Consultation 2/2015 : The Cost of Capital in Relation to Broadcast Transmission Final Determination

Introduction

The Weighted Average Cost of Capital (WACC) for Network Access ("NA") was set by Ofcom in 2006 at 10.4% pre-tax nominal, 7.7% pre-tax real. In 2008 the Office of the Adjudicator was set up and in its Guidance to the Adjudicator (Para 5.36) Ofcom said "we suggest that Arqiva should continue using this rate until such time as the Adjudicator thinks it appropriate to revise the rate".

In 2010 the Adjudicator commissioned Plum Consulting to review the market conditions and advise if the present rate was still applicable or if a full review was recommended. Their recommendation was that the present rate was still applicable and this was adopted by the Adjudicator.

Arqiva intended to refinance in 2014. Since the new financing arrangements could have a bearing on the applicable rate, the Adjudicator set 2014 as the next review. Plum was commissioned to carry out this review, and their report dated January 2015 is attached.

The duties of the Adjudicator are set out in the Undertakings; for these purposes, the relevant sections are:

Para 11.3, which obliges Arqiva to set charges, to the satisfaction of the Adjudicator, which are derived from costs and include an appropriate return on capital employed.

Appendix 1, Para 8 which permits the Adjudicator to issue guidance on matters covered by Paragraphs 9-12 of the Undertakings, specifically on the appropriate return on capital employed.

In their Guidance to the Adjudicator (5.16-5.19) Ofcom suggest that the Adjudicator might need to consider further mark-ups on cost to permit a return consistent with a competitive market and to encourage innovation.

The Adjudicator therefore has the power to set a new rate and in doing so take into account any relevant factors. The balance to be struck is ensuring that Arqiva makes an adequate return in order to ensure continued investment from its investors and to ensure the company is able to innovate, (whilst also providing incentives for efficiency) but to limit it, such that the cost of NA is commercially viable to its customers.

It should be noted that WACC is a view of Arqiva from the perspective of an investor, either of equity or debt, in Arqiva. Furthermore it should reflect not Arqiva as a whole but the regulated Network Access element (21% of total turnover in FY14 accounts) of Arqiva viewed as a stand-alone entity. Plum's Report (Appendix A) looks at NA as if it was a standalone business requiring separate funding and derives the several variables that make up WACC.

The review is forward looking and the new rate would come into effect by the issue of a Statement following this Determination. The review period has been proposed as 10 years from that point. This period has been chosen as most contracts are long term and stability is advantageous. The risk profile, which is discussed later in this document, may change in that period and a significant change may trigger a review before the ten years elapses. It is not intended that the new rate would apply to existing contracts.

Changes since the last review and changes looking forward

The pre-tax WACC (both real and nominal) is affected by the corporation tax rate. This will have reduced from 30% in 2007 to 20% (by April 2015), which reduces the WACC. Conversely, the attitude to risk has hardened and the risk premiums have increased. These two virtually cancel each other out.

The Plum report projects these factors into the future and recommends that WACC be set in the range 6.6% to 7.5% pre-tax real.

However, the report acknowledges that the capital asset pricing model (CAPM) formula for computing the WACC may not capture all of the risks faced by a broadcast transmission business. While company-specific risk is reflected on the debt side of the formula (via the company debt premium and the level of gearing), it may not be adequately captured on the equity side.

An element of company-specific risk is captured by the equity beta (the co-variance between returns on the asset and returns to the market portfolio). Yet this measure may not fully reflect the risk that the business is displaced by technological change and competition (which, in any case, might not be correlated to market returns). To compensate for this, the Plum report suggests 'aiming up' within the recommended WACC range.

Specific risk is relevant here as Arqiva's ability to provide NA is directly related to future spectrum availability, which is uncertain. Ofcom's 2006 Determination made no explicit reference to the finite life of Digital Terrestrial Television ("DTT"). Since then Channels 61 and 62 have been cleared of DTT, and it has now been confirmed that the 700 MHz spectrum will also be lost to DTT. The remaining spectrum for DTT looks to be available until 2030 but with a review in 2025. Furthermore, if DTT ceases the NA assets will become redundant. This "cliff edge" would make investors increasingly wary and would lead to the introduction of a premium to cover this risk.

Similar (but not so harsh) considerations exist in the radio market, which is slowly transitioning from analogue to digital.

The Adjudicator sees two options for dealing with this specific risk

a) Disregard it, which would make investment in new works increasingly hard to fund and risk shortening the life of DTT

b) Accept that it is a factor over and above the computed WACC and make allowance for it.

The first option does not meet the Adjudicator's duty to ensure adequate return and innovation. The second option of making an allowance for the technological risk is favoured by the Adjudicator.

At the present time the risk is small but it will increase over time and the end of this proposed review period coincides with the review of the spectrum in 2025 (at which point decisions on the lifetime of DTT may be made).

Setting the new WACC

The Adjudicator has to decide where to set the WACC. Without the specific risk factors discussed above then a median value would have been adopted, but taking the specific risk into account the Adjudicator was minded to set the WACC at 7.5% pre-tax real.

The intention was that the new value would remain valid until 2025. The Adjudicator would conduct an intermediate review if there was a significant change in the market or Arqiva's finances such as to warrant a review.

Consultation

The Adjudicator launched a consultation at the beginning of February 2015 with a closing date of 17 March. One response was received, from the BBC, and this is reproduced in full at Appendix B. The BBC response refers to work they commissioned from Frontier Economics but this was not included with the submission. The BBC has subsequently provided this report and, whilst it does not form part of their submission, the Adjudicator has used it to clarify some of the points raised. Subsequently, the Adjudicator has sought and been granted permission from the BBC to include the Frontier report in full and this is reproduced as Appendix C. The Adjudicator is grateful to the BBC for their response and contributions.

Discussion on points raised by the BBC

The views put forward by the BBC can be summarised as follows:

- The estimate of the cost of debt is too high and as a result the overall WACC estimate is too high
- The reduction in WACC compared to 2006 is inconsistent with the reduction observed in other regulated industries
- There is no justification for the proposed "aiming up" of the WACC to reflect specific risk
- The time horizon of ten years is too long and an interim review point might be appropriate.

Elements making up the WACC calculation.

WACC is calculated from the cost of debt, the cost of equity, the tax rate and gearing. There was complete agreement between Plum and the BBC (via Frontier) on gearing, inflation, the tax rate and the cost of equity (other than one small point discussed below). The following summary explains the differences between Plum and the BBC and the Adjudicator's views on these points.

	Plum Consulting		Frontier Economics	
	Low	High	Low	High
Risk-free rate (real)	1.5%	2.0%	1.5%	2.0%
Risk-free rate (nominal)	4.8%	5.4%	4.8%	5.4%
Equity risk premium	4.5%	5.0%	4.5%	5.0%
Equity beta	1.0	1.0	0.85	1.0
Cost of equity (post-tax)	**9.3%**	**10.4%**	**8.7%**	**10.4%**
Cost of debt	**7.0%**	**7.6%**	**5.8%**	**6.1%**
Gearing	35.0%	35.0%	35.0%	35.0%
Tax rate	20.0%	20.0%	20.0%	20.0%
Inflation	3.3%	3.3%	3.3%	3.3%
WACC (nominal pre-tax)	**10.1%**	**11.1%**	**9.1%**	**10.6%**
WACC (real pre-tax)	**6.6%**	**7.5%**	**5.6%**	**7.0%**

Cost of Equity

Adjudicator's Comment

There is exact agreement between Plum and Frontier on the risk free rate and equity risk premium that make up the cost of equity. The final factor is equity beta (a measure of response to market changes) which was set by Ofcom in 2006 as 1.0 and again by Plum at 1.0.

Plum suggested an equity beta value of 0.85 to 1.0 based on a study done for ComReg in Ireland, in which Europe Economics recommended an unlevered beta of 0.55 (equivalent to 0.85 at 35% gearing) based on two year beta estimates, but noted that the five year beta estimates were generally higher. Frontier Economics considered this estimate reasonable.

Plum ultimately recommended an equity beta estimate of 1.0 based on a longer-term view and consistent with Ofcom's previous determination. The Adjudicator intends to continue the use of 1.0.

Reference: Europe Economics. April 2014. "Cost of Capital for Mobile, Fixed Line and Broadcasting Price Controls" Report for ComReg. https://www.comreg.ie/_fileupload/publications/ComReg1428.pdf

Cost of debt.

The cost of debt is made up of a risk free rate plus a premium (representing the extra return investors require for investing in debt rather than a risk free asset).

The BBC commented "*the Plum report has taken an historic approach to the risk free rate (which is high relative to the current rates) combined with a current approach to debt spread (which is high relative to the historic rate). This is not in line with regulatory best practice which is either to take the actual debt position combined with a forecast of new debt (Ofwat and CMA approach) or to take a purely historic rolling average (Ofgem approach)*

Using the two methods adopted by regulators noted above to estimate the cost of debt our independent review indicated an approximate range for the nominal cost of debt to be 5.8-6.1 compared to the 7.0-7.6% in the Plum report"

Adjudicator's Comment.

The first difference between Plum and the BBC is one of approach. The Adjudicator does not accept that Plum have not followed regulatory best practice as it is more the case that the regulatory approach is developed for each industry rather than there being a blanket best practice.

Ofwat (2014) reviewed both historical and forward looking evidence on total market returns and the risk free rate. Ofgem has used a historical average for the cost of debt for the RIIO-ED1 but had also committed to updating it annually. Ofcom has stated "*Our approach is to estimate a WACC that is based on historic and current data but which should be relevant for the period covered by the control*."

Reference: Ofcom. Fixed Access Market Review. June 2014. http://stakeholders.ofcom.org.uk/telecoms/ga-scheme/specific-conditions-entitlement/market-power/fixed-access-market-reviews-2014/statement/

Looking deeper it is interesting to note that, notwithstanding the BBC comment above, Frontier agree precisely with Plum on the nominal risk free rate range (4.8-5.4%) and that the difference is in the premium added to that (Plum 2.2% and BBC/Frontier's implied value is 1-1.7%).

Again there is a difference in approach. Plum have looked at NA as a standalone entity and BBC (Frontier) have looked at cost of debt for the company overall (whereas NA is only 21% of the company turnover).

The Adjudicator is content that the Plum methodology is valid and consistent with Ofcom's approach in the past.

In the time since the Plum report was published there has been a downward shift in the forecast interest rate. The three year Bank of England forecast dropped by 0.55% between Nov 2014 and Feb 2015, which had led the Adjudicator to consider reviewing the cost of debt. The latest figure in May, however, shows an increase.

Other Considerations

Comparison with 2006

The BBC comment "*Using the two methods adopted by regulators to estimate the cost of debt our independent review indicated an approximate range for the nominal cost of debt to be 5.8 -6.1% compared to 7.0-7.6% figure in the Plum report.*

This change combined with the wider range for equity Beta reduced the overall WACC range to 5.6-7.0%. The reduction in WACC this implies compared to the 2006 figure is consistent with the reductions seen across the regulated infrastructure"

Adjudicator's Comment

Resetting the equity Beta to 1.0 in the BBC (Frontier) calculations gives a WACC range of 6.3-7.0% to compare with the Plum result of 6.6-7.5%. Setting aside specific risk for a moment (discussed below) the Adjudicator would have adopted the median value of 7.05%, which represents a drop of 0.65% compared to 2006.

The BBC comments imply that this is too small a drop. A range of regulated industries have shown a larger reduction in WACC. Some of this will have been driven by change in Risk Free Rate (RFR), some by other factors specific to that industry.

Of all those markets that could be cited, the Adjudicator feels the closest is airports and the CAA as this, unlike the distribution industries, exists in a market where there are alternatives. Here the change from 2006 to 2014 was 0.85% with other industries exhibiting changes to 2.0%.

However, the Adjudicator feels that such comparisons are not helpful in reaching a conclusion, for two reasons:

- Industry-specific factors in other determinations are unlikely to apply here, and
- Economy-wide factors, although reliant on the same data, are likely to be interpreted based on the regulatory review period in a specific industry (and this is significantly shorter for many regulated industries)

Aiming up

The BBC in section b) of their response disagrees with the need to aim up within the range.

In summary they feel

- The risks were not fully explored, in particular risks that have reduced.
- WACC already takes account of specific risk through gearing, allowances on cost of debt and "top of the range" beta.

In their introduction, the BBC state *"that this is an important decision for Arqiva and the wider broadcast industry that will bind relevant parties for a 10 year period, a period that might include a potential transition to using more efficient technologies for broadcast"*.

Adjudicator's Comment.

It is acknowledged that all the risk factors were not set out in full in the Consultation.

In 2006 the environment was very different and the WACC determination was part of establishing the high power contracts for DTT running up to DSO. The risks that were considered then were short term execution risks around DSO itself i.e. the change from analogue to digital. An investor's perspective would be a capital programme matched to a series of contracts which run beyond 2030 and would recover and provide a return on capital.

The execution DSO risks have crystallized and gone.

