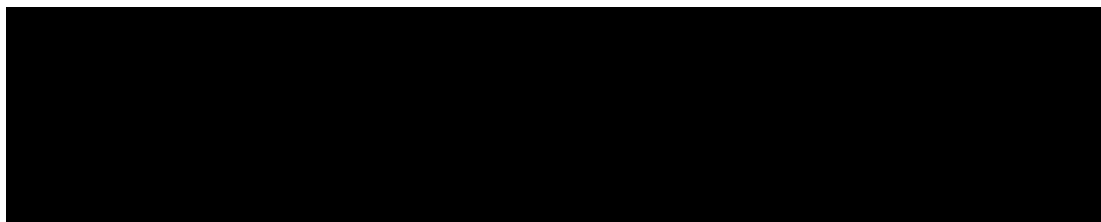
http://www.ofgem.gov.uk/Networks/ElecDist/PriceCtrls/DPCR5/Documents1/FP_1_Core%20document%20SS%20FINAL.pdf, page 53.

¹⁵⁹ The Competition Commission have a broad range for the ERP as part of their WACC analysis, but end up choosing a point estimate at around the 80th percentile of the overall range. An ERP estimate at the 80th percentile of the above range would give a point estimate of 4.6%.

A range of values for the ERP

A1.36 Figure 14 below summarises our ERP estimates.

Figure 14 Summary of ERP estimates



Note “GM” refers to geometric mean and “AM” refers to arithmetic mean

- A1.37 We believe that a broad range of 4 to 5% reflects a balanced view of the available evidence, but we place more weight on the ex-post historic estimates than other estimates of the ERP.
- A1.38 We have reviewed evidence from market commentators and the Bank of England, and believe that the high levels of volatility in equity markets suggest that the equity risk premium has increased in recent years.
- A1.39 We maintain our belief that the downside of setting an ERP too low is worse than the downside of setting the ERP too high. We therefore tend to favour setting the ERP towards the upper end of the 4 to 5% range.
- A1.40 Specifically, our point estimate for the ERP is 5.0%, at the top of our range.
- A1.41 Our decision to choose a point estimate at the top of our prior range is in response to increased market volatility and turbulence, which is likely to lead to investors requiring increased returns in exchange for holding equity rather than risk-free assets.
- A1.42 Our estimate of the ERP has not changed since the publication of the Third Pay TV Consultation.

Sky's equity beta

- A1.43 The value of a company's equity beta reflects movements in returns to shareholders (as measured by the sum of dividends and capital appreciation) from its shares relative to movements in the return from the equity market as a whole.
- A1.44 In order to estimate Sky's equity beta we commissioned reports from the Brattle Group, which measured the daily correlation between Sky's share price movements and the FTSE Allshare and FTSE Allworld indices. We commissioned a first report for our Third Pay TV Consultation and we recently commissioned an updated version for this statement. The latest report can be found in an appendix to this annex.
- A1.45 In the Third Pay TV Consultation, Brattle concluded that Sky's most recent equity beta lay in the range 0.75 – 0.95, with a mid-point of 0.85. Its latest report suggests a range of 0.40 to 0.95, based on the daily covariance between Sky's share price and the FTSE All-World index over the last 2 years. The range suggested by Brattle's latest report is wider than that suggested previously, which is a reflection of

the level of uncertainty of the estimates (as measured by a number of different statistical tests – see Chapter 3 of the latest Brattle report for details).

- A1.46 We would note however that the latest 2 year daily covariance based on the FTSE All-Share index returns a value of 0.85. Our preferred measure of Sky's equity beta is against the FTSE All-Share, although we recognise the relevance of the All-World index, since some of Sky's shareholders are likely to be global (rather than UK-only) investors¹⁶⁰. On this basis, we consider 0.85 to be a reasonable estimate of the equity beta for Sky. This is in line with our estimate at the time of our Third Pay TV Consultation.
- A1.47 Brattle also concluded that Sky's equity beta does not appear to have moved as a result of the movements in Sky's gearing level, which has been between 12% and 22% for the last 2 years. In addition, none of the beta estimates are biased, and they pass several statistical tests¹⁶¹. In this sense, the results can be seen as robust.

What did respondents to our June 2009 consultation say?

- A1.48 In its response to our Third Pay TV Consultation, Sky asserted that Ofcom had failed to have due regard to the uncertainty and measurement error in the equity beta estimate for Sky. In particular Sky noted that the Brattle report had included a significant discussion about the potential unreliability of its estimate of Sky's equity beta, which it believed Ofcom ignored.
- A1.49 We agree that there is an inherent level of uncertainty and potential for measurement error in the equity beta estimates as given by market observations. As a regulator we must use the information available to us and determine a reasonable estimate based on our regulatory judgement. We believe that our estimate of 0.85 is a reasonable one based on the available evidence.

Gearing levels

- A1.50 Our approach to gearing is to assume an optimal level of gearing, which is that at which the cost of capital is minimised and the value of the firm is maximised.
- A1.51 Since the cost of debt is lower than the cost of equity, this suggests that the optimal rate would favour debt financing. However, if the level of debt gets too high the risk of financial distress increases very quickly, and equity investors recognise that their claim on the assets of a firm in financial distress comes after the claims of debt holders. Therefore, equity holders will be wary of high levels of gearing, particularly in firms where there are limited fixed assets (which could be liquidated in the event of distress).
- A1.52 So we would expect investors in Sky, which would have relatively few assets to sell in the event of financial distress, to want lower levels of gearing than those of a company like BT, where substantial valuable fixed asset investments might help to

¹⁶⁰ We note from Table 1 of the latest Brattle's report that the latest equity beta estimates against the FTSE All-World index are around 0.2 lower than the equivalent All-Share measurements. This may suggest that, given the UK focus of Sky's business, its shareholders tend to be UK-focused, and that the All-Share measurement is more robust. We also tend to prefer 2-year daily measurements over 1-year daily measurements as the increased number of readings can help reduce the standard error of the estimates.

¹⁶¹ See Chapter 3 of Brattle's report for details of statistical tests.

insulate investors from the risk of losing their investment. As a point of reference, we assume the optimal gearing rate to be 35% for BT Group, which was based on BT's long-run average gearing up until the last few years.

- A1.53 On the basis that investors should want a gearing rate that maximises the benefit from cheaper debt financing, but without jeopardising the financial viability of the firm, we assume an optimal gearing level of 30% for Sky. This assumption is unchanged since our Third Pay TV Consultation.

Debt markets

Introduction

- A1.54 Our WACC calculations require two further inputs in addition to those already set out. Specifically:

- The risk-free rate; and
- Sky's debt premium.

- A1.55 Since the latter half of 2007 there has been increased uncertainty and volatility in world credit markets, and we have been mindful of this when considering our estimates of debt parameter values.

- A1.56 In 2008 we noted two effects, which are partially offsetting for the purposes of our calculations:

- As volatility and uncertainty in credit and property markets increased, central bank interest rates fell and the risk-free rate also dropped.
- The demand for corporate debt diminished and the required spreads on corporate debt issues increased, pushing up corporate debt premia.

- A1.57 In this period, nominal gilt yields first increased and then fell back more recently, as investors' desire for low-risk assets, such as government gilts, drove up demand, pushing prices up and yields down. In addition, declines in expected inflation have pushed nominal gilt yields down. As part of the same preference for low-risk assets, spreads on corporate bonds (which are more risky than government gilts) increased, and continue to be at relatively high levels.

- A1.58 In 2009, corporate debt yields have reduced somewhat but are still at historically high levels. Sky's most recently issued debt currently trades at around 2% above equivalent government gilts, which reflects its Baa1/BBB credit rating.

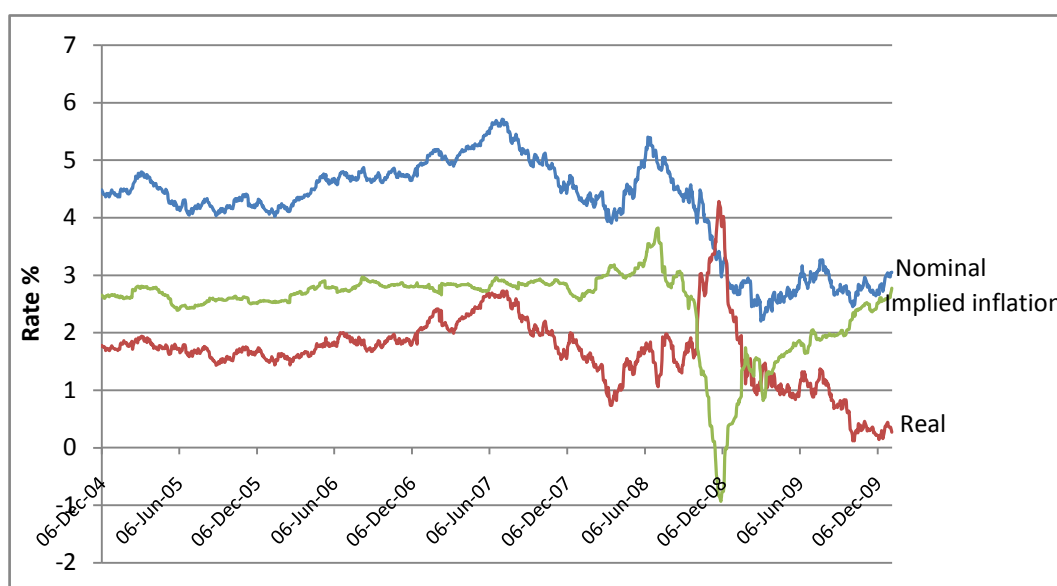
- A1.59 Our expectation is that the current levels of corporate bond spreads are unlikely to remain at such elevated levels for the next 10 years.

The risk-free rate

- A1.60 The risk-free rate of interest is an input into both the calculations of the cost of debt and the cost of equity.

- A1.61 For a UK company, a proxy for the nominal risk-free rate is the yield to maturity on gilts, or government strips¹⁶², while the real risk-free rate can be proxied by the yield on index-linked gilts of appropriate maturity. The difference between the two provides an estimate of forecast inflation.
- A1.62 We can track the nominal, real and implied forecast inflation rates over time, using Bank of England data on 5-year duration gilts, as shown by Figure 15 below.
- A1.63 From Figure 15 we can see that the nominal yield peaked at around 5.8% in July 2007 but in 2009 was generally below 3%, partly due to falls in inflation expectations. At the same time, real gilt yields peaked at a high of over 4%, but are now below 1%.

Figure 15 5 year gilt yields - Nominal, Real & Implied Inflation



Source: Bank of England data

- A1.64 The average nominal yield for 5-year zero coupon gilts has fallen over the last 2 years. While we would generally tend to give more weight to more recent nominal rates than those from a number of years ago, we are mindful that we do not wish to estimate the rate based on a period of abnormally low nominal rates, or abnormally low implied inflation. We also do not want to use extremely volatile recent data if these data are still moving materially.
- A1.65 We also believe that gilt yields have been depressed due to the impact of the Bank of England’s Quantitative Easing programme and high demand from pension funds that experienced losses in equity markets.
- A1.66 Given the likelihood of increasing nominal yields, we give more weight to the 1, 2, 3 and 5 year averages than recent very low rates.

¹⁶² STRIPS stands for “Separate trading of registered interest and principal securities”. These are fixed-income securities sold at a significant discount to face value which offer no interest payments because they mature at par.

Source: Bank of England data

A1.67 Using values from Figure 16, alongside our view that current observed rates are unusually low, our broad range for the real risk-free rate is 1.5% to 2.0%. This range can be viewed as a prudent range on which to base our risk-free rate. We note that excluding the period from September 2008 (i.e. after the collapse of Lehman Brothers) the real risk-free rate from the preceding 4 years is around 1.8%.

Figure 16 Historic averages of Nominal, Real and Inflation 5 year rates (8 Jan 2010)

	Nominal	Real	Inflation
Spot rate (08/01/10)	3.1	0.3	2.8
1 month	2.9	0.3	2.6
3 months	2.8	0.3	2.5
6 months	2.8	0.6	2.2
1 year	2.8	0.9	1.9
2 years	3.5	1.4	2.1
3 years	4.0	1.7	2.3
5 years	4.2	1.7	2.5

Source: Bank of England data

A1.68 We are using an estimate of 2% for the real risk-free rate, at the high end of our range, since we believe that this is a prudent long-term estimate of this parameter.

Inflation in our risk-free rate assumption

A1.69 Our assumption for future inflation is 2.5% per year. We recognise that this is slightly below the rates implied by current gilt yields, but we believe it is a reasonable projection, based on the Bank of England target rates and long-term forecast, and in line with inflation assumptions in recent charge controls¹⁶³.

Sky's Debt Premium

A1.70 Sky's credit rating is Baa1 (Moody's) and BBB+ (S&P).

A1.71 Sky's most recent debt issue was on 17 November 2008, when it issued \$600m of 10-year bonds at more than 500 basis points above the equivalent US government bond rate. We note that this was around the high point of corporate debt spreads, while current market prices (as of early February 2010) implies a yield of around 5%, versus equivalent gilt yields of around 3.5%, suggesting a debt premium of around 1.5%.

¹⁶³ A new pricing framework for Openreach, 22 May 2009 annexes, paragraph A6.55, page 104. Available at: <http://www.ofcom.org.uk/consult/condocs/openreachframework/statement/annexes.pdf>.

A1.72 The Bank of England's Quarterly Bulletin from November 2009¹⁶⁴ suggests that investment-grade non-financial corporate bond spreads have fallen from highs seen in Autumn 2008. The Bank notes that:

“Conditions in credit markets also continued to ease for non-financial companies. Spreads on sterling-denominated corporate bonds narrowed, especially for non-investment grade bonds. Indeed, the sharp widening in spreads in Autumn 2008, when the turmoil in financial markets intensified, has been largely unwound, although spreads remained above their average levels over the past decade.”

A1.73 Now that credit markets appear to have stabilised somewhat, the current observed level of debt premium for Sky appears to provide a reasonable long-term estimate of its debt premium.

Gearing and the debt premium

A1.74 Sky's gearing level at the time of its most recent issue of debt was just over 20%, above its current gearing level of around 15%. The slightly higher level of debt premium at the time of issuance may help to explain why Sky had to offer such a high yield on its debt, but it is more likely to be due to the level of market volatility following the collapse of Lehman Brothers, which resulted in a short-term spike in corporate bond rates.

A1.75 We believe that a long term debt premium for Sky would sit in the range 1 – 2%, although the top end of this range would only apply in periods of relatively high market uncertainty and volatility, such as the conditions that prevail at present.

A1.76 On a longer term view, we think that the debt premium for a mature, well-established and well-funded market operator may well tend towards the lower end of the range. At this stage, we consider it appropriate to select an estimate of the long-term debt premium for Sky at the mid-point of our range, or 1.5%. Our estimate is unchanged since the Third Pay TV Consultation.

Parameter assumptions for CAPM

A1.77 Figure 17 below sets out our WACC estimates for Sky based on the estimates outlined in the sections above.

¹⁶⁴ <http://www.bankofengland.co.uk/publications/quarterlybulletin/mo09nov.pdf>

Figure 17 Pre-tax nominal WACC for Sky

WACC component	Third Pay TV Consultation	Statement
Risk free rate %	4.5	4.5
Equity risk premium %	5	5
Equity beta	0.85	0.85
Cost of equity (post tax)	8.8	8.8
Debt premium %	1.5	1.5
Corporate tax rate %	28%	28%
Cost of debt post tax	6.0	6.0
Gearing %	30%	30%
WACC (post tax)	7.4	7.4
WACC (pre tax)	10.3	10.3

BSkyB's profitability in the context of the Ofcom market investigation

Second report

Prepared for Ofcom

February 2010



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Executive summary

In June 2009 Oxera prepared a report on the range of plausible economic rates of return earned by BSkyB from its pay-TV activities, considering, in particular, the importance of intangible assets. The report estimated returns at the aggregate level, seeking to provide estimates of returns for pay-TV activities that are as accurate and robust as possible. It also presented profitability measures at various levels of disaggregation, including for wholesale and retail activities; basic and premium channels; and premium sports and movies channels.

Since completion of that report, Sky has published its accounts for the latest financial year ending June 2009, making it possible to update the estimates of returns. Ofcom has also received responses to its third consultation, including a response from Sky and its advisers (Professor Paul Grout and PwC), who made a number of comments on Oxera's analysis and Ofcom's interpretation of Oxera's results.

Ofcom asked Oxera to prepare a second report to update the estimates of returns at the aggregate level and to estimate the cost of capital over time. Ofcom also asked Oxera to address the comments raised by Sky and Professor Grout.

This report presents updated estimates of economic rates of return for Sky's pay-TV activities together with estimates of the cost of capital. Estimates are derived under a number of scenarios to ensure that the analysis is robust and understand the sensitivity of the results to key assumptions.

Economic rates of return are measured in this report according to various metrics. Results under the conceptually appropriate metric—the internal rate of return (IRR) based on the depreciated replacement cost (DRC) of assets—suggest that economic rates of return under the base-case scenario for the period 2005–09 were around [x]%. Over a longer historical time period (ie, since flotation, covering the period 1995–2009), returns are estimated to be higher, at around [x]%. (In the table below the IRR ranges from 21% to 28%).

Updated estimates of the IRR (pre-tax, nominal, %)

Measure	1995–2009	1998–2009	2005–2009
IRR (DRC: year of investment)	[x]	[x]	[x]
IRR (DRC: annual revaluation)	[x]	[x]	[x]

Note: Oxera's first report describes in detail how these scenarios are calculated.
Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The conceptually appropriate benchmark against which to assess the level of returns is the cost of capital because, in competitive markets, which are characterised by free entry and exit, companies are expected to make profits in the long run that are broadly in line with the minimum returns required by investors (ie, the cost of capital). Profits above the cost of capital would eventually encourage entry by new competitors, and profits below the cost of capital would induce exit. Hence, returns that are persistently and significantly above the cost of capital are an indication of barriers to entry.

Estimates of the cost of capital (%)

	1995–2009	1998–2009	2005–2009
Pre-tax, nominal (average over the period)	13.2 (11.4–15.0)	13.1 (11.3–14.9)	12.4 (10.7–14.1)

Source: Datastream, OECD, Competition Commission (2008), ‘Stansted Airport Ltd - Q5 price control review’, October, pp. 1–130, and Oxera calculations.

The difference between estimates of the IRR and the cost of capital provides an estimate of the profitability gap for Sky’s pay-TV operating activities. The estimated profitability gap for Sky is [x] % in the base-case scenario for the period 2005–09. This gap is persistent over time, and is estimated at [x] % over the longer time period (1995–2009). (In the table below the profitability gap ranges from 8% to 15%).

Estimates of the profitability gap (%)

	1995–2009	1998–2009	2005–2009
Base case: IRR (pre-tax, nominal, based on IRR and average WACC over IRR period)	[x]	[x]	[x]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The profitability gap over the longer time period (from 1995 to 2009) is higher than over the more recent periods. This is consistent with higher customer acquisition costs relative to customer lifetime cash flows in the later years compared with the early years of the pay-TV market. The profitability gap from 1998 to 2009 is low relative to other time periods because BSkyB incurred significant investments over that period in the transition of customers to digital and in expanding the customer base. Hence, the analysis over this period captures significant investments, without capturing in full the future cash flows associated with these investments.

The profitability gap over the last five years is higher than that over the last ten years. Furthermore, inclusion of the most recent financial information in the analysis (ie, the updates introduced in this report) also increases the profitability gap.

The estimates of the profitability gap based on the return on capital employed (ROCE) support the estimates based on the IRR.

In response to Ofcom’s third consultation, Professor Grout presented evidence on total shareholder return (TSR), and concluded that it does not support the conclusion that Sky earned high returns.

In the context of analysing economic rates of return in competition policy analysis, evidence from TSR does not provide a meaningful measure of returns. While competition policy analysis seeks to understand the dynamic relationship between prices and costs, the TSR captures the relationship between prices and expectations. Thus, if stock prices at any point in time capture expectations of economic rents, the expected return on the share price will be the cost of capital, yet the firm may well be continuing to earn rents.

This report explores in detail this relationship between the TSR and IRR, given the expectations and market valuation at time of flotation of BSkyB. The main reason why the IRR exceeds the TSR is because the market value of assets used in the TSR analysis significantly exceeds the DRC of assets in the IRR analysis.

Indeed, in 1995, the market value of Sky’s assets was approximately six times the DRC. Analysis of lifetime per-subscriber cash flows suggests that this level of market value to replacement cost would be consistent with the economics of Sky’s business, where the

incremental per-subscriber cash flows significantly exceed the subscriber acquisition costs. Therefore, it is perfectly plausible that the market value of Sky was at a significant premium to the DRC at flotation. In such context, the TSR information provides no meaningful guide to how prices relate to costs. The analysis is repeated in more recent years to explain how this pattern has been persistent over the period since flotation.

Furthermore, the report explains that even if the TSR had any economic meaning in the context of analysing market power in Sky's pay-TV market, the measure is highly unreliable for a number of reasons (sensitivity to the choice of time period; ability to reflect performance of UK pay-TV activities; choice of benchmark; survivorship bias).

Therefore, the only economically meaningful approach to profitability in this case is to measure returns relative to the DRC of assets, as in the analysis of the IRR, and cross-check using the net present value (NPV) and ROCE indicators.

It should also be noted that TSR, as presented by Professor Grout, is the only measure that suggests low returns since 1995 for Sky's pay-TV activities. In the first report, Oxera considered returns for comparator companies, which provided support for the results of the IRR analysis. In this second report, Oxera has sought, in addition, to look at the profitability gap based on BSkyB's accounting rates of return relative to the accounting profitability gap for FTSE 350 companies (defined as the difference between the ROCE based on book values and the cost of capital). Using this measure, the average gap between Sky's accounting rate of return and the cost of capital is larger than the equivalent gap for 95% of companies in the FTSE 350 for the period 2005–08. If one examines the period from 1995 to 2008 as a whole, only one company in the FTSE 350 has had a larger accounting profitability gap than Sky. This suggests that Sky earned both high absolute returns and high relative returns.

Professor Grout also raised concerns in relation to the value of assets used in the IRR analysis, as well as arguing that the IRR may not be an appropriate measure of returns in competition policy analysis due to reinvestment rate assumptions. However, Oxera could not find evidence to support Professor Grout's arguments. For conceptual and empirical reasons, there is no evidence that Oxera's estimates of Sky's asset values are biased, or that the IRR biases the estimates of returns in this case or in the context of profitability analysis more generally.

In response to Ofcom's third consultation, Sky also suggested that the main factor that explains the profitability gap is its continual successful risk-taking and innovation. To assess whether this is a reasonable interpretation of the profitability gap, this report analyses the economic characteristics of Sky's investments, the persistency of returns over time, and the performance of Sky relative to expectations. The evidence shows that over the last ten years or so Sky's pay-TV activities do not exhibit features that are typical of markets with successful innovations and risk-taking (ie, uncertain demand, long payback periods and large upfront costs being invested). In other words, the profitability gap observed over the period 2005 to 2009 cannot be explained by such factors during this period or during the period since its flotation.

Overall, the significant difference between the economic rates of return that Sky has been earning on its pay-TV activities and the cost of capital provides evidence that is consistent both with prices in the last five years being high relative to costs and with the existence of barriers to entry in the UK pay-TV market.

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1 Introduction

In June 2009 Oxera prepared a report on the range of plausible economic rates of return earned by BSkyB from its pay-TV activities, considering, in particular, the importance of intangible assets.¹ The report estimated returns at the aggregate level, seeking to provide estimates of returns for pay-TV activities that are as accurate and robust as possible. It also presented profitability measures at various levels of disaggregation, including for wholesale and retail activities;² basic and premium channels; and premium sports and movies channels.

The objective of the disaggregate-level profitability analysis was to provide, where possible, an indication of the sources of aggregate-level profitability. Therefore, the results of the disaggregate profitability analysis were used to inform the assessment of relative returns between activities, as opposed to the absolute levels of returns.

The analysis of aggregate profitability suggested that, over the five years from 2004 to 2008, the aggregate return on assets under the base-case scenario was around [X]%. Over the longer term from 1995 to 2008, the return on assets was higher, up to [X]% on an internal rate of return (IRR) basis.³ To cross-check the estimates of the IRR, the study also considered estimates of the return on capital employed (ROCE). With assets, and hence capital employed, valued on the basis of book values (an approach typically considered by the UK Competition Commission, CC), the average ROCE over the five-year period (2004–08) was [X]%; with assets valued on a replacement-cost basis, the average ROCE was [X]% over the same period.

The key results of the disaggregate analysis were as follows.

- Returns for Sky wholesale activities appear higher than for Sky retail activities. These results seem to hold under a number of cost allocation approaches and sensitivity checks.
- At the retail level, estimates of returns for basic/premium channels do not seem sufficiently robust to draw conclusions on the relative returns. At the wholesale level, returns for premium channels appear higher than for basic channels. However, this should be interpreted with care given the adopted allocation approaches.
- Estimates of returns for sports/movie channels do not seem sufficiently robust to draw conclusions on the profitability of these channels, although the analysis seems to provide some weak evidence that movie channels may have higher margins than sports channels (given the adopted approaches to cost and revenue allocation).

After completion of the report, Sky published its accounts for the latest financial year ending June 2009, making it possible to update the estimates of returns.

¹ Oxera (2009), 'BSkyB's Profitability in the Context of the Ofcom Market Investigation', prepared for Ofcom, June.

² For Ofcom's description of the value chain, see Ofcom (2008), 'Profitability and investor returns: Annex 9 to second pay-TV market investigation consultation', September 30th, p. 12; Ofcom (2007), 'Pay TV market overview: Annex 8 to pay-TV market investigation consultation', December 18th, p. 7; Ofcom (2007), 'Pay TV market investigation: Consultation document', December 18th, p. 27.

