



A note on Ofcom's proposed WACC parameters for setting the ALF

This note sets out a range of evidence and analysis relating to determining the appropriate WACC parameters to use in setting the ALF (and relatedly, the appropriate inflation measure). Our view is that, rather than apply historical WACC parameters as used in the MCT decision, it would be more appropriate for Ofcom to use WACC parameters that reflect the latest available evidence. This would tend to suggest a somewhat lower WACC (and risk free rate) than currently proposed by Ofcom.

Introduction and context

Ofcom has published a consultation concerning its approach for determining the annual license fee (ALF) with respect to radio spectrum in the 900 MHz and 1800 MHz bands. This follows the December 2010 Government Direction, which specifically requires Ofcom to ensure that these rates reflect "full market value." This direction further requires Ofcom to have specific regard to the sums paid at the 4G Auction.

Setting the ALF requires Ofcom to first determine the 'lump sum' market value for spectrum and then convert this into an annual amount. In deriving the annual amount from the 'lump sum' valuation, Ofcom has ensured that the present value of the ALF payments (over 20 years) is equal to the market value of the lump sum.

From a practical perspective, in order to convert the estimated 'lump sum' market value for spectrum into an ALF, Ofcom has had to consider: (i) what the appropriate discount rate should be; (ii) whether it should be set in real or nominal terms (and relatedly, what the appropriate inflation measure should be); and (iii) whether it should be set on a pre or post-tax basis.

Regarding the above, in the Consultation Ofcom is proposing to:

- Set the cost of capital based on that used for the current charge controls for mobile call termination (MCT) – updated to reflect changes to corporation tax since those MCT controls were made.
- To set the cost of capital on a real, post-tax basis, reflecting Ofcom's view that bidders at the 4G Auction are likely to have formed their valuations based on expected returns after tax.

In the above context, Hutchison Three UK Ltd (Three) asked Economic Insight to consider Ofcom's decision to set the WACC using the parameters referenced in the MCT determination and provide our views as to: (i) what the appropriate approach should be to setting the WACC parameters (including providing our views as to the most appropriate inflation measure); and (ii) develop a range of evidence and analyses to inform what our proposed approach might imply in practice. In the remainder of this note we set out in turn:

- Ofcom's proposed approach for setting the WACC parameters for determining the ALF;
- the history of Ofcom's determination of WACC parameters for MCT;
- our assessment of the key issues relating to determining the appropriate approach to calculating the WACC for the purpose of setting the ALF; and
- recent evidence and analysis relevant to determining appropriate WACC parameters.

The wider question as to whether it is, in fact, a MNO WACC – rather than any alternative measure of discount rates, such as the risk free rate or the cost of debt – that is appropriate to the setting of the ALF is outside the scope of our work for Three. Our views here, therefore, merely relate to the appropriate basis for determining WACC parameters, were that deemed to be the appropriate measure.

Ofcom's proposed approach to setting the WACC for determining the ALF

Ofcom believes that, consistent with its First Competition Assessment¹, the WACC parameters it estimated in its March 2011 MCT determination remain the appropriate proxy for the discount rate that should be used to derive the ALF from the lump sum value. Ofcom has stated that this is for a number of reasons:

- » As the MCT WACC was set in relation to a hypothetical UK MNO, it is likely to capture similar systematic risks to those of relevance to the ALF.
- » The systematic risk associated with the 4G spectrum (which Ofcom, in part, used to determine the value of the lump sum) should also be consistent with the systematic risk of a hypothetical UK mobile-only operator.
- » That although the MCT WACC was estimated for the purpose of a four year charge control period, Ofcom made use of long-term historical data to inform a number of parameters (for example, the ERP was based on historical data over 100 years). Therefore, Ofcom does not consider that it would take different evidence into account were it estimating a longer term WACC – and so the MCT WACC parameters are valid in the context of the ALF being set over a 20 year period² (although as noted below, Ofcom has used updated corporation tax rates).
- » Ofcom believes that the date at which bidders estimated the value of the 4G spectrum provides an important reference point. Consequently, Ofcom is not minded to update the WACC to reflect more recent evidence. Ofcom further states that it has reviewed whether it should update the parameters of WACC, but believes that there has been no material changes in circumstances for the majority of the parameters from those relied upon in March 2011.

¹ Which Ofcom refers to in relation to: 'Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues.' Ofcom (22 March 2011).

² Note the licence has an indefinite term, but Ofcom's analysis to set the ALF assumes a 20 year notional term.

Ofcom is, however, proposing to make two changes with respect to its approach relative to that set out in the First Competition Assessment. Firstly, Ofcom is now proposing to set the (real) WACC on a *post-tax*, rather than *pre-tax* basis. Ofcom's stated rationale for this is that it believes bidders will have valued spectrum on a post-tax basis. Ofcom has further stated that its previous position of using a pre-tax WACC reflected concerns regarding making adjustments for tax treatment under a post-tax approach to ensure value equivalence between the ALF and the lump sum. Ofcom now believes it can address these concerns by calculating the appropriate ALF tax adjustment (and this issue is dealt with in our separate paper prepared for Three). We agree with this approach, as it recognises that, in reality, firms must pay a proportion of their profits in taxation in addition to remunerating debt and equity holders. Secondly, Ofcom is proposing to update the WACC to reflect changes to the rate of corporation tax since the March 2011 MCT decision. In particular, the March 2011 MCT WACC incorporated a corporation tax rate of 24%. For setting the ALF Ofcom is proposing to use the lower rate of 20%, which will apply from 2015/16 onwards. The following table provides a summary of the key parameters assumed in Ofcom's proposed WACC for setting the ALF.

Table 1 WACC parameters proposed by Ofcom for ALF determination

WACC parameter	MCT (2011) value	Proposed ALF value (2013)
Real risk-free rate	1.5%	1.5%
Gearing	30%	30%
Equity risk premium	5.0%	5.0%
Asset beta	0.56	0.56
Debt premium	1.5%	1.5%
Overall real pre-tax cost of debt	3.0%	3.0%
Corporation tax rate	24%	20%
Inflation	2.5%	2.5%
Real pre-tax WACC	6.2%	5.9%
Real post-tax WACC	4.1%	4.2%

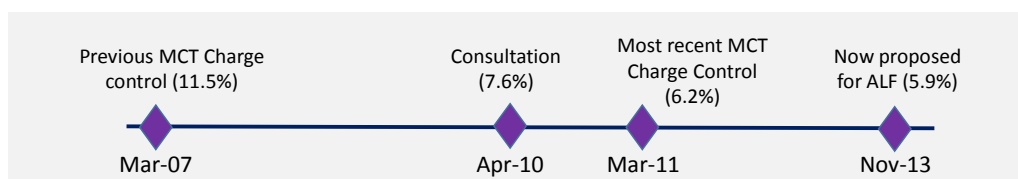
Source: Ofcom MCT determination and ALF consultation

Ofcom's determination of WACC parameters for mobile call termination

Given that Ofcom is proposing to base its WACC parameters for setting ALFs on the March 2011 MCT WACC, it is important firstly to understand the history and context to that MCT determination. In the following, therefore, we briefly set this out.

Firstly, it should be noted that Ofcom has created several iterations of cost of capital estimates for a hypothetically efficient UK mobile network operator in relation to MCT charge controls. Ofcom's final estimate for the *previous* charge control was in March 2007. It first consulted on the WACC for the *current* charge control in April 2010; and the latest estimate was in March 2011. The overall timeline for Ofcom's WACC determinations – and its estimates at each key milestone – is set out below.

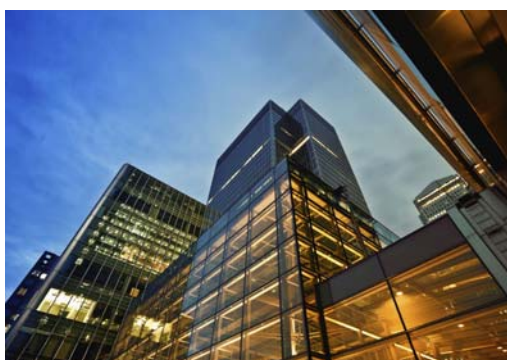
Figure 1: Ofcom Mobile Operator Pre-Tax Real WACC Estimates Timeline



Source: Ofcom and Economic Insight analysis

The above illustrates two important points. Firstly, it shows that it, particularly in times of financial market and wider macroeconomic uncertainty, one's view as to what the appropriate WACC should be can vary materially over a relatively short period in time. Secondly, that whilst Ofcom ultimately set the MCT WACC in March 2011, this was part of a long and detailed process that began at a much earlier point in time. Therefore, in order to determine the suitability of the parameters used in the

MCT decision to the setting of the ALF today, one must understand: (i) the overall context within which Ofcom reached its conclusions; and (ii) the data and evidence it relied upon.