The environment now is one where there is discussion on the life of DTT. Over the next few years 700MHz spectrum is to be lost to DTT. WRC15 will review the allocation of the remaining spectrum. Recent reviews by Ofcom have concluded that the remaining spectrum will be guaranteed to 2025 and reviewed at that point.

Competing platforms such as IP delivery are likely to gain traction and become an increasingly attractive alternative (improvements in broadband availability and capability are likely to accelerate this transition).

If DTT ends before the end of the economic life of the assets then these have no realistic alternative use.

The Adjudicator felt that these risks were unlikely to occur within the proposed 10 year period but would be a consideration for investors as the period ran on particularly past its mid-point. In their introductory comments, it appears the BBC feels that major change may occur sooner within the 10 year period. These risks may not be fully reflected via the CAPM formula.

There is also the possibility that there is an asymmetry of outcomes in setting the WACC, i.e. the downside of setting it too low is likely to exceed the downside of setting it too high. The regulatory response to this asymmetry is to "aim high" but remain within the range.
The Adjudicator believes there is a compelling case to aim high and is concerned that "top of the range" is not adequate to encourage innovation and investment.

Time Horizon

The time horizon of 10 years was chosen to provide some regulatory certainty to match the statements by Ofcom and the EU on the use of the UHF spectrum for DTT broadcasting.

References: Ofcom. March 2012. "Securing long term benefits from scarce spectrum resources" http://stakeholders.ofcom.org.uk/binaries/consultations/uhf-strategy/summary/spectrum-condoc.pdf and Pascal Lamy. August 2014. "Report to the European Commission - results of the work of the High Level Group on the future use of the UHF band (470-790 MHz)." http://ec.europa.eu/digital-agenda/en/news/report-results-work-high-level-group-future-use-uhf-band

The BBC *"considers it more appropriate to reflect the potential increase in the market view of specific risk by setting an interim review point than by setting WACC at the upper end of the range at this stage"*.

The Adjudicator accepts that setting a 5 year review point would result in a lower WACC for the first period but also believes it would be much higher in the second period. However, a 5 year review period may not be feasible, as Arqiva may require the near-term returns to compensate for the longer-term risk.

The Adjudicator remains satisfied that a WACC applicable for 10 years gives the greatest certainty and incentive to invest in DTT but (as noted in the Consultation) reserves the right to conduct an interim review if he feels it necessary.

Conclusion

The Adjudicator is grateful for the input from the BBC and Frontier as this has triggered valuable further consideration and analysis. The Adjudicator however remains of the view that the 7.5% (pre-tax real) figure proposed by Plum is appropriate and therefore this becomes the WACC to be applied to new Network Access reference offers and contracts from the date of publication of this Final Determination.

Appendix A: Plum Report – January 2015

Plum_Jan_2015_Estimated_WACC_for_br

The estimated cost of capital for broadcast transmission 2015-2025

A report for Office of the Adjudicator - Broadcast Transmission Services

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January 2015

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Executive Summary

Plum was asked to review the weighted average cost of capital (WACC) for broadcast transmission for the period 2015-2025. The long-duration of the WACC reflects the nature of the market for broadcast transmission which is dominated by long-term contracts. It also suggests that any revision to the WACC should apply on a forward looking basis i.e. to new contracts only.

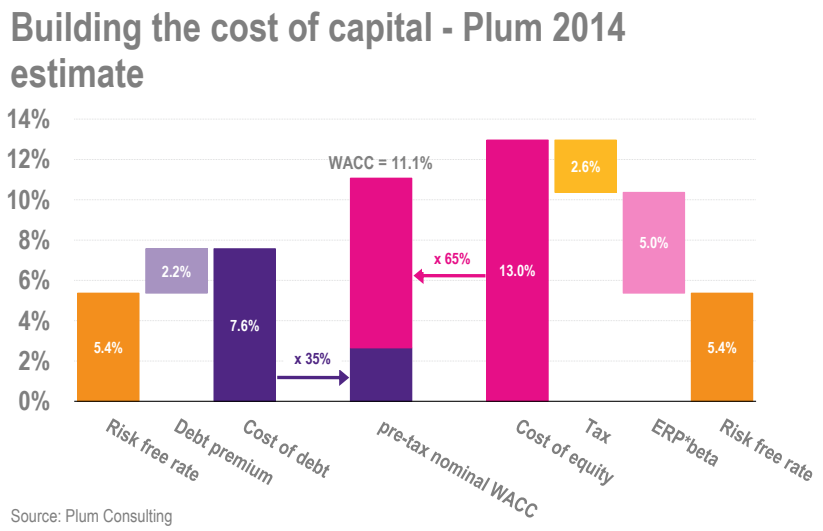
The current WACC of 7.7% real pre-tax or 10.4% nominal pre-tax was estimated in 2006 by Ofcom. In 2010 an assessment concluded that a full review at the time was not justified, in part on grounds that more information would be available post the 2014 Arqiva debt refinancing and as the impact of the financial crisis became clearer. In addition, the rate of corporate tax will have fallen from 30% in 2006 to 20% by 2015, which acts to lower the estimated WACC.

Taking the above factors into account, and assessing available evidence from a long-term perspective, we conclude that the estimated WACC for broadcast transmission is in the range 6.6% to 7.5% on a real pre-tax basis (or 10.1% to 11.1% on a nominal pre-tax basis).

In addition to information regarding the cost of capital we have regard to the risk in relation to broadcast transmission which has increased since both 2006 and 2010 due to growing platform competition and changes in spectrum policy including the proposal to reallocate 700 MHz spectrum for mobile broadband by or before 2022 and uncertainty regarding the future of sub-700 MHz spectrum.

These considerations introduce an element of asymmetric risk regarding longer-term revenues for broadcast transmission which is partially, but not fully reflected, via the reduction of less expensive debt versus more expensive equity finance over the coming decade.

We propose, having regard to asymmetric risk, that an assumed return on capital at the upper end of the range i.e. of 7.5% real pre-tax, be utilised in setting new contract prices (equivalent to 11.1% nominal pre-tax before deflation as illustrated below).



We also propose, given the possibility that the corporate tax rate or spectrum or public service broadcast policy might change materially before the coming decade is out, that such changes could trigger a full review if they expected to impact required returns by 0.5 percentage points or more.

1 Context and introduction

An estimate of the weighted average cost of capital (WACC) for broadcast transmission was last determined by Ofcom in 2006. In 2010 Plum Consulting carried out a study to determine whether a review of the cost of capital is justified at this stage.[1] The study concluded that:

> *"On the basis of available evidence, a review now of the cost of capital applying to broadcast transmission would be unlikely to result in a material change. However, depending on the decision by the Competition Commission on the Openreach WACC, developments in relation to sovereign risk and Arqiva's cost of re-financing, a review might be appropriate in future."*

The brief for this study was to carry out a forward looking review on the understanding that any revision of the WACC would apply for a period of 10 years from early 2015. Further, the wider context should be considered in assessing the WACC. In particular, broadcast transmission is subject to:

- Competition from other platforms which is evolving rapidly with the rollout of fibre and 4G and development of internet video and radio services.
- Long-term contracts with durations of 10-20 years.
- Adjudication rather than regulation with periodic review of price controls.

These characteristics differ from those applying to other regulated industries and form a key part of our assessment alongside the technical determination of a best estimate of the WACC.

In Section 2 we consider the characteristics of the broadcast transmission including competition and policy.

In Section 3 we consider the building blocks of the estimated WACC.

In Section 4 we set out our conclusion regarding the assumed return on capital for pricing purposes.

[1] Plum. July 2010. "The cost of capital in relation to broadcast transmission," http://adjudicator-bts.org.uk/documents/Plum_July2010_Cost_of_capital_in_relation_to_broadcast_transmission.pdf

2 The broadcast transmission market

The broadcast transmission market differs from other regulated services in the following ways:

- There are competing platforms for audio and video delivery including satellite, broadband and cable rather than monopoly provision, for example, in relation to gas and water distribution. In the case of broadband and internet protocol (IP) the platform has developed rapidly.
- The broadcast transmission market involves long-term contracts with durations of 10-20 years between Arqiva and broadcasters rather than short-term contracts with end users.
- The broadcast transmission market is in part funded indirectly via the BBC licence fee coupled with free to air delivery requirements which support funding of a high coverage terrestrial broadcast network.
- Broadcast transmission is subject to the Undertakings applying to the merger between Arqiva and National Grid Wireless including adjudication in case of disputes rather than ongoing *ex ante* regulation and 3-5-yearly periodic reviews of pricing.

We discuss these differences and their implications for assessing the WACC below.

2.1 Development of competing platforms

Digital Terrestrial Television (DTT) over the broadcast transmission network is the most widely used platform for TV viewing. The platform has coverage of 98.5% for the three Public Service Broadcasting (PSB) muxes[2] and 90% for commercial muxes.[3] PSB is also subject to specific requirements in terms of free to air transmission over the broadcast transmission platform. Terrestrial broadcasting is also the primary form of radio listening.

Competing platforms include cable, satellite including Sky and Freesat service and fixed and mobile broadband access for IP services. As cable coverage is limited to around 50% of households we focus on satellite and broadband access.

Ofcom estimate that Freesat household coverage is likely to be around 95% or less due to line-of-sight constraints and restrictions on installing a satellite dish.[4] As of September 2014 Freesat is available in 1.9 million UK households (about 8% of households).[5] Freesat is therefore a competitor with terrestrial transmission for commercial free-to-air broadcast TV. Whilst not a direct competitor, the penetration of pay satellite (Sky) potentially lowers the base on non-pay TV households, of whom most receive free-to-air TV via DTT.[6]

Fixed and mobile broadband, coupled with IP based delivery of video and audio, also offer competing platforms to terrestrial broadcasting. Broadband platforms and IP delivery have developed rapidly,

[2] PSB1 (BBC), PSB2 (Digital 3 and 4), PSB3 (BBC)

[3] COM4 (ITV), COM5 and COM6 (Arqiva). The planned coverage of the interim 600 MHz mux (COM7) is 70%.

[4] Ofcom. May 2014. "The future of free to view TV"
http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/discussion/ftv.pdf

[5] Freesat. October 2014. "Freesat winning new fans with freetime and mobile apps"
http://cdn.freesat.co.uk/freesat/freesat_website/content/downloadables/freesat%20q3%20final.pdf

[6] However it should be noted that DTT is still commonly used for secondary sets. Ofcom estimates that 3 in 4 TV households use DTT on at least one of their sets. But there is growing evidence of these may increasingly be replaced by tablets.

and more rapidly than anticipated at the time the WACC was last considered in relation to broadcast transmission in 2010.

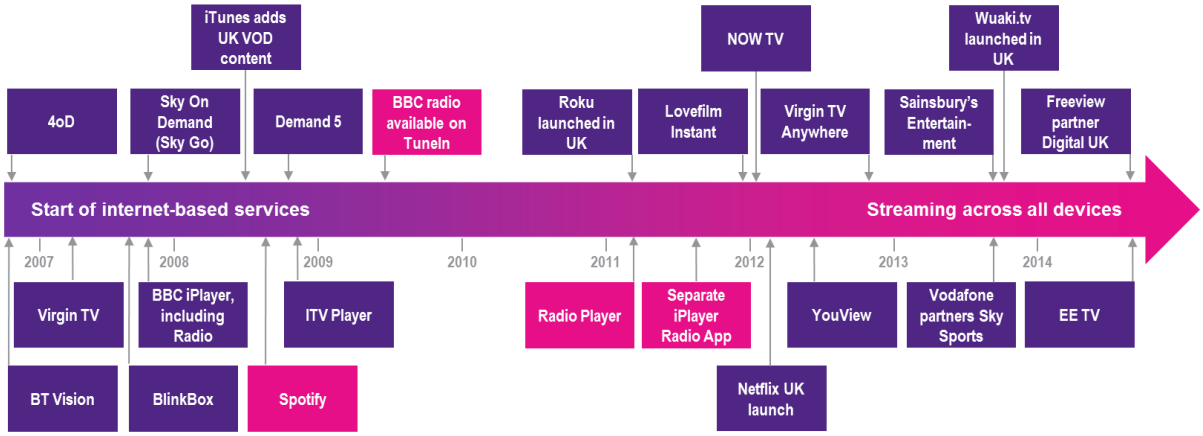
For radio, broadband has been a viable platform for some time, with 4G extending this to mobile delivery. Whilst video delivery over IP developed with basic broadband, superfast broadband supports higher definition video and multiple streams per household. Ofcom speculates that a fall in the total number of TV households from 26.3m in 2012 to 25.8m in 2013 may be attributable to households which watch audio-visual content via an IP connection only.[7]

Superfast fixed broadband – with speeds over 30 Mbps – was available to 73% of UK premises as of 2013 and BT is continuing to rollout fibre (predominantly fibre to the cabinet) with coverage to over 21 million households by Q2 2014.[8] The Government has made funding available to extend superfast broadband to 95% of homes and businesses by 2017, and is exploring options to ensure coverage of the 'final 5%'.[9] The costs of carrying data over fixed networks are also progressively falling.