³ In its response to Ofcom's consultation, Sky suggested that it would be appropriate to present the estimates of returns as ranges in order to reflect the uncertainty.

Ofcom also received responses to its third consultation, including a response from Sky and its advisers (Professor Paul Grout and PwC), who made a number of comments on Oxera's analysis and Ofcom's interpretation of Oxera's results.

Ofcom asked Oxera to prepare a second report to update the estimates of returns with one additional year of data and to address the comments by Sky and its advisers.

This second report is structured as follows.

- Section 2 compares the estimates of Sky's achieved rates of return on pay-TV activities with the benchmark cost of capital, and presents the comments of Sky and its advisers on what might explain the difference between the returns and the cost of capital.
- Section 3 explains why Professor Grout's analysis of Sky's share price returns is not relevant and presents the results of further Oxera benchmarking of Sky's accounting ratios—a measure which Professor Grout also refers to in his report.
- Section 4 responds to Professor Grout's comments on the use of the IRR to measure the economic profitability of Sky's pay-TV activities.
- In response to Sky's comments, section 5 reviews the evidence on whether continual innovation and successful risk-taking could explain the estimated profitability gap in recent years.

Further supporting evidence, details on the scenarios and the results of the sensitivity analyses are provided in the appendices.

2 Updated estimates of economic profitability

This section presents updated estimates of Sky's economic rates of return and the benchmark cost of capital, and summarises the comments of Sky and its advisers on how the difference between returns and the cost of capital (the profitability gap) observed over the recent period could be interpreted from a competition policy perspective.⁴

2.1 Updated estimates of returns

Oxera's first report, completed in June 2009, estimated Sky's historical returns up to the end of financial year 2008. Since the completion of that first report, Sky has published its financial results for the financial year ending in 2009. This section presents Oxera's updated estimates of returns.

The updated estimates of returns for Sky based on the depreciated replacement cost (DRC) values of assets have increased compared with the levels presented in the first report.⁵ The analysis suggests that the IRRs based on the DRC are in the range from [X%] to [X%] for the 2005–09 period. The estimates of returns based on the IRR are broadly in line with the estimates of returns based on the ROCE.

Returns can be measured in a number of ways. In the context of economic profitability analysis, the conceptually appropriate approach under several conditions is to use measures of the IRR and net present value (NPV).⁶

The IRR reflects the way in which firms make investment decisions in competitive markets. Specifically, the pattern of cash flows associated with economic activities typically has an initial cash outflow followed by a series of net cash inflows in subsequent periods. Moreover, in addition to the IRR being a theoretically robust method of investment appraisal, it is the one most commonly used in the business world.⁷ The IRR and the NPV take into account the inflows and outflows of an activity over time, and reflect the economic principle of the time preference of money.⁸

Therefore, Sky's updated returns are estimated using the IRR,⁹ with the ROCE used as a cross-check.¹⁰ The analysis follows the same methodology as applied in the first report.¹¹

One of the particular characteristics of Sky's business model that needs to be appropriately reflected in the profitability analysis is the presence of significant intangible assets, the largest of which is the subscriber base. Oxera's first report applied a conceptually appropriate framework for valuing intangible assets and estimating profitability in the context

⁴ The analysis is based on the latest full-year results and does not incorporate the interim results for the six months ended December 31st 2009 (released on January 28th 2010).

⁵ See Oxera (2009).

⁶ See, for example, Oxera (2003), 'Assessing Profitability in Competition Policy Analysis', a report prepared for the Office of Fair Trading; and Morris, D. (2003), 'Dominant Firm Behaviour under UK Competition Law', paper presented to the Fordham Corporate Law Institute, October.

⁷ In a survey of 392 chief financial officers of companies in the USA and Canada, Graham and Harvey (2001) found that around 75% always or almost always use the IRR or NPV as their evaluation technique. 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.

⁸ 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; Edwards, J., Kay, J. and Mayer, C. (1987), *The Economic Analysis of Accounting Profitability*, Oxford: Clarendon Press.

⁹ See, for example, Oxera (2003), op. cit.; and Morris (2003), op. cit.

¹⁰ These metrics were initially adopted in Oxera (2009), op. cit.

¹¹ See Oxera (2009), op. cit., sections 2 to 4.

of competition investigations, as set out in the Oxera 2003 report for the Office of Fair Trading (OFT) and previously used by the CC.¹²

The application of the IRR framework requires the assets to be valued at the beginning and end of the period under investigation. This can be done in a number of ways. In the context of economic profitability analysis, the value-to-the-owner principle, as defined by Edwards, Kay and Mayer (1987), provides a basis for choosing between the various approaches to asset valuation.¹³ This principle requires assets to be valued at *the minimum loss that a firm would suffer were it deprived of the use of that asset*.¹⁴

In this report, the value-to-the-owner principle has been applied, which involves estimating the replacement cost value of Sky's assets (as an estimate of the modern equivalent asset (MEA) value) as described in the first report. The estimation of the replacement cost value of assets involved the valuation of Sky's intangible assets. The use of replacement costs in this context is appropriate given the application of the IRR.

Table 2.1 presents the updated estimates of Sky's aggregate profitability (seeking to show returns for pay-TV activities that are as accurate as possible).¹⁵ Profitability estimates in this table are based on a number of asset valuation approaches. As described above, the relevant scenario in this case is the IRR based on the replacement cost asset valuation approach. The IRRs based on other asset valuation approaches are presented for completeness and are not used to interpret the evidence on returns.¹⁶

Table 2.1 Updated estimates of the IRR (pre-tax, nominal, %)

Measure	1995–2009	1998–2009	2005–2009
IRR (market value)	9.0	6.5	4.7
IRR (DRC: year of investment)	[REDACTED]	[REDACTED]	[REDACTED]
IRR (DRC: annual revaluation)	[REDACTED]	[REDACTED]	[REDACTED]
IRR (DRC opening, MV closing)	[REDACTED]	[REDACTED]	[REDACTED]
IRR (book value)	54.2	27.5	30.1

Note: Oxera's first report describes in detail how these scenarios are calculated.
Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The updated estimates suggest that over the past five years (2005–09) under the base-case scenario the returns based on replacement costs of assets were around [REDACTED]%. Under

¹² Oxera (2003), op. cit.; Competition Commission (2009), 'Rolling Stock Leasing Market Investigation', Appendix 6.4, paragraph 10, April 7th; Competition Commission (2006), 'Classified Directory Advertising Services', Appendix 7.1, paragraph 15a, December 21st.

¹³ Edwards, Kay and Mayer (1987), op. cit.

¹⁴ This requirement is the reason why the CC refers to the value-to-the-owner principle as the 'deprival value' principle.

¹⁵ In its response to Ofcom's third consultation, Sky suggests that Oxera is inconsistent in the way it makes adjustments for costs and revenue related to pay-TV activities. Specifically, Sky suggests that Oxera excludes non-UK pay-TV activities recognised as investments in Sky's financial accounts, but has not excluded activities such as broadband, which are integrated into the Group's operating cash flows. Although the costs and revenues attributable to broadband were not excluded (as the relevant data was not available), this is consistent with the overall conservative approach because broadband investments would be expected to be loss-making over the period of the analysis. This is because the analysis covers the period of investment in broadband business, but does not cover the period over which the corresponding future revenues are expected to materialise. In other words, if the cash flows were adjusted to exclude the broadband business, the estimated profitability of Sky's pay-TV business would be likely to have increased. See Sky (2009), 'Response by British Sky Broadcasting Group plc to Ofcom's Consultation Document "Pay TV Phase Three Document: Proposed Remedies" of 26 June 2009', October, p. 54, para 4.24.

¹⁶ Profitability estimates, based on the depreciated replacement cost (DRC) opening and market value (MV) closing asset values capture forward-looking expectations, with respect to Sky's returns.

alternative definitions of capital employed, the IRR based on replacement costs of assets over the period from 2005 to 2009 increases to [X]%.¹⁷

Over a longer historical time period (ie, since flotation, covering the period 1995–2009), returns on replacement costs of assets appear higher, at around [X]%. Under alternative scenarios for capital employed the IRRs increase to [X]%.¹⁸

The updated returns over the recent years are higher than the returns presented in the first report. For example, the IRRs based on replacement costs over the five-year period from 2005 to 2009 are about 1.5 percentage points higher than the IRR estimates over the 2004–08 five-year period. This is driven by a combination of strong cash flows and an increase in the replacement cost of the asset value during the financial year 2009.

These estimates of economic rates of return apply to a period when Sky was consistently investing in subscriber acquisition and expanding its subscriber base. Effectively, the time period for the estimation of economic rates of return is truncated—such that it captures all the acquisition costs associated with the subscriber base in 2009, but omits the net cash flows that would be expected over the remaining lifetime of the subscriber base in 2009. The implication is that the lifetime profitability—ie, taking into account the historical as well as the forward-looking periods—would be expected to be higher. To cross-check the IRR estimates, ROCE estimates were also considered. Table 2.2 shows the updated ROCE estimates.

Table 2.2 Updated estimates of the ROCE (pre-tax, real, %)

Measure	1995–2009	1998–2009	2005–2009
ROCE (DRC: year of investment)	[X]	[X]	[X]
ROCE (DRC: annual revaluation)	[X]	[X]	[X]
ROCE (book value)	25.5	16.9	29.8

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

On a book-value basis (an approach often considered by the CC), the average updated ROCE over the past five years is 30%. On a replacement cost basis, the average ROCE for the past five years is between [X]% and [X]%. ROCE estimates on a replacement cost basis should be regarded as conservative because the profits used in the numerator of the ROCE formula do not account for holding gains associated with growth of the asset value (as would be accounted for under the clean surplus accounting relationship). If holding gains were accounted for in profits, the ROCE would be closer to the IRR.

Under alternative definitions of capital employed, the ROCE over the five-year period from 2005 to 2009 based on DRC increases to [X]%.¹⁹

As in the case of IRRs, the updated ROCE estimates for 2005 to 2009 are higher than from 2004 to 2008, by approximately 0.5 percentage points.

¹⁷ See Appendix 1, Table A1.1. The estimate of [X]% over the 2005–09 period corresponds to the scenario in which cash is subtracted from capital employed.

¹⁸ See Appendix 1, Table A1.1. The IRR of [X]% over the period 1995–2009 corresponds to the scenario in which current liabilities are subtracted from capital employed.

¹⁹ See Appendix 1, Table A1.1. The ROCE estimate of [X]% over the 2005–09 period corresponds to the scenario in which current liabilities are subtracted from capital employed.

2.2 Estimates of the cost of capital

This section presents the estimates of Sky's cost of capital. The cost of capital is estimated for BSKyB Group and was not disaggregated to estimate separate costs of capital for pay-TV and other activities. The analysis of the cost of capital has been high-level for the purpose of indicating the size of the profitability gap rather than providing a precise estimate.²⁰ Results have been presented as ranges, both to indicate what a reasonable cost of capital would be and to recognise the degree of uncertainty around these estimates.

The cost of capital represents an appropriate benchmark for returns because, in competitive markets, which are characterised by free entry and exit, companies are expected to make profits in the long run that are broadly in line with the minimum returns required by investors (ie, the cost of capital). Profits above the cost of capital would encourage entry by new competitors, and profits below it would induce exit. Hence, returns that are persistently and significantly above the cost of capital are an indication of barriers to entry.

The cost of capital is used by the CC as a benchmark for assessing profitability, as shown, for example, in its investigation into the Classified Directory Advertising Services market:

Effective competition should put pressure on the profit levels of these companies so that they move towards their cost of capital in the medium to long run. In comparing profits to the weighted average cost of capital (WACC) we applied two profitability measures; return on capital employed (ROCE) and internal rate of return (IRR).²¹

The cost of capital of BSKyB Group has been measured as the cost of equity and cost of debt, weighted by the value of gearing (the WACC). The results of the analysis are presented in Table 2.3, which shows ranges for Sky's pre-tax, nominal cost of capital estimated for three time periods (1995–2009, 1998–2009 and 2005–09, consistent with the periods over which the IRR has been measured).²² The detailed methodology used to obtain these results is set out in Appendix 2.

In order to reflect appropriately the impact of the decreasing cost of capital over time, the cost of capital weighted by the investments over the period is estimated. As a sensitivity check, the cost of capital at the start of the period is also presented. In addition, the real cost of capital is presented. This is estimated as the nominal cost of capital deflated at RPI-based inflation²³ using Fisher's equation.²⁴

²⁰ The level of detail in this analysis is high-level relative to that which is often undertaken for the reviews of price controls for regulated utilities. This is because unlike a price control where there is a direct link between the point estimate adopted by the regulator for the cost of capital and the revenue the regulated utility is allowed to earn, the purpose in this case is to provide a robust indication of the size of the profitability gap.

²¹ Competition Commission (2006), 'Classified Directory Advertising Services market investigation', December 21st.

²² The estimates of the cost of capital in the earlier years are more uncertain than in the later years. Therefore, the estimates for earlier years were also cross-checked for consistency with a selected set of regulatory precedents from the late 1990s (as reported in Appendix 2).

²³ In 2009, a low nominal risk-free rate and negative annual inflation are observed. Therefore, to ensure that the profitability gap is not driven by atypically large fluctuations in inflation and depressed yields, in 2009 these two parameters have been consistently estimated with reference to historical data. Specifically, the inflation assumption (2.6%) and the nominal risk-free rate assumption (5.2%) for 2009 are based on three-year historical averages.

²⁴ While it is conceptually correct to use the real risk-free rate in estimating the real cost of capital, for simplicity the real cost of capital is estimated using Fisher's equation. The real cost of capital is calculated using the following formula:

$$k_r = \frac{(1+k_n)}{(1+\pi)} - 1$$

where k_r is the real cost of capital, k_n is the nominal cost of capital and π is the rate of inflation.

Table 2.3 Estimates of the cost of capital (%)

	1995–2009	1998–2009	2005–2009
Pre-tax, nominal (average over the period)	13.2 (11.4–15.0)	13.1 (11.3–14.9)	12.4 (10.7–14.1)
Pre-tax, nominal (beginning of the period)	17.1 (16.0–18.1)	14.0 (13.0–14.9)	12.9 (11.2–14.7)
Pre-tax, real (average over the period)	9.9 (8.1–11.6)	9.7 (8.0–11.4)	8.5 (6.9–10.2)

Note: The ranges for the WACC are driven by ranges for the equity beta, gearing and the equity risk premium. Source: Datastream, OECD, Competition Commission (2008), ‘Stansted Airport Ltd - Q5 price control review’, October, pp. 1–130, and Oxera calculations.

The estimates exhibit a downward trend between 1995 and 2009, primarily driven by the fall in the nominal risk-free rate. This downward trend drives a difference between the pre-tax nominal cost of capital estimated at the beginning of the period and the average over the period.

2.3 Estimates of the profitability gap

This section compares economic rates of return with the benchmark cost of capital and presents estimates of the profitability gap for Sky’s pay-TV operating activities. Robust estimation of the profitability gap requires the following two issues to be taken into account appropriately:

- the time period for estimating the cost of capital and comparing it with returns;
- the treatment of tax.

2.3.1 Time period for estimating the cost of capital and comparing it with returns

In analysing profitability, it is appropriate to compare returns with the cost of capital at the time when the investment decision was made (ie, with the ex ante cost of capital). The use of the ex ante cost of capital appropriately reflects the opportunity costs faced by investors when they were committing capital to the investment. Therefore, when assessing the profitability of individual investments, it is appropriate to compare the IRR with the cost of capital at the beginning of the IRR period—ie, when the investment is assumed to have been made.

When applying this principle to profitability analysis at the company level (as opposed to individual investments), it is necessary to recognise that the IRR for a company represents an average of the IRRs of individual investments made at different points in time. Therefore, when assessing profitability at the company level, it is not appropriate to use a single cost of capital at the beginning of the IRR period because changes in the cost of capital over the IRR period would need to be reflected in the benchmark. Put differently, the comparison should be made between the IRR and the cost of capital at the time when the capital was committed to investments, over different investment cycles.

In Sky’s case, it is particularly important to ensure that this comparison is accurate. Significant reductions in the cost of capital observed since flotation in 1995 and Sky’s continual investments²⁵ mean that, in this case, the profitability gap could be significantly underestimated if a single cost of capital at the beginning of the IRR period is used.

An appropriate benchmark, which would reflect changes in the cost of capital over time, could be estimated using analysis of the NPV. This would involve estimating the NPV of cash flows using appropriate (different) costs of capital for each year as discount rates and then

²⁵ Its asset value on a DRC basis grew by approximately 600% between 1995 and 2009 or from £ [x] billion to £ [x] billion.

deriving a single discount rate, which would yield the same total NPV. This single discount rate could be used as a benchmark for the IRR. Alternatively, a simple average WACC over the IRR period (ie, which does not take into account the NPV effects) could be used as an approximation.

In this report, an approximation is used based on the average WACC weighted by the annual value of investments. This is also cross-checked for consistency using the NPV analysis (ie, by estimating a single discount rate that will give the same NPV as annual costs of capital). Therefore, the profitability gap of Sky is estimated as the difference between the IRR and the WACC over the IRR period. The profitability gap based on the IRR at the beginning of the IRR period, which would not take into account changes in the cost of capital over time, is reported as a sensitivity check.

2.3.2 The treatment of tax

The second issue to be considered is whether the profitability gap should be estimated on a pre- or post-tax basis.

In general, estimates of economic profitability should not depend on whether the analysis is conducted on a pre- or post-tax basis, provided that tax assumptions in the cost of capital are consistent with the company's actual tax position. If a company is paying on average a statutory tax rate on its profits then a statutory tax rate should be assumed when estimating the tax wedge in the pre-tax cost of capital. If, however, it is paying on average less than a statutory tax rate (eg, due to tax losses) then a lower effective tax rate should be assumed, implying a lower pre-tax cost of capital and a higher profitability gap.

Sky was making accounting losses before flotation; it may also be reasonably expected that Sky was not paying the full statutory tax rate for a number of years after 1995 due to carried-forward tax losses. Thus, for a number of years during the IRR period, Sky's effective tax rate will have been lower than the statutory tax rate, in which case if returns and the cost of capital are compared on a pre-tax basis, an effective tax rate would need to be used when estimating the pre-tax cost of capital. If a (higher) statutory tax rate were used, the cost of capital would be overestimated and the profitability gap underestimated. This is because the benchmark would assume that Sky paid more taxes than it actually did. Alternatively, instead of estimating the effective tax rate, returns and the cost of capital could be compared on a post-tax basis.

In order to simplify the analysis and retain the overall conservative nature of the report, the profitability gap is estimated using the pre-tax cost of capital at the statutory tax rate. Given that this approach may underestimate the 'true' profitability gap, a sensitivity check is also considered where the IRRs are compared with the cost of capital on a post-tax basis.²⁶

2.3.3 Profitability gap in the case of Sky

Figure 2.1 below shows how the IRR, cost of capital and profitability gap evolved over the period from 1995 to 2009.

- **Estimates of the IRR.** For every year Figure 2.1 shows the pre-tax IRR for the period from that year to 2009. For example, the IRR in 2001 corresponds to the IRR measured over the period from 2001 to 2009 and the IRR in 2005 corresponds to the IRR measured over the period from 2005 to 2009. The IRR is reported on a nominal, pre-tax basis. The shortest time period considered for the analysis of the IRR is the last five years (ie, from 2005 to 2009); hence, Figure 2.1 does not show the IRR estimates after 2005.

²⁶ This involves estimating the IRR of post-tax cash flows (ie, pre-tax cash flows less taxes) and comparing with the post-tax cost of capital, estimated as the weighted average of the post-tax cost of equity and pre-tax cost of debt (also known as the 'vanilla' cost of capital).

- **Estimates of the cost of capital.** Figure 2.1 shows two scenarios for the cost of capital. For every year the first scenario (the dark purple line) shows an annual cost of capital estimated using the information available as at that year. For example, under this scenario the cost of capital in 2001 represents an estimate of Sky’s cost of capital in 2001.
- For every year, the second scenario (the dark brown line) shows an average of the annual costs of capital over the corresponding IRR period (ie, from that year until 2009), weighted by the amount of investments in every year. For example, under this scenario the cost of capital shown for 2001 corresponds to the average of the annual costs of capital over the period from 2001 to 2009, appropriately weighted. This scenario attributes significant weight to estimates of the cost of capital in 1999 and from 2004–09, and hence is lower than the first scenario for the majority of the years displayed in Figure 2.1. The cost of capital is reported on a nominal, pre-tax basis.
- **Estimates of the profitability gap.** For every year, the profitability gap is estimated as the difference between the IRR from that year until 2009 and the average WACC over the corresponding period.

Figure 2.1 Evolution of the IRR (measured for time periods ending in 2009) and cost of capital (pre-tax, nominal, %)

[✂]

Note: The estimates of the IRR correspond to time periods beginning in various years and ending in 2009. The average annual WACC is calculated by taking an average of the cost of capital estimates in each year, weighted by the capital expenditure made in the same year. The horizon over which the average WACC is estimated reduces over time, and is consistent with the period over which the relevant IRR is estimated.

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

Overall, the profitability gap, as shown in Figure 2.1, ranges from 5% [✂] to 15% [✂], with an average of around 9%.

Table 2.4 presents estimates of the profitability gap based on the IRR (DRC values of assets) and the nominal cost of capital.

- **Base case:** this scenario estimates the profitability gap as the difference between the IRR and average cost of capital over the IRR period, weighted by the amount of investment in each year. Both the IRR and the cost of capital are expressed on a pre-tax, nominal basis;
- **Sensitivity check:** this considers the impact of using a single cost of capital at the beginning of the period when the IRR is calculated as opposed to using an average over the period. Therefore, the profitability gap is estimated here as the difference between the IRR and the cost of capital observed at the beginning of the IRR period.

The range for the profitability gap is constructed by using ranges around the estimates of returns (driven by two approaches for estimating the replacement costs of assets) and the cost of capital (driven by the equity beta, gearing and ERP).

Table 2.4 Estimates of the profitability gap (based on IRR, %)

	1995–2009	1998–2009	2005–2009
Base case (pre-tax, nominal, based on IRR and average WACC over IRR period; statutory tax rate built into pre-tax WACC)	[✂]	[✂]	[✂]
Sensitivity check (based on the WACC at the beginning of the IRR period; the other parameters are as in the base case)	[✂]	[✂]	[✂]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The analysis shows that, for the period from 1995 to 2009, the profitability gap is around [X]%, decreasing to around [X]% in the period from 1998 to 2009, and subsequently increasing to around [X]% over the period covering the last five years. (In the table above, the profitability gap in the base case ranges from 8% to 15%). The relatively low profitability gap observed over the 1998–2009 period is driven by significant investments incurred by Sky over this period in the transition to digital television and the acquisition of customers. Hence, the returns over this period capture the investments, but do not capture future cash flows in full.

The analysis also shows that if the WACC is estimated at the beginning of the time period, this leads to a lower profitability gap because the WACC was decreasing over time. The profitability gap is around [X]% in the period from 1995 to 2009, around [X]% in the 1998–2009 period, and approximately [X]% in the period from 2005 to 2009. (In the table above, the profitability gap in the sensitivity check scenario ranges from 7% to 11%).

In order to cross-check the results based on the IRR, the report also considers the profitability gap based on the ROCE. Table 2.5 presents estimates of the gap between the ROCE (DRC: annual revaluation) and the real pre-tax WACC.

It is appropriate to use the real cost of capital as a benchmark because the ROCE based on DRC provides an estimate of *real* returns, as the inflation component is captured in the asset value and replacement cost depreciation.

Table 2.5 Estimates of the profitability gap (based on ROCE, %)

	1995–2009	1998–2009	2005–2009
ROCE (pre-tax, real, ROCE based on DRC–annual revaluation and average real pre-tax WACC over the period)	[X]	[X]	[X]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The profitability gap based on the ROCE for the period from 1995 to 2009 is around [X]%; for the period from 1998 to 2009 it is approximately [X]%; and over the 2005–09 period it is around [X]%. Although the estimates based on the ROCE support the IRR, more weight should be placed on the IRR because it is a more conceptually appropriate measure of economic rates of return.

The estimates of the profitability gap reported above are based on the pre-tax WACC estimated at the statutory tax rate. The pre-tax approach based on statutory tax rates is likely to underestimate the ‘true’ profitability gap because it would be reasonable to expect Sky’s effective tax rate to be below the statutory tax rate for at least several years of the IRR period. Therefore, as a sensitivity check on the pre-tax results, the profitability gap was also estimated on a post-tax basis using an estimate of actual taxes paid.

Table 2.6 shows the estimates of the post-tax IRR and post-tax WACC. In order to estimate the post-tax IRR, the amount of tax paid by Sky each year was subtracted from Sky’s pre-tax cash flows. The post-tax WACC was estimated as the average of the pre-tax cost of debt and post-tax cost of equity (also known as the ‘vanilla’ WACC).²⁷

²⁷ The vanilla WACC represents an appropriate benchmark for IRRs calculated using pre-tax cash flows less actual taxes paid.

Table 2.6 Sensitivity check: post-tax estimates of the profitability gap (nominal, based on IRR, %)

	1995–2009	1998–2009	2005–2009
IRR (DRC: year of investment)	[X]	[X]	[X]
IRR (DRC: annual revaluation)	[X]	[X]	[X]
WACC (post-tax, nominal, average over the period when IRR is estimated)	9.5 (8.2–10.8)	9.4 (8.2–10.7)	9.0 (7.8–10.2)
Profitability gap	[X]	[X]	[X]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

As shown in Table 2.6, the post-tax profitability gap is higher than the pre-tax profitability gap because Sky’s effective tax rates over the IRR period were lower than the statutory tax rates. The extent of the underestimate of the profitability gap based on the pre-tax analysis ranges from around 2% over the period from 1995 to 2009 to 0.5% over the last five years. This is consistent with the evolution of Sky’s tax position, because Sky was paying lower tax rates in the earlier years due to historic losses.