"In times of financial market and wider macroeconomic uncertainty, one's view as to what the appropriate WACC should be can vary materially over a relatively short period in time."

At the time of the March 2011 MCT decision, Ofcom commented on the extent to which the WACC had changed (1.4% percentage points) relative to the April 2010 consultation. Ofcom specifically stated that most (1.0%) of this was due to changes in macroeconomic circumstances – lower interest and tax rates, with the remainder (0.4%) of the change being due to a perceived reduction in the risk profile of mobile telecoms relative to the market as a whole.³

In order to be able to consider the appropriateness of the MCT WACC to the setting of the ALF, it is also important to review: (i) precisely what data and information Ofcom relied upon for each individual WACC parameter; and (ii) over what time period that data was assessed. Key issues addressed by Ofcom of particular relevance to the analysis set out in this paper include:

- » The extent of mean reversion that should be allowed for in the risk free rate (RFR) – Ofcom set a RFR of 1.5%, which was materially above prevailing spot rates at the time of the MCT decision.
- » Betas and gearing for the hypothetical MNO were based on Vodafone data because Ofcom deemed its activities to most closely align to those of a pure MNO. We agree with the relevance of Vodafone, but evidence shows that betas and gearing can evolve relatively rapidly.
- » The appropriate corporation tax rate. In the MCT decision Ofcom assumed a rate of 24%. However, for setting the ALF, Ofcom is proposing to use prevailing tax rates (we suggest there is a tension between this and Ofcom's decision not to update other WACC input parameters).

Further to the above, the following table (overleaf) provides a summary of the source information - and the periods over which it was assessed - in relation to Ofcom's final March 2011 MCT WACC determination.

³ 'Wholesale mobile voice call termination Modelling Annexes.' Annex 8: Cost of Capital, Ofcom, paras A8.7 – A8.8 (March 2011).

Table 2 Summary of evidence and assumptions relied upon by Ofcom in determining the March 2011 MCT WACC parameters

WACC parameter	MCT 2011 value	Source details
Risk-free rate (real)	1.5%	Primarily based on historical yields of 5 and 10 year government bonds (but with more weight on 5 year gilt) over a 10 year period. Ofcom's assumption of 1.5% was some way above prevailing risk free rates, but reflected its view that those levels were unsustainably low and that it was appropriate to take account of 'mean reversion'. Accordingly, Ofcom noted that the 5 year and 10 year yields on 5 year gilts were 1.3% and 1.7% respectively (in line with its 1.5% assumption). Ofcom also referenced the CC's risk free rate for Bristol Water of 1%-2%.
Gearing	30%	In the past Ofcom sought to identify an optimal level of gearing, based on a notionally efficient operator, which it assumed to be 10%. In the April 2010 consultation Ofcom used a range of 25%-35%. For the final March 2011 MCT determination Ofcom used 30%, which was based on the average gearing observed for Vodafone over the previous 2 years. Ofcom noted that this does not have any material effect on the overall WACC, as asset betas take into account gearing.
Equity risk premium	5.0%	Ofcom took into account evidence from respondents, market commentators, the Bank of England, and the Competition Commission to inform its review. In particular, research by Professors Dimson, Marsh and Staunton, who estimated the long-run ERP to be 5.2% (over the period 1900-2009) and the CC's determinations in relation to Bristol Water (2010) and the LLU Appeal (2009) where the ERP was determined to be 5.0%. One of the reasons cited for referencing the determinations by other regulators was "how recent" they were.
Beta	0.56	This is based on the mid-point of a range of averages for Vodafone over the following periods: 5 years to February 2011; 2 years to February 2011; 18 months to February 2011; and 1 year to February 2011. Vodafone is used because its lines of business are predominantly mobile (whereas the parent companies of other MNOs are engaged in a wider set of activities).
Debt premium	1.5%	Ofcom's debt premium estimate remained unchanged since its 2007 estimate. Its assumption of a 1.5% premium reflected yields on corporate debt with a 5 year redemption date (in line with its preference for 5 year gilts). Ofcom noted that recent yields on corporate bonds of the parent companies of UK mobile operators were in a range of 1-2% above risk-free rate. Ofcom further noted that the yield on Vodafone's 2017 GBP debt as of the middle of February 2011 was approximately 4.5%, around 1.5% above equivalent gilt yields.
Corporate tax rate	24%	For the March 2011 MCT decision, Ofcom took account of the Government's intention to reduce the corporate tax rate from 28% to 24% by 2014/15. As noted above, for the purpose of setting the ALF, Ofcom is proposing to use a rate of 20%, which will be effective from 2015/16.

Source: Review of Annex 8 of Ofcom March 2011 MCT Determination

The key issues regarding an appropriate approach to setting the WACC for determining the ALF

In the following we set out our assessment of the issues relating to what the appropriate approach should be for setting the WACC parameters to determine the ALF. In turn we address whether the MCT WACC is the appropriate reference point; and what regulatory best practice and the academic literature suggests in this regard.

Whether the MCT WACC parameters are the appropriate reference point

As described previously, Ofcom's rationale for applying the MCT WACC parameters to determine the ALF is based on its views that: (i) its overarching objective is to estimate a WACC that is consistent with its lump sum valuation; (ii) that the MCT WACC should be a 'reasonable proxy' for this; (iii) the systematic risk associated with 4G spectrum is likely to be consistent with that faced by a hypothetically efficient UK mobile-only operator; and (iv) that although the MCT WACC was

estimated for a 4 year charge control, Ofcom does not believe the fact that the ALF covers a 20 year period⁴ would lead it to take a materially different view.

With regard to Ofcom's above rationale, we have the following observations.

- » Firstly, it is important to note that the need to estimate the lump sum market value in the first instance arises from the Government's 2010 Direction that requires Ofcom ensure that licenses are set with respect to their "full market value". Furthermore, ultimately, these lump sum amounts are being used to set a revised ALF, which is anticipated as being effective from 2014. Relatedly, therefore, we would suggest that – given the Direction and the timing of the revised ALF – conceptually Ofcom's underlying objective must be to determine the *prevailing* market value of spectrum and thus the associated ALF. Irrespective of the nature of evidence used by Ofcom to inform its view as to the valuation therefore, this – we suggest – is the appropriate interpretation of its estimated lump sum values.
- » The corollary of the above is that, taking 'today' as a start point, if the objective is to ensure that the present value of the annual stream of payments under the ALF is the same as the 'lump sum' value then, by definition, the appropriate discount rate for achieving this *must* be the one that reflects investor's current expectations. Related to this, Ofcom's own analysis indicates how quickly investor's views can evolve. For example, as recently as 2007 it determined that the appropriate MCT WACC was 11.5%; yet most observers would agree that it would be inappropriate to use this in order to derive a forward stream of payments today. Whilst clearly 'how quickly' investor expectations adapt (and therefore the extent to which mean reversion should be allowed for) is somewhat uncertain, by not using the latest available data the risk is that Ofcom is not making use of the best available evidence.
- » We also note that Ofcom has accepted that – in principle – it might be appropriate to update its view of the WACC to reflect more recent data (at least up until the date of 4G bid submissions in December 2012). Indeed, Ofcom has stated: "*We have reviewed whether we should update the parameters used in the main assumptions and found no material change in circumstances, for the majority of parameters, from those estimated in March 2011 and the WACC estimated prior to bidder applications being submitted in December 2012.*"⁵ The implication of Ofcom's position is that (putting to one side whether one believes it is the 4G bid submission date, or the present that represents the appropriate reference point) ultimately there is a judgement as to whether certain parameters have changed sufficiently to merit a reconsideration of the WACC.
- » Related to the above, there is some tension between Ofcom's proposal to use contemporaneous corporation tax rates in order to set the WACC and its position that: (i) it is the MCT determination or 4G bid submission date – rather than 'today' – that represent the appropriate reference point; and (ii) that the WACC input parameters do not need to be updated relative to those assumed at the MCT determination (given the length of time between the MCT determination and the 4G auction and the speed at which investor expectations can evolve).
- » Ofcom has stated that, although the licence will be set over an indefinite term, it will consider undertaking reviews in future in circumstances where the evidence suggests key determinants of fees have changed significantly. Ofcom has further stated that it may set an initial period, during which no such review will be considered. Ofcom is (as part of the consultation) currently seeking stakeholder views as to these issues.⁶ We suggest that the scope for potential future reviews provides further support to our view that somewhat more weight should be placed on contemporaneous, rather than historical, evidence in the determination of the appropriate WACC parameters.