Mobile network operators are also extending 4G coverage from around 75% today to up to 98% by the end of 2015.[10] 4G not only offers higher speeds but also lower unit costs of data carriage. Additional radio spectrum availability will also increase speed, capacity and lower unit costs over time. Whilst mobile is comparatively expensive for sustained video streaming it is viable as a substitute for radio.

In parallel with the development of broadband access internet based services have also developed. Figure 2-1 shows the launch of such services in the UK.

Figure 2-1: Rise in internet-based services



TV development
Radio development
Source: Plum Consulting, Ofcom

[7] Ofcom. August 2014. "The Communications Market Report."
http://stakeholders.ofcom.org.uk/binaries/research/cmr/cmr14/2014_UK_CMR.pdf

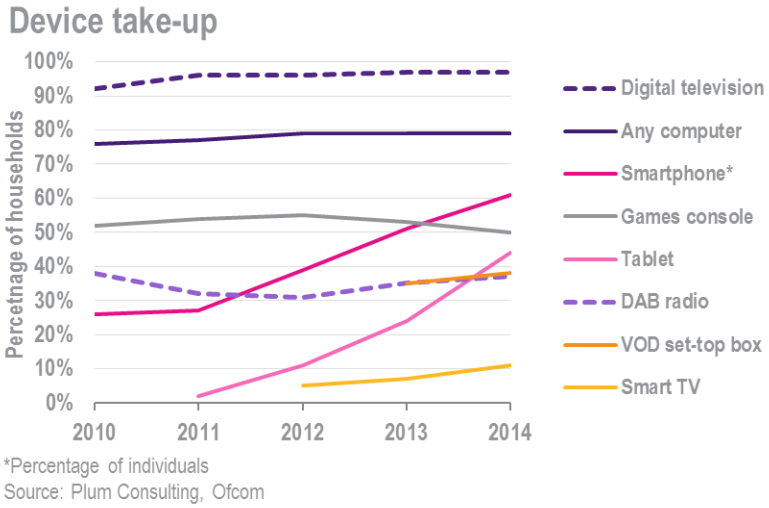
[8] http://www.btplc.com/Sharesandperformance/Quarterlyresults/PDFdownloads/q214-slides.pdf

[9] DCMS. August 2014. "Superfast broadband reaches 1 million more homes and businesses."
https://www.gov.uk/government/news/superfast-broadband-reaches-1-million-more-homes-and-businesses

[10] Ofcom. August 2014. "The Communications Market Report."

The rapid adoption of smartphones and tablets (Figure 2-2) also supports a shift towards internet video and radio services.[11] Research by Ericsson[12] suggests that viewing of streamed video content is closing in on scheduled broadcast TV.[13]

Figure 2-2: Household take-up of connected devices and digital broadcast devices



Online services also offer expanded capabilities and flexibility for consumers (though broadcast content recorded on a personal video recorder also affords flexibility) and opportunities for broadcasters to use data collected through IP connectivity to enhance consumer propositions and improve the return from advertising.

Developments in relation to compression standards and spectrum allocation for mobile also tend to favour competing platforms relative to terrestrial broadcasting. Adoption of the more advanced H.265 compression standard offers the possibility of halving the bit rate over broadband for a given quality. Adoption of H.265 for DTT broadcast transmission would require coordination and involve longer lead times due to the replacement cycles for TV sets and set top boxes.

In relation to spectrum availability it was agreed at the World Radio Communications Conference 2012 (WRC-12) that the 700 MHz band (694-790 MHz) would be allocated to mobile on a co-primary basis with broadcasting services after WRC-15. In the UK, Ofcom has published its decision to make the 700 MHz available for mobile data use by 2022 and sooner if possible.[14] The funding of 700 MHz clearance is yet to be decided with Ofcom noting that:

> "*It is for Government to decide whether to make public funding available to support this programme. We are discussing this question with Government at the moment, having regard to consultation responses and to our duties to citizens and consumers*."

[11] Ofcom. October 2014. "One in three children now has their own tablet computer." http://media.ofcom.org.uk/news/2014/media-lit-audit-oct2014/

[12] Ericsson. September 2014. "TV and Media 2014: changing consumer needs are creating a new media landscape." http://www.ericsson.com/res/docs/2014/consumerlab/tv-media-2014-ericsson-consumerlab.pdf

[13] While scheduled broadcast TV tends to be delivered over over-the-air broadcast and cable transmission, it is increasingly also being available over broadband delivery (IPTV and OTT).

[14] Ofcom. November 2014. "Decision to make the 700 MHz band available for mobile data - statement" http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/statement/700-mhz-statement.pdf

Further, whilst broadcasting is not currently subject to opportunity cost-based spectrum fees, such fees may apply from 2020.[15]

The development of competing platforms is increasing the choice available for video and radio services. The increased competitive pressure will impact on the terrestrial broadcast platform. Decreasing distribution costs of IP relative to DTT and better discoverability may make OTT delivery an increasingly attractive alternative for smaller commercial channels. Whilst long-term contracts offer some protection over time the development of alternative platforms, particularly with high coverage, involve longer-term risks for the terrestrial broadcasting platform.

2.2 Future of terrestrial broadcasting

The longer term allocation of both 700 MHz and sub-700 MHz spectrum is also under review in Europe. The High Level Group comprising senior executives from the mobile and broadcast sectors under the chairmanship of Pascal Lamy reported in August 2014 outlining the following proposals for the UHF band:[16]

- The 700 MHz band (694 to 790 MHz) should be released for mobile broadband use by 2020.
- The sub 700 MHz band should remain available for DTT use until at least 2030.
- The long-term position of the sub-700 MHz band should be reviewed before 2025.

PSB policy will also be reviewed. The current BBC Charter expires in December 2016 along with the 2010 licence fee settlement which freezes the fee level at £145.50. Formal negotiations on the charter renewal are not anticipated before the general election in 2015.

A report by Mediatique on the development of free-to-view TV forecasts a decline in DTT penetration from 43% in 2013 to 34% in 2024.[17] On the longer-term future of terrestrial broadcasting Ofcom note:

> "*…while we cannot exclude the potential for more radical changes, our central view remains that DTT will continue to be a very important delivery technology for FTV television over the next decade. Furthermore, we do not currently expect a full switch-off of DTT until post 2030, unless there was significant policy intervention to support a more aggressive timetable for change.*"[18]

The Culture, Media and Sport committee is currently looking into the future of BBC, including the role of the BBC in developing technology and new ways of distributing content.[19] Ofcom is also conducting

[15] Ofcom. July 2013. "Spectrum pricing for terrestrial broadcasting - statement." http://stakeholders.ofcom.org.uk/binaries/consultations/aip13/statement/statement.pdf

[16] Pascal Lamy. August 2014. "Report to the European Commission - results of the work of the High Level Group on the future use of the UHF band (470-790 MHz)." http://ec.europa.eu/digital-agenda/en/news/report-results-work-high-level-group-future-use-uhf-band

[17] Mediatique. May 2014. "The development of free-to-view television in the UK by 2024." http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/discussion/Mediatique.pdf

[18] Ofcom. May 2014. "The Future of Free to View TV". Page 24. http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/discussion/ftv.pdf

[19] Commons Select Committee. October 2013. "Future of the BBC: terms of reference.". http://www.parliament.uk/business/committees/committees-a-z/commons-select/culture-media-and-sport-committee/news/131022-future-of-the-bbc-tor/

the third PSB review.[20] This review will look at whether the PSBs will remain resilient to structural changes affecting viewing habits and TV advertising.

It is possible that the scope and scale of PSB may change in the future and this would inevitably have an impact on the role of DTT. However such changes are likely to be in the long term (post-2030). Whilst DTT medium-term future is assured the longer-term outlook is uncertain. Further, the timeframes in question are within the term of the longest contracts and within the life of some assets used for terrestrial broadcasting.

Terrestrial broadcast assets are also financed via long-term debt, and long-term prospects do impact on the scope to issue bonds (and the cost) in the nearer term since debt must be refinanced at maturity. In particular the ratings agency FitchRatings noted that:[21]

> *"To compensate for mid- to long-term revenue risk (due to the expiry of the contracts and overall technology risk), Fitch assesses how rapidly the transaction's debt levels reduce."*

As comparatively less expensive debt levels are reduced the overall weighted average cost of capital will rise. Long-term uncertainty will, therefore, have an impact on the cost of capital over the coming decade.

2.3 Regulation of terrestrial broadcasting

Broadcast transmission is not subject to standard utility style regulation with periodic reviews every two to five years and price control resets based on estimated revenues and the estimated WACC. Rather broadcast transmission is subject to reference offer rates (for which the estimated WACC is a factor), long-term contracts and adjudication in case of disputes.[22]

These differences, coupled with growing platform competition for video and audio 'transmission', change the nature of risk and return in ways that are relevant to an assessment of the WACC, and in particular a comparison with determinations for regulated utilities.

Existing contracts were agreed given the circumstances and anticipated circumstances at the time. They also involve long-lived assets, with depreciation extending beyond the agreed contract period (and into a future in which renewal becomes uncertain). An element of risk therefore exists that may not have been apparent at the time existing contracts were entered into. Further, overall contract terms were agreed given the WACC agreed by Ofcom in 2006.

It would therefore arguably not be appropriate to reflect a revision of the forward looking WACC today in existing contract terms. In other words, the estimated WACC is applied on a forward looking basis to reference offer terms and new contracts only.

The estimated WACC should also reflect the longer period for which the estimated applies – a decade in the case of broadcast transmission. In contrast, utilities such as water have (in effect) 'contracts' with customers regarding prices determined for the duration of each price control, do not face

[20] http://stakeholders.ofcom.org.uk/broadcasting/reviews-investigations/public-service-broadcasting/psb-review-3/terms-of-reference

[21] FitchRatings. July 2014. "Fitch revises Arqiva's Bonds Outlook to Negative". https://www.fitchratings.com/creditdesk/press_releases/detail.cfm?pr_id=837495

[22] http://adjudicator-bts.org.uk/undertakings.htm

competition risk, and may be compensated for changes in demand at each periodic review.[23] The appropriate WACC is then the WACC applicable to the relevant price control period and is applied to all "contracts".

Broadcast transmission is also facing growing competition as TV and radio services, which are traditionally delivered over these networks, evolve towards broadband access and internet based delivery. Compounding this are two additional factors – the constrained capacity of the broadcast network which constrains the ability to offer higher definition formats, and the risk that further radio spectrum is reallocated for mobile broadband. In the longer term these considerations involve an element of risk for the platform which differs from other utilities.

2.4 Conclusions

The broadcast transmission market differs in fundamental respects from other markets for which the WACC has been assessed by regulators due to rapidly developing platform competition, the presence of long-term contracts and the nature of regulation of broadcast transmission. The following are therefore relevant considerations in estimating an appropriate WACC for broadcast transmission:

- The timeframe over which an estimate of the WACC will apply is around 10 years. A longer-term perspective should therefore be adopted in interpreting movements in the cost of debt and the cost of equity. Further, decisions by other regulators should be interpreted mindful of the fact that those decisions hold for between two and five years rather than a decade.
- Whilst terrestrial broadcasting is subject to long-term contracts this does not necessarily imply that the risks are lower than for other regulated industries with shorter term regulatory review periods. The reason for this is that in other industries with little or no competition and limited demand risk the regulator can compensate at review for changes in demand by rebasing prices.
- Broadcast transmission is subject to growing competition from competing platforms, in particular broadband access coupled with IP delivery. There is also ongoing pressure for the reallocation of spectrum utilised for broadcasting for mobile use. Whilst the risk to the platform is longer-term in nature it is reflected in the near term via expectations that debt – which is lower cost than equity finance - will be reduced given longer term refinancing risk.
- Finally given the nature of long-term contracts and expectations at the time these were entered into it would arguably be inappropriate to apply any change in the estimated WACC on a retrospective basis. In other words, any revision to the estimated WACC should apply on a forward looking basis to new contracts only.

[23] Whilst water companies may face some risk in relation to industrial demand there is no prospect of competition in the residential market. Further, whilst there is some demand risk this is in any case mitigated by adjustment at subsequent price control reviews. In the telecommunications market there is competition and demand risk, though it is not anticipated that alternative platforms could substitute entirely for fixed network broadband access.

3 Building blocks of the estimated WACC

In this section we discuss the approach to estimating the WACC and draw on market data and decisions by other regulators in the UK (summarised in Appendix A) to estimate the components of the WACC. We also consider other estimates of the WACC for broadcast transmission in Sweden and Ireland (discussed in Appendix B).