2.4 Potential interpretation of results

The analysis suggests that Sky’s returns over recent years have been significantly higher than the ex ante cost of capital. Similar results are observed over the longer term: historical returns measured from 1995—the year when Sky was floated—also appear to have been significantly higher than the cost of capital.

As discussed above, in competitive markets, characterised by free entry and exit, companies are expected to make profits in the long run that are broadly in line with the minimum return required by investors (ie, the cost of capital). Profits above the cost of capital would encourage entry by new competitors, and profits below it would induce exit. Hence, returns that are persistently and significantly above the cost of capital are an indication of barriers to entry.

In response to Ofcom’s third consultation, Sky raised a number of concerns with the interpretation of the evidence on returns. First, Sky’s advisers raised some methodological issues with Oxera’s estimates of returns. Second, Sky seems to argue that in this case any potential gap between the returns and cost of capital does not indicate that there are distortions to the competitive process, but rather that it is the result of successful risk-taking and innovation.

2.4.1 Comments by Sky’s advisers on the measurement of returns

Sky’s advisers (namely Professor Grout) make a number of points about Oxera’s estimates of returns. First, Professor Grout argues that Oxera’s estimates of the IRR may be biased because the asset value is incorrectly estimated.

The general point is that, even if one makes the unrealistic assumption that the market is perfectly competitive and puts to one side the problem of valuing assets that are clearly identified, it should not be surprising to find that the equilibrium required rate of return on physical and financial assets will be persistently above the CAPM derived cost of capital. Obviously this will be more important in some businesses than others. In dynamic markets where there is changing technology and innovation the problem of ‘hidden assets’ is likely to be significant.²⁸

²⁸ Grout, P.A. (2009), ‘A Report on Profitability’, September, p. 2.

Second, he suggests that, due to the way in which the IRR is calculated, it can be used only to assess whether returns exceed the cost of capital, but not to ascertain the extent to which this is the case. Therefore, estimates of the IRR cannot be used to assess whether returns **persistently** and **significantly** exceeded the cost of capital.

The central point is that these results [the NPV/IRR analysis] relate only to whether the IRR or truncated IRR is above the cost of capital. In particular, they do not relate to the extent to which the IRR is above the cost of capital. But, as indicated above, it is this latter relationship that is central to competition policy. Knowing how far the IRR is above the cost of capital is necessary if profitability data is to help decision making.²⁹

Third, presenting evidence on Sky's total shareholder return (TSR) and accounting returns in competition policy analysis, Professor Grout argues that the view that Sky's profitability was high is not supported.

In relation to TSR, his analysis shows that the performance of Sky's share price was not out of line with certain benchmarks.

Overall, the evidence from this detailed analysis of the distribution of returns of companies shows that an extremely significant uplift in the existing stock market returns to Sky shareholders would not have produced a return that looks particularly high relative to other companies in the market. So approaching Sky's profitability through this stock market evidence does not support a case that Sky is abnormally profitable.³⁰

In relation to accounting returns, Professor Grout argues that accounting ROCEs in past market investigations where firms were not found to behave against the public interest were higher than the accounting ROCEs estimated for Sky. He concludes that this evidence is relevant in this case, and does not support the view that Sky's profitability is high.³¹

2.4.2 Drivers of the profitability gap

Sky seems to argue that in this case it is not appropriate to interpret the evidence that returns exceed the cost of capital as an indication of distortions to the competitive process because there are other factors that explain the profitability gap.

Contrary to Ofcom's simplistic analysis, returns in excess of cost of capital are normally regarded as a weak and imperfect indicator of whether competition is effective, due to the fact that such a gap can be caused by a range of factors other than the exercise of market power. It is only possible to conclude that such excess returns are attributable to weak competition if other potential causes of them can be safely ruled out, which is rarely the case – and is certainly not the case in relation to Sky's business.³²

Sky suggests that the main factor that explains the gap between returns and the cost of capital is Sky's continual successful innovation. Specifically, it states:

Sky has a strong and consistent track record of being an innovator, and in particular a first mover – identifying opportunities, undertaking large-scale, risky investments to take advantage of such opportunities, and executing well.³³

In such a context, a finding that Sky has, in the past, earned an aggregate rate of return that exceeds its estimated cost of capital should be entirely unsurprising.³⁴

²⁹ Ibid., p. 8.

³⁰ Ibid., p. 28.

³¹ Ibid., p. 33.

³² Sky (2009), op. cit., p. 61, para 4.55.

³³ Ibid., p. 63, para 4.60.

³⁴ Ibid., p. 64, para 4.61.

Sky's argument, therefore, seems to be that it is not unreasonable to expect returns to exceed the cost of capital due to Sky's continual innovation delivering high (and higher than expected) ex post returns.

2.5 Summary and objectives of this report

In summary, Oxera's analysis suggests that Sky's historical returns have been persistently and significantly above the cost of capital. According to economic theory and CC precedent, this evidence could be interpreted as being prima facie evidence consistent with the existence of barriers to entry in the UK pay-TV market.

Sky's advisers suggest that there is no evidence of Sky earning high returns. Specifically, Professor Grout argues that the evidence on TSR and accounting returns in past market investigations is both relevant and does not support a conclusion that there is a distortion to the competitive process. He also argues that Oxera's estimates of returns may be biased due to issues with asset valuation and the IRR as a measure of profitability.

Sky appears to acknowledge that it is reasonable to expect that it has been earning returns in excess of the cost of capital if this profitability gap is a consequence of Sky's successful innovation and risk-taking, as opposed to a distortion to the competitive process.

This report considers these comments from Sky and its advisers. Section 3 reviews the relevance and robustness of Professor Grout's evidence on TSR and accounting returns, as well as its potential interpretation. Section 4 considers Professor Grout's points on the robustness of Oxera's estimates of returns. Section 5 looks at the potential impact of successful innovation on the estimates and interpretation of returns in the recent years.

3 Evidence on total shareholder returns in the economic analysis of profitability in competition policy

Sky commissioned Professor Grout to review Oxera's estimates of Sky's economic profitability. Professor Grout seems to argue that TSR provides a more meaningful measure of Sky's economic profitability for the purpose of competition policy analysis than the IRR, and that TSR does not provide evidence suggesting that Sky's historical returns have been high.

This section demonstrates that, in the context of analysing economic rates of return in competition policy analysis, evidence from total shareholder returns does not provide a meaningful measure of returns. While competition policy analysis seeks to understand the relationship between prices and costs, the TSR captures the relationship between prices and expectations. Thus, if stock prices at any point in time capture expectations of economic rents, the expected return on the share price will be the cost of capital, yet the firm may well continue to earn rents.

This section also shows that, from the practical perspective, TSR provides a significantly less reliable estimate of Sky's returns on its UK pay-TV operations than the IRR because TSR is less robust to the underlying assumptions.

For these two reasons, the use of IRRs, as in Oxera's analysis, is the only economically meaningful approach that could be applied with a sufficient degree of robustness towards estimating the profitability of Sky's UK pay-TV operations in the context of competition policy analysis.

3.1 Reconciliation between total shareholder returns and the IRR

The main reason why the IRR is higher than TSR in this case is because the value of assets used in the TSR analysis significantly exceeds the value of assets in the IRR analysis. The value of assets acts as a 'denominator' in the analysis of returns, with which cash flows are compared. Thus, for the same level of cash flows, the higher the value of assets, the lower the returns.

This 'mechanical' reason why the IRR is higher than TSR reflects the difference in what these two measures seek to capture from the economic perspective. TSR estimates returns to shareholders, and therefore the asset value used in calculating TSR reflects the market value of assets, which reflects the NPV of present and future investments. The IRR estimates returns relative to the costs incurred by Sky in creating the asset value (measured as the DRC).

The market value used in the TSR calculation is a function of expected future cash flows discounted at the cost of capital.³⁵ Measurement of returns based on market value (whether by the IRR or TSR) is therefore circular, to the extent that if actual cash flows equal expectations, the measured IRR will equal the cost of capital (notwithstanding that cash flows may include significant rents). IRR based on the replacement cost of assets does not suffer from this circularity. In practice, this explains why regulators and competition authorities do not use market values and TSR as the basis for analysing the economic profitability of activities.

³⁵ This section uses the term 'market value' to reflect the valuation approach (ie, cost-based value versus cash flow-based value) rather than to draw a distinction between market value (of equity) and enterprise value (of assets).

The difference between the market value and DRC value of Sky's assets is, therefore, the main reason why TSR is significantly lower than the IRR.

To illustrate this difference, Figure 3.1 compares the DRC and market value of Sky's assets, and shows that, in each year, the market value has significantly exceeded the replacement cost value. In 1995, the starting year for the analysis of returns, the market value was approximately six times the replacement cost of the opening asset value. In light of this, it is not surprising that TSR (the return relative to the market value of assets) is significantly lower than IRR (the return relative to the replacement cost value of assets).

Figure 3.1 The value of Sky's assets under different valuation approaches (£m)

[✂]

Source: Sky's annual reports, Sky's responses to Ofcom's questionnaires (including, where relevant, additional specific data from Ofcom), and Oxera's analysis.

It is plausible for the IRR relative to the replacement cost value of assets to be over-estimated in comparison to the actual IRR if there is measurement error in the valuation of assets. Section 4.1 considers the potential for measurement error to explain the profitability gap and shows that there seems to be no robust evidence for this.

In fact, the difference between the market and replacement cost value of assets can be understood by reference to the economic characteristics of Sky's investments. For example, the costs to Sky of acquiring additional subscribers are significantly lower than the value of additional cash flows generated by these subscribers over their lifetime. This illustrates the economic reason why the market value of assets (which reflects the value of expected future cash flows) significantly exceeds the replacement cost value of assets (which reflects the costs incurred by Sky in acquiring assets). The difference between the costs of creating assets and the value that these assets generate for the business is entirely consistent with economic profitability being high.

The economic rationale for the observed difference between the market value of Sky's assets at flotation and the costs incurred by Sky to create these assets can be illustrated using a simple model of incremental per-subscriber lifetime cash flows. The model considers the additional costs of acquiring a new subscriber and the additional cash flows over the assumed subscriber's lifetime.

Table 3.1 shows the key assumptions underpinning the model. The model is calibrated on the observed data for three years (1994, 1995 and 1996) to test the sensitivity of results to assumptions.

Table 3.1 Assumptions for the illustrative incremental lifetime per-subscriber cash-flow model

Total for Sky (£m)	1994	1995	1996	Per subscriber (£)	1994	1995	1996
Cash flows					Additional cash flows		
Revenue	550	778	1,008	Revenue	217	269	310
Marketing (SAC)	37	59	76	OPEX (excluding SAC)	135	119	190
Other OPEX (excluding SAC ¹)	343	474	617	Additional investments			
Subscribers				SAC	40	87	109
As at year end ('000)	2,541	2,893	3,247	Additional annual cash flow (£)	81	150	121
Gross subscriber additions ('000)	922	675	701	Pre-tax, nominal WACC (%)	17.1	17.1	17.3

Note: ¹ Subscriber acquisition costs.

Source: BSkyB share prospectus; Sky annual reports; Oxera analysis.

Using the data in Table 3.1, the incremental per-subscriber lifetime cash flows are modelled as Sky's profits in each year (exclusive of marketing costs) divided by the number of subscribers. As the subscriber is assumed to remain with Sky for seven years,³⁶ cash flows are modelled over a seven-year period. The upfront investment is estimated as the subscriber acquisition costs (SAC).³⁷ The resulting estimate of annual cash flows per subscriber is approximately £81 and the one-off upfront investment £40, based on data for 1994. Table 3.2 shows the estimates of incremental lifetime per-subscriber cash flows; Table 3.3 shows the corresponding per-subscriber estimates of profitability.

While the estimates may not be precise due to the high-level nature of the analysis, they could reasonably be expected to reflect the scale of upfront investments in new customers relative to additional annual cash flows from new customers.

³⁶ The seven-year horizon is consistent with the estimates of the expected lifetime of subscribers, given the observed churn rates. See Oxera (2009), section 3.4.1.

³⁷ This was estimated as the ratio of marketing costs to net subscriber additions in each year.

Table 3.2 Illustrative incremental per-subscriber lifetime cash-flow model (£)

	Year 0 (Investment)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Cash flows (1994)								
Annual cash flows		81	81	81	81	81	81	81
Upfront investment	-40							
Net cash flow	-40	81	81	81	81	81	81	81
Cash flows (1995)								
Annual cash flows		150	150	150	150	150	150	150
Upfront investment	-87							
Net cash flow	-87	150	150	150	150	150	150	150
Cash flows (1996)								
Annual cash flows		121	121	121	121	121	121	121
Upfront investment	-109							
Net cash flow	-109	121	121	121	121	121	121	121

Source: BSkyB share prospectus; Sky annual reports; Oxera analysis.

Table 3.3 Illustrative incremental per-subscriber profitability metrics

	1994	1995	1996
Subscriber valuation			
Present value of operating cash flows (£) (implied market value of a customer)	319	587	469
Upfront investment (£) (implied DRC value of a customer)	40	87	109
Ratio of present value of cash flows to acquisition costs (implied Tobin's Q for an additional subscriber)	8.0	6.8	4.3
Profitability			
Payback period (years)	<1	<1	<1
NPV @ WACC (£)	279	500	360
IRR (%)	203%	173%	110%
WACC (%)	17.1%	17.1%	17.3%

Note: Tobin's Q measures the ratio of the market value to the cost of assets; in this case, the present value of cash flows divided by the investment.

Source: BSkyB share prospectus; Sky annual reports; and Oxera analysis.

The model shows that the present value of reasonable expectations of incremental lifetime per-subscriber cash flows significantly exceeded the acquisition costs of subscribers.³⁸ This means that the implied Q ratio (ie, the ratio of the market value to the replacement cost of assets) of additional subscribers is orders of magnitude higher than 1 and is consistent with high profitability of investing in additional subscribers. The model calibrated in different years produces a per-subscriber Q ratio in the range from 4 to 8 and lifetime IRR from 110% to 203%.

³⁸ Given that the model is structured on an incremental basis (ie, only additional cash flows from new subscribers are considered), it is not possible to reconcile it back directly to the aggregate numbers. For example, it is not possible to derive asset values for pay-TV activities in aggregate by simply scaling the per-subscriber asset values by total subscriber numbers. This is because the model excludes other assets that existed at the time of flotation, and does not incorporate any assumptions about growth in total subscriber numbers.

The high Q ratio of incremental investments in subscribers provides the economic rationale as to why Sky's observed Q ratio at flotation was significantly in excess of one. It is reasonable to expect that the market valuation at flotation incorporated this significant expected difference between the lifetime cash flows of subscribers and their acquisition costs. This pattern of high cash flows relative to costs has persisted throughout the period to 2009 and has been reflected in analysts' forecasts as expectations have been updated over time.³⁹ This is consistent with the persistently high Q ratio observed throughout the period displayed in Figure 3.1.

The estimates of expected profitability of incremental investments in subscribers reported in Table 3.3 may be conservative because the model assumes that cash flows remain stable over the lifetime of subscribers. In practice, per-subscriber cash flows for existing subscribers may be expected to increase over time because of growth in the ARPU (average revenue per subscriber) and reduction in costs, primarily driven by lower content costs per subscriber (because the number of subscribers grows faster than the content costs). The expected lifetime of subscribers at flotation may also have been higher than seven years.

Although the model could be seen as crude and is used here to illustrate the inappropriateness of using TSR and valuations as the basis for valuing assets in a profitability analysis as opposed to deriving robust estimates of cash flows, its results are not out of line with modelling conducted by equity analysts. For example, in 2005, UBS estimated that the lifetime returns to additional subscribers were approximately 200%, with a payback period of 18 months.⁴⁰

Overall, the high Tobin's Q for Sky at flotation and in subsequent years throughout the period to 2009 is the underlying reason why the measures of TSR are lower than the measures of IRR presented in Table 3.4.

Table 3.4 TSR and IRR (%)

Measure	1995–2009	1998–2009	2005–2009
TSR (post-tax, nominal, return on equity, annualised)	5.1	1.9	–0.9
IRR (DRC: year of investment; pre-tax, nominal, return on assets)	∞	∞	∞
IRR (DRC: annual revaluation; pre-tax, nominal, return on assets)	∞	∞	∞

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

3.2 Why is TSR not meaningful in competition policy analysis?

As TSR is the return on market value, it captures performance relative to expectations underpinning the market value. As a result, the assumption that Sky would continue generating high returns after flotation (as was demonstrated in the previous sub-section) would automatically imply that TSR would not be expected to be high (as high expectations would already be captured in the market value of assets). Professor Grout's assertion that if Sky was earning excessive returns, this would be expected to be reflected in the TSR, would

³⁹ As shown in section 5.4, where the expected IRR is estimated based on analysts' forecasts.

⁴⁰ UBS (2005), 'Investment research – B SkyB: Focus on consumer', August 17th. It should be noted that the estimates of the lifetime per-subscriber IRR are significantly higher than the aggregate profitability, as captured by the IRR for Sky's pay-TV activities. For example, the lifetime per-subscriber IRR around the time of flotation is around 112%, while the pre-tax IRR for the period 1995–2009 under the base-case scenario is approximately ∞%. The main driver of this difference is the assumptions about the investment programme. The model of the expected per-subscriber IRR at flotation assumes a single investment at the start of the period, followed by net cash inflows over the entire lifetime of the subscription. In contrast, the IRR estimated for Sky's pay-TV activities is based on Sky's actual investment programme, which has seen consistent cash outflows on subscriber acquisition over the estimation periods. Relative to the per-subscriber lifetime model, the IRR for pay-TV activities is truncated because, although it includes the full value of acquisition costs associated with the subscriber base in 2009, it does not capture all the value of the net cash flows expected over the remaining lifetime of the subscribers.

therefore be correct only if there was no expectation that Sky would continue to generate high returns after flotation.

The evidence that TSR is low is, therefore, entirely consistent with the evidence that Sky's operating cash flow performance over the last ten years seems to have been in line with or below market expectations as reflected in equity analysts' reports. (This evidence is presented in section 5.4.)

Overall, low TSR could only be interpreted as evidence that Sky's actual performance has been lower than market expectations. In competition policy analysis, however, the relevant question is not how Sky's actual cash flows compare with market expectations, but how actual cash flows compare with costs incurred to acquire assets that generate these cash flows.

The analysis of economic profitability in competition policy analysis seeks to provide an indication of how Sky's outturn prices relate to costs incurred in acquiring assets and running the business. The TSR, however, does not provide any indication of the relationship between prices and costs, and hence is not a meaningful measure of returns in this case, given the objectives of profitability analysis in competition policy.

Conceptual flaws of the TSR as a measure of returns in competition policy are widely acknowledged. For example, there was significant discussion of the relevance of the TSR evidence in the context of the Cruickshank report into competition in UK banking, where Barclays and Lloyds highlighted its conceptual flaws. Specifically, Barclays stated:

Barclays believed that total returns to shareholders (TSRs) were an inappropriate measure of returns for competition policy purposes. TSRs incorporated investor sentiment as well as the underlying change in economic performance from investors' expectations. TSRs did not measure profits, and could not measure excess profits reliably, only a change in expectations about future profits. For example, if a business was expected by investors to make excess profits both at the beginning and the end of any measurement period, then TSRs would not show excess returns over the period. TSRs would show that Amazon.com and many other high-technology companies that had yet to make a profit were in fact excessively profitable.⁴¹

Similar concerns were raised by Lloyds in its submission to the CC:

Lloyds TSB told us that it had severe reservations about the use of share price data to make inferences about market power. Lloyds TSB did not believe that such an approach could be supported conceptually.

If a firm had market power and investors were aware of this, its share price would be higher to reflect the higher expected value of future earnings. The actual TSRs received, therefore, would appear to be at a normal level since they would be calculated against this high share price. Therefore, market power would only influence TSRs if the company earned profits from the exercise of market power which were not expected at the beginning of the period in question, or if investors' perceptions of the extent of market power changed (whether or not there was, in fact, a change in the firm's market power). Hence, TSRs should be of extremely limited interest to competition authorities in assessing whether a firm or firms enjoyed market power—they could provide evidence only of a change in market power (or of a change in perceptions of market power), not of its existence.⁴²

In light of conceptual flaws with the measure, the CC did not put weight on this measure, for example, when referring to the Cruickshank report:

⁴¹ Competition Commission (2002), 'The supply of banking services by clearing banks to small and medium-sized enterprises: A report on the supply of banking services by clearing banks to small and medium-sized enterprises within the UK', Volume 1 summary and conclusions, March.

⁴² Ibid.

In fact, the Cruickshank report calculated that total returns to banks' shareholders including the gains from increases in share prices over the 12 years to 1999 were excessive, but the banks objected that this measurement method is very sensitive to the time period adopted and, in any event, reflected changes in expectations between the start and end dates. We have not, as a result, used this approach to identify profitability but, by the same token, do not regard it as the correct way to seek to identify the value of intangibles.⁴³

In cases where the market value significantly exceeds the replacement costs of assets, the only meaningful approach to profitability is to estimate returns using the DRC value of assets.⁴⁴ Returns on replacement cost assess performance relative to the costs of creating assets, rather than the expected value of future net cash flows to these assets, and hence would provide an indication of how prices relate to costs.

Therefore, in this case, the IRR based on the DRC of assets, and cross-checked by ROCE and NPV, appears to be the only economically meaningful approach to profitability analysis. The evidence that TSRs are low does not appear relevant for assessing returns in competition policy in this case, and hence does not invalidate the conclusions based on the IRR. Instead, it confirms that, at flotation, the market valued the business at a much higher level than the replacement cost of its assets, including intangible assets.

3.3 Unreliability of the TSR as a measure of returns

In addition to the conceptual flaw of using market value rather than replacement costs as the basis for asset valuation in economic profitability analysis, practical limitations suggest that the TSR is not a robust measure of returns in this case either, for the following four reasons:

- sensitivity to the choice of the period;
- ability to reflect performance of UK pay-TV activities;
- the choice of benchmark; and
- survivorship bias.

3.3.1 Sensitivity to the choice of the period

TSR is not robust with respect to the measurement period. This sensitivity arises because TSR is based on the share prices at the start and end of the time period of interest and the dividends paid during this period. In the case of Sky, share price changes are main drivers of the TSR, as dividends have historically been relatively low.⁴⁵

Figure 3.2 indicates how the TSR measure of profitability could lead to inappropriate conclusions about the existence of market power. Measured from flotation to March 6th 2000, abnormal shareholder returns were 647%, whereas from March 6th 2000 to June 30th 2009 abnormal returns were minus 70% (ie, a loss).⁴⁶ If TSR had been used to measure profitability for a competition investigation in early 2000, it would seem likely that the impact of market expectations on share prices—and hence on the reliability of TSR as an indicator of market power—would have been clearly recognised.

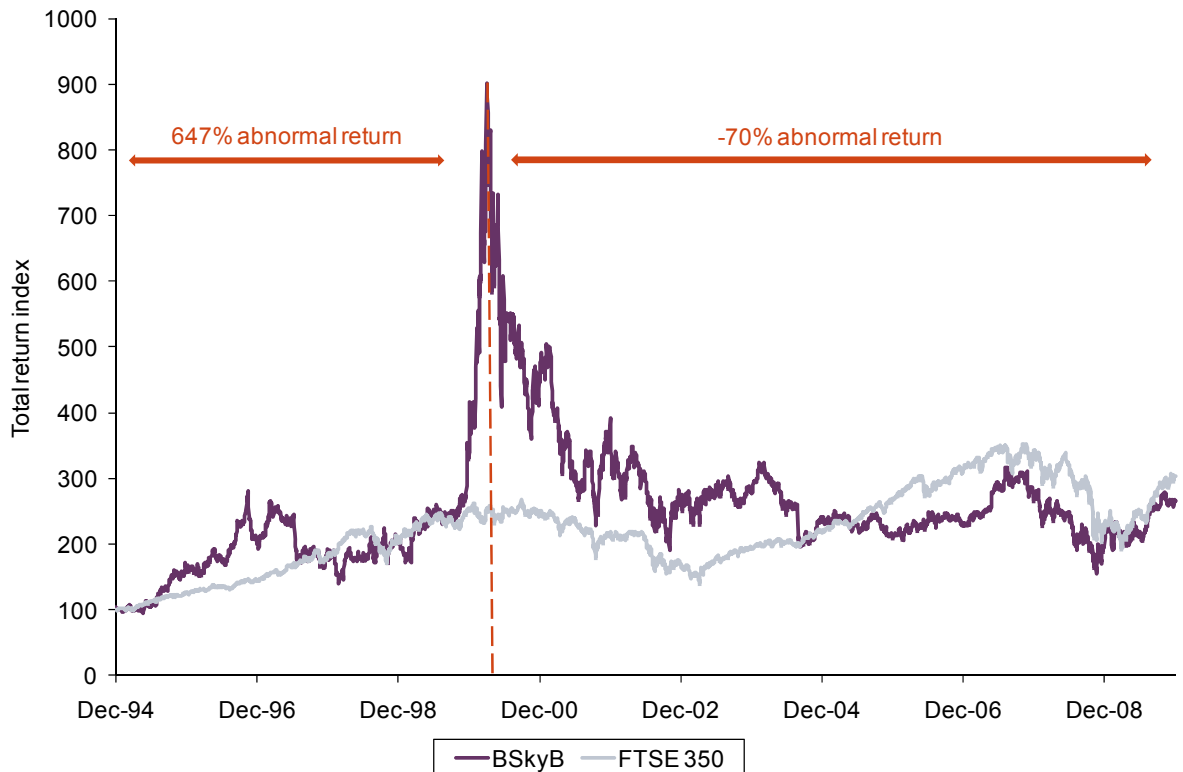
⁴³ Competition Commission (2002), 'The supply of banking services by clearing banks to small and medium-sized enterprises: A report on the supply of banking services by clearing banks to small and medium-sized enterprises within the UK', Volume 1 summary and conclusions, March.