⁴ Note the licence has an indefinite term, but Ofcom's analysis to set the ALF assumes a 20 year notional term.

⁵ 'Annual licence fees for 900 MHz and 1800 MHz spectrum: Consultation.' Ofcom (2013), para 5.72.

⁶ 'Annual licence fees for 900 MHz and 1800 MHz spectrum: Consultation.' Ofcom (2013), paras 6.21 and 6.22.

» Further to the preceding, Ofcom suggests that, because its lump sum value estimates are based on 4G auction values, it is appropriate to use a WACC estimate that reflects investor's expectations at the time of the auction, which Ofcom states is closely proxied by the MCT WACC. However, whilst Ofcom relied heavily on 4G auction prices to inform its view, in practice it also relied upon a range of evidence: *"We have not sought to take a mechanistic approach to deriving best estimates from the available evidence. Rather, we have considered the evidence for each band in the round, and used our judgement to decide how much weight to place on the various pieces of evidence to develop a best estimate for each band."*⁷ In particular, we note that the evidence Ofcom used to inform its lump sum valuation also included:

- benchmarking of auction values in other EU countries between 2010 and 2013;
- ratios of values between different spectrum bands across countries; and
- technical and other evidence – primarily a qualitative assessment of the underlying properties of spectrum and the commercial implications.

Put simply, it is important to note that the lump sum values reflect Ofcom's estimate of the market value for 900 MHz and 1800 MHz spectrum (which is based in part on 4G auction values), rather than simply reflecting the historical 4G auction prices.

Our view is that the lump sum amounts estimated should be interpreted as representing the prevailing market value of spectrum, as this is consistent with Ofcom's objective and the timing of when the new ALF will be introduced. As a result, we consider that it may not necessarily be appropriate to link the setting of the WACC for the ALF to investor expectations from the time of the 4G auction. This view is further reinforced by the fact that Ofcom made use of a range of evidence when determining the lump sum values. Instead, we suggest that the appropriate WACC parameters for setting the ALF should be those consistent with prevailing market evidence and investor expectations.

Regulatory best practice and other evidence

Related to the above, we note that it is also generally regarded as regulatory best practice to make use of the latest available data and evidence when determining regulated rates of return and charges. In particular, we note that Ofcom stated that *"we favour using up to date estimates as far as possible"*⁸ in relation to setting LLU and WLR charge controls. Similarly, in relation to determining the risk free rate, Ofgem has stated that *"we interpret this to mean that the Smithers Report advocates the use of the latest market data as the best indicator of the future cost of debt."*⁹

Consistent with this, academic research has found that best practice in business is also to use the latest available data for estimating the cost of capital. Burner et al. (1998)¹⁰ surveys corporations and found that many re-estimate their cost of capital for significant events such as acquisitions and high-impact economic events. Truong et al (2006)¹¹ also find that corporates review their discount rate regularly and update it as conditions change, thus highlighting the importance that companies place on having up-to-date estimates of the cost of capital.

Recent evidence regarding key WACC input parameters

It is well established that it is appropriate to make use of the most recently available data and evidence when setting the cost of capital. In the following, therefore, we set out an assessment of the current evidence in relation to each WACC parameter in turn. This evidence relates both to: (i) financial market data, such as recent trends in the RFR; and (ii) relevant regulatory WACC determinations that have occurred since the March 2011 MCT WACC decision. In assessing what the latest data might imply with regards to the WACC, we have sought to broadly follow the same

⁷ *'Annual licence fees for 900 MHz and 1800 MHz spectrum: Consultation.'* Ofcom (2013), para 4.51.

⁸ *'Fixed access market reviews: Approach to setting LLU and WLR Charge Controls.'* Ofcom, (Aug 2013).

⁹ *'TPCR4 Rollover: Initial Proposals.'* Ofgem, (August 2011).

¹⁰ *'Best practices in estimating the cost of capital: survey and synthesis.'* Burner et al., *Financial Practice and Education*, (1998).

¹¹ *'Cost of Capital Estimation and Capital Budgeting Practice in Australia.'* Truong et al., (2006).

approach adopted by Ofcom at the March 2011 MCT decision (i.e. we have reviewed the same types of evidence as that relied upon by Ofcom). However, we should note that - in practice - we cannot know precisely what weight Ofcom attached to each individual piece of evidence it referred to, and so we cannot necessarily infer that Ofcom would draw the same conclusions as us from this evidence.

A WACC for a hypothetically efficient, notionally geared, operator

In setting a WACC for the MCT determination, an important element of Ofcom's approach was that it sought to do so with respect to a *hypothetical*, efficient mobile network operator (MNO). Whilst Ofcom's gearing assumption was based on Vodafone Group's actual gearing, Ofcom stated that it was nonetheless being used as the reference point for an efficient operator.¹²

We agree that, in identifying a WACC for setting the ALF, it is appropriate to do so with respect to a hypothetically efficient, notionally geared, MNO. In particular, the use of notional gearing in setting any form of regulatory WACC recognises the fact that firm management is best placed to manage the risks associated capital structure and financing. Consequently, in setting out our views as to the key issues and considerations relating to WACC in the remainder of this paper, it should be noted that we are assuming that this relates to a hypothetical, notionally geared, firm.

A CAPM approach to the cost of equity

Consistent with Ofcom, we believe it remains appropriate to adopt a CAPM approach to determining the cost of equity. Given the instability and uncertainty that has characterised financial markets in recent years, various regulators have considered there to be merit in focusing on total equity returns, rather than developing a cost of equity 'bottom up' starting from the constituent parts of CAPM. For example, this issue has been raised recently by PwC in its report to Ofwat on an appropriate WACC methodology for the PR14 price control in the water and sewerage industry.¹³ The rationale for a total equity approach arises from the fact that the individual CAPM parameters can be more volatile across the business cycle compared to overall returns (which are more stable).

Nonetheless, it ultimately remains necessary to separately identify an appropriate RFR, equity risk premium (ERP) and beta in order to determine the WACC for the purpose of setting the ALF. In this context, it is important to keep in mind how recent market conditions may have impacted these parameters, and the interlink-ages that exist between them. In particular, in periods of uncertainty investors may be more risk averse. Consequently the premium required for risky assets tend to increase, and assets that regarded as being safe – such as government bonds – receive inflows of capital. Therefore, as macroeconomic related risks increase, the ERP might be expected to increase, whereas the yield on government bonds falls. Relatedly, one would also ideally seek to assess evidence relating to both the RFR and ERP over similar time periods for reasons of internal consistency. In the current case, when evaluating how best to interpret recent evidence regarding key equity parameters (as set out below) in the context of determining a WACC for setting the ALF, a key consideration is the extent to which the data accurately captures investor expectations in a post financial crisis environment. Ultimately, this is somewhat subjective and requires a degree of judgement.