3.1 Methodology for estimating the cost of capital

We employ the CAPM framework in coming to our estimate of the WACC. The CAPM methodology was used by Ofcom in 2006 to estimate the WACC for site access. It is also widely used by both UK regulators and regulators in other countries. In relation to the choice of methodology the Competition Commission stated that: *"CAPM remains the tool with the strongest theoretical underpinnings"* and that *"none of the alternative models helps to overcome the problems that CAPM has in dealing with limited market data."*[24]

3.2 WACC formula

Under the CAPM, the pre-tax nominal WACC is calculated as follows:

$$WACC = \frac{K_e * (1 - G)}{(1 - t)} + K_d * G$$

Where K_e is the cost of equity, K_d is the cost of debt, G is gearing,[25] and t is the rate of tax. In turn, the cost of equity, K_e, and the cost of debt, K_d, are given by the following two formulae respectively:

$$K_e = RFR + ERP * \beta$$

$$K_d = RFR + dp$$

Where *RFR* is the risk-free rate, *ERP* is the equity risk premium, *β* is the equity beta and *dp* is the company's debt premium.

Figure 3-1 illustrates the relative magnitudes of each of these components in Ofcom's 2006 estimate of the (nominal) pre-tax WACC, whilst Figure 3-2 discusses alternative measures of the WACC.

[24] Competition Commission. February 2010. "Bristol Water plc - Notice of Reference: Determination of Adjustment Factor for the period 2010-2015," http://webarchive.nationalarchives.gov.uk/20140402141250/http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/non-inquiry/rep_pub/reports/2010/fulltext/558_appendices.pdf, pN4 para 19

[25] The proportion of debt funding over total debt and equity funding.

Figure 3-1:

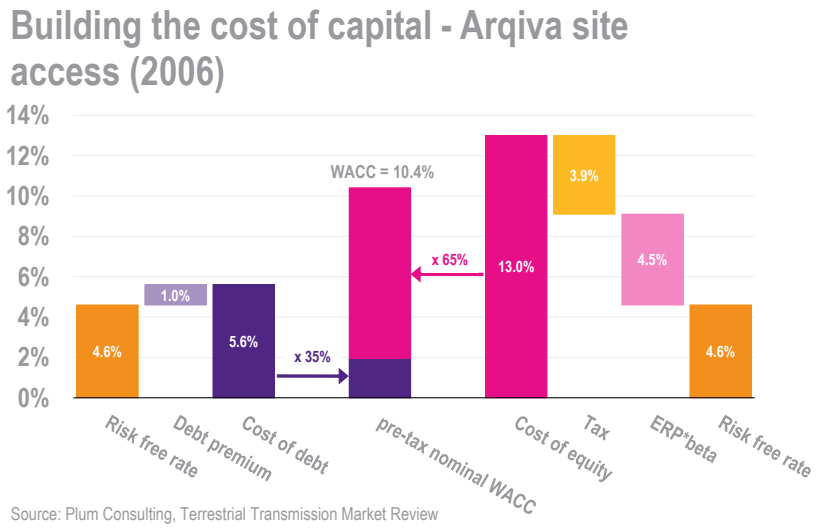


Figure 3-2: A note on different versions of the WACC

There are a number of different versions of the WACC: real or nominal, and pre-tax, post-tax or 'vanilla'. The version of the WACC used, and the way it is calculated, has implications both for firms and for the value of the WACC itself.

In this paper we compute a nominal, pre-tax WACC, which we then deflate using our inflation assumption to derive a real, pre-tax WACC. The pre-tax WACC is the appropriate WACC to use for the determination of prices, and we provide both nominal and real estimates as per Ofcom (2006). In setting contract prices Arqiva utilise the real pre-tax WACC.

Further discussion on the issues relating to the various versions of the WACC can be found in the sections on inflation and tax (Sections 3.8 and 3.9 respectively).

We now examine each of the components of the WACC in turn.

3.3 Risk-free rate

The risk-free rate (RFR) is the rate of return required by investors from a risk-free investment. The RFR can be expressed in real or nominal terms. Regulators mostly estimate the real risk-free rate, and use it either as a building block of the WACC or to compute the nominal risk-free rate to be used in the WACC calculation.

The real RFR is usually estimated using yields on index-linked government bonds (gilts in the UK) where there is minimal risk of a government default.[26] However, recent yields may no longer be a good proxy for the RFR, because:

- Quantitative easing has depressed yields.[27]

[26] For example, Ofcom (June 2014), Ofwat (Jan 2014), Competition Commission (March 2014)

[27] www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb100101.pdf

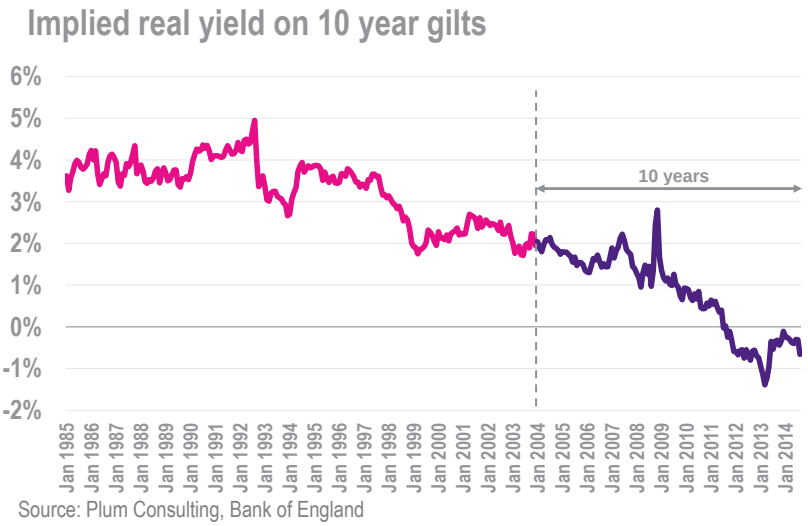
- Pension fund regulation has increased demand for ILGs, depressing yields.[28]

We are therefore cautious in interpreting recent data that may be affected by current market conditions, such as ILG yields. We also consider that taking a long-term view is important in this industry for the reasons set out in Section 2. Therefore, we examine regulatory decisions, historic gilt yields and forecast bank rates from a medium term perspective in coming to an estimate.

3.3.1 Historical gilt yields

Figure 3-3 shows 10 year gilt yields from 1985 to today.[29] The historical data suggest that the recent negative real yields are an anomaly, and that a long-term RFR would be higher.

Figure 3-3:



Source: Plum Consulting, Bank of England

In a report for Scottish Power, NERA (2014) uses the Dimson, Marsh and Staunton database to calculate a long-run average estimate of the UK government bond rate, which implies a long-run real risk-free rate of 2.1%.[30]

3.3.2 Regulatory decisions

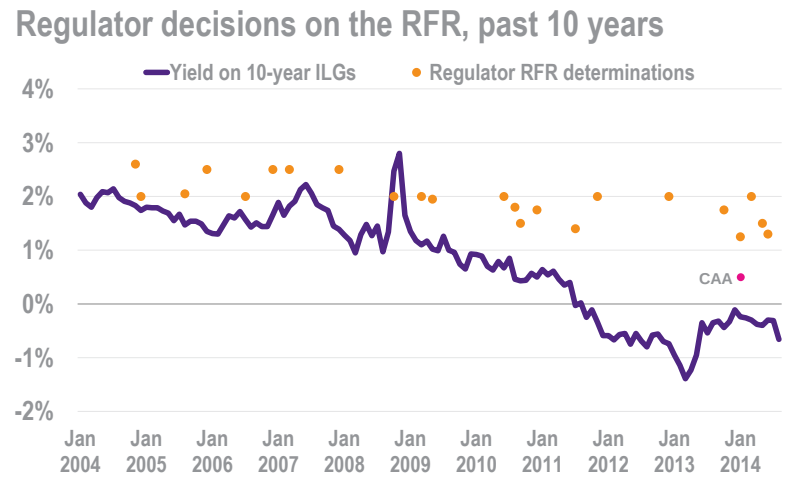
In recent years regulators' estimates have diverged from index-linked gilt (ILG) yields. Figure 3-4 shows ILG yield data for the past decade overlaid with recent regulatory estimates of the RFR.

[28] http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/qb060402.pdf

[29] Bank of England data. http://www.bankofengland.co.uk/statistics/pages/yieldcurve/default.aspx

[30] NERA. March 2014. "The Cost of Equity for Scottish Power's Distribution Network Operators at RIIO-ED1," http://www.spenergynetworks.co.uk/userfiles/file/201403_NERA_CostOfEquitySP_ED1.pdf p12

Figure 3-4:



Source: Plum Consulting, Bank of England, regulator websites

The revealed 'regulatory inertia' indicates that regulators are taking a longer-term view in their decision-making. For example, in the 2014 FAMR consultation, Ofcom was asked to provide more detail on how it arrived at its estimate of the RFR, given that observed ILG yields were low. In response, Ofcom stated that:

> *"We considered that, given the current market conditions, we should exercise regulatory judgement in order to balance observed data about past or future conditions, with the need to estimate a real RFR appropriate for estimating costs in 2016/17. We said we continued to believe it was appropriate to exercise caution when interpreting data that may be distorted by current market conditions, for example, the impact of quantitative easing. In estimating the WACC, we take account of a range of data sources and in particular consider movements in the trend to assist us in exercising our regulatory judgement."*[31]

Recent regulatory decisions on the RFR mostly range between 1-2%. The exception is the CAA's January 2014 estimate of 0.5% for Heathrow and Gatwick airports. However, this is because the CAA revised their total market return (TMR) estimate downward and decided to reflect the difference via changing the RFR rather than the equity risk premium (ERP) - the CAA notes that the low RFR is:

> *"…to ensure consistency and is a consequence of the reduction in the TMR [Total Market Return], and should not be viewed in isolation from the TMR and ERP"*[32]

In relation to terrestrial broadcasting we note that we take a longer-term view than would be appropriate in other regulated sectors with five yearly, or more frequent, reviews.

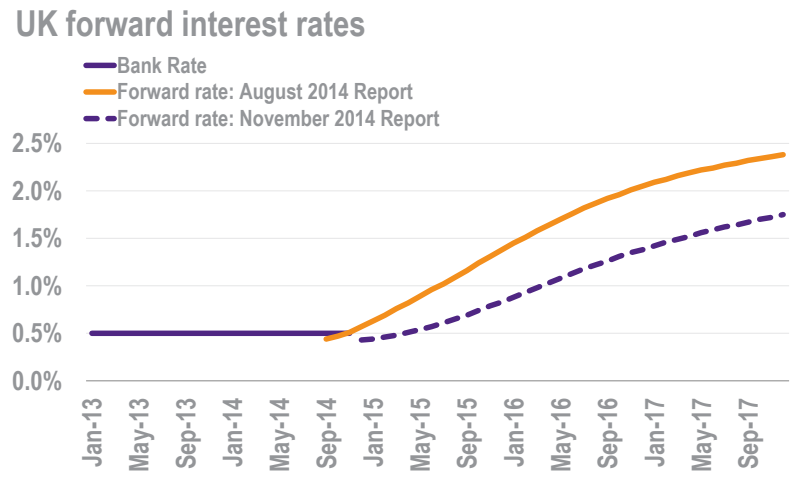
3.3.3 Forecast bank rate

The Bank of England forecasts a rise in the bank rate to around 1.75% by 2017 (a smaller increase in comparison with the August inflation report).[33]

[31] Ofcom. June 2014. FAMR, Annex 14, A14.36-37 http://stakeholders.ofcom.org.uk/telecoms/ga-scheme/specific-conditions-entitlement/market-power/fixed-access-market-reviews-2014/statement/

[32] http://www.caa.co.uk/docs/33/CAP%201140.pdf

Figure 3-5: Expectations for interest rates (Bank Rate)



Source: Plum Consulting, Bank of England Inflation Reports, August 2014 and November 2014

3.3.4 Conclusion

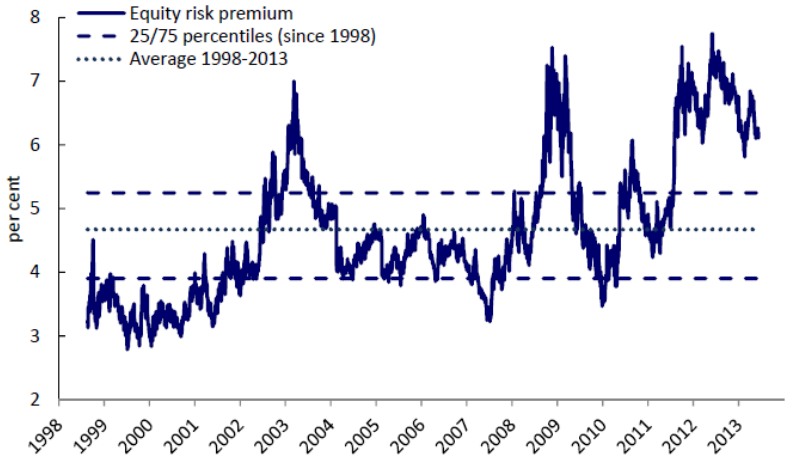
After considering the above information sources we conclude that the appropriate value for the RFR is between 1.5% and 2%. Both historical data and by the Bank of England's bank rate forecasts suggest that this is an appropriate figure.

3.4 Equity risk premium

The equity risk premium (ERP) is the additional return investors require to invest in the equity market, as opposed to investing in a risk-free asset. The ERP is calculated as the difference between total market returns (TMR) and the risk-free rate (the ERP therefore represents the market as a whole, and is not company-specific). The estimated ERP has been trending upward over the past decade (Figure 3-6).