⁴⁴ This is consistent with the value-to-the-owner principle, as defined by Edwards, Kay and Mayer (1987), op. cit. Application of this principle means that assets are valued at the lower of the replacement cost or the economic value. Economic value is the higher of the NPV of future cash flows or the net realisable value from selling the assets. Therefore, if the market value exceeds the replacement cost then it is appropriate to value assets at replacement cost.

⁴⁵ Over the period 1995–2009, the average dividend yield on Sky's shares was 1.2%; this compares with 3.2% for the FTSE 100 or FTSE All-share indices.

⁴⁶ Abnormal returns are measured as the difference between the TSR for Sky and the TSR for the FTSE 350.

Figure 3.2 BSkyB Group abnormal shareholder returns



Source: Datastream, and Oxera analysis.

Therefore, as TSR is mainly driven by market expectations of future cash flows at two points in time, the TSR measure is highly sensitive to changes in expectations (and the changes in expectations are quite volatile). In contrast, as the IRR takes into account the costs associated with the creation of assets, it is not affected by changes in expectations, and is therefore less sensitive to the choice of time period.

3.3.2 Ability to reflect performance of UK pay-TV activities

The TSR assesses the quoted entity's performance (ie, the performance of the Group); however, in this case, the analysis focuses on Sky's UK pay-TV activities. The IRR, based on detailed cash-flow analysis, is able to proxy the profitability of relevant activities separately—and with a certain degree of accuracy—from that of other activities undertaken by the Group. Therefore, conclusions on profitability drawn from the IRR to UK pay-TV operations would not necessarily be expected to be the same as those based on TSR for the Group.

In the case of Sky, it is possible that the difference in the scope of activities covered by the IRR and TSR measures is significant. Sensitivity to the scope of activities is illustrated with reference to two specific investments not included in the IRR analysis, but which would be expected to have had a negative effect on shareholder value: acquisitions of stakes in Kirch Pay TV and ITV.⁴⁷

Table 3.5 shows Sky's TSR measured on a total returns index, where BSkyB's market value has been adjusted for changes in the fair value of these two investments during the measurement period. This adjustment suggests that Sky has outperformed in all time periods and against all benchmarks considered, once these two investments are excluded.

⁴⁷ On April 14th 2000, BSkyB Group acquired a 22% stake in Kirch Pay TV, a German media group, for £1,519.9m. On May 8th 2002, the carrying value of this investment was written down to zero in BSkyB's accounts. On November 17th 2006, BSkyB Group acquired a 17.9% stake in ITV plc, a UK television broadcaster, at a value of £946m. As at June 30th 2009, the fair value of this investment was written down to £235m in BSkyB's accounts.

Table 3.5 BSkyB Group's annual average total shareholder returns (%)

	1995–2009 ¹		1998–2009		2005–2009	
	TSR (Group)	TSR (adjusted for unsuccessful investments unrelated to UK pay-TV activities) ²	TSR (Group)	TSR (adjusted for unsuccessful investments unrelated to UK pay-TV activities)	TSR (Group)	TSR (adjusted for unsuccessful investments unrelated to UK pay-TV activities)
Sky	5.1	6.7	1.9	3.8%	–0.9%	1.3%
		TSR		TSR		TSR
FTSE 100		5.2		0.3		–0.9
FTSE 350		5.6		1.0		–0.4
FTSE All-share		5.5		1.0		–0.5
FTSE 350 Media		1.0		–2.8		–5.7
FTSE 350 FL Telecoms		1.0		–6.4		–9.5

Note: ¹Returns are measured from June 30th in the starting year to June 30th 2009 based on the total returns indices, inclusive of dividends. ²The adjustment estimates TSR excluding the effects of investments in Kirch Pay TV and ITV.

Source: Datastream, annual reports and Oxera analysis.

Given how sensitive the TSR is to the scope of activities, it is reasonable to conclude that the IRR is a more robust measure of the performance of Sky's UK pay-TV activities.

3.3.3 The choice of benchmark

The interpretation of the TSR depends on the choice of benchmark. This, for example, has been highlighted in one of Sky's annual reports, which does not identify a single benchmark, but rather compares shareholder returns to the FTSE 100, FTSE 350 Media, and NYSE TMT indices:⁴⁸

This graph shows the growth in the value of a hypothetical £100 holding in the Company's ordinary shares over five years, relative to three indices [*ie, the FTSE 350 Media index, the NYSE TMT index and FTSE 100*], which are considered to be the most relevant broad equity market indices for this purpose.⁴⁹

More generally, options for the benchmark include the following.

- **The cost of equity**—this benchmark would entail measuring actual returns relative to the ex ante returns required by shareholders in BSkyB Group. As Professor Grout restricted consideration of benchmarks to the actual returns on various equity market indices, the analysis of TSR relative to the cost of equity is not considered further in this report.
- **A risk-adjusted returns index**—this benchmark would measure returns relative to the actual returns on an equity index with similar systematic risk to BSkyB Group. As the equity beta for BSkyB Group relative to the FTSE 350 (and FTSE 100) is close to 1, unadjusted returns for this index could be used a reasonable proxy. Given that Sky's beta relative to the FTSE 250 is different from 1, a direct comparison between BSkyB's TSR and returns for this index does not appear meaningful.

⁴⁸ Sky Annual Report 2009, p. 63.

⁴⁹ *Ibid.*, p. 63; text in italics added.

- **The returns of comparator companies**—this benchmark would measure returns relative to the actual returns of companies in the same or similar sectors to BSKyB Group. In the case of BSKyB Group, relevant indices are the FTSE 350 Media and FTSE 350 Telecoms.

Table 3.5, which compared shareholder returns with the relevant risk-adjusted returns indices (the FTSE 100, FTSE 350, and FTSE All-share), shows that, on this basis, BSKyB Group has underperformed (if adjustments for unsuccessful investments are not introduced). However, relative to companies operating in the same or similar sectors (FTSE 350 Media and FTSE 350 Fixed-Line Telecoms), Sky has outperformed.

Overall, while the evidence on TSR suggests that the returns to shareholders in BSKyB Group have been lower than returns to shareholders in the FTSE 350 index, BSKyB Group's shareholders have received returns above those of shareholders in media and telecoms companies.

3.3.4 Survivorship bias

Another issue associated with benchmarking TSR is the potential for survivorship bias. Using a particular shareholder return index as the benchmark is likely to entail assessing profitability against a sample of companies that is changing over time. Of the 350 companies in the FTSE 350 index in 1996, only 128 were still in the FTSE 350 in 2009. Therefore, Professor Grout's analysis of TSR benchmarks BSKyB Group against a sample of surviving companies. The interpretation of TSR for BSKyB Group will depend on the extent to which the performance of surviving companies is different from that of the 350 companies in the FTSE 350 index in 1996.

3.4 Benchmarking accounting returns against peers

Shareholder returns are not the only alternative measure of profitability. In this context, it is also relevant to consider the evidence on accounting rates of return, an indicator which Professor Grout examines in his report. (This is further described in section 4 below.)

Table 3.6 considers the evidence on the profitability gap based on the difference between accounting ROCEs and the cost of capital.

Table 3.6 Difference between ROCE (book values of assets, total assets less current liabilities as capital employed) and WACC (nominal, pre-tax), 2004–08

		Sky (%)	Median for the index (%)	Average for the index (%)	Number of companies with profitability gap higher than Sky	Total number of companies in the index	Proportion of companies with profitability gap higher than Sky (%)
Overall market	FTSE 350		2.2	6.6	6	241	2.5
Media companies	FTSE 350 Media	32.2	3.7	4.1	0	11	0.0
Telecoms companies	FTSE 350 Telecoms		-5.3	2.6	0	5	0.0

Note: ROCE measured as EBIT divided by total assets less current liabilities, for all companies including Sky. Source: Bloomberg, Sky, Datastream, and Oxera calculations.

The analysis shows that the difference between Sky's accounting ROCEs and cost of capital (accounting profitability gap) has been higher than for 95% companies in the FTSE 350.

Repeating this analysis for the period 1995–2008 indicates that this performance has been persistent over time, as only one company had an average accounting profitability gap larger than Sky over this period.

The analysis presented in Table 3.6 calculates the accounting profitability gap with ROCE based on the book value of assets. However, as Sky has intangible assets that are not captured in book values, the ROCE based on book values is likely to overstate economic profitability. Although such potential biases would be expected to be averaged out in a large sample at least to a degree, it is possible that Sky has a systematically higher proportion of intangible assets than comparator companies. Therefore, it is useful to do a similar benchmarking analysis based on the DRC of Sky's assets.

Table 3.7 repeats the analysis of the accounting gap, but this time benchmarking the ROCE for Sky measured relative to the DRC of assets. As this measure of ROCE is based on earnings less depreciation on a DRC basis—and hence is adjusted for the effects of inflation—it is appropriate to benchmark Sky's ROCE against the real WACC.

Table 3.7 Difference between ROCE (DRC for Sky, book values for comparators, total assets less current liabilities as capital employed) and WACC (pre-tax real for Sky, pre-tax nominal for comparators), 2004–08

		Sky (%)	Median for the index (%)	Average for the index (%)	Number of companies with profitability gap higher than Sky	Total number of companies in the index	Proportion of companies with profitability gap higher than Sky (%)
Overall market	FTSE 350		2.2	6.5	50	241	20.7
Media companies	FTSE 350 Media	[X]	3.7	2.2	1	11	9.0
Telecoms companies	FTSE 350 Telecoms		-5.3	-1.5	0	5	0.0

Note: ROCE measured as EBIT divided by total assets less current liabilities, for all companies excluding Sky. For Sky, ROCEs are measured with total assets valued on a DRC basis, less investments in joint ventures, and the accounting gap is measured relative to the real WACC.

Source: Bloomberg, Sky, Datastream, and Oxera calculations.

Under this scenario, which attributes a large intangible asset value to Sky and no intangible asset values to all other FTSE 350 companies, the accounting profitability gap for Sky is still significantly higher than for a large proportion of the sample. Relative to the constituents of the FTSE 350, Sky is still in the top quintile, whereas relative to FTSE 350 Media and Telecoms companies, Sky is in the top decile. Of the 50 companies in the FTSE 350 identified as having a profitability gap higher than Sky in 2004–08, only 22 still have a higher profitability gap over the longer time period (1995–2008).

Overall, the accounting profitability gap for Sky is at, or near, the top of the distribution when benchmarked against a large sample of companies. This result is robust to alternative approaches to asset valuation, and is persistent over a long time horizon.

Benchmarking of the accounting profitability gap against a broad sample of comparators also addresses the two concerns expressed in Sky's response to Ofcom's third consultation and the accompanying reports by PwC about the benchmarking analysis presented in Oxera's first report:

- the choice of comparators;
- the use of accounting data to measure returns.⁵⁰

In response to the first concern, it is relevant to consider the approaches undertaken by competition authorities, and in particular the CC, when using benchmarking analysis to assess the competitive level of returns.

⁵⁰ Sky (2009), op. cit., paras 4.81–4.83.

In general, the CC seems to have set the threshold for a company to qualify as an appropriate benchmark at a lower level than the threshold requested in the PwC benchmarking report.⁵¹ For example, in its investigation into classified directory advertising services, the CC's benchmarking analysis involved comparison of Yell's returns against a large sample of more than 4,000 publicly listed companies, and against smaller sub-sets of companies derived on the basis of similarity in terms of selected quantitative risk metrics (eg, cost structure, revenue volatility, beta) as well as by excluding outlier companies (eg, companies with return on sales (ROS) higher than 100% or negative asset values).⁵² This approach is similar to that adopted in Oxera's first report.

The criticisms in the PwC report therefore appear to apply to the benchmarking approaches undertaken by the CC in past investigations, as well as the approach implemented by Oxera. As such, PwC's position appears to challenge the value of benchmarking in general as much as the particular approach adopted by Oxera.

The second concern, regarding the use of accounting data to measure returns, has been addressed by the analysis presented in this section, which benchmarks the accounting profitability gap. Consideration of the gap for Sky with ROCE measured on both a DRC and a book-value basis suggests that the profitability gap for Sky has been near the top end of the distribution for FTSE 350 companies.

Overall, the evidence from benchmarking analysis of the accounting profitability gap is consistent with the profitability gap based on the IRR and contradicts the results based on the TSR.

3.5 Accounting returns in competition investigations

Professor Grout's paper on profitability presents evidence on accounting ROCEs of companies investigated by the CC from 1970 up to 2000. This evidence is used to suggest that the ROCEs presented in Oxera's report do not meet the threshold for intervention as determined by CC precedent, and that there is no relationship between the level of the accounting ROCE and whether the CC found a distortion to the competitive process.

This evidence is not robust. First, Professor Grout has not distinguished between those cases where the CC did and did not place significant weight on ROCE estimates. A high ROCE based on historical cost asset values is not the only indicator that a company may be operating against the public interest. Therefore a strong relationship between the level of ROCE and the conclusions of the CC with respect to profitability would not be expected.

Second, accounting ROCEs are influenced by a range of factors unrelated to the underlying level of economic returns—most importantly, accounting standards and the level of systematic risk. Professor Grout does not seem to have made an attempt to control for these factors.

Third, Professor Grout does not consider whether the approach to estimating the ROCE in the CC analysis is consistent with the ROCEs calculated for Sky and presented in Oxera's first report. As there are a number of different ways to define capital employed, in order to maintain consistency with the overall conservative nature of the report, the ROCE reported in Oxera's first report measures returns relative to total assets.⁵³ However, an alternative definition of capital employed is total assets net of current liabilities. As current liabilities represent a substantial share of total liabilities on Sky's balance sheet, Sky's ROCE would be

⁵¹ PwC (2009), 'Evaluation of the selection of comparators used in Annex 9 of Ofcom's pay TV phase three document: A report for British Sky Broadcasting Limited', Final Report, September 18th.

⁵² Competition Commission (2006), 'Classified Directory Advertising Services market investigation', Appendix 7.1: Assessment of Yell's and Thomson's profitability, December 21st.

⁵³ As the ROCE was measured for Sky's pay-TV activities, the definition of capital employed also excluded investments in joint ventures.

45% over the period 2004–08 if current liabilities were removed from the definition of capital employed. However, Professor Grout quotes Oxera's estimates where currently liabilities were not excluded (29% ROCE for the period 2004–08; 26% for the longer period 1995–2008). Therefore, it is not possible to have any confidence in this analysis.

Due to the fundamental problems with this analysis, the evidence on ROCEs from market investigations reported by Professor Grout could be seen as misleading.

4 Robustness of the estimates of the IRR

In his report, Professor Grout commented that asset valuation may be challenging in this case—due to the nature of the pay-TV industry—and that the IRR may not be an appropriate measure of returns due to re-investment rate assumptions implied in the calculations of the IRR.⁵⁴ Professor Grout then argued that Oxera's estimates of Sky's returns may be biased and unreliable and that it may be more appropriate to consider alternative measures of profitability.

First, it is extremely hard to provide a clear asset value for the problem at hand and hence very hard to capture an accurate rate of return. The truncated IRR approach is likely to be better than the ROCE but large difficulties remain. For this reason it is attractive to look at stock market information and see what insight this can give.

Second, it is desirable to move away from the simple uninformative benchmark of 'returns greater than the cost of capital' to some indication of what might be deemed more appropriate.⁵⁵

The analysis of stock market information presented by Professor Grout, and why it is largely irrelevant to the analysis of economic profitability analysis in the context of competition policy, was addressed in section 3. In particular, it emphasised why the use of stock market information, as advocated by Professor Grout, is inappropriate from the conceptual perspective (and hence has not been traditionally relied upon by UK competition authorities) and does not provide a robust estimate of the rates of return from Sky's pay-TV activities.

This section responds to Professor Grout's comments on the robustness of the approach adopted by Oxera for measuring returns, and demonstrates that the approach is conceptually appropriate in this context (as well as based on the relevant CC precedent). The section then shows that there is no evidence to expect that Oxera's estimates of Sky's profitability may be biased or not sufficiently robust due to any potential concerns with asset valuation or choice of the measure.

The estimates of rates of return above the cost of capital and low TSR for BSkyB as a whole are not inconsistent because the TSR, which is based on stock market data, provides a downward biased measure of returns when markets expect the company to be highly profitable. For this reason UK competition authorities have not relied on stock market information and have instead sought to obtain relevant insights into the nature of the competitive process from operating profitability.

4.1 Valuation of assets

4.1.1 Professor Grout's comments on Oxera's valuation of Sky's assets

Professor Grout seems to argue that Oxera's estimates of Sky's returns are biased due to issues with asset valuation. Specifically, he states:

it should not be surprising to find that the equilibrium required rate of return on physical and financial assets will be persistently above the CAPM derived cost of capital.⁵⁶

⁵⁴ Professor Grout also presented evidence on other indicators of profitability. Practical and conceptual challenges with relying on this evidence are considered in section 5 of this report.

⁵⁵ Grout (2009), op. cit., p. 2.

⁵⁶ Grout (2009), op. cit., p. 2.

According to Professor Grout, such biases may arise because Oxera's analysis underestimates the asset value by omitting certain types of asset. The examples of such omitted assets provided by Professor Grout are skills, knowledge and experience acquired by Sky over time.

As time goes on the company learns how to do things more cheaply and this investment through learning by doing will need reward in the future to justify the effort. Income forgone while learning cheaper, cleverer or more effective ways to do something deserves a reward as does any other investment. There are many types of experiences, activities and rewards for risks taken that create the successful current architecture of the company, all of which are relevant in this context.⁵⁷

Oxera's first report estimated the DRC value of Sky's assets (as a proxy for MEA, modern equivalent asset) using Sky's statutory accounts as a starting point, to which the estimated value of intangible assets was added. According to the value-to-the-owner principle,⁵⁸ Sky's intangible assets were valued as capitalised costs.

Given this valuation approach, Professor Grout's comments could be interpreted in two ways. One interpretation may be that Professor Grout is arguing that Oxera's analysis omitted certain specific costs that should have been capitalised. Alternatively, he may be arguing that there are assets that were acquired by Sky without incurring upfront cash costs and that they should be included in the asset value when estimating economic profitability.

This section considers both of these interpretations and shows that there is no evidence that any costs were omitted from the analysis or that a significant part of the profitability gap could be explained by assets that were acquired by Sky without incurring costs.

4.1.2 Cost-oriented valuation of Sky's assets

In the first profitability report, Oxera estimated the DRC value of Sky's assets using the cost-oriented valuation approach in line with the value-to-the-owner principle.⁵⁹ As detailed in section 3 of Oxera's first report,⁶⁰ this involved identification of the relevant assets (including intangible assets) and capitalisation of costs that were invested to create these assets.

To ensure robustness, Oxera's first report explored a number of scenarios relating to identification of the relevant subscriber acquisition costs that should be capitalised and capitalisation methods. Specifically, two scenarios were used:⁶¹

- under the **conservative scenario**, subscriber acquisition costs (SAC) were defined as the total marketing and subscriber management costs recorded in the statutory accounts divided by the number of gross subscriber additions in a given year. This provides an upper end of the range because not all such costs would meet the criteria for capitalisation;
- under the **base-case scenario**, the selection of the relevant costs to capitalise followed the three criteria for recognising intangible assets used by the CC:
 - the assets created must be identifiable;
 - the costs must be incurred now for earnings that are to be delivered later;
 - the costs must be additional to the baseline costs of running the business.⁶²

⁵⁷ Ibid., p. 2.

⁵⁸ Edwards, Kay and Mayer (1987), op. cit.

⁵⁹ See Oxera (2003), op. cit., pp. 43–46, paras 4.12–4.22.

⁶⁰ Oxera (2009), op. cit., sections 2 and 3.

⁶¹ Ibid., section 3.4.

⁶² Competition Commission (2002), 'The Supply of Banking Services by Clearing Banks to Small and Medium-sized Enterprises: A Report on the Supply of Banking Services to Small and Medium-sized Enterprises within the UK', March 14th.

Therefore, under this scenario, two changes were made to total marketing and subscriber acquisition costs: costs that do not create an intangible asset were excluded and investment was separated from maintenance costs, based on statutory accounts and management accounting data provided by Sky. The costs not considered as part of SAC include: subscriber management costs, marketing costs that do not create investments in intangible assets, and marketing acquisition costs that are not related to pay-TV.

One potential interpretation of Professor Grout's comments is that Oxera's analysis omitted certain specific cost lines that should have been capitalised and, in doing so, underestimated the opening asset value.

In order for costs to be capitalised, they need to involve an upfront commitment of capital, which over a relatively long term would be at risk of not being recovered. There is no evidence that the estimates of the IRR could be significantly biased due to omitting certain cost lines from the analysis.

- First, a detailed analysis was conducted for the first report to identify relevant costs; several scenarios for capitalising costs were then considered. Professor Grout does not provide any evidence suggesting that this analysis may have omitted any costs (eg, by identifying specific cost lines that should be included in the asset value).
- Second, it is unclear whether inclusion of additional costs would necessarily lower the IRR estimates. This is because increases in the opening asset value driven by capitalisation of additional costs may be offset by increases in the closing asset value and cash flows. The net effect on the IRR would depend on factors such as the useful economic life of the asset being capitalised.
- Third, additional sensitivity analysis demonstrates that the estimates of returns are robust to a number of alternative estimates of Sky's SAC.

To further support the estimates of returns, a number of additional sensitivities are considered below. Sky's largest intangible asset is its subscriber base. The analysis below shows that the value of Sky's subscriber base is robust to alternative SAC definitions. Four alternative scenarios for the SAC are considered.

- **Sensitivity I: SAC based on statutory accounts.** This uses the SAC as calculated by Sky and reported in its statutory accounts. The SAC figures calculated by Sky are available from 1999. Given that the focus of the analysis is profitability in the recent period (2005–09), the results of the sensitivity are presented for the period from 2005 to 2009 only.
- **Sensitivity II: exclusion of upgrade costs.** In this scenario, the costs associated with customer upgrades are excluded from the Oxera estimate of SAC, as they could be argued to represent maintenance costs as opposed to investments. For this analysis, Oxera used data on upgrade costs provided by Sky, available from 2006.⁶³ Given that the focus of the analysis is profitability in the recent period (2005–09), the results of the sensitivity are presented for the period from 2005 to 2009 only.
- **Sensitivity III: alternative allocation of marketing costs between customer acquisition and maintenance.** In this scenario it is assumed that the subscriber maintenance costs are increasing over time as a share of marketing costs. Therefore,

⁶³ As mentioned by Sky, the detailed management account that provided a thorough breakdown of marketing costs is available from 2006 only.

the SAC in 1995 are based on 100% of marketing in the year, while in 2009 only 62% of marketing was modelled to represent SAC.⁶⁴

- **Sensitivity IV: alternative treatment of costs associated with the transition to digital.** This scenario tests the impact of including the additional costs associated with transferring subscribers from analogue to digital—ie, the costs associated with replacement of analogue set-top boxes with digital set-top boxes. The analysis involves inclusion of the full amount of marketing costs stated for 1999 and 2000. If the costs associated with transition to digital were included, the SAC in 1999 would increase to £1,420.

Table 4.1 Sensitivity of the IRR to alternative estimation of the SAC, 2005–09 (%)

	Base case	Sensitivity I	Sensitivity II	Sensitivity III	Sensitivity IV
IRR (DRC: year of investment)	[X]	[X]	[X]	[X]	[X]
IRR (DRC: annual revaluation)	[X]	[X]	[X]	[X]	[X]
IRR (DRC opening, MV closing)	[X]	[X]	[X]	[X]	[X]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

Table 4.1 shows that the estimates of profitability are robust to alternative scenarios for the SAC.

4.1.3 Assets acquired without incurring costs

Professor Grout’s comments could also be interpreted as suggesting that the asset value in the profitability analysis should include assets that were acquired by Sky over time without incurring costs. Professor Grout refers to these as ‘hidden assets’.

There seems to be no robust evidence that hidden assets explain a significant part of the profitability gap, for two reasons:

- from the conceptual perspective, it would be reasonable to expect that the benefits of hidden assets would be passed through to consumers in competitive markets over a sufficiently long period of time. Hence, when evaluating returns in competition policy analysis, in general, it would not be appropriate to include them in the asset value since this would be equivalent to assuming that shareholders are entitled to earning a return on something they have not spent capital to acquire.
- the sensitivity analysis demonstrates that a hypothetical hidden asset (including any potential benefits of high efficiency) would need to be implausibly large in order to remove the profitability gap.

The sensitivity analysis (as set out in Table 4.2 below) considers two types of hypothetical hidden assets:

- costs incurred by Sky that were not capitalised in the opening asset value in 1992 (the first year of the asset valuation model). The sensitivity considers how large the increase in the opening asset value would need to be to remove the excess returns modelled since 1992;
- investments made by Sky over time in acquiring skills and experience that may not have been capitalised in Oxera’s analysis. The sensitivity considers how large the increase in the opening and closing asset value would need to be to remove excess returns over

⁶⁴ The methodology for allocating marketing costs between customer acquisition and maintenance was discussed in Oxera (2009), op. cit. section 3.4.1.

the last five years. This sensitivity would capture any benefits that may be related to Sky's efficiency.