Risk free rate

Ofcom is proposing to apply a real RFR of 1.5%, consistent with its MCT decision. As noted in the previous summary table, the evidence Ofcom relied upon in reaching this view primarily consisted of: (i) an assessment of real yields on 5 and 10 year gilts; and (ii) the CC's determination with respect to Bristol Water. In evaluating this evidence, Ofcom attached more weight to 5 year gilts and the fact that prevailing yields were unusually low relative to long-term data. In particular,

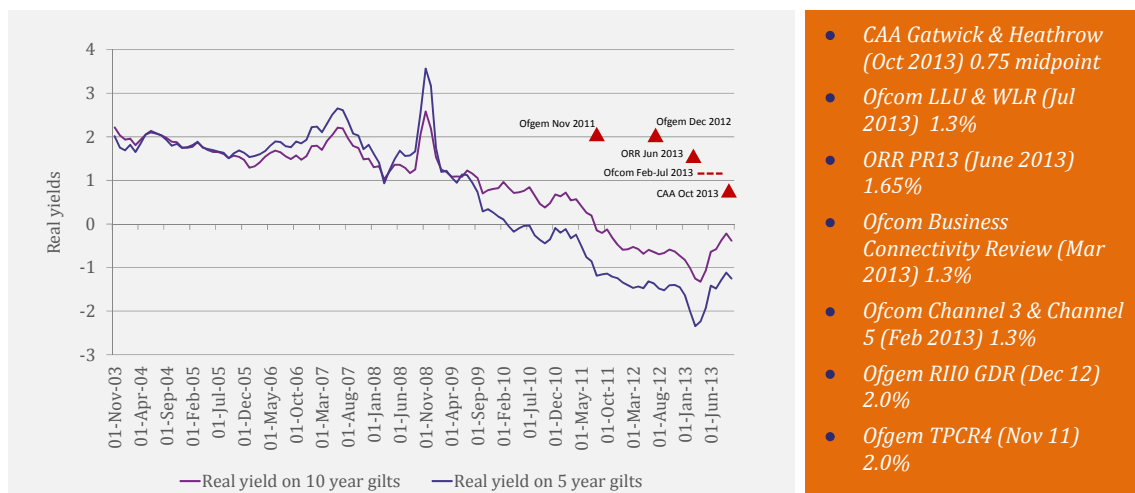
¹² 'Wholesale mobile voice call termination Modelling Annexes.' Annex 8: Cost of Capital, Ofcom, paras A8.7 – A8.94 (March 2011).

¹³ 'Cost of capital for PR14: Methodological considerations.' PWC (July 2013).

Ofcom referred to the tendency towards mean reversion with respect to the RFR when determining an appropriate assumption for setting the WACC.

In the context of our view (set out above) that Ofcom should make use of the most recently available data for the purpose of setting the WACC (and therefore ALF), we have examined: (a) contemporaneous evidence regarding the RFR; and (b) a range of recent regulatory determinations. The chart below shows the real yield on 5 and 10 year gilts, and a range of recent regulatory RFR determinations.

Figure 2: Real yield on 5 and 10 year gilts and recent regulatory decisions



Source: Bank of England, Economic Insight analysis and regulatory determinations

As noted previously, when reviewing data on real gilt yields to inform its position regarding the RFR for the MCT determination, Ofcom focused on average yields over a 10 year period, up until the date of that decision. Using the above latest data on real gilt yields, we find that long-run average yields up until October 2013 inclusive are:

- for 10 year gilts, 1.0% over 10 years; and
- for 5 year gilts, 0.7% over 10 years.¹⁴

The above compares to real yields on 5 year gilts of between 1.3% and 1.7% over 5 and 10 years as reported by Ofcom at the time of the MCT decision.¹⁵ The lower long-term averages using the above data are consistent with the fact that yields have continued to be negative in real terms since the MCT decision.

Of course, in determining the RFR for the purpose of making regulatory cost of capital decisions, a key issue is the need to balance current market evidence against a longer-term perspective – particularly in the context of those regulatory decisions being forward-looking. Indeed, this issue has been highlighted by Ofcom in its proposal to retain a RFR of 1.5% for the purpose of setting the WACC for the ALF, where it has noted that current negative yields are ‘unusual’ when compared to longer-term data. In this regard, however, we note that the 10 year average yield already provides a relatively long-term perspective and that in its MCT decision, Ofcom ultimately attached substantial weight to this analysis. We therefore suggest that the above data on 10 and 5 year gilt yields over 10 years provides strong evidence that the appropriate RFR for determining the ALF WACC is somewhat lower than that which Ofcom is proposing.

In determining the RFR within its March 2011 decision, Ofcom also relied on regulatory precedent, and drew particular attention to the Competition Commission’s decision with respect to Bristol

¹⁴ Rounded to 1dp.

¹⁵ ‘Wholesale mobile voice call termination Modelling Annexes.’ Annex 8: Cost of Capital, Ofcom, paras A8.7 – A8.53 (March 2011).

Water. We therefore consider it appropriate to similarly consider what more recent regulatory precedent might imply today. These are summarised in the following table.

Table 3 Summary of risk free rates assumed in regulatory determinations

Regulator	Determination	Date	Real risk free rate
Ofgem	TPCR4 Rollover Final Proposals	Nov-11	2.00%
Ofgem	RIIO gas distribution final proposals	Dec-12	2.00%
Ofcom	Financial terms for the Channel 3 and Channel 5 licences	Feb-13	1.26%
Ofcom	Business connectivity market review	Mar-13	1.26%
ORR	PR13 draft determinations	Jun-13	1.65%
Ofcom	LLU and WLR Charge Controls	Jul-13	1.26%
CAA	Heathrow price control	Oct-13	0.75%
CAA	Gatwick price control	Oct-13	0.75%

Source: Review of regulatory determinations

The above table shows that, with the exception of the ORR PR13 decision, since 2013 regulators are assuming a RFR that is somewhat below the 1.5% currently being proposed by Ofcom. Indeed, we note that Ofcom itself has assumed a RFR of 1.3% in relation to its decisions regarding the Channel 3 and 5 licences, and the LLU and WLR charge controls. The average RFR across all regulatory determinations in 2013 is 1.2%.



“We suggest an appropriate range for the RFR might be 1.0%-1.3%. Our rationale is that the lower bound is consistent with the average yield over 10 years for 10 year gilts. The upper bound is consistent with Ofcom's more recent determinations for both the Business Market Review and the LLU and WLR charge controls.”

Of the above, we suggest that the CCA's determinations for Heathrow and Gatwick are particularly useful, given how recently they were made (and noting that Ofcom's stated rationale for referencing the CC's Bristol Water decision at the time of the MCT was that it was 'recent'). For its October 2013 airport determinations, the CAA suggested that the appropriate range for the RFR lay between 0.5% and 1.0%, and assumed a mid-point of 0.75% in its WACC. In reaching this view, the CAA was mindful of balancing the need to reflect the latest information against the long-run RFR. However, the CAA noted that there the risk of paying too much attention to recent evidence is not one-sided, stating: “...using long-run rates also has its difficulties as the basis for the estimation because it is not clear whether and when the economy might return to such rates.”¹⁶ We think this is highly pertinent to Ofcom's concern regarding mean reversion. In particular, as the CAA's control will apply over a 5 year period, effective from April 1st 2014, the regulator's assessment of the RFR reflects its view as to what RFR is currently appropriate over the medium-term.

Similarly, across its own more recent determinations, whilst Ofcom has consistently noted that caution should be attached to the recent history of very low (and negative) yields, it nonetheless determined that it was:

¹⁶ *'Estimating the cost of capital: a technical appendix to the CAA's Final Proposal for economic regulation of Heathrow and Gatwick after April 2014.'* CAA (October 2013).

*"appropriate... to reflect the continued fall in estimates of the real risk free rate to some degree."*¹⁷

Overall we share Ofcom's view that it is important to take mean reversion into account when determining an appropriate RFR, particularly as the ALF is being set based on a 20 year notional license term and the fact that we are at the bottom of the interest rate cycle. However, we also think that this issue needs to be balanced against the need to ensure that the WACC accurately reflects current expectations. As such, we would suggest that the best currently available evidence – as indicated by recent regulatory determinations – would tend to support a RFR somewhat below the 1.5% proposed by Ofcom. In particular, we suggest an appropriate range for the RFR might be 1.0%-1.3% (with a midpoint of 1.15). Our rationale is that the lower bound is consistent with the average yield over 10 years for 10 year gilts. The upper bound is consistent with Ofcom's more recent determinations for both the Business Market Review and the LLU and WLR charge controls. This range reflects our judgement that there is a somewhat greater need to allow for mean reversion in the context of a long-term licence, relative to typical price control periods of 5 years.

Equity risk premium

In its March 2011 MCT determination, Ofcom assumed a point estimate for the ERP of 5.0%. This reflected a range of evidence – but in particular analysis by Professors Dimson, Marsh and Staunton, who examined ERP data over a period of over 100 years. Ofcom also took into consideration data from the Bank of England and the CC's determination in relation to Bristol Water (where an ERP of 5.0% was also assumed). Ofcom stated that the Bristol Water ERP was relevant because of 'how recent' the determination was, but also that the generic market-wide nature of the ERP meant that it was appropriate to consider determinations made elsewhere.