[33] Bank of England. November 2014. "Inflation Report."
http://www.bankofengland.co.uk/publications/Documents/inflationreport/2014/ir14nov.pdf

Figure 3-6: ERP estimates from the dividend discount model



Source: Bank of England[34]

We look at both the market data and regulatory decisions to formulate our estimate of the ERP.

3.4.1 Market data

The data presented in Figure 3-6 suggest an average ERP over 1998-2013 of 4.5% to 5%. Furthermore, Dimson, Marsh Staunton (2011) provide evidence on long-term equity premia relative to bonds.[35] They find that the UK equity risk premia over 1900-2010 have an arithmetic mean[36] of 5.2% and a geometric mean of 3.9%.

NERA (2014) argue that arithmetic mean is suitable when *"the forecasting period is short relative to the observation period for the historical average and there is no negative auto-correlation in returns".*[37] Since we have a long observation period for historical premia (110 years) and the evidence for mean reversion *"is at best weak"*[38], more weight should be placed on the arithmetic mean figure of 5.2%.

3.4.2 Regulatory decisions

Recent regulatory decisions have estimated an ERP of around 5% (Figure 3-7)

[34] Speech given by David Miles. June 2013. *"Central bank asset purchases and financial markets"*, p5 http://www.bankofengland.co.uk/publications/Documents/speeches/2013/speech671.pdf

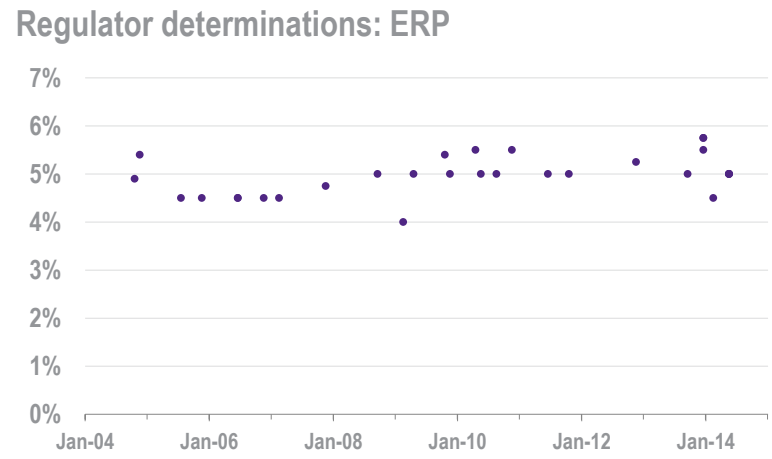
[35] Dimson, Elroy, March, Paul, and Staunton, Mike. 2011. "Equity Premia Around the World", London Business School, http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1940165_code937.pdf?abstractid=1940165&mirid=1

[36] The arithmetic mean is sum of *n* numbers divided by *n* – for example, for 2 and 8 the arithmetic mean is (2+8)/2 = 5. The geometric mean is the *nth* root of the product of *n* numbers – for example, for 2 and 8 the geometric mean is √(2*8) = 4

[37] http://www.spenergynetworks.co.uk/userfiles/file/201403_NERA_CostOfEquitySP_ED1.pdf, p15

[38] Dimson et al (2011), p13

Figure 3-7:



Source: Plum Consulting, regulator websites

Some regulators have estimated an ERP above 5% in recent years. However, we need to consider both the ERP and RFR estimates in tandem to ensure that they are consistent with total market returns, since ERP and RFR tend to move in opposite directions.[39]

We note that those regulators estimating higher ERPs (for example, the CAA, which estimated an ERP of 5.75% in 2014) have tended to counterbalance the higher ERP with a comparatively low RFR. We therefore need to keep our estimate of the longer-term RFR in mind when estimating the ERP.

Considering historical market data, regulatory decisions and our estimate of the RFR, we conclude that a range of 4.5% to 5% for a longer-term ERP is appropriate. Taken together, our estimates of the RFR and ERP imply a total equity market return of between 6% and 7%.

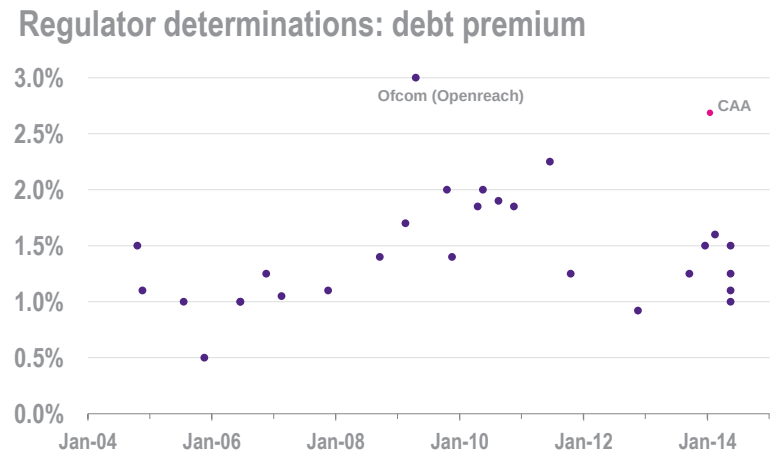
3.5 Debt premium

The cost of debt is the sum of the RFR and a premium reflecting the additional risk of corporate debt over government debt. A company's premium will represent a number of factors, including the company's credit rating and the outlook for the industry.

Regulators' estimates of the debt premium are shown in Figure 3-8. The CAA estimate is highlighted again since the high level of the debt premium (as inferred by Plum) is likely a consequence of the CAA's low RFR estimate.

[39] Ofcom noted in 2014: *"…in the 2013 BCMR Statement, we considered the link between the ERP and the risk-free rate. We noted that the risk-free rate and the ERP tended to move in opposite directions."* Ofcom FAMR 2014, Annex 14, para 14.131

Figure 3-8:

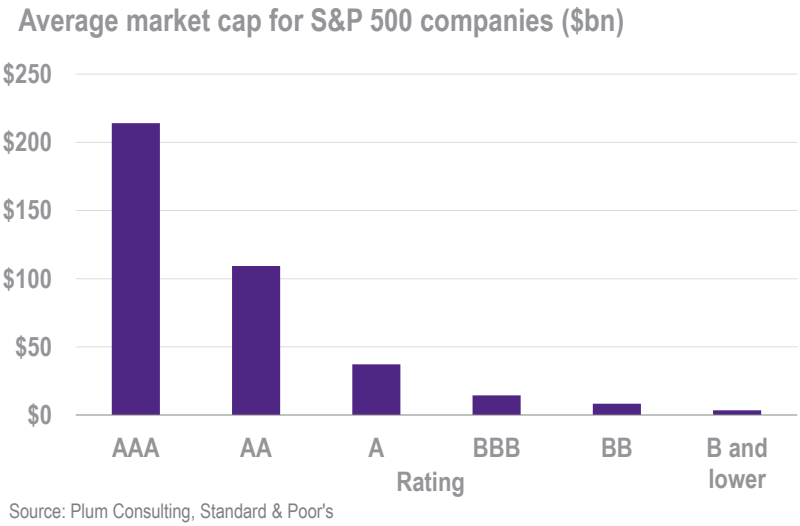


Source: Plum Consulting, regulator websites

Note: some regulators did not directly report their assumed debt premium. In those cases we have inferred a debt premium based on their total cost of debt and risk free rate estimates.

We assume that a BBB credit rating is the appropriate credit rating for terrestrial broadcasting. Terrestrial broadcasting is too small to achieve an A rating (credit ratings partly reflect company size as shown in Figure 3-9), and while a BBB+ rating could lower the cost of debt it would reduce the potential gearing achievable. On the other hand, a BBB- rating (or lower) would make it harder to fund new investments. We note that Arqiva is currently rated BBB.

Figure 3-9:

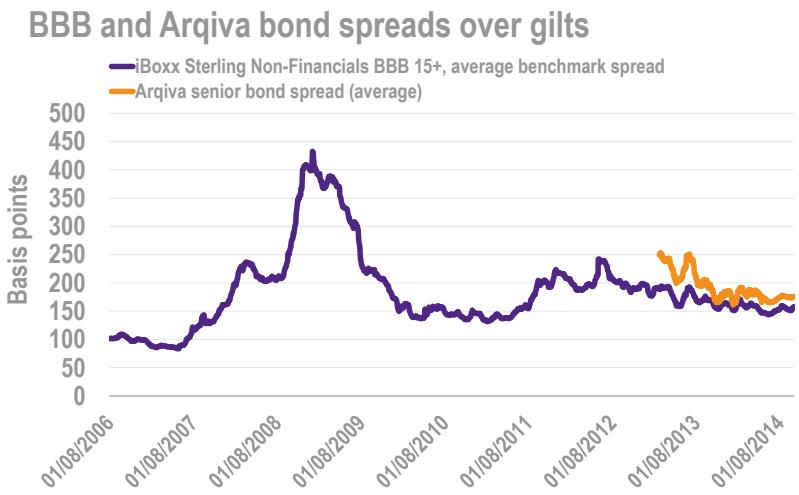


Source: Plum Consulting, Standard & Poor's

Accordingly, we examine the spread of BBB-rated bonds over gilts. We note that the 8-year spread (Figure 3-10) average is 185 basis points over gilts. However, Arqiva's bonds have shown spreads on average 20 basis points higher than this (Figure 3-10). We also allow an additional 15 basis points to

cover debt issuance fees and the new issuance premium (following discussions with Arqiva). We conclude an appropriate value for the debt premium is 2.2%.

Figure 3-10:



Source: Plum Consulting, iBoxx, Arqiva

3.6 Gearing

The assumed percentage of debt used in calculating the WACC is known as the gearing. Ofcom (2006) state that:

> *"Under the CAPM a firm can potentially lower its overall cost of capital by increasing its gearing ratio. This is because debt is generally cheaper than equity as a result of tax advantages to debt. It is not, however, optimal for a firm to increase its level of gearing indefinitely. This is because, as the amount of debt in the business increases, so does the risk that the firm will not be able to pay all of its debtholders. As this happens, debtholders will demand a higher return"*[40]

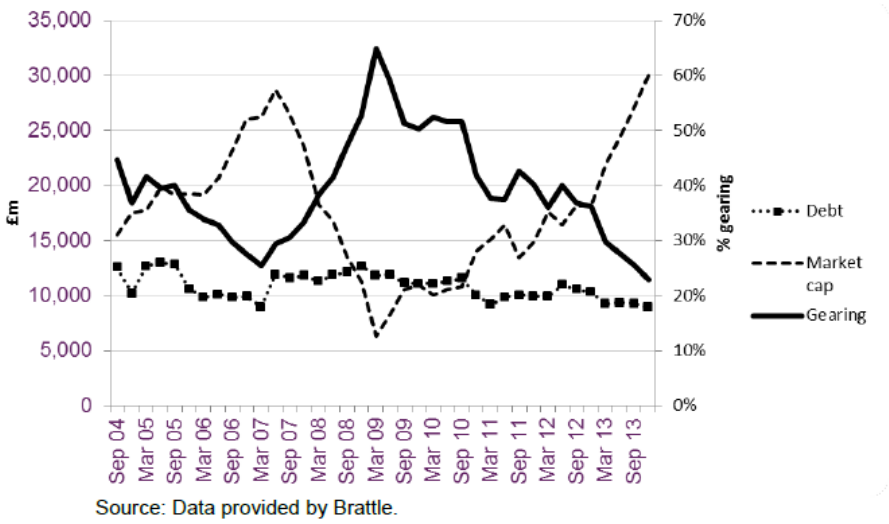
A firm that faces low levels of risk will therefore be more able to sustain a high gearing ratio. It can commit to taking on more debt as there is a low probability it will be unable to repay its debt.

Regulators' estimates of gearing depend on the industry they are regulating. Utility companies are estimated to have high gearing ratios - future demand for their services is relatively certain. On the other hand, BT has generally had a lower gearing ratio (see Figure 3-8) as have mobile operators.[41]

[40] Ofcom. July 2006. "Terrestrial Transmission Market Review", Annex 1, IX

[41] Ofcom, June 2014, "Mobile call termination market review 2015-18," http://stakeholders.ofcom.org.uk/consultations/mobile-call-termination-14/ Annex 14 Figure A14.2 for estimates of the gearing level of MCPs

Figure 3-11: BT's gearing over the last ten years



Source: Data provided by Brattle.

In 2006, Ofcom estimate a gearing of 35% for site access, on the grounds that (a) 35% falls in between utility companies' gearing ratios (typically 50%) and Crown Castle's estimates of the gearing ratios for Macquarie Communications Infrastructure Group and Crown Castle International (around 20%) and (b) 35% was *"approximately equal to BT's current level of gearing"*.[42]

We now look specifically at Arqiva's business to inform our gearing estimate. Arqiva's business consists of terrestrial broadcasting, satellite, digital platforms, telecoms and smart metering/M2M divisions (terrestrial broadcasting accounts for c.30% of Arqiva's revenues).