Table 4.2 Sensitivity of the IRR to a hypothetical hidden asset

	Sensitivity to the opening asset value, IRR (1992–2009)		Sensitivity to the opening and closing asset value, IRR (2005–09)	
	Asset value in 1992 (£m)	Increase in asset value required to remove the profitability gap (£m)	Asset value in 2005 (£m)	Increase in asset value required to remove the profitability gap (£m)
IRR (DRC: year of investment)	[X]	[X]	[X]	[X]
IRR (DRC: annual revaluation)	[X]	[X]	[X]	[X]
IRR (DRC opening, MV closing)	[X]	[X]	[X]	[X]

Source: Datastream, Bloomberg, Sky, Ofcom, Oxera calculations.

Table 4.2 shows that the opening asset value would need to increase by around £[X]m–£[X]m or more than triple (when the DRC asset value is used) in order to remove the profitability gap. This is equivalent to increasing the SAC in 1992 (the first year of the asset valuation model) from £[X] per subscriber to £[X]. Such a high SAC in 1992 is not supported by Sky's marketing costs at the time.⁶⁵

Similarly, the value of potential skills and experiences acquired by Sky over time would need to be significant: the opening and closing asset value would need to increase by £[X]m–£[X]m (or more than 50%) in order for returns over the last five years to be in line with the cost of capital.⁶⁶

Overall, for the above conceptual and empirical reasons, there seems to be no robust evidence that hypothetical hidden assets could explain the profitability gap.

4.2 Calculation of the IRR

Sky and Professor Grout seem to suggest that the IRR is not an appropriate measure of returns in competition policy analysis because it does not measure the extent to which the estimated return exceeds the cost of capital.

IRR is not 'designed for' or well-suited to assessing the question of whether returns persistently and significantly exceed the cost of capital⁶⁷

This section demonstrates that the IRR does not introduce biases in the analysis of returns for conceptual or practical reasons.

Professor Grout's argument is based on a technical feature of the IRR that, for a given investment project with a non-zero NPV, it is theoretically possible to change the profile of cash flows such that the same NPV is retained but the IRR is changed.

A major problem with using the IRR to provide a precise number to the extent that a company's profitability is above the cost of capital is that two alternative ways of

⁶⁵ Past losses were also considered in Oxera's first report.

⁶⁶ Intangible assets such as brand, customer relations and corporate reputation are already accounted for in the asset base by capitalising the relevant marketing costs. See Oxera (2009), op. cit., p. 10.

⁶⁷ Sky (2009), op. cit., p. 59, para 4.45.

undertaking a project that give identical value to shareholders and have identical present value cost to customers can have very different IRRs.⁶⁸

This technical feature is driven by particular re-investment and borrowing rate assumptions in the IRR.

From the conceptual perspective this technical feature of the IRR does not invalidate the profitability analysis. This is because, as the company would be expected to have already chosen the value-maximising cash-flow profile, the company would not be expected to be able to change the profile of cash flows and retain the same NPV. Therefore, for any given value of the project, there would be one set of cash flows and one IRR, which together reflect the true economic profitability of the project.

Professor Grout provides an example where he suggests that if Sky changes its pricing strategy to charge less upfront for installation of the set top box and more for annual subscription, the per-customer NPV would remain the same but the IRR would decrease. While mathematically this is correct, in practice Sky may not be able to change the pricing policy and retain the same NPV because the new pricing policy may lower the demand (and thereby reduce the cash flows) as well as increase the payback period and hence risks (and thereby increase the discount rate).

Therefore, for any given project, there is likely to be one cash-flow profile corresponding to a given NPV and one IRR reflecting the economic profitability of the project.

From the practical perspective, Professor Grout suggests that this feature of the IRR means that it cannot robustly measure whether the estimated returns exceed the cost of capital *significantly and persistently*.

Even assuming that the NPV could be preserved under an alternative cash-flow profile, the *significance* of the observed profitability gap is evident from the consistency of the IRRs with the modified IRR (where a specific assumption about the reinvestment and borrowing rate can be made) as well as with the ROCEs.

Table 4.3 Cross-checking the IRR: modified IRR and ROCE, 2005–09 (%)

	Base case	MIRR	ROCE
DRC: year of investment	[✂]	[✂]	[✂]
DRC: annual revaluation	[✂]	[✂]	[✂]

Note: MIRR refers to the modified IRR. The difference between the MIRR and IRR is the assumed rate of return on re-invested cash flows. Under the IRR approach, all generated cash flows are assumed to be re-invested at a rate equal to the IRR of the project. Under the MIRR, the cash flows are assumed to be re-invested a different rate. In this table, it is assumed that cash flows are re-invested at a rate of 15%.

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

The *persistence* of the profitability gap could be demonstrated using the NPV cross-check. Figure 4.1 shows the ratio of the NPV of Sky’s realised cash flows (including the market value in 2009 as the closing value) to the estimated replacement costs of Sky’s assets.

Figure 4.1 Persistence of the profitability gap: ratio of the NPV of cash flows to Sky’s estimated replacement costs

[✂]

Source: Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

⁶⁸ Grout (2009), op. cit., p. 2.

As seen from Figure 4.1, the stability of the observed market value premium suggests that the observed profitability gap was stable over time. Given that the NPV is used in the numerator of the ratio, any potential biases that, according to Professor Grout, may affect the IRR, would not be present in this case. Overall, there is no evidence to suggest that IRR would provide a biased estimate of returns in the context of the economic profitability analysis in general or in this case.

5 Can Sky’s pay-TV profitability gap be explained by Sky’s successful innovation and risk-taking?

In response to Ofcom’s third consultation, Sky suggested that the main factor that explains the profitability gap is its continual successful risk-taking and innovation. This section starts by reviewing the conceptual aspects of analysing profitability in the context of markets where innovation is a significant driver of returns. It then considers evidence on the extent to which such aspects are relevant to Sky. It shows that there is no conclusive evidence to support the proposition that Sky has the characteristics that would be expected to be observed in the case of companies whose returns are driven by successive innovations and successful risk-taking.

5.1 Interpretation of profitability in innovative industries

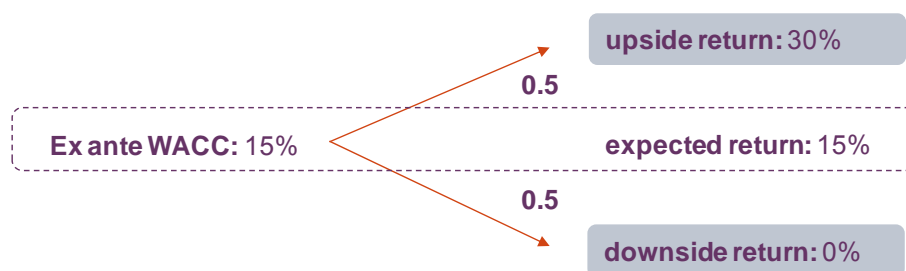
Innovation could lead to high returns (ie, returns significantly above the cost of capital) because successful investments in innovation may generate high returns as compensation for downside risks taken at the time of the investment.

Figure 5.1 illustrates the mechanism through which such successful risk-taking may lead to high returns. It shows a stylised example of a risky investment with the following characteristics:

- in the successful (upside) scenario, the company earns a high return (30%);
- in the unsuccessful (downside) scenario, it earns a low return (0%);
- the expected return (ie, the average of different scenarios) is 15%;
- the expected return is assumed to be in line with the ex ante cost of capital (15%).

If the upside scenario occurred, the ex post profitability analysis of this stylised example would show a significant profitability gap: 15% = 30% (ex post return) – 15% (ex ante WACC). Given that expected returns were in line with the cost of capital, high actual returns in this example provide compensation for bearing risks at the time of the investment.

Figure 5.1 Stylised illustration of a risky investment project



Source: Oxera.

Sky seems to suggest that its returns are driven by investments in such risky projects, which turn out to be successful and therefore provide compensation for risks taken at the time of the investment.

The reason that successful firms will be observed to earn excess returns is straightforward. Firms’ profits are the result of a series of investments over time. Standard investment theory indicates that firms should invest where they identify ‘NPV positive’ projects – investment opportunities where returns exceed their cost of capital (and, where they have multiple such opportunities but finite resources, firms should

invest in projects with the highest expected NPV). Furthermore, it is well-known that firms tend to set hurdle rates for investment well above their cost of capital (either explicitly, or implicitly when evaluating investment decisions) to provide a 'margin of error' – i.e. to reflect the risk of project failure, or uncertainty about potential returns.⁶⁹

Accordingly, given that firms' profits are the result of such investments, firms that are faced with a series of NPV-positive projects over time, and execute them successfully (which tends to be the case for firms that remain in the market and so are available for analysis), will be observed to earn returns above their cost of capital.⁷⁰

In order to interpret the results of profitability analysis accurately, it is necessary to identify the differentiating features of two types of company:

- one where the investments turn out to be highly profitable, but where, ex ante, the company was expected to have 'normal' returns. For such companies, high returns could be expected to be generated by successful risk-taking;
- one where investments had high actual returns and these high returns had been expected ex ante. For such companies, successful risk-taking would not be sufficient to explain the profitability gap.

It is possible to identify three key features of businesses where high returns may be expected to be generated by successful risk-taking:

- **nature of investments:** such businesses commit significant amounts of capital upfront against the prospect of uncertain future demand;
- **persistence of high returns:** returns are not persistently high and are expected to converge to the cost of capital in the long term;
- **expected returns:** returns, which are significantly above the cost of capital, are not expected at the onset of the investment, but could be observed ex post due to successful risk-taking.

The first feature is that companies in such markets tend to undertake investments which require a significant upfront commitment of capital for a relatively long time period against the prospect of highly uncertain future demand.

In the event that such investments prove successful and the realised demand is high, ex post returns could significantly exceed the cost of capital. However, if the investment fails, the capital committed upfront could be lost with no returns, or even significant losses. If, however, investments are scalable to changes in demand or demand uncertainty is low, a significant difference between actual returns and the cost of capital would not be expected, even if demand turns out to be high.

These features of investments in innovation have been recognised in the academic literature and by the competition authorities. For example, according to Geroski (1994), investments in innovation are characterised by significant upfront costs, uncertain future revenues and relatively long payback periods:

many of the costs of producing an innovation are known and incurred upfront, while revenues are generated in the future, often in unexpected ways.

More generally, users of new products and processes often are slow to perceive, and then to learn how to use an innovation, and this also means that the net benefits of a

⁶⁹ Sky (2009), op. cit., para 4.50.

⁷⁰ Ibid., para 4.51.

new innovation may accrue for very long periods of time, and in ways impossible to imagine *ex ante*.⁷¹

Sky also seems to suggest that one reason why its actual returns are high is because it successfully undertakes large-scale risky investments.

Sky has a strong and consistent track record of being an innovator, and in particular a first mover – identifying opportunities, undertaking large-scale, risky investments to take advantage of such opportunities, and executing well.⁷²

The second feature of businesses whose high returns may be generated by successful risk-taking is that their returns are not expected to be persistently high.

If there is competition at the onset of the investment (which is a feature of a well-functioning market), high returns would not be expected to persist in the long term because the successful innovator would be expected to change over time and different companies would be expected to profitably bring their products to the market. Accordingly, returns persistently in excess of the cost of capital would suggest a deviation from a well-functioning market since it would indicate there may be limited competition at the onset of the investment. For example, CC chairman, Peter Freeman, confirmed in 2004 that persistency of high returns is an appropriate indicator of market power in innovative markets.

We accept that ... high profits may be attributable to superior entrepreneurial activity, successful innovation, and more efficient techniques of production and organisation ... That is not to say that ... high returns necessarily indicate a high level of efficiency or that adequate conditions for competition can always be expected ... Each case requires an assessment of the economic circumstances ...

In high-tech markets (especially where there are network effects), the situation is potentially much more difficult, not least because the very high *ex ante* risks of failure arguably mean that the *ex post* returns to 'winning' firms and technologies should similarly be high. This may in some instances limit the usefulness of using profitability measures in such markets, at least in a short term or static sense. This does not mean that competition authorities should abandon any attempt to look at profitability performance, especially where high profits might be expected to persist over the longer term, but it does mean that facile assumptions should be avoided.⁷³

The third feature of companies whose high returns could be generated by successful risk-taking is that their expected returns are in line with a competitive benchmark.

In a well-functioning market, companies do not, *ex ante*, expect to earn high returns, but may actually earn high returns. As illustrated in Figure 5.1, successful risk-taking would be reflected in actual performance in excess of expectations rather than in an expectation of high returns at the onset. For example, in 2001, John Vickers, at the time chairman of the OFT, confirmed that it is appropriate to consider the evidence on expected returns as an indicator of market power in innovative industries:

One of the things that competition does is to compete away large expected profits. In some circumstances, therefore, manifest evidence of large profits well in excess of the cost of capital may suggest, albeit tentatively, that competition is perhaps less than fully effective. At least it should raise the question of why the excess profits are apparently not being competed away.

⁷¹ Geroski, P.A. (1994), *Market Structure, Corporate Performance, and Innovation Activity*, Oxford: Oxford University Press.

⁷² Sky (2009), *op. cit.*, para 4.63.

⁷³ UK Competition Commission (2004), 'The Enterprise Act and Innovation', speech by Peter Freeman (then Deputy Chairman), CBI Competition Conference, March 5th.

In innovative industries, however, expected profits and actual profits can of course be vastly different. (The same is true of buying lottery tickets, and the reasons are not unrelated.)

Innovation is an uncertain business, and if the profits from successful innovation did not exceed the costs, no-one would do it. Ex post 'excess' profits (for the winners) are therefore the norm in innovative industries, and are not in fact excessive if there was effective competition to innovate initially.⁷⁴

Similarly, in academic literature, the importance of expected returns as an indicator of market power was confirmed, for example, by Encaoua and Hollander (2002):

in markets driven by innovation, high ex post returns on investment do not reveal anything about market power. Indeed, if such returns were unachievable, no one would take part in the race. The relevant criterion is expected return.⁷⁵

Sky also seems to agree that successful risk-taking could be one of the reasons for high actual returns only if it can be observed that returns turn out to be higher than expected returns. For example, in relation to the investment in digital television, Sky acknowledges the relevance of expectations in interpreting the evidence on actual returns.⁷⁶

For example, in 2001 Zenith Media forecast that Sky's subscriber base would reach 7.7 million by 2010. Similarly, Informa forecast in early 2002 that Sky's subscriber base would reach 7.8 million homes by 2010. Accordingly, Sky has added almost twice as many subscribers in the last 8 or 9 years than was anticipated.

Retail subscriber growth provides only a partial view of Sky's performance. It is more appropriate to consider total cash flows to capture all sources of profitability (including other sources of revenues, as well as, importantly, costs). Section 5.4 contains a comprehensive review of the evidence on Sky's performance relative to expectations.

The rest of this section discusses the evidence to test whether these features are observed in the case of Sky and hence whether its high returns could be expected to be driven by successful risk-taking.

5.2 Economic characteristics of Sky's investments

This section reviews the evidence on whether Sky's investments have the characteristics that would be expected if high returns were being generated by successful risk-taking. The section reviews evidence on the scalability of investments and demand risk.

5.2.1 Scalability of investments (payback period)

The more flexibility a company has over when and how much to invest, the shorter the time period over which its capital is at risk and the lower the potential impact of a demand shock. This is because changes in demand would not be expected to lead to stranding of capital, since the company would be able to scale its investment programme accordingly. Therefore, significant and prolonged differences between ex post returns and the cost of capital would not be expected for companies with scalable investments.

This means that evidence of Sky's investments not being scalable (ie, that the payback periods are long) would be consistent with one of the characteristics of markets where high returns could be generated by successful risk-taking.

⁷⁴ OFT (2001), 'Competition Policy and Innovation', speech by John Vickers (then Director General of Fair Trading), International Competition Policy Conference, Oxford, June 27th.

⁷⁵ Encaoua, D. and Hollander, A. (2002), 'Competition Policy and Innovation', *Oxford Review of Economic Policy*, 18:1, 63–79.

⁷⁶ Sky (2009), op. cit., para 4.63.

Measures of asset intensity could be used to assess the scalability of Sky's investments. Table 5.1 benchmarks Sky's asset intensity, defined as total assets divided by total operating costs. In general, the less scalable are investments to changes in demand, the higher the ratio of assets to costs.

The evidence shows that Sky's asset intensity is lower than the average (median) for all benchmark samples. For example, Sky has lower asset intensity than 61% of the companies in the FTSE 350 index based on Oxera's estimates of the DRC values of assets. Sky also has lower asset intensity than 85% of companies in the FTSE 350 Media index. This suggests that Sky has a low amount of capital invested relative to the size of operating cash flows and that the payback period on investments is likely to be relatively short.

Table 5.1 Asset intensity (% of companies with asset intensity higher than Sky)

	Overall market	Media companies	Pharma and Biotech	TV and non-TV comparators
	FTSE 350	FTSE 350 Media	FTSE 350 Pharma & Biotech	Selected comparators
Number of companies	339	13	8	53
Book values for Sky	76%	100%	88%	89%
DRC values for Sky	61%	85%	88%	68%

Note: Asset intensity is defined as total assets divided by total operating costs based on data available for 2008. Total operating costs includes the cost of goods sold, depreciation, amortisation, selling, general and administrative, and other operating costs.
Source: Datastream and Oxera analysis.

This evidence is consistent with the market perception of the riskiness of Sky's investments, as reflected in reports by equity analysts. A significant number of reports indicate that the payback period on Sky's investments is relatively short. For example, UBS estimated that the payback period of a subscriber on a basic package was 25 months compared with 18 months for subscribers on average across all basic and premium packages.⁷⁷ UBS's analysis of returns of basic and average customers over estimated subscriber lifetimes is shown in Table 5.2, which indicates that the payback period could be seen as short and the IRR as high (it also shows that the payback period for premium subscribers is shorter and the IRR is higher than for basis subscribers).

Table 5.2 Illustrative equity analysts' estimates of subscriber payback periods (2005)

	Basic	Average
ARPU (£)	250	380
SAC (£)	240	250
IRR (%)	92%	224%
Payback (months)	25	18
NPV (£)	595	996

Source: UBS (2005), op. cit., p. 29.

The following description from Robertson Stephens, an investment bank, suggests a pattern where investment in subscribers is largely proportional to demand and the fixed capital commitment is low relative to the total value of invested capital:

⁷⁷ UBS (2005), 'Investment research – BSKyB: Focus on the consumer', August 17th, p. 29.

Satellite is wireless, which means it automatically 'passes' nearly every home without requiring incremental capital spending. In addition, satellite is very good for digital media, with the only required network upgrade taking place at the satellite transponder and customer premise locations (leaving out the need to upgrade an in-the-ground cable network).⁷⁸

Furthermore:

In order to offer interactive services, Pay-TV companies must spend a lot of money on:

- Digital set-top boxes: £100-200 each
- Customer service house calls: £75-100 each, often with 2-3 calls per installation
- Cable operators must also upgrade their network to two-way HFC digital cable, £500-1,000 per subscriber.

We believe it is important to note several factors with regard to Sky's capital costs. With regard to digital set-top boxes, Sky expenses these costs while cable operators capitalize set-top boxes resulting in lower short-term EBITDA levels for Sky. With regard to upgrading their network for digital capability, Sky's platform is already completely digital and essentially passes every home since it is a satellite network. However, we believe Sky must still find a solution for a broadband return path which will require future investment.⁷⁹

In relation to investments in content, ABN AMRO estimated that revenues attributable to Premier League rights for 2008 would equal £1,211m, while the respective direct annual costs were estimated to be £341m.⁸⁰

One of the longest contractual commitments that Sky has with a content provider is the contract with FAPL, which is currently for a period of three years. The nature of its contractual obligations is such that Sky can avoid liabilities for obligations beyond one year in the future. For example, in the event of low demand for certain TV programmes, Sky could decide to breach the contract with FAPL.

This suggests that Sky is not locked into long-term contractual commitments for football rights. Contractual arrangements with film studios also appear to be largely proportional to demand.

Under our pay television agreements with the US major movie studios, we generally pay a US dollar-denominated licence fee per movie calculated on a per movie customer basis, some of which are subject to minimum guarantees, which were exceeded some time ago.⁸¹

The nature of Sky's investments in subscriber acquisition also suggests that the amount of Sky's investment is largely variable according to the level of demand, and hence has relatively low exposure to the risk that actual subscriber numbers are lower than forecast.

Marketing costs increased by 22% to £907 million reflecting the strong demand for Sky+HD throughout the period and our decision to accelerate the take-up of the product through a lower retail box price. Subscriber acquisition cost was £308 reflecting the improvement in premium box mix, with around 90% of new customers in the second half of the financial year joining Sky with either a Sky+ or Sky+HD box, compared with 56% in the comparable period.

⁷⁸ Robertson Stephens Inc. (2001), 'BSkyB: Satellite King. Satellite: Blessing or Curse? Initiating Coverage with Long-Term Attractive Rating', February 21st, p. 1.

⁷⁹ Ibid, p. 8.

⁸⁰ ABN AMRO (2006), 'Game Theory', March 22nd, p. 7.

⁸¹ British Sky Broadcasting Group plc. (2009), 'Annual Review 2009', p. 40.

Similarly, for investments in Sky+ and HD television, Sky recognises that costs are largely proportional to demand. The payback period on these investments also appears, on average, to be short:

The majority of costs are geared to demand; Sky+HD customer acquisition costs have been incurred in proportion to take-up and will be recovered on average within 18 months.⁸²

Overall, the evidence seems to suggest that Sky does not commit large amounts of capital upfront as its investments are characterised by significant scalability to demand and short payback periods. This suggests that the downside risks are relatively low, as Sky would be able to scale back its investments in response to a demand shock. Therefore, a significant deviation between ex post returns in a successful scenario and the cost of capital would not be required to compensate for downside shock.

5.2.2 Uncertainty of demand

The scale of demand uncertainty affects the extent to which ex post returns could be expected to exceed the cost of capital in the event that demand turns out to be high. For a given level of capital intensity, the higher the demand uncertainty, the more likely it is that 'normal' ex ante expected returns could correspond to high ex post returns. Similarly, the lower the demand uncertainty, the lower the potential difference between actual returns and the cost of capital.

Evidence that the demand uncertainty of Sky's investments was high would be consistent with one of the characteristics of markets where high returns could be generated by successful risk-taking.

Sky also refers to uncertainty of its demand when arguing that its high returns have been driven by successful risk-taking. For example, Sky stated that investments in HD TV may not have generated sufficient demand (however, as discussed above, this would not be expected to have led to significant losses because the level of investments would be adjusted to changes in demand):

There was no certainty when these investments were made that HD would gain sufficient traction with Sky's actual and potential subscribers for this investment to pay-off.⁸³

The main objective of the analysis of demand risks is to assess whether Sky's returns in recent years and in the future could be expected to be driven by risks taken in the past. This requires assessing the ex ante demand risk at the time when investments that determine returns in recent years were made.

The analysis therefore focuses on the evidence of demand risks over the last five to ten years, specifically quantitative analysis of ex post demand volatility supplemented by contemporary risk assessments by equity analysts. It would not be expected that investments made more than ten years ago would significantly influence recent returns because the payback period on most of Sky's investments is relatively short (and appears to be shorter than five years). It is possible that demand risks faced by Sky more than ten years ago were higher than those faced recently, but the compensation for any such high risks would be expected to have been already recovered by Sky.

There is no evidence that Sky faced significant demand risks over the last five to ten years.

Table 5.3 compares the volatility of growth in Sky's subscriber numbers with several other industries where sufficient volume data is available. It shows that over the past five years the

⁸² British Sky Broadcasting Group plc. (2009), 'Results for the twelve months ended 30 June 2009', p. 8.

⁸³ Sky (2009), op. cit., para 4.63.

volatility of volume growth for Sky was one of the lowest in the sample, and lower than for some regulated utility companies. Volatility was higher over the past ten years, relative both to most regulated utility companies over this period and to Sky's recent performance, albeit lower than volatility for Stansted Airport and Nokia's handset sales.⁸⁴

Table 5.3 Volatility (standard deviation) of volume growth rates (%)

	1998–2008	2004–2008
Gas ¹	3	3
Electricity ¹	1	1
Airports: Heathrow, Gatwick, Stansted	6, 6, 15	9, 8, 11
Water: Thames Water ²	4	2
Rail	–	2
Fixed-line and mobile subscriptions: BT	–	2
Pay-TV: Sogecable	–	10
Handsets: Nokia	28	10
Mobile subscriptions: Vodafone	–	5
Letter-post items, domestic service: Royal Mail ³	3	2
Sky	9	1

Note: Volatility is calculated by measuring the standard deviation on the annual growth rates of the number of subscribers or customers.¹ The gas and electricity data relates to the whole industry. ² Thames data relates to public water supply measured at point of delivery to premises and includes non-potable water. ³ Data on the number of letters posted is not available for 2001 and 2008, thus the volatility is measured without the data for these periods.

Source: BERR, Energy statistics; BAA airports websites; Department for Environment, Food and Rural Affairs; Department for Transport (2009), 'Public Transport', November, pp. 1–15; Ofcom (2008), 'The Communications Market', Chapter 4: Telecoms, pp. 195–259; OFT and annual reports; Universal Postal Union website.

Table 5.4 benchmarks the volatility of Sky's revenue growth. The figures reported in the table represent the percentage of companies in each sample that had higher volatility of revenue growth than Sky. The volatility of Sky's revenue growth over the last eight years has been lower than at least 73% of other companies across all benchmark samples.