As set out previously, when considering what the appropriate ERP might be today, it is important to recognise that recent market conditions pose a number of challenges. Not least the fact that capital markets are heavily influenced by government macroeconomic policy and have been subject to an unusual amount of uncertainty and volatility. Notwithstanding this, given Ofcom's rationale for examining ERPs as determined in other sectors at the time of the MCT decision, we have similarly reviewed recent regulatory determinations in this regard, which are summarised in the following table.

Figure 3 Summary of ERP determinations

Regulator	Determination	Date	ERP
Ofgem	TPCR4 Rollover Final Proposals	Nov-11	4.50%
Ofgem	RHIO gas distribution final proposals	Dec-12	5.25%
Ofcom	Financial terms for the Channel 3 and Channel 5 licences	Feb-13	5.00%
Ofcom	Business connectivity market review	Mar-13	5.00%
ORR	PR13 draft determinations	Jun-13	5.00%
Ofcom	LLU and WLR Charge Controls	Jul-13	5.00%
CAA	Heathrow price control	Oct-13	5.75%
CAA	Gatwick price control	Oct-13	5.75%

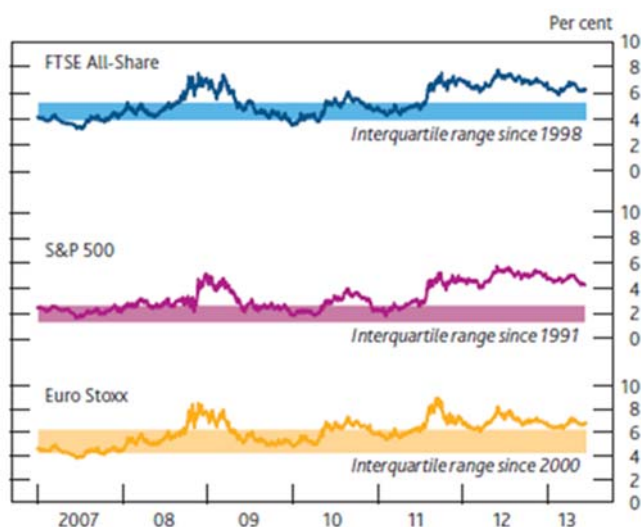
Source: Review of regulatory determination

¹⁷ *'Business Connectivity Market Review: Annex 8.'* Ofcom (July 2013).

Across the regulatory determinations shown above, the average ERP is 5.2% (the average is slightly higher, at 5.3%, if we include only those determinations made in 2013). This, then, is somewhat above than the 5.0% being proposed by Ofcom.

Whilst it is commonplace to focus on historical data when considering the appropriate ERP, forward looking models can serve as a useful cross check. The most widely accepted approach for assessing equity returns on a forward looking basis is the dividend growth model (DGM). The underlying concept of the DGM is that the prevailing market price of assets reflects the expected discounted value of their future cash flows. The Figure below shows the Bank of England's ERP estimates as derived from its multi-stage DGM model.¹⁸

Figure 4: Bank of England ERP estimates



Source: Bank of England, 'Financial Stability Report', June 2013.

The Bank of England's ERP estimates (as produced by its DGM model) are frequently relied upon in regulatory cost of capital determinations and submissions. For example, recently FTI's report for Ofgem in relation to the RIIO-T1 and GDI price controls¹⁹ made explicit reference to this, as did NERA's report for Heathrow in relation to the CAA's 2013 price control.²⁰ Consequently, in relation to DGM based estimates of the ERP, the Bank of England's data is generally regarded to be a good source of evidence.

The above data shows that the FTSE 100 ERP's estimated by the Bank of England:

- have generally increased since 2010; and
- in recent years have consistently been above 6%.

In addition to historical data and future expected returns approaches, such as DGM evidence, investor surveys can also be used to provide evidence as to the prevailing ERP (and a number of such surveys exist). In June 2012 a survey of risk premiums in 82 countries was published, which shows that, for the UK, investor's required equity risk premium was 5.5%.²¹ However, it is generally accepted that survey based estimates of the ERP should be treated with care, as (i)

¹⁸ The Bank of England's DGM is a multi-stage model in which future expected cash flows are proxied by an assumed rate of dividend growth. Over the short-to-medium term, this is based on consensus data from surveys of investors' expectations of future earnings, as published by the Institutional Brokers' Estimate System (IBES). Long run growth is expected to be constant and in-line with the overall economy. The ERP is effectively the residual of the total market return and the RFR. For further details see: 'Interpreting equity price movements since the start of the financial crisis.' The Bank of England (2010).

¹⁹ 'Cost of capital study for the RIIO-T1 and GD1 price controls.' FTI report for Ofgem (2012). See page 34.

²⁰ 'A Review of the CAA's Approach to Estimating the WACC at Q6: A Report for Heathrow.' NERA (2013). See pages 16-17.

²¹ 'Market Risk Premium used in 82 countries in 2012.' Fernandez, Aguirreamalloa and Corres. IESE Business School and World Finance Conference Paper (2012). UK estimate based on a sample of 171 responses.

responses can be highly sensitive to recent stock price movements; (ii) respondent's may have differing interpretations of the questions and may have differing expectations of other relevant factors, such as the RFR; (iii) there is some evidence of individual response bias, including gender bias. There is a range of literature that discusses these issues further. For example, see Damodaran (2011).²²

As indicated previously, it is important that both the ERP and RFR are considered holistically. In particular, if we believe that the RFR has fallen because equity has become more risky, or because investors are more risk averse, then we would normally expect an increase in the ERP to reflect this. Taking this into consideration, along with the most CAA regulatory determinations and DGM evidence, we consider that it would be appropriate to assume an ERP somewhat higher than that proposed by Ofcom. In the round, we suggest a range of between 5.50% and 5.75% (with a midpoint of 5.63) is reasonable in that:

- the upper bound is consistent with the latest CAA determinations and reflects higher expected returns to equity as implied by the DGM evidence;
- the lower bound reflects the fact that, for internal consistency with our proposed RFR range, we should assume an ERP somewhat higher than at the time of the MCT determination; and
- when viewed holistically with our assumed beta, this range implies total equity market returns that are consistent with long-run evidence (see later).

Equity and asset beta

As noted previously, Ofcom based its view as to what the appropriate asset beta and gearing should be on Vodafone Group data. In determining the beta, Ofcom made use of a range of estimation methods and periods, but placed more emphasis on the 2 year daily equity beta analysis, noting that: *"Our belief is that 2 year daily data affords the best compromise between sufficient datapoints to provide a statistically robust estimate, and the most up to date information."*²³ Ofcom's evidence included analysis undertaken by Brattle, which made use of data over 2 years up to and including October 2010. Ofcom's own internal analysis was updated to include data up to February 14th 2011, and it noted that this more recent period was less likely to be influenced by the credit crisis.

Brattle concluded from its analysis of Vodafone's beta (and other comparators) that a reasonable estimate of a UK mobile operator's asset beta would be around 0.5. In reviewing the evidence in the round, Ofcom concluded that it thought a range for asset betas of 0.5 – 0.61 was appropriate. Ofcom assumed a point estimate of 0.56, which is the midpoint (with an assumed gearing of 30%).

We are of the view that Vodafone remains a valid reference point for a hypothetical MNO (see later gearing discussion). We have, therefore, examined evidence regarding Vodafone's current equity beta, as estimated by Thomson Reuters. The estimation methodology applied by Thomson Reuters is based on using daily data over a 5 year trailing period, where equity volatility is assessed relative to the FTSE 100. As there are some methodological differences between the approach applied by Thomson Reuters and that used by Ofcom, we have assessed the data over a period of 4 years, as this allows us to make inferences regarding whether the beta is likely to have increased or declined since the March 2011 MCT decision. The following table shows our analysis of Vodafone Group's equity and asset betas (where actual gearing ratios have been used in each year for the conversion).

²² *'Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2011 Edition.'* Damodaran, Stern Business School (2011).

²³ *'Wholesale mobile voice call termination Modelling Annexes.'* Annex 8: Cost of Capital, Ofcom, paras A8.7 – A8.105 (March 2011).