Table 3-1: Arqiva Broadcast Holdings Limited financing

	£m
Shareholder financing (equity)	2,243.3
Bank loans	1,023.5
Senior bonds	1312.5
Junior bonds	600
Finance lease obligations	14
Accretion on inflation-linked swaps[43]	59.9
Total	**5253.2**
Of which, investment-grade debt	*2,409.9*
Investment-grade debt / (investment-grade debt + equity)	*53%*

Source: Arqiva Broadcast Holdings Limited Annual Report 2014

[42] Ofcom. July 2006. "Terrestrial Transmission Market Review", Annex 1, XI

[43] From discussions with Arqiva

As discussed in Section 3.5, we consider that a BBB credit rating is appropriate for a terrestrial broadcaster. Accordingly, to estimate gearing we consider Arqiva's investment-grade debt (i.e. debt BBB and higher) only. This is because terrestrial broadcasting alone would not be able to support sub-investment grade debt. In our calculation we therefore we exclude Arqiva's junior bonds (rated B-). We estimate the resulting investment-grade gearing to be 53%.

Fitch has stated that it would expect to see the business deleveraging to around 3x earnings over the next ten years.[44] With Arqiva's EBITDA of £407m in 2014 this implies an investment grade debt of c. £1.2bn. Assuming the enterprise value remains the same this would suggest a gearing of 26% in ten years. With a steady deleveraging, the average gearing over the 10 years would therefore be c. 39%.

We do not consider that a broadcast transmission business would be able to maintain a higher gearing than Arqiva as a whole. Such a business would face specific technology and competition risks. For these reasons it is likely that the 39% figure represents an upper limit of the achievable gearing by a broadcast transmission business over the coming ten years.

We therefore conclude that an appropriate value for the gearing is 35%. This is consistent both with the historic review and a forward-looking view of Arqiva's business.

3.7 Equity beta

A company's equity beta measures the movement in returns from its shares relative to the movements in the return from a market portfolio. The average company in the market would have an equity beta of 1.0. A beta greater than 1.0 would imply that the investment's returns respond more than one-for-one with market returns.

In the 2006 review of the cost of capital for site access, Ofcom used an equity beta estimate of 1.0 (the average for the market). We do not believe there is a compelling case for deviating from Ofcom's estimate.

If we use the average asset beta of tower and mast companies and apply our estimate of gearing, we derive an equity beta estimate close to 1.0. These parameters are related via the following formula:

$$Equity\ beta = \frac{Asset\ beta}{(1 - gearing)}$$

Using Europe Economics' estimate of the two-year asset beta (0.55) along with our estimate of gearing, we compute an equity beta of 0.85. However, a longer term view of tower and mast asset betas (such as the five-year asset beta) suggests a higher asset beta (e.g. 0.6 or 0.65) in which case the derived equity beta approaches 1.0.

Further, although we consider that the risks of broadcast transmission have increased due to platform competition and reduced expectations regarding spectrum availability, we note that these risks are not necessarily reflected via the equity beta (which is a measure of covariance with the market was a whole), or have an impact which may be ambiguous.

For example, the risk to future revenue may be greater in a better performing economy if higher incomes encourage more adoption of, and investment in, high speed broadband, new devices including tablets and IP set top boxes and in IP video services. This could imply a negative correlation

[44] https://www.fitchratings.com/creditdesk/press_releases/detail.cfm?pr_id=837495

between GDP growth, the stock market generally and the value of broadcast transmission i.e. a reduced beta.

Rather such risks may be reflected through (a) the debt premium, and (b) a lower accepted level of future gearing. Additional risk not adequately captured by these elements, such as the risk that assets will not be fully recovered via future contract revenues, may be compensated for outside of WACC estimation by aiming up in setting the estimated return used for price setting to reflect asymmetric risk.[45]

3.8 Inflation

A number of regulators use the real risk-free (i.e. the rate without accounting for inflation) rate as a building block in the CAPM formula to generate a real WACC estimate. Ofcom adopts an alternative approach (used both in 2006 and in the 2014 FAMR consultation), which is to compute a nominal pre-tax WACC (using the nominal risk-free rate) and then deflate this to derive a real pre-tax WACC.

Figure 3-12 contains a discussion of the approach to nominal versus real WACC estimation. We use the Ofcom approach of deflating the nominal pre-tax WACC to derive the real equivalent using the Fisher relationship[46].

Figure 3-12: Real vs. nominal WACC: dealing with inflation

A nominal WACC will allow for inflation, and is calculated by using the nominal risk-free rate as a building block when constructing a WACC estimate. In turn, the nominal risk-free rate can be calculated in two ways: either by estimating a real risk-free rate and combining it with an estimate of inflation, or by estimating the nominal risk-free rate directly (we adopt the former approach).

A real WACC can be computed either by deflating the nominal WACC (an approach used by Ofcom and in this paper) or directly, by using the real risk-free rate as a building block when constructing the WACC estimate (favoured by other regulators including the CAA[47]). The two methods can give different results, but, as Oxera demonstrate, the former is less likely to lead to under-recovery.[48]

In the 2014 FAMR, Ofcom assumes an RPI forecast of 3.2%, based on the three sources in Table 3-2.

Table 3-2: Sources for Ofcom's RPI estimate in the FAMR 2014

Forecast based on:	HMT 2016/2017 (forecasts as at Feb 2014)	Implied inflation on forward rates for 5 and 10 year bonds	Long run RPI-CPI wedge
RPI estimate	3.2%	3.2 to 3.5%	3.3 to 3.5%

Source: Ofcom, FAMR 2014 Table A14.9

[45] Competition Commission, https://www.caa.co.uk/docs/5/ergdocs/ccreport_appf.pdf, para 150-155

[46] The Fisher relationship: real rate = [(1+nominal rate)/(1 + inflation rate)]-1

[47] http://www.caa.co.uk/docs/33/CAP%201140.pdf

[48] Oxera. 2005. *"Which WACC when? A cost of capital puzzle",* http://www.oxera.com/Latest-Thinking/Agenda/2005/Which-WACC-when-A-cost-of-capital-puzzle.aspx

However, in the 2014 mobile call termination market review,[49] Ofcom computes a long-run estimate of RPI inflation using just the long-run RPI-CPI 'wedge' (that is, the Bank of England's target CPI inflation rate of 2% plus the estimated long-run difference between RPI and CPI of 1.3%[50]). In the mobile call termination market review Ofcom states that:

> *"We note that our RPI assumption of 3.3% differs slightly from the 3.2% rate used in the 2014 FAMR Draft Statement, which was concerned with forecasting out to 2016/17. Given the long-run nature of the 2014 MCT model we consider that we should use the best available long-run estimate of RPI consistent with the long-run CPI estimate of 2%."*

Similarly, we use the Bank's long-run estimates for the RPI of 3.3%.

3.9 Tax

The tax rate has a material impact on the estimated WACC, as set out in Figure 3-13

Figure 3-13: The impact of tax on the WACC

The WACC is computed using the cost of equity and the cost of debt. The cost of equity is a post-tax measure – it is the return required by equity investors *after* corporation tax deductions. The cost of debt, on the other hand, is pre-tax, since interest on debt is tax-deductible. Calculating a WACC from the (post-tax) cost of equity and the (pre-tax) cost of debt gives the 'vanilla' WACC.

To compute a pre-tax WACC, we have to convert the post-tax cost of equity to a pre-tax cost of equity. This is done by multiplying the post-tax cost of equity by a tax 'wedge' (in effect, adding an increment onto the cost of equity). Note that this will increase the cost of equity (and hence the WACC). This is because companies pay taxes on profits, so the pre-tax cost of equity must be larger to account for a company's tax liabilities.

For example, say a company's equity investors require a return of 7%. This is the return a company must deliver to those investors *after* paying tax on its profits. The pre-tax cost of equity is given by:

$$Pre-tax\ cost\ of\ equity = Post-tax\ cost\ of\ equity \times \frac{1}{(1-tax\ rate)}$$

If the tax rate is 30%, then the pre-tax cost of equity will therefore be 7%*1/(1-30%) = 10%. From this 10% the company must fund both its tax commitments and still provide equity investors with a return of 7%. A lower tax rate will therefore mean a lower pre-tax WACC, since a lower return is required to meet both tax liabilities and equity investors' requirements. The CAA also observed a fall in their estimated (real) pre-tax WACC for Heathrow and Gatwick, which they largely ascribe to the tax rate reduction:

"The WACCs for both airport operators have reduced compared to the Q5 settlement of 6.2% for HAL and 6.5% for GAL. The reductions mainly reflect reductions in corporate tax, the cost of debt and TMR since the previous settlement (2008/9 to 2013/14)."

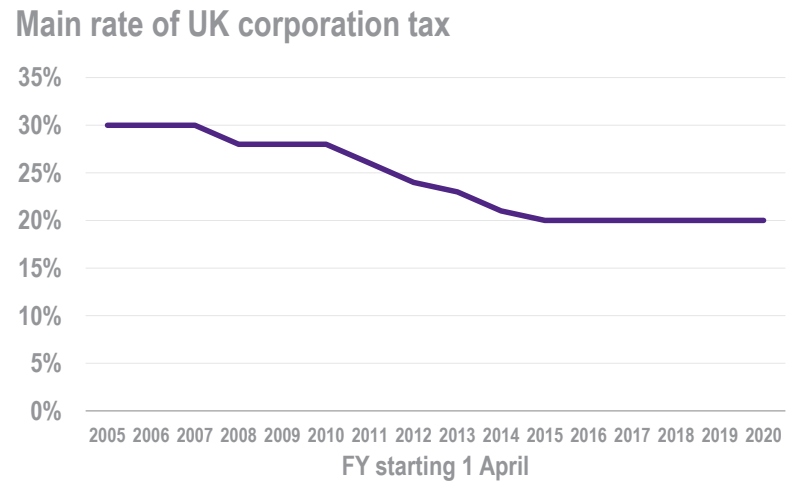
A reduction in the tax rate from 30% in 2006 to 20% in 2015 would, considered in isolation, result in a reduction of the 2006 Ofcom estimate of the real pre-tax WACC for broadcast transmission from 7.71% to 6.64%.

Since 2007, corporation tax rate has fallen from 30% and to an anticipated 20% in 2015 (Figure 3-14).

[49] http://stakeholders.ofcom.org.uk/consultations/mobile-call-termination-14/

[50] Bank of England Inflation Report. Feb 2014.
http://www.bankofengland.co.uk/publications/Documents/inflationreport/2014/ir14feb.pdf

Figure 3-14:



Source: Plum Consulting, IFS, HMRC

In estimating the WACC we assume that corporate tax rate will remain at 20%. However, given the duration of WACC estimate flowing from this review we propose that any future movement in the corporate tax rate that would impact the WACC by ½ percentage point or more be considered as grounds for a further review of the WACC prior to 2025.

4 Conclusion regarding the assumed return on capital

Having considered the market and regulatory context, market data and other recent regulatory decisions we now come to a view regarding the appropriate WACC for broadcast transmission to apply during the period 2015-2025. Before reaching a conclusion based on our assessment of financial market data and decisions by other regulators we consider overall anticipated risk and return over the period 2015-2025 and the balance of costs in relation to upside and downside risk in setting the WACC.

4.1 The nature of risk, overall risk and return

The opportunity cost of capital which investors would expect to be met when investing in broadcast transmission depends on market returns, the mix of debt and equity and the extent of non-diversifiable risk associated with broadcast transmission business. However, the actual return to investors depends on anticipated cash flows - revenues less costs - associated with broadcast transmission; and the duration of cash flows. Risk therefore enters into consideration of whether investment is justified in a number of ways:

- Non-diversifiable or systemic risk relates to risk that is correlated with the market as a whole and cannot therefore be mitigated by holding a portfolio of stocks. Systemic risk is reflected via the beta coefficient in the WACC formula. An example of a non-diversifiable risk would be a revenue or cost element which is correlated with GDP, which in turn is correlated with equity returns generally. A diversifiable risk is specific to the business.
- Via the assessment by ratings agencies and bond holders of risk and therefore both the quantity of debt and the price of debt. Higher risk could see lower bond ratings and a higher price of debt, and/or pressure to reduce debt over time - thereby increasing the proportion of more expensive equity and the overall WACC. Both diversifiable and non-diversifiable risk may impact on price of debt or the share of debt and therefore the WACC.
- Finally there may be an element of risk that is not reflected via the WACC formula but nevertheless reduces expected revenues and returns. For example, if there is a probability that a business will be displaced by technological change and competition at some point in the future then this risk may be specific but nevertheless relevant to equity holders since it could truncate future returns. Such risk may be reflected via an adjustment to expected future cash flows and offset by higher prices in the near term. However, it is not necessary reflected in the WACC and may therefore be neglected in assessing regulated returns.

We consider that the nature of specific technology and competition risk, and the changed nature of such risk over time, is a relevant consideration in relation to broadcast transmission. In particular the risk of reallocation of 700 MHz) and potentially sub-700 MHz) spectrum for mobile may have been considered low and the anticipated rollout of fibre slower and more partial than is now the case.