Table 5.4 Volatility (standard deviation) of Sky's revenues, 2000–08 (% of companies with revenue growth volatility higher than that of Sky)

	Overall market	Media companies	Pharma and biotech	TV and non-TV comparators
	FTSE 350	FTSE 350 Media	FTSE 350 Pharma & Biotech	Selected comparators
Number of companies	254	8	4	45
Revenue volatility	89%	75%	75%	73%

Note: Revenue volatility is calculated using the standard deviation of annual revenue growth rates. Number of companies reflects the count of companies for which data was available for the period in question.

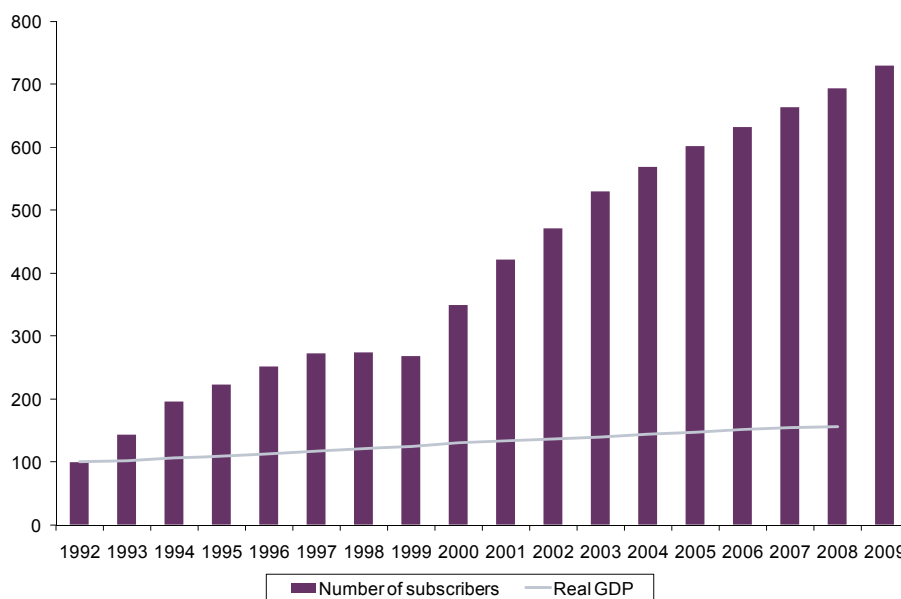
Source: Datastream, annual reports and Oxera analysis.

⁸⁴ From the conceptual perspective, it would be appropriate to decompose demand volatility into the systematic and idiosyncratic components because the systematic component would be already captured in the comparison of returns with the cost of capital, while the significance of idiosyncratic component would need to be assessed through comparison with benchmarks identified in Table 5.3. Such an analysis however is likely to be challenging to undertake in practice and may not provide sufficiently robust results as well as would not be expected to materially the conclusions.

Overall, Tables 5.3 and 5.4 show that, over the past ten years, Sky's demand risk does not appear to have been exceptionally high relative to other companies. Furthermore, the demand volatility seems to have decreased and, given the evidence on the growth in subscriber numbers, over the last five years has been lower than for some utility companies.

It is possible for volatility of out-turn revenue and customer numbers to be low, even if ex ante demand uncertainty was high. This is because the out-turn demand data reflects a single realisation of the full spectrum of potential demand outcomes that existed at the time of Sky's investments. However, if significant demand risks were present then, over a ten-year time period, such risks would be expected to be realised and observed as demand shocks. Figure 5.2 shows that Sky's actual subscriber numbers, however, continued to grow steadily over this period (including during the current recession).

Figure 5.2 Evolution of Sky's subscriber base (indexed as at 1992)



Source: Sky's annual reports and Datastream.

Market perception of demand risk, as reflected in reports by equity analysts, seems to confirm this assessment. Over the last five to ten years, analysts seem to have perceived Sky's subscriber base to be increasingly stable. For example, in 2002, BNP Paribas stated that:

There are little signs of Sky's churn level threatening to increase beyond acceptable levels. The loyalty of Sky's subscriber base has been tested in recent years through two successive yearly price increases of 8% each. In each instance, there was no discernible impact on churn.⁸⁵

Bear Stearns also highlighted relatively low demand risk and suggested that factors that may expose Sky to potential demand shocks were mitigated by Sky's strong market position:

We certainly are not saying that our forecasts are risk free. Potential risks include regulation, set-top box burn-out/technological obsolescence, sports rights owners disintermediating Sky to create their own channels, and the threat of a major consumer spending downturn.

⁸⁵ BNP Paribas (2002), 'The Second Coming', October 14th, p. 25.

However, we believe that Sky's competitive position is currently so strong – and unlikely to be seriously challenged for many years – that this greatly mitigates against most of the risks (with the possible exception of the regulators).⁸⁶

Equity analysts have recognised a certain degree of demand uncertainty in the earlier years. In general, it appears that analysts were more uncertain about the development of the pay-TV market and demand for digital services in the late 1990s and early 2000s. For example, in 1999 this uncertainty is reflected in an assessment by Flemings Research of the rate of take-up of digital television:

We have developed our market model with reference to the history of technology adoption and the anticipated market shares of the three players. We recognise that the adoption curve may not work to plan, or the market shares may pan out differently. Should the take-up of digital be slow, we would expect early consolidation among the industry players, with perhaps a single cable company and an alternative DTH/TTV platform. It is, of course, equally possible that the model for adoption will be the S-curve, resulting in a positive surprise.⁸⁷

Overall, the evidence does not seem to suggest that Sky has faced significant demand risk over the past ten years. The level of demand risk also appears to have decreased over time. Therefore, the evidence does not appear to support the argument that high returns in recent years represent compensation for high risk, particularly given the short payback period on investments. Neither does the evidence appear to support an argument that returns going forward need to include a component to compensate Sky for past risks, given that recent investments appear to have been made against a background of demand risk that has decreased over time.

5.3 Persistency of returns

In well-functioning markets with free entry and exit, returns would be expected to converge to the cost of capital in the long run. This also applies to markets characterised by a significant level of innovation. High out-turn returns would not be expected to persist in the long term in innovative markets, as this would provide an incentive for companies to enter the market—if necessary with a competing technology.

The evidence presented in section 2 suggests that the gap between returns and the cost of capital has been significant and persistent over time. The presence of this profitability gap over a 14-year period suggests that there would have been a strong incentive for companies to innovate and enter the market with a competing service offering. Indeed, a number of companies have attempted to enter the market, with varying degrees of success, but as there has not been a significant effect on the returns of Sky, this appears to be inconsistent with what would be expected in a well-functioning innovative market.

To put it differently, there is no evidence that the significant profitability gap from 2005 to 2009 represents a short-term deviation from a long-term equilibrium where returns are in line with the cost of capital.

5.4 Performance relative to expectations

This section reviews the evidence on expectations of Sky's performance. As discussed in section 5.1, the third feature of businesses where high returns are generated by successful risk-taking is that their expected returns are in line with the cost of capital. Therefore, evidence that Sky's expected returns were in line with the cost of capital would be consistent

⁸⁶ Bear Stearns (2002), 'Marching to its own beta' August 29th, pp. 8–9.

⁸⁷ Flemings Research (1999), 'BSkyB', March 30th, p. 22.

with the argument that Sky's high actual returns have, indeed, been driven by successful risk-taking.

To test this hypothesis, analysis is conducted based on market expectations of Sky's performance as reflected in reports by equity analysts. While individual reports would be expected to vary in their access to information, and hence the quality of their forecasts, the impact of such variability can be mitigated by considering a large sample of reports.⁸⁸

5.4.1 Estimates of the IRR based on expected cash flows

Table 5.5 shows estimates of the IRR based on projections of Sky's performance by a number of analysts who systematically followed Sky. It should be noted that sufficiently detailed projections of Sky's performance are available only in the reports published from 1998 onwards.

Based on the IRR model developed in Oxera's first report, Table 5.5 compares profitability estimates based on Sky's actual cash flows with estimates based on analysts' expectations in 1998, 2000, 2001 and 2004 of cash flows in future time periods.⁸⁹ This shows that Sky's actual returns have been consistently lower than forecast by analysts. For example, the IRR for the period 1998–2003 implied by analysts' forecasts made in 1998 was [redacted]% compared with an IRR based on actual cash flows of [redacted]%. The gap between expectations and actual performance appears to have been particularly large for forecasts made in 2000.

Table 5.5 IRR based on expected cash flows (%)

Measure	1995–2009	1998–2003	2000–2009	2001–2009	2004–2009
No. of analysts' reports used to estimate the IRR		2	1	3	6
Base case ¹ (churn)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expectations in 1998		[redacted]	n/a	n/a	n/a
Expectations in 2000			[redacted]	[redacted]	[redacted]
Expectations in 2001				[redacted]	[redacted]
Expectations in 2004					[redacted]

Note: These estimates are based on the average observed across the parameters in the analysts' reports.¹ As described in Oxera (2009), p. 15.

Source: Sky, Ofcom, analysts' reports, and Oxera calculations.

Data on expected cash flows for the years before 1998 was not available in sufficient detail to estimate the IRR. However, a high-level comparison of profits (EBITDA) shows that actual profits in 1997 and 1998 were broadly in line with (or slightly below) expectations of these profits in 1996 (Table 5.6).

Table 5.6 Actual versus expected EBITDA in 1997 and 1998 (£m)

	1997	1998
Expectations in 1996	375	421
Actual	379	357

Source: Sky, Ofcom, analysts' reports, and Oxera calculations.

⁸⁸ The analysis of market perceptions of the riskiness of Sky's business has been informed exclusively by reports with direct investor implications, where assessments of Sky's business risk feed into performance projections, and further to recommendations for investors.

⁸⁹ The analysts' reports provide projections of Sky's financial statements and operational metrics, including subscriber numbers and churn rates. These projections are used as inputs for the IRR model developed as part of Oxera's first report, yielding estimates of the IRR expected by analysts.

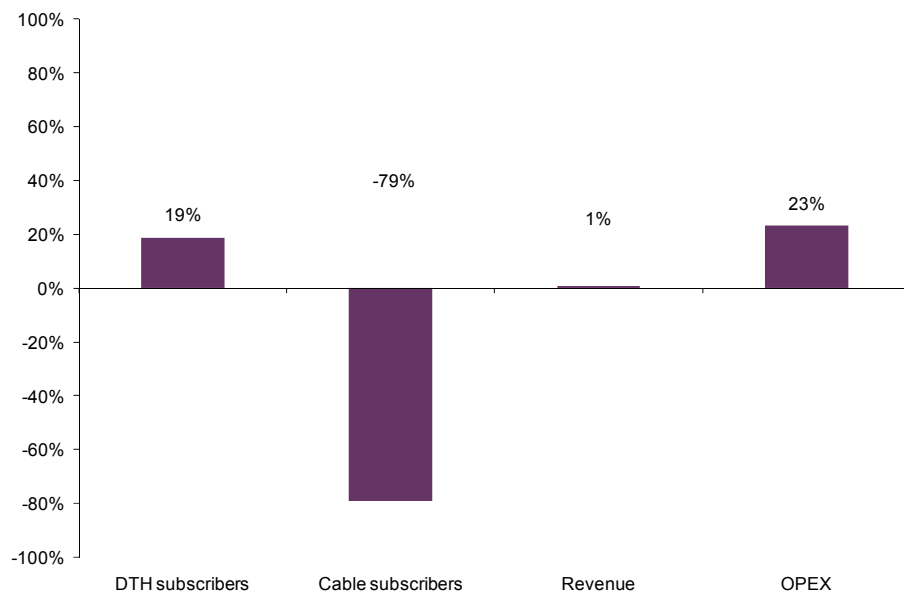
It seems that on average realised cash flows have been in line with—or slightly below—analysts’ forecasts over the last 10–15 years. As a result, as shown in Table 5.5, Sky’s realised returns were in line or slightly below expected returns. Although there is no sufficiently robust data on cash flows for earlier years, investments made more than 10–15 years ago would not be expected to have a significant influence on recent returns and future expected returns because the payback period on most of Sky’s investments is relatively short.

It seems that the main driver of the difference between expected and outturn performance is costs. It appears that the market significantly underestimated the level of future operating costs (ie, outturn costs exceeded expectations), while realised revenues have been broadly in line with expectations.

This is contrary to the perspective of performance relative to expected demand presented in Sky’s response. Referring to a report from Zenith Media, Sky stated that the company has outperformed market expectations in terms of subscriber numbers for its DTH platform. Actually, while performance has been better relative to expectations with respect to Sky’s retail (DTH) subscribers, this has been more than offset by worse performance relative to expectations for cable subscribers.⁹⁰ Compared with forecasts of approximately 13.5m total subscribers (DTH and cable), Sky has achieved approximately 10m subscribers.

Figure 5.3 compares Sky’s actual subscriber numbers (DTH and cable), revenues and operating costs of 2008 to analysts’ projections made in 2001 for 2008.

Figure 5.3 Sky’s actual subscribers, revenue and operating costs in 2008 compared with analysts’ projections for 2008 developed in 2001 (% difference)



Note: The projections are averages across four analysts’ reports available for 2001.
 Source: Morgan Stanley (2001), ‘Back to the Future?’ April 4th; ABN AMRO (2001), ‘Weighing Up the Risks’, August; BNP Paribas (2001), ‘Running to Stand Still’, May 2nd; Nomura (2001), ‘Thinking Inside the Box’, June 18th; BSkyB Annual report 2008.

The combination of actual total subscriber numbers being lower than forecast and actual operating costs being higher than forecast appear to have led to actual returns being lower than forecast.

⁹⁰ The Zenith Media projections seem to be broadly consistent with the analysts’ reports reviewed in this analysis.

5.4.2 Economic and business context for analysts' expectations

This section reviews the reasons provided by analysts to support their expectations. These reasons provide the context for Sky's expected performance.

A qualitative review of analysts' perceptions of Sky's risks and earnings prospects has been structured around three periods:

- from stock market listing until the introduction of digital television (1995–99);
- from the migration of subscribers to digital television until diversification from the core television offering (2000–03);
- recent years (2004 onwards).

Before the introduction of digital TV (1995–99)

The sample of analysts' reports available for the pre-digital time period is mostly limited to reports from Merrill Lynch. Although these reports do not contain the detailed projections for operational metrics, such as the subscriber base, that are available from more recent reports, the EBITDA forecasts for the time period following the start of the programme of subsidising reception equipment were consistently in excess of actual EBITDA. These forecasts were justified by the analysts' perception that Sky held a strong position in content acquisition, and would benefit from its large subscriber base. As suggested by Merrill Lynch in 1995:

we believe that the likelihood of any programming wars in the U.K. has been reduced. The cable companies appear to be focused on telephony and video distribution, leaving pay programming to BSkyB. Competition in regard to basic channels will probably increase, but the stakes are not nearly as high. We believe BSkyB is an excellent way for investors to participate in the growth of U.K. multi-channel television as it benefits from both the growth of cable as the dominant programmer and dish distribution as both the programmer and distributor.⁹¹

and further:

In addition to program contracts BSkyB has the largest base of subscribers. Therefore, any entity whether a new satellite competitor or even cable operators will be unable to pay what BSkyB can on an economic basis.⁹²

A view consistent with the above was reiterated in Merrill Lynch reports published in 1996 and 1997.

Before and during the introduction of digital reception equipment, the expectation was that Sky would be exposed to competition from the cable TV operators. At the time, equity analysts expected the pay-TV market to be divided between the three main platforms, as set out by Flemings Research:

The UK will have three players providing digital TV services: the three cable TV companies, digital terrestrial TV (OnDigital), and BSkyB, via satellite. We estimate the long-term market shares of the three to be 45% satellite, 40% cable and 15% terrestrial TV.⁹³

In terms of the transition to digital, while Flemings Research identified risk drivers to which Sky was exposed, the expectation was that Sky's overall position was sufficiently established to mitigate risks of any significant downside scenario.

Our investment case is based on the fact that the digital TV industry will be very successful in the UK, and that BSkyB, as the leader in analogue, will have first mover

⁹¹ Merrill Lynch (1995), 'Daily Research Analysis - BSY Media', July 6th.

⁹² Merrill Lynch (1995), 'Daily Research Analysis - BSY Media', March 2nd.

⁹³ Flemings Research (1999), 'Seeing the New Picture', March, p. 1.

advantages, and an installed base that will give it leverage to take a leading position in digital TV.⁹⁴

This suggests that, although during this period there was the expectation that Sky would be facing a competitive digital television market and there would be risks associated with the transition of its existing subscriber base to digital, Sky was expected to maintain its market-leading position and status as a profitable company.

After successful migration of customers to DTH platform (2000–03)

After the introduction of digital TV, analysts appear to have perceived Sky's market position as having been maintained or even strengthened. High expectations for Sky's future cash flows were generally based on the perceived strength of Sky's subscriber acquisition model combined with significant content holdings:

We believe BSKyB is well positioned strategically due to a demonstrated ability to rapidly gain new satellite subscription customers, and a powerhouse content business that should provide incredible stability to the model.⁹⁵

Many analysts noted that Sky's competitive position strengthened when ITV Digital went bankrupt, and cable companies NTL and Telewest experienced financial difficulties:

We are not surprised that BSKyB managed to sustain a linear growth path in terms of net subscriber additions over this period. It effectively had no competition.⁹⁶

Consistent with this, according to Deutsche Bank:

There is the concern that as Sky approaches a more mature phase in its growth profile, it will be branded a utility.⁹⁷

Thus, a perception of relatively limited competition, and the strengths of an established business model, fed into analysts' EBITDA projections, which generally exceeded those realised in the subsequent years.

Maturing and stable subscriber base and diversification of product offering (2004 onwards)

Since 2004, analysts have suggested that, having established its position as the leading pay-TV provider, Sky has focused on diversification of its product offering, while maintaining its content holdings to retain its position in the television market. As noted by Cazenove:

the growth potential of the industry should not be underestimated (45% pay-TV and 50% broadband penetration) whilst Sky retains significant competitive advantages and product differentiation.⁹⁸

However, while Sky's competitive position has generally been considered relatively robust, some analysts have noted risks from expected technological developments. For example, Daniel Stewart & Company quotes a study from Analysys Mason to emphasise the role of emerging, IP-based, platforms as drivers of competition.

At the same time, Ethernet connectivity and web service technologies based on open standards are being built into both set-top boxes and TVs. These elements are the building blocks of an 'open TV' content distribution environment, where the consumer is

⁹⁴ Ibid., p. 20.

⁹⁵ Robertson Stephens Inc. (2001), 'BSkyB: Satellite King. Satellite: Blessing or Curse? Initiating Coverage with Long-Term Attractive Rating', February 21st, p. 1.

⁹⁶ ABN AMRO (2004), 'Move to Reduce (from Hold)', November 11th, p. 2.

⁹⁷ Deutsche Bank (2004), '90% of the iceberg', September 6th, p. 10.

⁹⁸ Cazenove (2007), 'Company memo: BSKyB', April 19th, p. 1.

no longer reliant on a platform operator to dictate and control the nature and the quality of the service.⁹⁹

As might be expected, given the shorter forecast horizon, analysts have forecast Sky's overall revenues and subscriber base somewhat more accurately since 2005 than since 1995. Sky's SAC during recent years have continued to exceed analysts' projections, as reflected in realised EBITDA still being lower than expected. Furthermore, with the more diversified business model, discrepancies between analysts' forecasts and realised results are increasingly driven by uncertainties over the revenues and costs associated with the HD and broadband roll-outs rather than the core television offering.

5.5 Summary

Innovation can lead to high returns as compensation for downside risks taken at the time of the investment. In a well-functioning market, such businesses exhibit a number of characteristics that can lead to returns being significantly above expectations.

Companies in innovative and risky markets commit significant amounts of capital upfront when demand forecasts are highly uncertain. Sky's investments appear to have a short payback period and to be significantly scalable to demand, suggesting that Sky has relatively low levels of capital committed and exposure to downside shocks. Moreover, Sky does not appear to have faced significant demand risk over the past ten years, and the level of demand risk appears to have decreased over time. This evidence does not suggest that high actual returns over recent years represent compensation for past risks or that future returns need a significant component to compensate Sky for risk-taking.

It is possible for returns to deviate in the short term from the cost of capital. However, in the long term, returns in a well-functioning market would be expected to converge to the cost of capital, even in innovative markets. As returns for Sky have been persistently above the cost of capital over a 14-year time horizon, there is no evidence to suggest that the significant profitability gap during 2005–09 represents such a short-term deviation.

The risks in well-functioning innovative markets mean that expected returns will be in line with the cost of capital. Quantitative and qualitative evidence on expectations for Sky's business, based on analysts' forecasts, suggests that Sky's actual cash flows and returns have been consistently lower than expectations. This evidence is not consistent with a scenario where actual performance is better than expected and could therefore represent appropriate compensation for successful risk-taking.

Therefore, there is no conclusive evidence to support the proposition that Sky has characteristics that would be expected to be observed in the case of companies whose returns are driven by successful innovations and risk-taking.

⁹⁹ Daniel Stewart & Company (2009), 'British Sky Broadcasting – The importance of HD', 27th October, p. 5.

A1 Alternative scenarios for the IRR and ROCE

Table A1.1 Sensitivities with respect to the definition of capital employed (%)

	1995–2009	1998–2009	2005–2009
IRR			
IRR (DRC (year of investment) – cash)	[X]	[X]	[X]
IRR (DRC (year of investment) – current liabilities)	[X]	[X]	[X]
ROCE			
ROCE (DRC (year of investment) – cash)	[X]	[X]	[X]
ROCE (DRC (year of investment) – current liabilities)	[X]	[X]	[X]

Source: Datastream, Bloomberg, Sky, Ofcom, and Oxera calculations.

A2 Evidence supporting the cost of capital analysis

The cost of capital for Sky has been calculated using a weighted average of the cost of debt and the cost of equity.

The cost of equity has been estimated using the capital asset pricing model (CAPM). The formula for estimating the cost of equity k_e under the CAPM is:

$$k_e = r_f + \text{ERP} \times \beta$$

where:

- r_f is the risk-free rate;
- ERP is the equity risk premium for the whole equity market;
- β is the risk measure of a particular asset relative to the market.

The individual parameters of the CAPM formula have been estimated as follows.

- **The nominal risk-free rate** has been estimated using the spot yield to maturity on a UK gilt index with maturity equal to five years. This approach results in an estimate of 4.1% for the risk-free rate in 2005.¹⁰⁰
- **The equity beta** has been estimated from a regression of the daily returns to Sky's equity on the daily returns on the FTSE All-share index. A one-year estimation period has been used for the equity beta. Since beta estimation is dependent on the time period selected, the betas are supplemented with estimates based on a five-year estimation period.¹⁰¹ The equity betas have been de-gearred at average gearing over the estimation period and re-gearred at spot gearing.¹⁰² Estimates represent the equity beta for Sky Group and have not been broken down into separate betas for pay-TV and non-pay-TV activities.
- **The equity risk premium** has been estimated using a range of 3.5–5.0%, consistent with Oxera's advice to rolling stock companies.¹⁰³ ERP is generally measured over a long period of time because it is difficult to measure, with sufficient degree of robustness, variations in ERP over relatively short periods. Therefore, the same range is used for the period between 1995 and 2007. However, in order to reflect the uncertainty of the recent financial crisis in the ERP estimate, a range of 3.5–5.5% is used for 2008 and 2009.

To estimate the WACC, the analysis also requires the cost of debt and gearing.

¹⁰⁰ In 2009, there was a significant reduction in gilt yields compared with the previous year. In the context of profitability analysis, it is not appropriate to allow the gap between returns and the WACC to be driven by uncertainty in the government bond markets. Thus, the three-year average gilt yield is used to estimate the 2009 cost of capital. Changing the maturity of the risk-free rate from five to 10, 15, 20 or 30 years results in a change (increase or decrease) in the WACC estimate of a maximum of 100bp.

¹⁰¹ In 1995, the one-year beta is calculated as at December 8th 1995 to allow for one year of data in the estimation. From 1996 onwards, one-year betas are estimated as at June 30th of each year. For periods before 2000, the five-year equity beta is estimated based on the period from December 8th 1994 to December 8th 1999.

¹⁰² For example, in 2005, gearing of 3.6% (1-year average) and 6.9% (5-year average) is used to de-gear the raw betas and a spot gearing of 3.7% is used to re-gear the resulting beta estimates.

¹⁰³ In the same inquiry, the CC used a point estimate of 3.5%. This would lower the high end of the pre-tax WACC range by 1.7–2.7%. See Competition Commission (2009), 'Rolling Stock Leasing Market Investigation', Appendix 6.6, April 7th.

- **The cost of debt** for the period 1999–2009 has been based on the yield to maturity on Sky’s sterling-denominated bonds.¹⁰⁴ For example, in 2005, the spot yield of 5.8% on Sky’s bond maturing in 2017 is used as an estimate for the cost of debt. Due to the lack of availability of sufficient information on corporate bonds with a similar credit rating to Sky, in the period prior to 1999 the cost of debt has been estimated as the sum of the contemporary risk-free rate and the spread between the yield on Sky’s sterling-denominated bond issued in 1999 and the risk-free benchmark rate as at 1999.
- **Gearing** as at the estimation dates has been used to weight the cost of equity and the cost of debt to estimate the WACC.

Table A2.1 summarises the parameters used in estimating the cost of capital for the three periods.