Table 4 Vodafone Group betas

	2010	2011	2012	2013
Equity beta	0.75	0.76	0.65	0.56
Asset beta	0.55	0.56	0.46	0.37

Source: Thomson Reuters and Economic Insight analysis



“To be conservative, we would suggest a range for the asset beta of between 0.46 – 0.50, with a midpoint of 0.48. At an assumed gearing of 35% for the hypothetically efficient notionally geared UK MNO the midpoint implies an equity beta of 0.69.”

Our estimated asset betas for 2010 and 2011 of 0.55 and 0.56 are consistent with the range reported by Ofcom at the time of the March 2011 MCT decision. Since then, the above data shows that Vodafone Group's beta has declined, such that our estimated asset betas for 2012 and 2013 are 0.46 and 0.37 respectively (and the corresponding equity betas fell to 0.65 and 0.56). We note that this downward trend is also consistent with Ofcom's previous analysis, where it was noted that: “Brattle's work shows a steady decline in Vodafone's 2 year equity beta since at least 2004.”²⁴ We further note that, whilst this is a relatively sharp drop, Ofcom itself noted that Brattle's analysis also revealed steep declines in more recent years. Relatedly, we note that the continued decline in equity betas is consistent with an increase in the company's gearing (set out subsequently).

We think that it is appropriate to recognise the increase in Vodafone's gearing, to the extent that it is being used as a reference point for the notionally geared MNO. Accordingly, for reasons of internal consistency, it is also appropriate to assume a somewhat lower beta than that proposed by Ofcom. To be conservative, we would suggest a range for the asset beta of between 0.46 – 0.50, with a midpoint of 0.48.

At an assumed gearing of 35% for the hypothetically efficient notionally geared UK MNO (see later) the midpoint implies an equity beta of 0.69. This translates to a total real (pre-tax) cost of equity of 6.8%, which is in line with long-run estimates of total equity market returns.

Cost of debt

The overall cost of debt for a notionally efficient UK MNO consists of both: (i) the RFR (as discussed previously); and (ii) an assumed debt premium. In order to reach a view on the appropriate premium for debt over the RFR, Ofcom examined the yield on corporate debt of the parent companies of the UK MNOs (i.e. Vodafone, Deutsche Telekom, France Telecom and Telefonica). Ofcom found that these were generally at a premium of between 1-2% in excess of its view of the appropriate RFR, indicating a debt premium of 1.5%.

To examine the current debt costs faced by the MNOs, we obtained details of all bonds issued by their respective parent companies, and calculated the average nominal rate paid. Using an assumed inflation rate of 2.4% (see subsequent discussion of inflation) and an assumed RFR of 1.0% – which is our lower bound – this would imply a current range for the debt premium of between 1.0% and 2.0%, as shown in the table below.

²⁴ ‘Wholesale mobile voice call termination Modelling Annexes.’ Annex 8: Cost of Capital, Ofcom, paras A8.7 – A8.118 (March 2011).

Figure 5 Current debt costs

	Deutsche Telekom	Orange SA	Telefonica	Vodafone
Current nominal bond rates (%)	4.4%	4.6%	5.5%	4.8%
Real bond rates (%)	2.0%	2.2%	3.0%	2.3%
Assumed real RFR (%) ²⁵	1.0%	1.0%	1.0%	1.0%
Implied debt premium (%)	1.0%	1.2%	2.0%	1.3%

Source: Thomson Reuters and Economic Insight analysis

The average implied debt premium across all MNO parent companies is 1.4%, which is fractionally lower than the 1.5% premium assumed by Ofcom, indicating that there has been little change in this parameter since the MCT decision. However, as we are proposing a somewhat lower RFR than Ofcom previously determined, we consider it appropriate to use a slightly higher debt premium. In the round we propose that an appropriate range for the debt premium would be 1.5% to 2.0% in real terms (1.75% as a midpoint).

When considering the cost of debt in totality, it is important to keep in mind that prevailing market conditions mean that total embedded debt costs are likely to be low compared to forward looking debt costs. This must be taken into consideration when determining an appropriate rate for setting the ALF over a notional 20 year license period. In practice, the extent to which total debt costs are likely to rise depends on: (a) the maturity of existing debt, which drives the extent to which refinancing is required; and (b) the extent to which future investment will require new debt to be raised. This view is consistent with PwC's advice to Ofwat in relation to the forthcoming price control in the water industry: "In the UK, there is a future market expectation of a gradual increase in interest rates (as implied from forward rates), although markets do not currently anticipate a quick return to historic average long-term debt interest costs."²⁶

Gearing

As noted previously, Ofcom based its view as to what the appropriate asset beta and gearing should be on Vodafone Group data, the rationale being that its activities were primarily mobile network related (whereas the other UK MNO parent companies undertook a wide range of activities). Given that for the purpose of setting the WACC, we are concerned with what the appropriate gearing should be for a notionally efficient MNO, we agree that – where possible – the evidence for input parameters should be closely related to the core activities that an MNO would be expected to undertake.

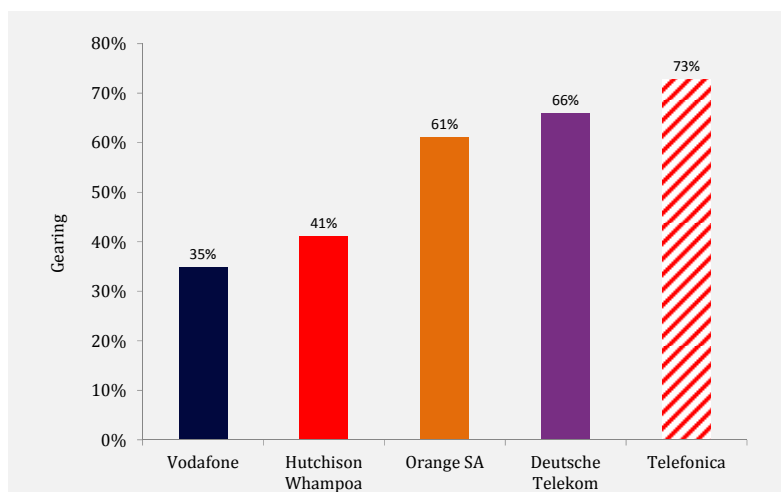
In the first instance, however, we nonetheless examined the latest data on gearing for the UK MNO parent companies. The results of this are shown in the following figure.²⁷

²⁵ The midpoint for our RFR range is 1.15%; 1.0% represents the low end for our RFR range and is used here to illustrate the implied Debt premium. Ultimately in any case we assume higher debt premium than implied by this data for reasons of internal consistency.

²⁶ *Cost of capital for PR14: Methodological considerations.* PWC (July 2013), page 10.

²⁷ Gearing has been calculated using data from Thomson Reuters and reflects the ratio of net debt to capital employed, where net debt is long term liabilities + short term debt – cash and equivalents (where relevant short term debt is identified as being all interest bearing debt plus any short term debt classified as being a proportion of long term debt). Data relates to period ending December 2012.

Figure 6: Gearing of MNO parent companies - 2012



Source: Economic Insight analysis of Thomson Reuters data

The above reveals that there is currently a considerable spread of gearing across the UK MNO parent companies, ranging from 35% (Vodafone) to 73% (Telefonica). In principle, this may imply that notional gearing for a hypothetical MNO could be somewhat higher than assumed by Ofcom. However, as noted previously, this turns on how relevant we consider the core activities of the parents to be, which are summarised in the following table.

Table 5 Summary of core activities of parent companies

MNO parent	Summary of activities
Deutsche Telekom	Deutsche Telekom AG is a Germany-based integrated telecommunications provider offering fixed-network lines, broadband lines, and mobile communication networks. As of June 2013, Deutsche Telekom had 31.7m fixed-network line customers and 143.6 mobile customers. ²⁸ This indicates that 80% of its customer base relates to mobile.
Hutchison Whampoa	Hutchison Whampoa Limited is an investment holding company. Its operations consist of six core businesses: ports and related services, property and hotels, retail, infrastructure, energy, and telecommunications.
Orange SA	Orange is a France-based company offering its customers a range of services covering fixed and mobile communications, data transmission, wireless telecommunication services, broadcasting services, Internet and multimedia and advertising services, among others. Approximately half of Orange's revenues are from mobile services ²⁹
Telefonica	Telefonica SA is a Spain-based company offering fixed telephony accesses, Internet and data accesses, mobile accesses and pay television. Approximately 60% of Telefonica's revenues are from mobile services ³⁰
Vodafone	Vodafone Group Plc (Vodafone) is a mobile communications company which provides mobile voice, messaging, data and fixed line services. Whilst its accounts do not segment revenues by area, we understand that it relates almost entirely to mobile.