Further, we consider it reasonable to expect that steps were not taken in the past to offset such risk, for example via higher contract prices than an assessment based on expected revenues, likelihoods of future contract renewal, asset lives (prices were calculated assuming asset lives exceeded contract lives) and the WACC might have suggested at the time. This is both because expectations of risk have changed and because regulators are reluctant to allow for risk beyond their direct impact via the WACC.

We conclude that there is an element of risk in relation to future cash flows that is not fully reflected via the WACC formula and is better thought of as biasing cash flows downwards relative to an estimate based on a business as usual projection. One way of allowing for this risk is to use a cost of capital assumption in calculating prices which is higher than the best central estimate of the WACC.[51]

4.2 Upside and downside costs in relation to the WACC

In an unregulated market the WACC is endogenous and can respond dynamically to changes in market circumstances and in response to the portfolio of investments and returns comprising the business.

With regulation an estimate of the WACC is made and a number for the WACC (which may differ from the best estimate of the WACC) is then applied alongside other assumptions to determine allowed prices. Prices, with possible automatic adjustment for inflation and assumed efficiency gains, are then fixed for a period of time. There may also be provision for error correction, for example, if volumes differ materially from those assumed when the price control was set.

This implies that the actual opportunity cost of capital may differ from the WACC (since estimation is approximate) and that the actual WACC and estimated WACC – even if initially the same - may diverge before subsequent review. The fact that the WACC is exogenous may also imply that there is "right" WACC that could incentivise efficient investment when there is a portfolio of options (which is almost always the case particularly if there is flexibility over the timing of investment).[52]

The combination of uncertainty and possible asymmetry in terms of the costs of upside and downside errors in setting the WACC implies that the best (economically efficient) WACC may differ from the best estimate of the WACC.

Whether regulators allow for upside and downside costs depends on the nature of the business and the nature of regulation i.e. whether there is scope for correction of errors between reviews. In relation to airports the Competition Commission concluded that (paragraphs 150 to 152):[53]

> *"Given the uncertainties in cost of capital estimates, we considered the cost of setting an allowed WACC that was too high or too low. If the WACC is set too high then the airports' shareholders will be over-rewarded and customers will pay more than they should. However, we consider it a necessary cost to airport users of ensuring that there are sufficient incentives for BAA to invest, because if the WACC is set too low, there may be underinvestment from BAA or potentially costly financial distress. Annex 5 illustrates how the weight to be put on these costs will flow into the decision-making process.*
>
> *Given the significance to customers of timely investment at Heathrow and Gatwick, we have given particular weight to the cost of setting the allowed WACC too low. Most importantly, we note that it is difficult for a regulator to reduce the risks of underinvestment within a regulatory period.*

[51] Ruback, Richard S. October 2010. "Valuation when Cash Flow Forecasts are Biased," http://www.hbs.edu/faculty/Publication%20Files/11-036.pdf

[52] Williamson. 2009 "The regulation of next generation access networks and the draft Commission Recommendation", In NEREC – Monitoring EU telecoms policy. www.nerec.es/wpcontent/files/NEREC_report.pdf

[53] https://www.caa.co.uk/docs/5/ergdocs/ccreport_appf.pdf

Taking these factors into account, we concluded that the allowed WACC should be set close to the top of our range."

Given the nature of the broadcast transmission market and regulation of the market we consider that asymmetric costs apply in setting the WACC too low versus too high and that this is further reason to aim up in setting the WACC.

4.3 WACC estimate for 2015-2025

We have used our estimates of the WACC components in the previous section to estimate a WACC for broadcast transmission. The components and the resulting WACC are summarised in Table 4-1 below, along with Ofcom's 2006 estimate.

Table 4-1: Estimated WACC for 2015-2025 versus Ofcom 2006 estimate

	Ofcom (2006)	Revised lower bound	Revised upper bound
Risk free rate (real)	2%	1.5%	2%
Risk free rate (nominal)	4.6%	4.8%	5.4%
Equity risk premium	4.5%	4.5%	5%
Equity beta	1.0	1.0	1.0
Gearing	35%	35%	35%
Debt premium	1%	2.2%	2.2%
Corporation tax rate	30%	20%	20%
Inflation	2.5%	3.3%	3.3%
Cost of debt (pre-tax)	5.6%	7.0%	7.6%
Cost of equity (post tax)	9.1%	9.3%	10.4%
Nominal pre-tax WACC	**10.4%**	**10.1%**	**11.1%**
Real pre-tax WACC	**7.7%**	**6.6%**	**7.5%**

Source: Plum Consulting

Our estimated real pre-tax WACC range (6.6%-7.5%) is below Ofcom's 2006 estimate of 7.7%. This is due to the fall in the rate of corporation tax, partially offset by an increase in the estimate of the equity risk premium (if we consider only the impact of the tax fall on the 2006 Ofcom estimate the resultant real pre-tax WACC would be 6.6%).

4.4 Assumed return on capital for price setting purposes

The assumed return on capital for price setting purposes may differ from the estimated WACC in order to reflect other relevant considerations that would not necessarily be reflected via the CAPM formula. In particular, expected revenues may be lower than projected revenues due to asymmetric risk. In

relation to broadcast transmission longer-term risks, due to growing platform competition and competition for spectrum resources, are relevant considerations; particularly given the absence of the periodic price resetting mechanisms which exist for other regulated businesses.[54]

Having regard to the nature of the risks in the broadcast transmission market and the nature of regulation we propose that the WACC applied in price setting be at the upper end of the estimated range for the WACC i.e. 7.5% real pre-tax.

4.5 Possible triggers for review prior to 2025

Overall we consider it unlikely that developments in the capital markets would justify review of the WACC prior to 2025. In particular, whilst historically interest rates have fallen the estimated cost of equity has risen, lending a degree of stability to the overall market return.

However, policy decisions are a different matter and it may be appropriate to include triggers for review if significant changes which impact the risk environment in relation to broadcast transmission or the WACC via the corporate tax rate were to occur.

The reason the proposed WACC has been reduced relative to the WACC set in 2006 by Ofcom is the reduction in the corporate tax from 30% to 20% in 2015. Should the tax rate vary materially in future this might be grounds for review. We propose that a future variation in the corporate tax rate of around 5 percentage points or more (i.e. with triggers at 15% and 25%), which would change the pre-tax WACC by 0.5 percentage points, may be grounds for review.

We also propose that policy decisions that would impact on the longer term viability of terrestrial broadcasting, for example, further reallocation of spectrum below 700 MHz and/or a material change to public service broadcasting policy which impacted demand for terrestrial broadcasting, might be grounds for review.

[54] Such price resetting would in any case be of limited value if a platform was progressing losing business due to platform competition.

Appendix A: Recent UK regulatory estimates of the WACC

Regulator	Review	Date	Status	WACC (real, pre-tax)*	Real RFR	ERP	TMR
Ofwat	Price Control Determination	Dec 2014	Final	4.1%†	1.25%	5.5%	6.75%
Ofgem	RIIO-ED1 Electricity Transmission (Local)	Nov 2014	Final	4.3%	1.5%	5%	6.5%
Ofcom	Fixed Access Market Review (WACC for BT Group)	Jun 2014	Consultation	6.6%	1.3%	5%	6.3%
Ofcom	Mobile Call Termination Review	Jun 2014	Consultation	6.9%	1.3%	5%	6.3%
Competition Commission	Northern Ireland Electricity Limited	Mar 2014	Final	4.9%	1.25%	4.5%	5.75%
CAA	Heathrow and Gatwick Airports	Feb 2014	Final	5.35% (Heathrow) 5.7% (Gatwick)	0.5%	5.75%	6.25%
ORR	Network Rail	Oct 2013	Final	4.9%	1.75%	5%	6.75%
Ofgem	National Grid Electricity Transmission and National Grid Gas	Dec 2012	Final	5.2%	2%	5.25%	7.25%
Ofcom	LLU and WLR services (WACC for BT Group)	Mar 2012	Final	6.1%	1.4%	5%	6.4%
Ofgem	Gas and Electricity Transmission Price Controls (one-year rollover)	Nov 2011	Final	5.8%	2%	5%	7%
CAA	NATS	Dec 2010	Final	7%	1.75%	5.25%	7%
Competition Commission	Bristol Water	Sep 2010	Final	6.1%	2%	5%	7%
Ofcom	*Site access*	*Jul 2006*	*Guidance*	*7.7%*	*2%*	*4.5%*	*6.5%*

* For some reviews, only vanilla WACCs were reported. We have adjusted them by calculating real pre-tax WACCs using the same inputs.

† Wholesale. Calculated by applying the 14 basis point retail margin adjustment to a pre-tax WACC.

Appendix B: Other estimates in relation to broadcast transmission

Aside from the Ofcom review of 2006, we are aware of two other regulatory reviews of a WACC for broadcast transmission (though both were assessed for integrated broadcaster and broadcast transmission businesses):

- A 2007 study by Copenhagen Economics for PTS on the WACC for broadcasting operators in Sweden, which estimated a pre-tax nominal WACC of 8.37%.[55]
- A 2014 review of the WACC in three sectors (including broadcasting) by ComReg, which estimated a pre-tax nominal WACC for broadcasting of 8.68%.[56]

The more recent estimate in Ireland is summarised in Table B-1. Key differences in Ireland versus the UK include a lower corporate tax rate and lower assumed equity beta estimate (pushing the estimate down) and lower (notional) gearing estimate (pushing the estimate up).

Table B-1: ComReg estimate in Ireland

Component	Low estimate	High estimate	Point estimate
Risk free rate (real)	1.75%	2.5%	2.3%
Risk free rate (nominal)	3.28%	4.55%	4.09%
Equity risk premium	4.6%	5.25%	5%
Equity beta	0.53	0.80	0.73
Gearing	25%	25%	25%
Debt premium	1.5%	2.25%	1.75%
Corporation tax rate	12.5%	12.5%	12.5%
Inflation	1.5%	2%	1.75%
Cost of debt (pre-tax)	4.78%	6.8%	5.84%
Cost of equity (post tax)	5.73%	8.75%	7.76%
Nominal pre-tax WACC	6.11%	9.20%	8.11%
Nominal pre-tax WACC after "aiming up"[57]			8.68%
Real pre-tax WACC			6.8%

[55] Copenhagen Economics. Feb 2007. "WACC for Broadcasting – Teracom," https://www.pts.se/upload/Documents/SE/WACCforBroadcasting.pdf

[56] ComReg. April 2014. "Review of Cost of Capital (Mobile, Fixed Line, Broadcasting)," http://www.comreg.ie/_fileupload/publications/ComReg1428.pdf

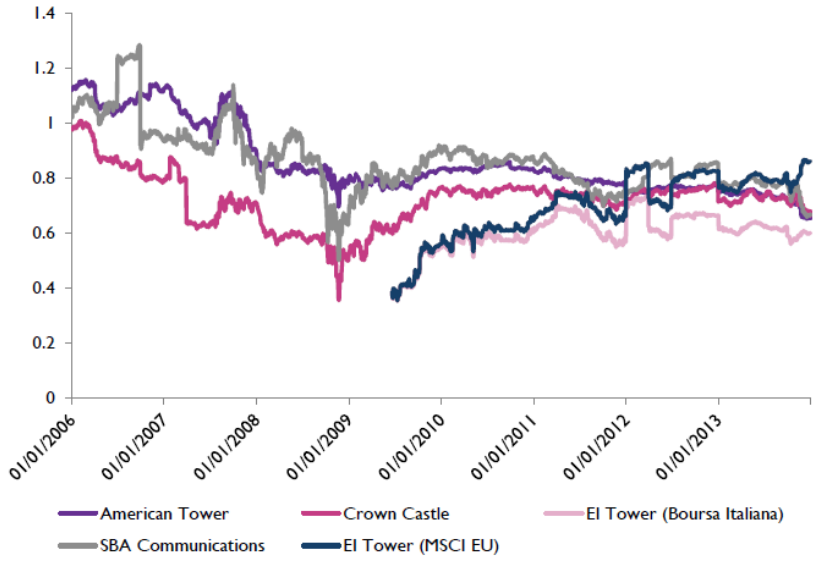
[57] ComReg "aim up" their WACC estimate towards the upper end of the estimated range by increasing several components (the nominal risk free rate, the asset beta and the debt premium), to reflect *"the asymmetry of consequences between those of setting the cost of capital too low and those of setting it too high"*. The "aiming up" implies an uplift of ~7% to the point estimate nominal pre-tax WACC.

Europe Economics, in their study into broadcast cost of capital for ComReg (2014)[58], estimate an equity beta by estimating an asset beta and a debt beta. The asset beta is estimated from regulatory precedent and two-year asset betas for tower and mast companies and the debt beta is set to zero. The equity beta can then be computed as follows:

$$Equity\ beta = \frac{Asset\ beta}{(1 - gearing)}$$

Using their estimates of the asset beta (0.55) and gearing (25%) Europe Economics derive an equity beta of 0.73. We note that our estimate of gearing is higher (see 3.6), at 35%. Applying our estimate of gearing and using the same asset beta we derive an equity beta of 0.85. However, a longer term view of tower and mast asset betas (such as the five-year asset beta, shown in Figure B-1) might suggest a higher asset beta (say 0.6 or 0.65), in which case our derived equity beta approaches 1.