Table A2.1 Estimates of the WACC parameters

	1995		1998		2005	
	Low	High	Low	High	Low	High
Risk-free rate (nominal, %)	8.2	8.2	6.3	6.3	4.1	4.1
Cost of debt (%)	10.8	10.8	9.0	9.0	5.8	5.8
ERP (%)	3.5	5.0	3.5	5.0	3.5	5.0
Raw equity beta	0.81	0.94	0.81	0.86	1.11	1.33
Equity beta	0.89	0.94	0.82	0.85	1.11	1.29
Cost of equity (%)	11.3	12.9	9.2	10.6	8.0	10.5
Historical gearing (%)	5.4	13.7	5.4	7.1	3.6	6.9
Spot gearing (%)	13.7	13.7	6.5	6.5	3.7	3.7
Tax rate (%)	33	33	31	31	30	30
Assumed inflation (%)	3.5	3.5	3.7	3.7	2.9	2.9

Source: Datastream, OECD, ONS, Competition Commission (2008), ‘Stansted Airport Ltd - Q5 price control review’, October, pp. 1–130, and Oxera calculations.

Table A2.2 presents some of the regulatory precedents on the cost of capital in the 1990s. Where necessary, the reported costs of capital have also been expressed in pre-tax, nominal terms to aid comparison with the estimates for Sky.

¹⁰⁴ For the period 1999–2004, this is based on the bond maturing in July 2009, and in July 2017 for the period 2005–09. The cost of debt as at 2005 is estimated from the spot yield on October 14th 2005, the first trading day of the bond maturing in July 2017. All cost of debt estimates thereafter are based on spot yields as at June 30th of each year.

Table A2.2 Cost of capital precedents in the 1990s

Regulator	Cost of capital (%)	Year	Description	Adjusted cost of capital (nominal, pre-tax, %) ¹
CAA—south-east airports	8	1991	Real, pre-tax	14
Oftel—BT	17–20	1992	Nominal, pre-tax	17–20
Ofwat	5–6	1994	Real, post-tax	12–13
Oftel —BT	12.5	1996	Nominal, pre-tax	12.5
CAA—BAA London Airports	6.4–8.3	1996	Real, pre-tax	9–11
Ofgas—electricity distribution	5.0–7.1	1999	Real, pre-tax	6–8

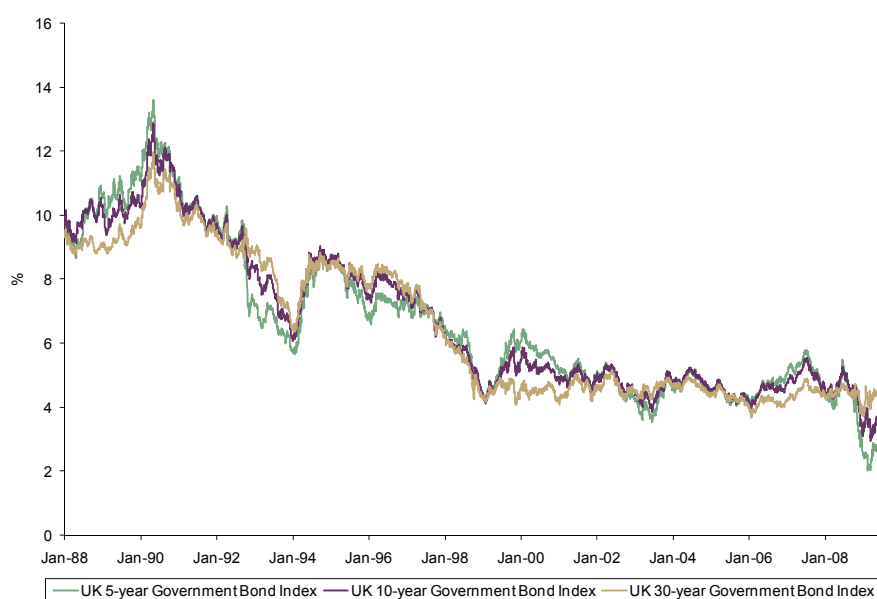
Note: ¹Adjustments are made on the final estimates using inflation and tax assumptions adopted to estimate Sky's real, post-tax cost of capital. RPI-based inflation is used converting estimates from real into nominal terms.

Source: Oftel (1992), 'BT's Cost of Capital: A Consultative document issued by the Director General of Telecommunications', January; Competition Commission (1991), 'BAA plc: A report on the economic regulation of the South-East airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd)'; Ofgas (1999), 'Review of Public Electricity Suppliers 1998–2000, Distribution Price Control Review: Consultation Paper', May; Oftel (1996), 'Pricing of Telecommunications Services from 1997: Oftel's Proposals for Price Control and Fair Trading'; Ofwat (1994), 'Future Charges for Water and Sewerage Services: The outcome of the periodic review'; Competition Commission (1996), 'BAA Plc: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd)', OECD and ONS.

Although the number of precedents available for the 1990s is limited, they nevertheless provide a relevant cross-check for Sky's cost of capital. For example, the determinations by Ofwat, Oftel and CAA in the period between 1994 and 1996 were approximately equivalent to setting the nominal pre-tax cost of capital in a range of 9–13%, lower than the 13.2% weighted average estimated for Sky over the period 1995–2009, and significantly lower than the 17.1% at the start of this period.

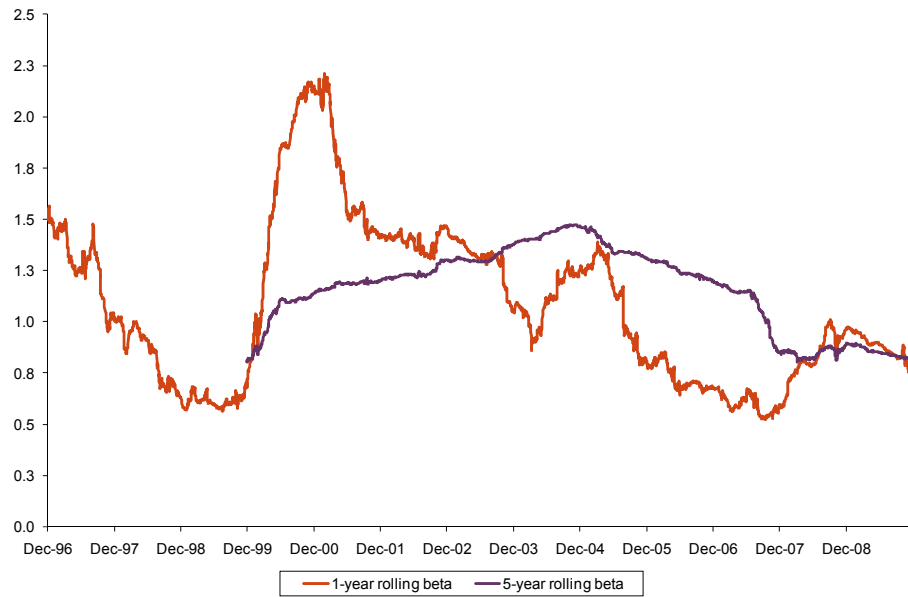
Figure A2.1 illustrates the evolution of yields on government bond indices that have been used as the basis for the risk-free rate in the estimation of the cost of capital. Figure A2.2 presents estimates of the one- and five-year rolling equity betas, and Figures A2.3 and A2.4 present yields and spreads on the bonds used to estimate the cost of debt.

Figure A2.1 Evolution of yields of UK 5-, 10- and 30-year government bond index (%)



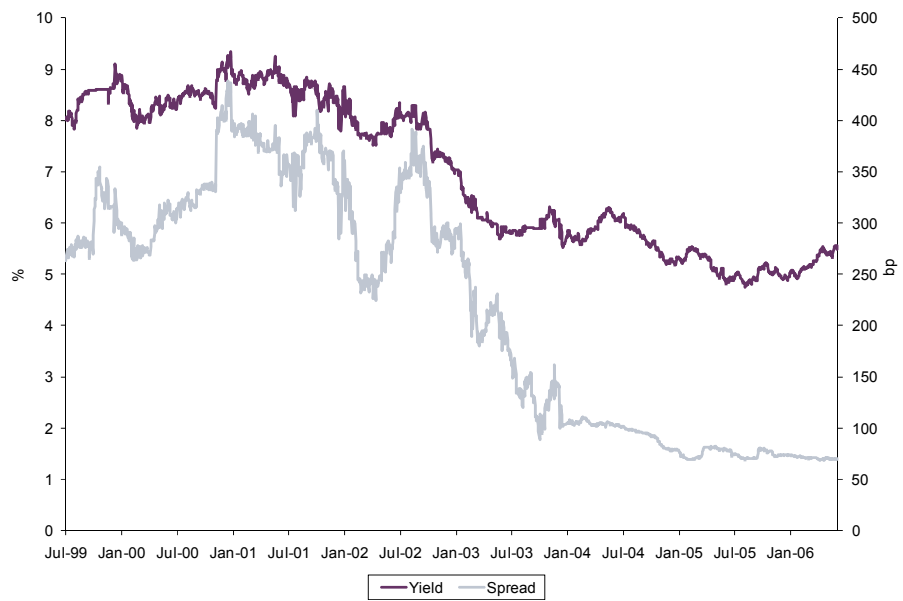
Source: Datastream.

Figure A2.2 BSkyB Group's one-year and five-year rolling equity betas



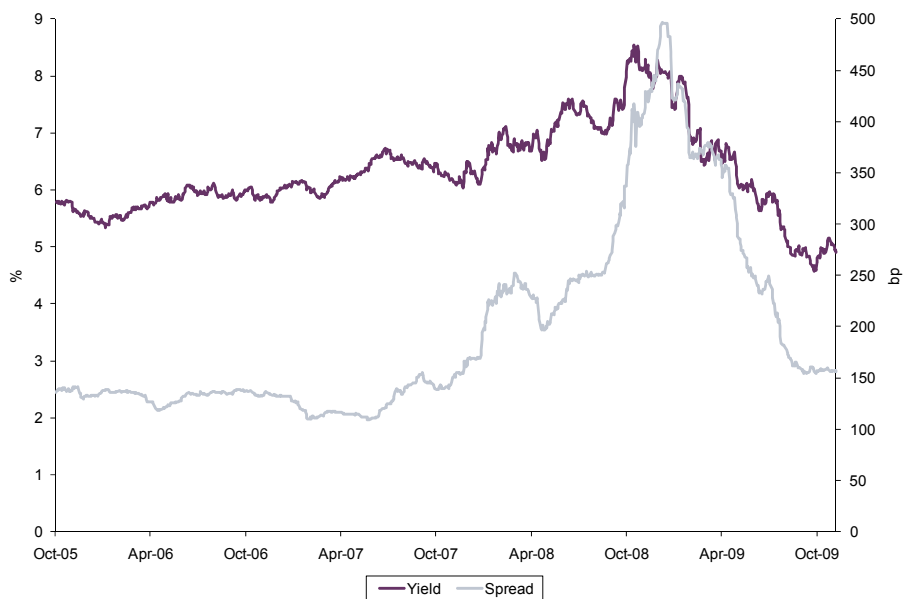
Source: Datastream, and Oxera calculations.

Figure A2.3 Yields (%) and spreads (bp) on BSkyB Group's bond issued in 1999 and maturing in 2009



Source: Datastream, and Oxera calculations.

Figure A2.4 Yields (%) and spreads (bp) on Sky's bond issued in 2005 and maturing in 2017



Source: Datastream, and Oxera calculations.

A3 Alternative time period for the gap between ROCE and WACC

Table A3.1 Difference between ROCE (book values of assets, total assets less current liabilities as capital employed) and WACC (nominal, pre-tax), 1995–2008

		Sky (%)	Median for the index (%)	Average for the index (%)	Number of companies with profitability gap higher than Sky	Total number of companies in the index	Proportion of companies with profitability gap higher than Sky (%)
Overall market	FTSE 350		2.3	5.4	1	143	0.7
Media companies	FTSE 350 Media	87.5	-1.4	7.2	0	8	0.0
Telecoms companies	FTSE 350 Telecoms		3.4	27.7	0	3	0.0

Note: ROCE measured as EBIT divided by total assets less current liabilities, for all companies including Sky. Source: Bloomberg, Sky, Datastream, and Oxera calculations.

Table A3.2 Difference between ROCE (DRC for Sky, book values for comparators, total assets less current liabilities as capital employed) and WACC (pre-tax real for Sky and pre-tax nominal for comparators), 1995–2008

		Sky (%)	Median for the index (%)	Average for the index (%)	Number of companies with profitability gap higher than Sky	Total number of companies in the index	Proportion of companies with profitability gap higher than Sky (%)
Overall market	FTSE 350		2.3	4.8	42	143	29.4
Media companies	FTSE 350 Media	[x]	-1.4	-2.8	0	8	0.0
Telecoms companies	FTSE 350 Telecoms		3.4	1.1	0	3	0.0

Note: ROCE measured as EBIT divided by total assets less current liabilities, for all companies excluding Sky. For Sky, ROCEs are measured with total assets valued on a DRC basis, less investments in joint ventures, and the accounting gap is measured relative to the real WACC. Source: Bloomberg, Sky, Datastream, and Oxera calculations.

A4 High-level review of selected CC and OFT precedents

A selected sample of CC precedents was reviewed to explore the CC's approach to interpretation of observed returns and estimates of competitive benchmark (eg, cost of capital), and the weight given to these measures in the final determination. Furthermore, the reviewed precedents include, to a variable extent, discussion on the interpretation of the derived estimates, and the factors, such as innovation, that may contribute to the gap between returns and the cost of capital.

The specific CC precedents reviewed include the following inquiries/market investigations:

- classified directory advertising services;
- personal current account banking services in Northern Ireland;
- banking services to SMEs;
- home credit;
- video games;
- newspapers;
- tampons;
- photocopiers;
- online database services.

Furthermore, the OFT's review of BSkyB in 1996 has been reviewed to provide further insight into competition authorities' approach to the interpretation of returns and estimates of competitive level of returns.

A4.1 The role of profitability analysis in competition investigations

Some of the precedents reviewed have involved explicit comparison of returns against the cost of capital, while others have based the profitability analysis on a comparison of accounting ratios against industry benchmarks. Examples of cases involving analysis of the profitability gap include classified directory advertising services, banking services to SMEs, home credit, and the OFT's 1996 assessment of BSkyB.

- In the classified directory advertising services market inquiry, the CC estimated Yell's returns using a truncated IRR and ROCE based on turnover, costs and EBITDA measures. In addition, the CC compared Yell's ROS with selected comparators. The profitability gap was estimated to be in the range of –2% to 12%, based on a comparison of truncated IRRs and ROCEs to the WACC. While the CC did not state explicitly how much weight it placed on various types of measures, it acknowledged its preference for truncated IRR and recognised the limitation of the EBITDA-based measures.¹⁰⁵ The following was concluded by the CC:

Because of the issues we faced in asset valuation, our preferred measure for this investigation is the truncated IRR which gives less weight to asset valuations than ROCE. From the above results, we conclude, based on the truncated IRR estimates, that Yell's profits were high over the five years to 31 March 2006 and in excess of its WACC. This view is supported by the benchmarking we have done comparing Yell's ROS with various comparators.

While our preferred measure here is the truncated IRR over the five years, this measure does not show the trends over the period, nor is it suitable for focusing on the results of a particular year. For this, we need to consider our estimates of ROCE. Our range of

¹⁰⁵ Competition Commission (2006), 'Classified Directory Advertising Services market investigation', December 21st.

estimates of Yell's ROCE calculated using turnover and cost multiples for each of the five years overlaps with our estimated range of WACC for the period and trends down over the five years.

It is therefore not possible to conclude from the available evidence that Yell's profits at the end of the period were in excess of its WACC, although a number of factors suggest that they may have continued to be so. These include the fact that while our estimated ROCE figures were declining over the period, so was our estimate of the WACC, and the likelihood that the measures we have used will have tended to overstate the value of Yell's assets, and hence understated its profitability.¹⁰⁶

- Similarly, in the CC's inquiry into the supply of banking services to SMEs, the cost of equity was considered the appropriate measure of profitability due to the nature of the industry. A profitability gap of 9%, 10% and 12% in 1998, 1999 and 2000 respectively between the returns on equity and cost of equity of the four largest clearing groups was considered to indicate excessive profitability.¹⁰⁷
- A further example is the home credit market investigation in which the CC concluded that the 5–13% profitability gap between the ROCE of S&U and Provident respectively and the cost of capital of other typical large home lenders partly reflected prices that were higher than they would be in a competitive market.¹⁰⁸
- In the OFT's 1996 assessment of BSKyB's profitability, the IRR was compared with the cost of capital, and the 'excess return' of 10.3% was considered high and, according to OFT, could not be sustained in a competitive market.¹⁰⁹

The CC has also undertaken benchmarking analyses to supplement its profitability assessments. Examples of its benchmarking analyses are summarised below.

- In the classified directory advertising services investigation, the CC compared Yell's ROS against 4,000 other companies in the UK, Continental Europe and the USA. Furthermore, it compared Yell's UK ROS to that of its business in the USA. The CC tested several scenarios, including comparing Yell's returns to companies with similar risk profiles as indicated by turnover volatility, EBITDA volatility and betas. The CC found that Yell's ROS was always in, or above, the eighth decile of the whole sample and sub-samples with similar risk characteristics.¹¹⁰
- Similarly, in the investigation into the UK video games industry, the ROS and gross margins of a sample of comparators with risk exposure similar to that of Nintendo and Sega were used. Specific characteristics mentioned were strong brand name, heavy promotion among young consumers, and rapid changes in fashion and technology. Further comparisons were conducted for companies with activities in the video games value chain.¹¹¹
- Another example of the use of comparators is the investigation of the tampons industry of the UK, in which ROCE was compared against a sample of companies in the health

¹⁰⁶ Competition Commission (2006), 'Classified Directory Advertising Services market investigation', December 21st, paragraphs 7.110 - 7112.

¹⁰⁷ Competition Commission (2002), op. cit.

¹⁰⁸ Competition Commission (2006), 'Home credit market investigation', November 30th.

¹⁰⁹ Office of Fair Trading (1996), 'The Director General's review of BSKyB's Position in the Wholesale Pay TV Market', December.

¹¹⁰ Competition Commission (2006), 'Classified Directory Advertising Services market investigation', December 21st.

¹¹¹ Monopolies and Mergers Commission (1995), 'Video Games – A report on the supply of video games in the UK', March.

sector. However, there was no explicit indication of whether these were the competitive benchmarks.¹¹²

A4.2 Assessment of the impact of innovation

The CC precedents include, to a variable extent, discussion on the interpretation of the derived estimates, and the factors that might contribute to the gap between IRR and cost of capital—innovation being the relevant factor in this context. In the reviewed determinations, the CC has concluded the following.

- Having undertaken a qualitative assessment of Yell’s innovation, specifically in colour advertising, the CC concluded that colour advertising was not a significant innovation to the extent it could enable Yell to continue to earn substantial returns in a competitive market.¹¹³
- In both the home credit market and the Northern Ireland banking investigation, the CC recognised that in the short term actual returns might deviate from expected returns on capital due to innovation, but that, in the medium to long run, these should converge.¹¹⁴
- Furthermore, in the tampons market investigation, the MMC recognised that high profits may be reasoned by innovativeness and entrepreneurial ability, but it did not make any adjustments for this in the analysis.¹¹⁵

An example where the MMC explicitly discusses the case for innovation in the form of high-risk investments is the investigation into indirect electrostatic photocopiers in the UK. It recognised the high innovativeness of Rank Xerox in the interpretation of profitability analysis:

At the time when Rank Xerox began to market plain paper copiers in this country, the Xerox group had already undertaken a great deal of costly research and development which had been by no means assured of success; and even when a commercially marketable machine had been developed there was no certainty that it would be commercially and technically successful. In its early days the production and marketing of plain paper copiers must therefore be regarded as having been a high risk industry. On this account alone relative high profits could be justified for a period to allow adequate reward for the risks accepted. However, Rank Xerox has now become firmly established and, although new techniques and new machines are still being developed, the period of particularly high risk and the need to compensate for such risk have in our view passed. In making this point we do not imply that the industry is now free from risk. An example of continuing risk is the fact that a recently introduced machine has not achieved the targets set for it. There must also be some risk involved in the launching of the company’s latest machine, the 9200. But such risks are in our view not risks of the severity involved in the original development and marketing of plain paper copiers.¹¹⁶

Thus, the MMC suggested that the risk of investments made more recently was not sufficient to explain the high returns.

Furthermore, it is noted that OFT undertook sensitivity checks to establish what the probability of failure of the investment would have to be in order to eliminate the excess

¹¹² Monopolies and Mergers Commission (1986), ‘Tampons – A Report on the supply in the United Kingdom of Tampons’, January.

¹¹³ Competition Commission (2006), ‘Classified Directory Advertising Services market investigation’, December 21st.

¹¹⁴ Competition Commission (2006), ‘Home credit market investigation’, November 30th.

¹¹⁵ Monopolies and Mergers Commission (1986), ‘Tampons – A Report on the Supply in the United Kingdom of Tampons’, January.

¹¹⁶ Monopolies and Mergers Commission (1976), ‘Indirect electrostatic reprographic equipment—A report on the supply of indirect electrostatic reprographic equipment’, December.

return. The OFT estimated that the prior probability of failure would have had to have been 41.1% and concluded that such a high level of risk seemed implausible.¹¹⁷

¹¹⁷ Office of Fair Trading (1996), 'The Director General's review of BSkyB's Position in the Wholesale Pay TV Market', December.

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**ESTIMATE OF
BSB'S EQUITY BETA**

JANUARY 2010

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1 Introduction

Ofcom asked us to perform an update of BSkyB's equity beta to reflect recent stock market data. In this report, we adopt the same methodology as in other previous engagements for Ofcom.¹ We calculate daily returns from holding stock in BSkyB and from holding a market index. We examine data for two market indices: the FTSE All-Share reflecting all stocks trading on the London Stock Exchange, and the FTSE All-World reflecting a large proportion of publicly traded stocks around the world. We perform a regression of the daily returns on each company against the daily returns on the market index. The regression coefficient is the equity beta. We use market data up to and including January 20th 2010.

Previous work for Ofcom examined beta estimation methods.² One issue concerned the frequency with which to measure stock returns: whether to use daily, weekly or monthly returns. Analysts might use weekly or monthly returns if there is a concern about the liquidity of stock trading. No such concern exists in this case. Trading in the stock of BSkyB is highly liquid. During 2009, the average daily trading volume was 4.1 million shares, equivalent to turning over 1.1% of the shares outstanding every week. All of our estimates therefore focus on daily returns. Another methodological choice relates to the duration of the data window. We focus on a two-year window in this report, while also reporting the results from a one-year window. Two years provide a sizeable sample of daily stock returns without extending so far back in time as to include data from periods before the four companies experienced significant changes.

We provide an important caveat for the work presented in this report. While we examine the statistical robustness of the observed betas, we do not assess in detail the broad effect of the credit crisis on the observed betas nor do we assess whether the immediate past could be a reliable guide to the future period of interest to Ofcom.

Chapter 2 presents beta estimates for BSkyB. Chapter 3 reports the results of several tests of the statistical reliability of the beta estimates.

¹ See, for example, *Updated Estimate of BT's Equity Beta* (October 2008) and *An Estimate of the Equity Beta of BskyB* (March 2009).

² See *Issues in beta estimation for UK mobile operators*, July 2002.

2 Equity beta estimates

2.1 Current estimates

Table 1 reports beta estimates for BSKyB. All of the estimates rely on daily return data. We report separate one-year and two-year beta estimates as well as separate estimates against two market indices. All of the various estimates reflect data up to January 20th 2010.

Table 1: Current equity beta estimates

	1 Yr		2 Yr	
	Beta	SE	Beta	SE
All-Share	0.648	0.071	0.855	0.042
All-World	0.450	0.085	0.673	0.060

Beta estimates against the FTSE All-share come in roughly 0.1-0.2 higher than against the All-world. This effect occurs for both the one-year and two-year estimates. The effect may be unsurprising, given the predominant UK focus of BSKyB's operations. Nevertheless, the gap between the beta estimates for the different indices only re-opened following the heart of the credit crisis. The graphs below show a recent downward trend in the one-year estimates, from which the two-year estimates have been somewhat insulated to date. The divergence between the one-year and two-year estimates only re-appears during 2009. We also note that the two-year betas against both indices come in higher than the one-year counterparts.

The two-year beta estimate against the All-share is almost identical to the estimate presented in our previous report (0.88 to 0.86), while the one-year beta against the All-Share has declined by almost 0.3 (0.92 to 0.65). The two-year beta estimate against the All-world declined by just over 0.1 (0.83 to 0.67), while the one-year estimate has declined by close to 0.4 (0.82 to 0.45).

2.2 Beta estimates over time

In the previous section, we observed changes in the BSKyB beta estimates over the past year or so. We now examine how recent stock market performance has affected estimates of BSKyB's equity beta. Figure 1 plots "rolling" one-year and two-year beta estimates for BSKyB against the FTSE All-share. Figure 2 is a repeat of Figure 1, except that we calculate estimates against the FTSE All-world. All of the plots keep the duration of the beta estimation windows constant through time (either one or two years). They simply shift the data window forward as time passes.

Figure 1: Rolling betas against the FTSE All-share



Figure 2: Rolling betas against the FTSE All-world



Developments in financial leverage may contribute to the overall shape of the beta estimates over time, but they cannot fully explain the observed movements. In other words, the rise in the equity beta estimates between mid-2007 and the end of 2008 is greater than we would predict based on the observed changes in financial leverage, as is the decline in the one-year beta estimates since Autumn 2008.

BSkyB's stock price peaked in mid-2007 at just over £7 a share. Over the next year, the stock price more than halved to as little as £3.30 during the heart of the credit crisis in October 2008. The stock price collapse wiped over £6 billion off of BSkyB's market capitalisation, with the market cap bottoming out in October 2008 at £5.7 billion. Since then, the stock price has recovered significantly, and now stands at close to £6 a share, implying a current market cap of £10 billion.