Source: Economic Insight review of annual reports

Given the evidence set out above, we consider it reasonable to assume that Vodafone continues to represent a good reference point for considering the appropriate WACC input parameters for a hypothetical MNO. In this regard, at the time of its March 2011 MCT decision, Ofcom reported that

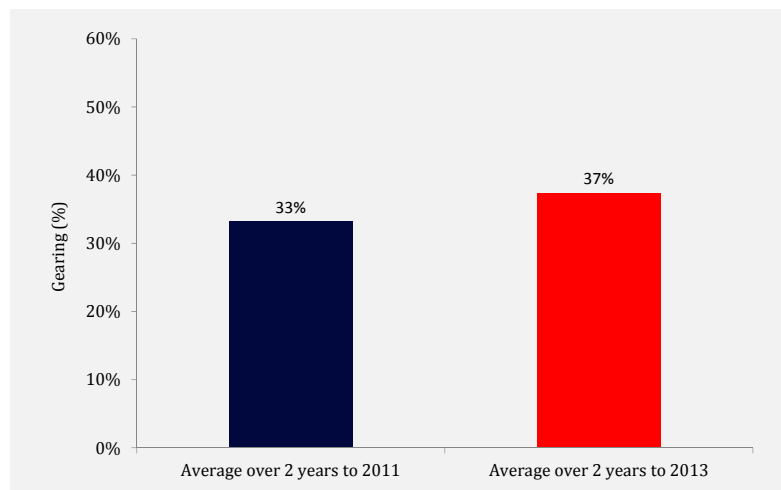
²⁸ Deutsche Telekom Interim Group Report H1 2013

²⁹ Based on proportion of mobile services and mobile equipment sales of total revenue, as given by note 3 in Orange's first half 2013 financial report

³⁰ Based on the proportion of mobile revenues of total group revenue, as given on page 33 of Telefonica's 2012 financial report

Vodafone Group's gearing had varied between 25% and 35% over the last two years and so it based its assumption on an assumed gearing of 30%. We have re-calculated Vodafone Group's average gearing for the last four years, as shown in the following chart.

Figure 7: Vodafone Group Plc Gearing



Source: Economic Insight analysis of Thomson Reuters data

Our analysis shows that, over the 2 years to December 2011 Vodafone's gearing was 33%, consistent with the ranges previously quoted by Ofcom. Over the 2 years to December 2013, however, Vodafone's gearing increased somewhat to an average of 37%. The relatively modest increase in Vodafone's gearing in recent years is consistent with the reported decline in its equity beta (as discussed previously).

In considering what an appropriate level of gearing might be today for a notionally geared, hypothetically efficient, MNO, it is important to take into account the low interest rate environment, which will have provided companies with a buffer on their debt service ratios. Therefore, consistent with us implicitly assuming debt costs that allow for some future increases, we think that a prudent approach would be to assume a level of gearing at the midpoint between the 2011 and 2013 two year averages. This implies a gearing of 35%.

Corporation tax rates

In line with our views set out previously, we consider that – as we are seeking to calculate an ALF that is consistent with a prevailing market value of spectrum – it is appropriate to use prevailing expectations of corporation tax rates when calculating a post-tax WACC. Consequently, we have assumed that, as per HMRC guidance, the tax rate will be 23% for 2013/14, 21% for 2014/15, and 20% for 2015/16 and thereafter. Over a 20 year period, this implies an average rate of tax of 20.2%.

In our view, there is some tension inherent in Ofcom's current proposed approach, as it is proposing to update its assumptions regarding tax, whilst leaving all other WACC input parameters unchanged from the time of the MCT determination.

Inflation

Ofcom is proposing to set the ALF so that it is constant in real terms. In other words, Ofcom will increase the nominal price of the ALF in each year to reflect inflation. Consequently, inflation affects Ofcom's methodology in two ways. Firstly, with regard to the annual adjustment to the nominal ALF. Secondly, it is used to determine the real WACC. In its ALF consultation, Ofcom is proposing to assume an RPI measure of inflation, at a rate of 2.5%, which is also consistent with its March 2011 MCT determination.

In principle there are a number of inflation measures that could be used to determine a WACC for setting the ALF, but in practice the RPI and CPI measures are of most relevance. There are a

number of differences between the measures, including: the basket of goods they include; the source of expenditure data used to estimate weights; and the formulae used to construct the indices. In our view, the appropriateness of these in the current context depends on: (i) whether the choice in any way affects the balance of inflation risk between the licensee and the licensor; and (ii) a more objective consideration of the relative merits of the inflation indices from an economics perspective (i.e. which measure best reflects the underlying cost drivers of the hypothetically efficient MNO).

With regard to the first issue, Ofcom has suggested that the choice of index does not affect the balance of inflation risk and that – so long as the same index is built into both the WACC and the ALF inflation adjustment – licensees should be indifferent as to whether RPI or CPI is used. In principle, we agree with Ofcom's statement as, from a net present value perspective, a licensee would be indifferent to the choice of index so long as it was properly incorporated into both the WACC and the nominal ALF payments (i.e. if the same inflation measure as used in the WACC was used to inflate the nominal ALF payment in each year). However, in practice this assumption could break down if: (a) it was more difficult to forecast one inflation index over another, such that the outturn rate of inflation used in the price index to adjust the nominal ALF differed, ex post, from that rate of inflation used in the WACC; and (b) if that divergence worked systematically to the advantage or disadvantage of the licensees. It is difficult to know with any certainty whether either of these factors is likely to arise in practice. However, to provide some indicative information we have reviewed a range of evidence.

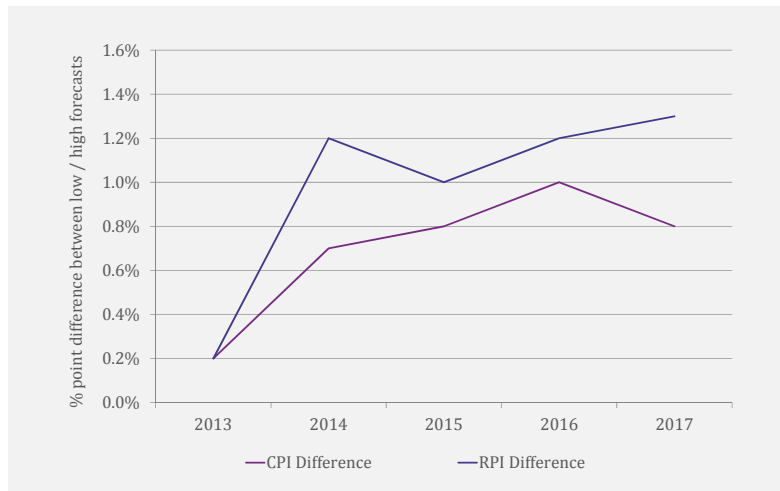
Firstly, we have examined *forecast* inflation rates for both CPI and RPI. This is because forecast data may provide us with information as to whether there are any inherent differences in uncertainty across the two measures (i.e. whether one measure is more likely to be subject to forecast error than the other). Regarding uncertainty more generally, analysis from the Centre for Policy Studies³¹ shows that the Bank of England's ability to forecast inflation has generally deteriorated over time. From August 2001 to May 2004 the average error (in relation to CPI) was just +0.1 percentage points; from August 2004 to May 2007 the average error was +0.4 percentage points; and from August 2007 to November 2011 the average error was +1.4 percentage points. Therefore, putting to one side differences between the indices, forecasting errors have generally increased over time.

Of most interest to the current case, however, is whether there are any inherent differences in the accuracy of RPI and CPI forecasts. Relating to this, HM Treasury collates forecast data from independent institutions regarding both CPI and RPI projected over five years. Using the latest published forecast data³², we have examined the percentage point 'wedge' between high and low forecasts for both measures. On average, over the five year forecast period, we find that the difference for CPI is 0.7 percentage points, and for RPI the difference is 1.0 percentage points. This would tend to be consistent with there being somewhat more certainty regarding future CPI relative to RPI, although the difference in spread is relatively modest.