During the stock price collapse (mid 2007 to end of 2008), BSkyB took on close to a £1 billion in additional debt. The collapse in the market cap together with the rise in debt prompted a modest spike in BSkyB's financial leverage at the end of 2008. As of mid-2007, financial leverage stood close to 15% (debt outstanding of roughly £2 billion and a market cap of £12 billion at the peak). By October 2008, financial leverage more than doubled to over 33% (debt outstanding rose to £3 billion, and the market cap collapsed to just under £6 billion). The spike in financial leverage corresponds with the spike in the one-year betas, suggesting that financial leverage may have contributed some of the observed movements in equity beta.

Table 2 documents the change in financial leverage over time. It calculates financial leverage in two ways: one consistent with our previous report, and an alternative measure based on a fuller assessment of BSkyB's net working capital position. Our previous report relied on "net debt" figures supplied by Bloomberg. "Net debt" is a standard measure of a firm's financial obligations commonly used by financial analysts, and equals debt outstanding less the cash balance. At the end of 2008, a rising cash balance offset the introduction of additional liabilities and masked the appearance of any spike upwards in financial leverage.

In the preparation of this report, we reviewed BSkyB's annual reports for this update, and identified that BSkyB consistently runs negative working capital (current liabilities often exceed current assets). Negative working capital arises in part because BSkyB's accounts payable significantly exceeded its accounts receivable. At the end of 2008, payables exceeded receivables by an amount close to the balance of cash on hand. BSky B has apparently been relying on the payables, which are another form of debt, to raise sufficient cash for operations. Given this position, treating negative working capital as additional debt gives a superior measure of BSkyB's ongoing financial obligations than "net debt" which deducts the cash balance from long-term debt without considering the liabilities represented by accounts payable. Table 2 calculates financial leverage in both ways and shows how our preferred approach for measuring leverage reveals the spike at the end of 2008.

Table 2: Financial leverage

	Full Assessment of Net Working Capital			Based on Net Debt		
	End of	One-Year	Two-Year	End of	One-Year	Two-Year
	Period	Average	Average	Period	Average	Average
31-Dec-05	9.2%	9.2%		4.0%	4.0%	
30-Jun-06	9.5%	9.3%		4.9%	4.4%	
31-Dec-06	19.1%	14.3%		17.4%	11.1%	
30-Jun-07	15.3%	17.2%	13.3%	12.3%	14.9%	9.7%
31-Dec-07	16.4%	15.9%	15.1%	13.9%	13.1%	12.1%
30-Jun-08	21.9%	19.2%	18.2%	16.5%	15.2%	15.0%
31-Dec-08	25.4%	23.6%	19.8%	21.2%	18.8%	16.0%
30-Jun-09	20.2%	22.8%	21.0%	15.6%	18.4%	16.8%

Note: Financial leverage reached its peak in October 2008 when the stock price hit its low point. The end of year figure already reflects a 50% recovery of the stock price and consequent reduction in leverage.

Simple calculations illustrate the potential scale of financial leverage on the beta estimates. If we use the simplest possible re-levering formula and presume financial leverage increased from 15% in mid-2007 to 30% during the heart of the crisis, we would expect the equity beta to rise by 0.1-0.2. Figure 1 and Figure 2 both illustrate a larger 0.3-0.5 rise in the one-year equity betas over the relevant time frame. At least 0.1-0.3 of the observed rise in the one year equity betas therefore remains unexplained. By the same token, we might expect the recent improvement in the stock price and consequent reduction in financial leverage to prompt a decline in the equity beta of similar magnitude – i.e. 0.1-0.2. This would again leave some of the recent movement in the one-year beta estimates unexplained.

A range of 0.1-0.2 represents an upper bound on the impact of financial leverage. The average financial leverage during the entire one and two data windows is most relevant to our beta estimates. The average over extended data windows will be necessarily less volatile than the snapshots considered above. Leverage developments may somewhat contribute to the observed beta estimates, but they cannot provide the full explanation.³

The explanation for the downward trend in the one-year beta estimates since October 2008 must lie elsewhere from financial leverage. It could stem from a general re-assessment of risk on the part of investors since the collapse of Lehman. Investors' recent risk assessments may be motivated in part by the robust performance of BSKyB's customer portfolio during the recession. Perhaps the customer portfolio has proved more resilient to the economy than anyone expected. A change in risk perceptions would flow through slowly to the beta estimates as more recent post-Lehman data replaces pre-crisis data in the data window, and as the robust performance of BSKyB became apparent. The

³ Another reason that 0.1-0.2 is an upward bound is that our leverage calculations presume that the market value of BSKyB's debt remains close to its face value throughout the period in question. This assumption is reasonable since BSKyB retains a high investment grade credit rating. However, our approach may overstate leverage in 2008 to the extent that corporate yields spiked and bond prices dipped during the credit crisis.

shape of the one-year beta estimates is potentially consistent with this view, with a slight trend downwards since the credit crisis began as data from before the Lehman collapse falls out of the rolling data window.

Figure 3 compares rolling one-year betas against the FTSE All-share and FTSE All-world. A gap between the indices has again appeared since the collapse of Lehman Brothers, with the beta against the All-world declining at a greater rate than the beta against the All-share. This may reflect UK performance relative to the rest of the world. The effects of the credit crisis on the UK economy were severe, not least because of the importance of financial services to the UK. Effects elsewhere were somewhat different. These differential impacts could underlie the divergence of the estimates against the two indices.

Figure 3: One-year betas



We cannot be certain about any of these observations. The overall magnitude of the observed changes in the betas remain within or close to twice the standard error. We tested our two-year betas for the possibility of a structural break around the end of 2008, reflecting a wholesale re-assessment of risk following the collapse of Lehman. To test for such a structural break, we performed a Chow test with the hypothesis of a structural break during September and October 2008. The test comes out negative.

Although we observe a current downward trend in the one-year estimates, which in time we would expect to flow through to the two-year estimates, we cannot yet conclude if the trend simply represents statistical noise or if it is something more fundamental.

2.3 Discussion

The recent movements in the equity beta estimates for BSkyB cannot be explained with reference to changes in financial leverage, although financial leverage may have

contributed. In chapter 3 we perform several statistical tests and confirm that the beta estimates are generally reliable. Nevertheless, chapter 3 indicates that standard errors calculated in the normal way will tend to understate the true uncertainty of the estimates. For example, we find several Dimson coefficients are significant. Incorporating the effect of leads and lags into the regression widens the resulting standard errors. Indeed, our estimates would reflect more uncertainty even than that, if we also thought it likely that the true beta had fundamentally changed over time.

The best current estimate for the equity beta of BSKyB is: 0.67. We report the beta against the FTSE All-World because BSKyB pulls substantial investment from all corners of the globe. We would normally recommend a range of +/- approximately two standard deviations around the mid-point figures. However, in this case, because of the presence of both significant Dimson coefficients and some heteroskedascity and autocorrelation, we cannot rule-out a beta estimate within a much wider range – 0.40-0.95.⁴

⁴ The wider range reflects that around the most recent Dimson beta against the All-world.

3 Statistical reliability

The use of daily returns data in regressions to estimate equity beta can risk introducing statistical problems, for example in relation to thin trading. We discussed these problems in earlier papers for Ofcom.⁵ We perform a number of statistical tests to check for potential problems in this case.

3.1 Dimson adjustment

To test for possible bias relating to trading illiquidity and to assess if time differences⁶ caused distortions, we perform the “Dimson” adjustment to the estimated betas by including a one-period lag and a one-period lead. Over the two data periods, the separate coefficients of the lag and lead terms were significantly different from zero in only two cases: the two-year regression against the All-share using up-to-date data, and the two-year regression against the All-world using up-to-date data. Although a lead or lag coefficient was significant in these regressions, the resulting Dimson adjustments never result in a statistically different beta estimate overall from the one obtained using the standard approach. Nevertheless, the significant coefficients may indicate the presence of a wider confidence interval for the observed betas than the standard approach. Table 3 reports Dimson betas and standard errors.

Table 3: Dimson adjustments – up-to-date data

	1 Yr				2 Yr			
	Beta	Dimson Beta	Dimson SE	Significance	Beta	Dimson Beta	Dimson SE	Significance
<i>All-share</i>								
19-Jan-10	0.65	0.75	0.19	Neither lag nor lead	0.86	0.82	0.10	Only lag significant
31-Aug-08	0.97	0.93	0.18	Neither lag nor lead	0.85	0.78	0.13	Neither lag nor lead
<i>All-world</i>								
19-Jan-10	0.45	0.40	0.21	Neither lag nor lead	0.67	0.78	0.14	Only lead significant
31-Aug-08	0.97	0.82	0.24	Neither lag nor lead	0.86	0.80	0.10	Neither lag nor lead

3.2 Tests for heteroscedasticity and auto-correlation

We perform a series of standard diagnostic tests to assess if the beta estimates satisfy the standard conditions underlying ordinary least squares regression. The standard conditions are that the error terms in the regression follow a normal distribution and that they do not suffer from heteroscedasticity (linked to the fitted values) or auto-correlation (follow some pattern over time). Failure to meet these conditions would not invalidate the beta estimates, but would have the following consequences:

⁵ See *Issues in beta estimation for UK mobile operators*, July 2002.

⁶ The London Stock Exchange closes at 5pm BST, while the markets in other countries close may close earlier or later. Broad index data may therefore combine closing prices relating to different time of day.

1. Although OLS is still an unbiased procedure in the presence of heteroscedasticity and/or autocorrelation, it is no longer the best or least variance estimator.
2. In the presence of heteroscedasticity and/or autocorrelation, the standard error calculated in the normal way may understate the true uncertainty of the beta estimate.
3. Heteroscedasticity and/or auto-correlation may indicate that the underlying regression is mis-specified (i.e. we have left out some explanatory variable).
4. Failure of normality does not *per se* undermine the validity of OLS, but the presence of outliers raises difficult questions about the robustness of the beta estimates.

Heteroscedasticity

Figure 4 to Figure 5 show scatter plots of the residuals against the returns predicted by the regression, for our two-year regressions using up-to-date data. We constructed comparable plots for our one year regressions and when analyzing different time periods. Visual inspection does not reveal any obvious pattern - the “vertical spread” does not appear to change in any systematic way as we move horizontally across the graph. However, there are clearly a number of outliers.

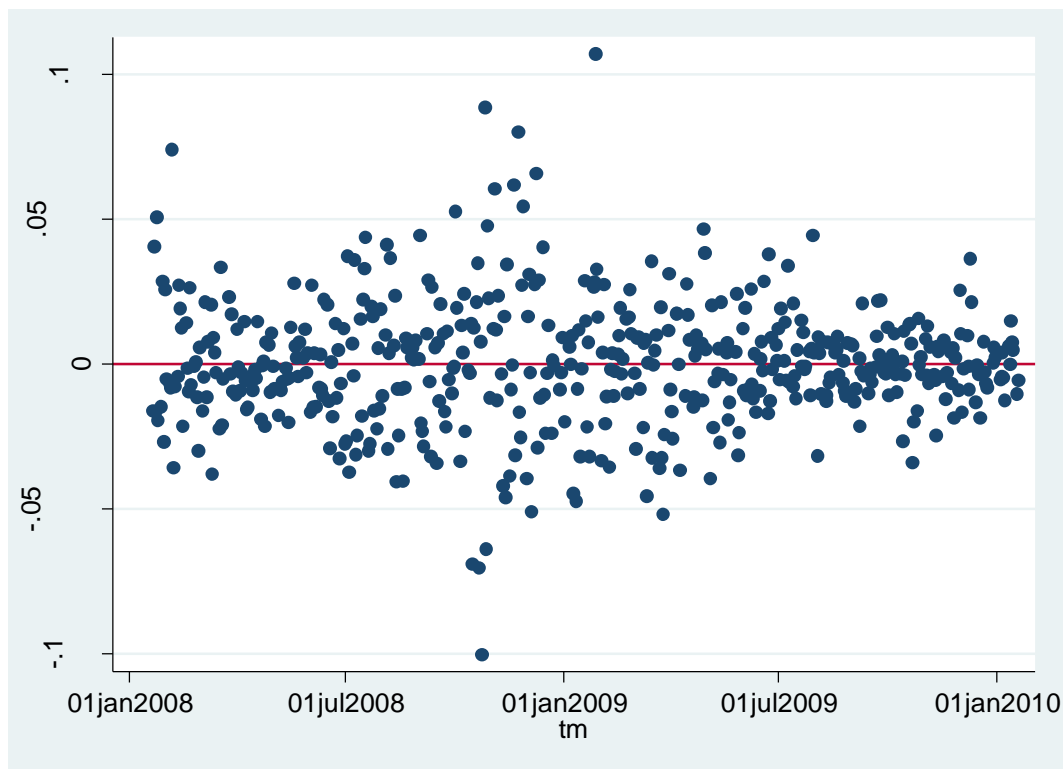
Figure 4: Up-to-date two year beta against All-share –residuals against fitted values

Figure 5: Up-to-date two year beta against All-world - residuals against fitted values

We also examine whether there is a change in the pattern of residuals over time. Figure 6 to Figure 6 show an apparent peak in the magnitude of the residuals around the end of 2008, with the magnitude of residuals declining since then. All this appears to reflect market turmoil, and the extreme volatility witnessed during the heart of the credit crisis, as well as some recovery since then. The plots again relate to two-year beta estimates using up-to-date data.

Figure 6: Up-to-date two year beta against All-share - residuals over time

Figure 7: Up-to-date two year beta against All-world – residuals over time



Since simple inspection suggests that there may be some heteroscedasticity, we apply a formal test (Cameron & Trivedi's decomposition) to investigate further. This test is similar to the White test, which we used in previous reports, but covers both heteroskedascity and the skew and kurtosis of the errors. Table 4 reports results.

Table 4: Cameron & Trivedi's test for heteroscedasticity

	1 yr			2 yr		
	Test statistic	p-value	Heteroskedasticity	Test statistic	p-value	Heteroskedasticity
<i>All-share</i>						
19-Jan-10	6.83	3.3%	Yes	7.13	2.8%	Yes
31-Aug-08	0.11	94.8%	No	3.28	19.4%	No
<i>All-world</i>						
19-Jan-10	5.16	7.6%	No	23.10	0.0%	Yes
31-Aug-08	1.50	47.3%	No	9.55	0.8%	Yes

The tables indicate the presence of some heteroscedasticity in the up-to-date data, but less in the pre-Lehman data. This most likely relates to the significant increase in market volatility around the heart of the crisis.

Auto-correlation

We also perform a formal test for auto-correlation (the Durbin-Watson test). Unsurprisingly, this test indicates a degree of autocorrelation in most of the regressions, also likely reflecting the development of the credit crisis and the changing extent of market volatility. The effect of this auto-correlation is that standard errors will overestimate the precision of the regression.

Table 5: Durbin–Watson test for autocorrelation

	1 yr		2 yr	
	DW Stat	Serial Correlation	DW Stat	Serial Correlation
<i>All-share</i>				
19-Jan-10	1.455	Yes	1.636	Yes
31-Aug-08	1.798	No	1.754	Yes
<i>All-world</i>				
19-Jan-10	1.562	Yes	1.847	No
31-Aug-08	2.035	No	1.909	No

Robust regression

We do not think that the heteroscedasticity and auto-correlation are a significant problem. We performed a robust regression that accommodates the presence of some heteroscedasticity in the data. The robust regression is a standard feature of computerised statistical packages like STATA. The robust regression derives the same coefficients as standard OLS, but calculates standard errors robust to heteroscedasticity. We find that the robust standard errors are close to the OLS ones (see Table 6). The presence of auto-correlation should not affect the central beta estimates, but means that even the robust standard errors will underestimate the true level of uncertainty associated with the measurements.

Table 6: Robust standard errors

	1 yr			2 yr		
	Beta	OLS SE	Robust SE	Beta	OLS SE	Robust SE
<i>All-share</i>						
19-Jan-10	0.648	0.071	0.085	0.855	0.042	0.054
31-Aug-08	0.973	0.066	0.064	0.845	0.048	0.056
<i>All-world</i>						
19-Jan-10	0.450	0.085	0.095	0.673	0.060	0.085
31-Aug-08	0.968	0.105	0.114	0.865	0.073	0.089

3.3 Normality of residuals

We plot histograms of the “studentised residuals” to test for the normality of the residuals. The curve superimposed on the histograms is a standard normal distribution. If the error terms follow a normal distribution then the studentised residuals should follow the t-distribution, which for our size of sample is practically indistinguishable from the standard normal distribution. The histograms broadly resemble normal distributions except for a few too many observations in the centre of the plots and a few too many outliers. Figure 8 to Figure 9 show histograms for two-year regressions using up-to-date data.

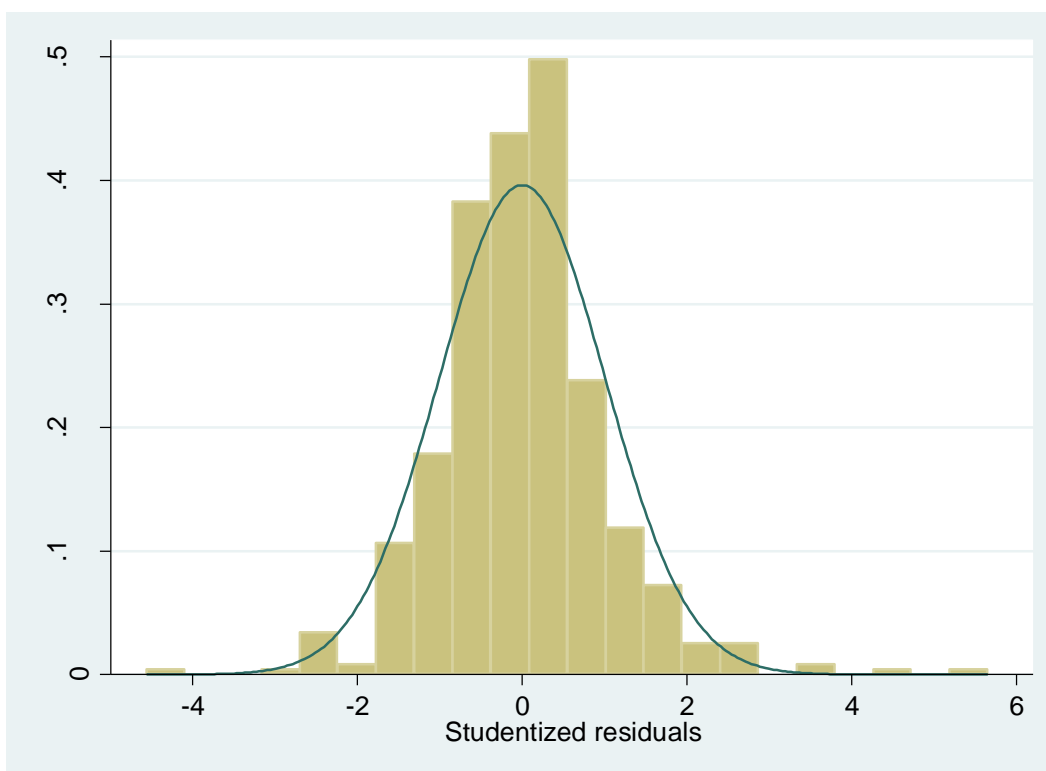
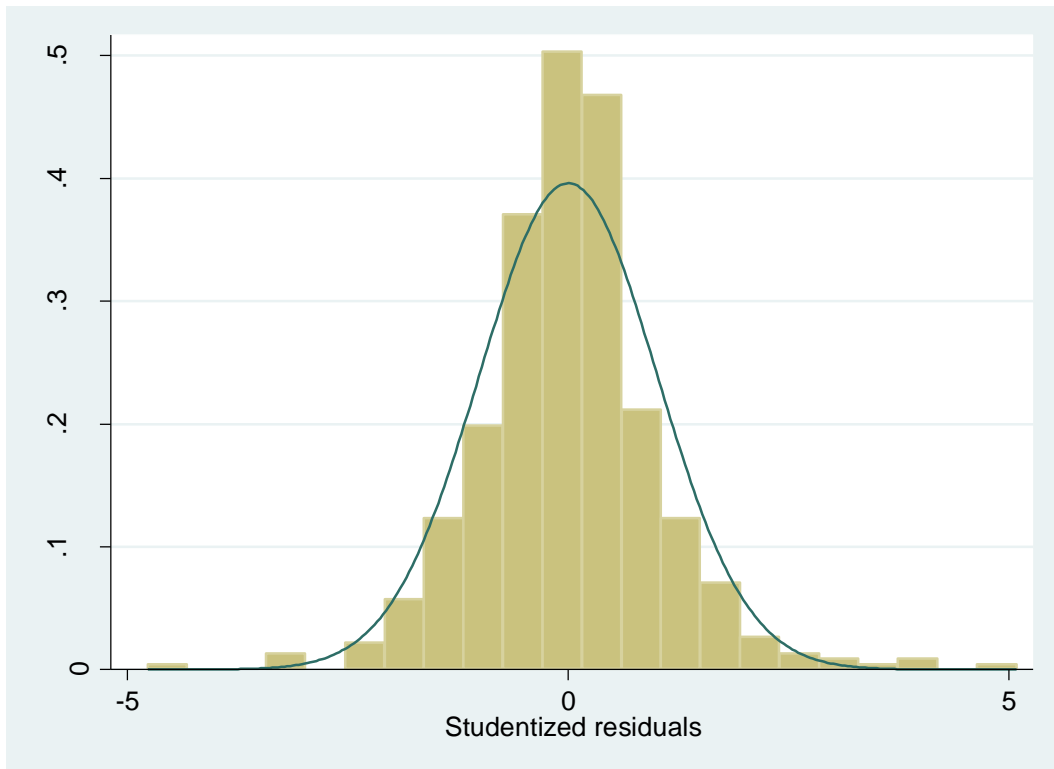
Figure 8: Studentized residuals – two year against all-share

Figure 9: Studentized residuals – two year against all-world



3.4 Outliers

We perform two analyses to understand the influence of particular points on our beta estimates. We repeat the standard OLS regressions but only after removing “influential outliers”. We also perform an iterative regression that gives less weight to data points reporting large residuals and enjoying high leverage (i.e. influence on the regression line).

To identify potential outliers we calculate the ‘Cook’s D’ measure of the influence of each point on the regression outcome. A usual threshold is to classify points with a Cook’s D score over $4/N$ (number of observations) as influential. Table 7 lists such influential dates for the two year betas calculated using up-to-date data. The majority of the influential “outliers” for the two year regressions occurred during September to December 2008 – i.e. in the immediate aftermath of the collapse of Lehman Brothers. No other period of the data window contributes as many outliers for the two year regressions. The majority of the outliers for the one year regressions occurred in March and April 2009.

Table 7: Removing influential outliers

All Share		All World	
1 Yr	2 Yr	1 Yr	2 Yr
28-Jan-09	24-Jan-08	28-Jan-09	24-Jan-08
29-Jan-09	6-Feb-08	29-Jan-09	6-Feb-08
2-Mar-09	5-Aug-08	10-Mar-09	11-Mar-08
3-Mar-09	19-Sep-08	12-Mar-09	26-Jun-08
10-Mar-09	2-Oct-08	17-Mar-09	5-Aug-08
16-Mar-09	8-Oct-08	23-Mar-09	9-Sep-08
23-Mar-09	10-Oct-08	25-Mar-09	19-Sep-08
2-Apr-09	13-Oct-08	26-Mar-09	2-Oct-08
29-Apr-09	15-Oct-08	9-Apr-09	6-Oct-08
30-Apr-09	16-Oct-08	29-Apr-09	16-Oct-08
5-May-09	17-Oct-08	30-Apr-09	20-Oct-08
13-May-09	22-Oct-08	5-May-09	22-Oct-08
3-Jun-09	24-Oct-08	13-May-09	24-Oct-08
30-Jul-09	27-Oct-08	21-May-09	27-Oct-08
3-Aug-09	29-Oct-08	9-Jul-09	28-Oct-08
14-Oct-09	4-Nov-08	30-Jul-09	29-Oct-08
	11-Nov-08		4-Nov-08
	17-Nov-08		11-Nov-08
	20-Nov-08		13-Nov-08
	24-Nov-08		17-Nov-08
	28-Nov-08		20-Nov-08
	1-Dec-08		21-Nov-08
	9-Dec-08		24-Nov-08
	9-Jan-09		28-Nov-08
	14-Jan-09		1-Dec-08
	28-Jan-09		5-Dec-08
	29-Jan-09		8-Dec-08
	2-Mar-09		9-Dec-08
	2-Apr-09		28-Jan-09
	29-Apr-09		23-Mar-09
	5-May-09		26-Mar-09
	3-Aug-09		9-Apr-09
16	32	16	32

Table 8 compares the beta estimates obtained using standard OLS with those obtained through the iterative regression giving less weight to outliers and through a regression with all influential outliers removed. The broad similarity between the standard beta

estimates and the other estimates provides confidence that outliers are not driving the results.

Table 8: Influential outliers

	1 yr				2 yr			
	Standard	Robust	No Outliers	Number of Outliers	Standard	Robust	No Outliers	Number of Outliers
<i>All-share</i>								
19-Jan-10	0.648	0.618	0.622	16	0.855	0.794	0.840	32
31-Aug-08	0.973	0.961	0.959	15	0.845	0.801	0.787	42
<i>All-world</i>								
19-Jan-10	0.450	0.426	0.483	16	0.673	0.658	0.657	32
31-Aug-08	0.968	0.989	0.926	12	0.865	0.838	0.740	33