³¹ <http://www.cps.org.uk/files/factsheets/original/120113142525-Factsheet6InflationforecastsUPDATE3.pdf>

³² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/260252/201311_ForecastComparison.pdf

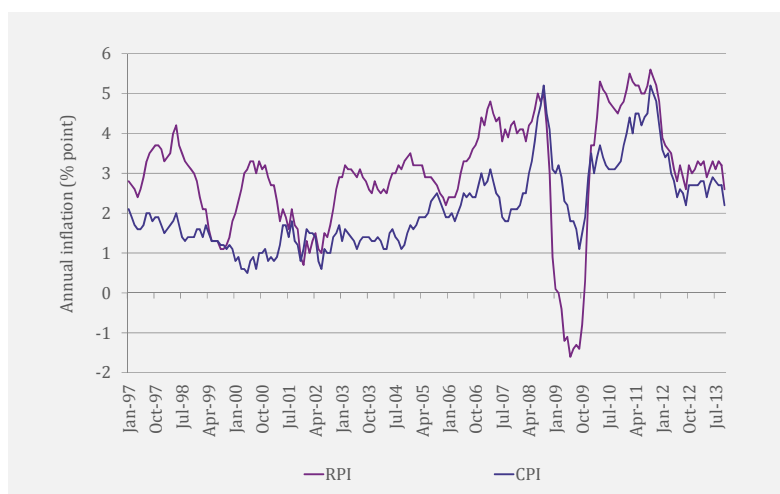
Figure 8: Percentage point spread between low/high RPI and CPI forecasts



Source: HM Treasury

Another way of considering the likelihood of forecasting errors (which, as noted above, determine the likely scope for divergence between the lump sum value and the present value of ALF payments ex post) is to look at the volatility of both measures over a long period of time. We have therefore examined trends in the RPI and CPI back to January 1997, as published by the ONS. These are shown in the following figure.

Figure 9: Long-term volatility in RPI and CPI measures



Source: ONS

Based on this we find that the long-term average rate of inflation is:

- 3.0% for RPI; and
- 2.1% for CPI.

We further calculated the standard deviations for both measures over the same time period and found that these to be:

- 1.4 for RPI; and
- 1.0 for CPI.

Put simply, and consistent with the slight difference in forecasting spreads shown earlier, historical data tends to indicate that CPI is a more stable measure than RPI. This is consistent with there being less scope for divergence between the lump sum value and the (ex post) present value of the stream of ALF payments under a CPI, rather than RPI, form of indexation.

With regard to the second issue: an objective consideration of the relative merits of RPI versus CPI, we note the following.

- » ***The official status of RPI has been removed.*** There have in recent years been an increasing number of concerns raised regarding the underlying robustness of the RPI measure. In particular – and as referenced by Ofcom in its LLU and WLR Charge Controls, in January 2013 the ONS announced that RPI “does not meet international standards” and recommended that a new index be published. In March 2013 the designation of RPI as a National Statistic was cancelled. However, it will continue to be published - not least because of its importance to index-linked government bonds (and relatedly, the extent of corporate debt that is index linked to RPI).
- » ***Regulators, including Ofcom, are now actively considering CPI.*** As part of its RPI-X@20³³ review of energy network regulation, Ofgem considered the replacement of RPI indexation with CPI indexation. With the Bank of England switching to the CPI measure in 2003, and it becoming an increasingly accepted measure of inflation, a case was seen to move from RPI – although ultimately Ofgem retained RPI. Similarly, in its Consultation on setting LLU and WLR charge controls,³⁴ Ofcom propose to use CPI as the default inflation index for that charge control and future ones. A number of factors were taken into consideration (official status of the index; cost causality; exogeneity; availability of independent forecasts; regulatory predictability) and, largely as a result of the declassification of RPI, Ofcom has favoured CPI.
- » ***An assessment of cost causality indicates CPI may be preferable.*** From an economics perspective we are primarily interested in which index best reflects the underlying cost drivers of a hypothetical MNO. In this regard, we note that one reason for Ofgem’s decision to retain RPI was that its use in corporate and government index-linked bonds meant that it played a critical role in the determination of a fair return on assets. Relatedly, ORR’s decision to retain RPI reflected the fact that it fundamentally drives Network Rail’s actual cost of debt (half their debt is RPI linked).³⁵ In our view, however, the index-linked debt issue is more pertinent to ex-ante price regulated, capex intensive, natural monopoly type industries. Whilst we have not undertaken a detailed review of cost causality for the purpose of our work, we note that the RPI basket includes a number of items that we consider to be irrelevant to the cost drivers of a notional MNO, including: mortgage interest payments, house depreciation and house purchase costs. Furthermore, ONS analysis indicates that these housing cost items explain a material proportion of the differences between the RPI and CPI measures.³⁶ It is likely, therefore, that a full cost causality analysis would show CPI to be the more appropriate metric.

On balance, we think that a CPI measure is most appropriate to the setting of a WACC for determining the ALF.

Further to the above, and consistent with our view that it is appropriate to base the WACC parameters on prevailing investor expectations, we think that the average of the latest 5 year forecasts as published by HM Treasury represent a reasonable source of data. This indicates that an appropriate rate of CPI inflation to assume in determining the WACC is 2.4%. Were an RPI measure to be retained instead, the HM Treasury consensus forecasts would indicate an inflation rate of 3.3%.

Whether the WACC should be set on a pre or post-tax basis

Ofcom’s proposed WACC for setting the ALF has been determined on a post-tax basis. As noted above, Ofcom’s stated rationale for this is that it believes such an approach is consistent with the basis on which the MNO’s valued 4G spectrum in the first instance – noting that 4G auction prices were themselves an input into Ofcom’s determination of the market value of the spectrum lump

³³ <https://www.ofgem.gov.uk/ofgem-publications/51901/rpi-xrecommendations.pdf>

³⁴ http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf

³⁵ <http://www.rail-reg.gov.uk/pr13/PDF/pr13-draft-determination.pdf>

³⁶ For example, see ‘[Differences between the RPI and CPI Measures of Inflation.](#)’ ONS (2010).

sum. Ofcom further states that its prior position of proposing a pre-tax WACC reflected the complication in differing tax treatments between the ALF and the lump sum, which would need to be adjusted for under a post-tax approach (see our separate note on the ALF tax adjustment).

We consider that Ofcom's revised approach, which is to be explicit and transparent regarding the assumptions it is making relating to tax treatments, is appropriate. This is because it properly reflects the fact that a proportion of firm profits will be paid to tax authorities in addition to being distributed to debt and equity investors. We therefore agree that the WACC should be determined on a post-tax basis.

Conclusions

A key issue to the determination of the ALF is that it should reflect the prevailing market value of spectrum. We therefore believe that, conceptually, Ofcom's estimated lump sum values should be interpreted accordingly. Taking this as a given, we suggest that in deriving the ALF from the lump sum by reference to a WACC, it is appropriate to do so using the most up-to-date evidence that is available. Such an approach is consistent both with best regulatory practice and the academic literature. In addition, we are of the view that: (i) it is appropriate to set the WACC on a post-tax basis (reflecting the fact that firm profits must be distributed to tax authorities as well as to equity and debt holders); and (ii) that a CPI measure of inflation should be applied, as there is less scope for ex-post discrepancies between the present value of the ALF and the lump sum value of spectrum compared to an RPI measure (which is more volatile).

The analyses set out here show that, once contemporaneous evidence is taken into account, the appropriate WACC for determining the ALF is likely to be somewhat lower than that proposed by Ofcom (4.2% real post tax). Indeed, based on the midpoints identified for each WACC parameter outlined in this paper, the latest evidence would tend to suggest a real post-tax WACC of 3.8%. Our assumed parameters, which underpin this view, are summarised in the table below.

Table 6 WACC parameters for ALF consistent with latest evidence

WACC parameter	Ofcom's proposed ALF values	Values consistent with latest evidence (based on midpoints, shown to 1dp)
Real risk-free rate	1.5%	1.2%
Gearing	30%	35%
Equity risk premium	5.0%	5.6%
Asset beta	0.56	0.48
Debt premium	1.5%	1.8%
Overall real pre-tax cost of debt	3.0%	2.9%
Corporation tax rate	20.0%	20.2%
Inflation	2.5%	2.4%
Real pre-tax WACC	5.9%	5.4%
Real post-tax WACC	4.2%	3.8%

Source: Economic Insight

Further information

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