Figure B-1: Five year asset betas for tower and mast companies



Source: Bloomberg and Europe Economics calculations.

[58]Europe Economics. April 2014. "Cost of Capital for Mobile, Fixed Line and Broadcasting Price Controls," https://www.comreg.ie/_fileupload/publications/ComReg1428a.pdf

Appendix B: BBC Submission

BBC response to cost of capital consultation

BBC'S RESPONSE TO THE ADJUDICATOR'S CONSULTATION ON THE COST OF CAPITAL IN RELATION TO BROADCAST TRANSMISSION

17TH MARCH 2015

BBC'S RESPONSE TO THE ADJUDICATOR'S CONSULTATION ON THE COST OF CAPITAL IN RELATION TO BROADCAST TRANSMISSION

The BBC has reviewed the published assessment by the Office of the Adjudicator into the Cost of Capital in Relation to Broadcast Transmission and the report by Plum Consulting on which the assessment is based.

The BBC notes that this is an important decision for Arqiva and for the wider broadcast industry that will bind relevant parties for a 10 year duration, a period that might include a potential transition to using more efficient transmission technologies for broadcast. We have therefore commissioned an independent assessment from Frontier Economics of the Plum report and the Adjudicator's decision prior to submitting this response.

This independent assessment has indicated some significant differences in approach and choice of methodology to those adopted by Plum Consulting, and we would appreciate the opportunity to discuss further with the Adjudicator ways in which these findings might affect his assessment of the appropriate level for determining the cost of capital.

The consultation requested responses to three specific questions:

a) **Do you agree with the conclusions of the Plum report?**

There are some fundamental aspects of the report where our assessment differs considerably from the conclusions of the Plum report.

Principally, the Plum report has taken an historic approach to the risk-free rate (which is high relative to the current rates) combined with a current approach to the debt spread (which is high relative to the historic rate).

This is not in line with current regulatory best practice which is either to take the actual debt position combined with a forecast for new debt (Ofwat and CMA approach), or to take a purely historic rolling average (the Ofgem approach).

This approach to estimating the cost of debt, combining a long-term risk-free rate with a short term debt spread, applies the two components of the cost of debt in an inconsistent way and in this case the result of this 'high-high' approach is a figure that is higher than either the historic or the current rate and hence we would consider overstates the cost of debt.

We also note that the resultant debt component of the WACC is set significantly above current fixed rate financing levels experienced by Arqiva and there is no evidence to suggest a risk over the next few years to its ability to raise new finance at rates well below the cost of debt included in the report.

This would suggest that the cost of debt might more appropriately be set at a level reflecting realistic market rates with scope for an interim review in say, 5 years, to take account of the latest market information and data on risk.

b) **Do you agree with the Adjudicator's approach to specific risk?**

We do not agree with the some aspects of the approach taken to specific risk.

In particular the Adjudicator's assessment lists the only significant change since 2006 as being that "*there was no consideration in 2006 that the life of Digital Terrestrial Television ("DTT") might be finite*".

We acknowledge that this is a significant change and that comparing risk factors involves an element of judgement, however the current assessment appears to focus only on this potential new risk and does not consider risks that are likely to be lower than they were in 2006.

An immature regulatory regime, long asset lives and uncertainty over asset recovery were factors in increasing the assessment of specific risk at that time, and it is not clear that the report adequately considers the offsetting reduction in these risk elements.

In our view, a more balanced assessment might be that the level of specific risk does not appear to be higher than in previous periods and there is therefore no clear case for the uplift to the WACC proposed.

In addition, the assessment of the WACC already appears to include adequate allowance for the level of specific risk:

- Through allowing for a lower level of gearing
- Through allowance for the forward looking cost of debt
- Through a top-of-the range figure for the beta in the cost of equity calculation.

We therefore question whether it is appropriate to take specific risk as the sole reason for setting the WACC at the upper end of the range and would ask the Adjudicator to reconsider whether this approach has led to effectively double counting the impact of specific risk.

c) **Do you agree with the proposal to set WACC at 7.5%?**

Based on the above assessment, the BBC is of the view that the WACC is potentially overstated.

Using the two methods adopted by regulators (as noted under a) above) to estimate the cost of debt our independent review indicated an appropriate range for the nominal cost of debt to be 5.8% to 6.1%, compared to the 7.0% to 7.6% figure in the Plum Consulting report.

This change, combined with a wider range for the equity beta, reduces the overall WACC range to 5.6% to 7.0%, and we would question the need to adopt the higher end of that range, given the adequate consideration of specific risk already incorporated.

The reduction in WACC this implies compared to the 2006 figure is consistent with the reductions seen across the regulated infrastructure sector.

We would further note as per above, that we consider it more appropriate to reflect the potential for increase in the market view of specific risk by setting an interim review point than by setting the WACC at the upper end of the range at this stage.

Conclusion

We have highlighted some concerns over the approaches taken by Plum in deriving the components of a cost of capital for Arqiva and by the Adjudicator in interpreting and applying Plum's assessment into setting an appropriate level for the WACC. In summary:

- The methodology for calculating the cost of debt is flawed and results in a far higher cost than that currently evidenced in the market
- The components of specific risk are overly weighted in favour or adverse risk changes against favourable risk changes
- Specific risk is over-emphasised, both through the setting of risk premium and again in selecting the high end of the range.

In addition, in our view it is impractical at this moment to foresee the implications of a potential transition to more efficient technologies on the risk profile of the DTT platform. It does not seem appropriate that a WACC set in 2015 on assumptions at that time would bind all parties into a component of the charging mechanism for an investment in the regulated network that could, for example, secure greater longevity for the platform.

In this context, the BBC has concerns around a decision being made now for as long a term as 10 years without a specific provision to review in the event of any such fundamental changes to the existing DTT transmission infrastructure.

Given these concerns around the uncertainty, the absence of a mechanism to reflect future changes in risk profile and the high level of WACC being proposed at this time, we would consider it essential that the BBC should have the opportunity for further dialogue with the Adjudicator to ensure that all factors are adequately considered or reviewed before implementing a long term decision of this nature. We would also like to meet to present supporting evidence to our assessment of the methodology and conclusions adopted in determining the level of the WACC.

Appendix C: Frontier Report

Frontier_BTS
WACC_13-03-15_STC

Cost of capital for broadcast transmission

A PAPER FOR THE BBC

The Office of the Adjudicator – Broadcast Transmission Services (OTA-BTS) has issued a consultation on the cost of capital for network access of broadcast transmission services[1]. To support this consultation OTA-BTS published a report on the cost of capital by Plum Consulting[2].

The BBC has commissioned Frontier Economics to review the assessment of the cost of capital and the proposals set out in the consultation. This paper summarises the outcome of this review and it focuses on two main issues. First, the estimate of the cost of capital range presented in the Plum Consulting report. Second, the proposed treatment of specific risk.

The main findings of this assessment are as follows:

- The approach to estimating the cost of debt, combining a long-term risk-free rate with a short term debt spread, overstates the cost of debt.
- Using the two methods used by regulators to estimate the cost of debt we estimates the appropriate range for the nominal cost of debt to be 5.8% to 6.1%, compared to the 7.0% to 7.6% figure in the Plum Consulting report.
- This change, combined with a wider range for the equity beta, reduces the overall WACC range to 5.6% to 7.0%. The reduction in WACC this implies compared to the 2006 is consistent with the reductions seen across the regulated infrastructure sector.
- The consultation proposes an uplift to the WACC to reflect specific risk. In our assessment there is no clear case for this uplift. The level of specific risk does not appear to be higher than in previous periods and the WACC that we estimate (which includes a substantial premium to other infrastructure sectors) includes adequate allowance for risk.

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1 OTS-BTS: Consultation 2/2015: *The Cost of Capital in Relation to Broadcast Transmission*. http://adjudicator-bts.org.uk/adjudicator.htm.

2 Plum Consulting: *The estimated cost of capital for broadcast transmission 2015-2025*, January 2015. http://adjudicator-bts.org.uk/adjudicator.htm

Background to Broadcast Transmission WACC

The WACC for broadcast transmission was originally set by Ofcom in 2006. Ofcom estimated that the *nominal pre-tax weighted average cost of capital* (WACC) was 10.4%[3]. This was translated into a real pre-tax rate of return of 7.71% in the reference offers by applying an inflation assumption of 2.5%.

This cost of capital has not been amended since 2006. In 2010 the Office of the Adjudicator commissioned a report from Plum Consulting on the cost of capital. The report[4] argued that it was not appropriate to review the WACC for broadcast transmission at that time.

In the 2015 report Plum Consulting estimated a range for the real pre-tax WACC of 6.6% to 7.5%. This is shown in **Table 1** below.

Table 1. WACC estimates for broadcast transmission

	Low	High
Risk-free rate (real)	1.5%	2.0%
Risk-free rate (nominal)	4.8%	5.4%
Equity risk premium	4.5%	5.0%
Equity beta	1.0	1.0
Cost of equity (post-tax)	**9.3%**	**10.4%**
Cost of debt	**7.0%**	**7.6%**
Gearing	35.0%	35.0%
Tax rate	20.0%	20.0%
Inflation	3.3%	3.3%
WACC (nominal pre-tax)	**10.1%**	**11.1%**
WACC (real pre-tax)	**6.6%**	**7.5%**

Source: Plum Consulting

In addition, Plum Consulting recommended that a point estimate at the top of the range (7.5%) was applied. This was justified for the following reasons.

3 Ofcom, *Terrestrial transmission market review – updated general guidance for setting of charges and review mechanism*, July 2006.

4 Plum Consulting, *The cost of capital in relation to broadcast transmission*, July 2010.

- A view that the risk of changing technology or communications policy may not be adequately reflected in the WACC or in other elements of the reference offer methodology. In particular the risk that 700MHz or sub-700MHz spectrum may be reallocated in the future.

- A view that the costs of setting the WACC too low are greater than the costs of setting the WACC too high and that therefore it is appropriate to 'aim up' in the WACC range when setting the point estimate.

The case for selecting a point estimate at the top of the range is considered in the final section on specific risk.

The next two sections address the market evidence on the cost of capital and the lessons from regulatory decisions in other sectors.

Cost of capital estimate

This section reviews the estimate of the cost of capital provided in the Plum Consulting report. It considers the cost of equity, cost of debt and the overall Weighted Average Cost of Capital (WACC).

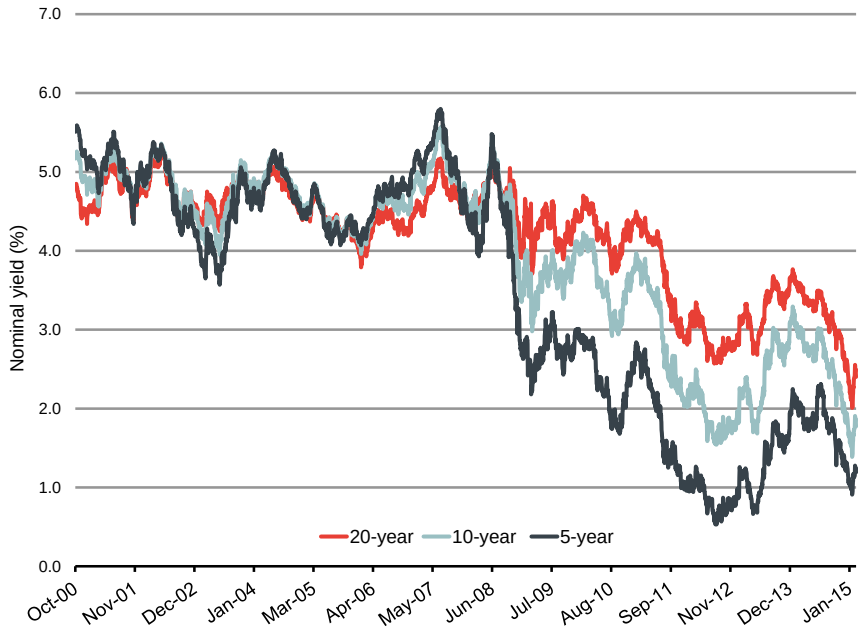
Risk-free rate

First we consider the risk-free rate, which is used as an input into the calculation of both the cost of equity and the cost of debt. Plum Consulting estimated a range for the nominal risk-free rate of 4.8% to 5.4%. This was derived from a real-risk free rate range of 1.5% to 2.0% and an RPI inflation forecast of 3.3%.

The estimate of 1.5% to 2.0% for the real risk-free rate is based on long-run data over the past 100 years. It is also in line with a number of recent regulatory decisions.

The data in **Figure 1** shows that the nominal risk-free rate range of 4.8% to 5.4% is very high compared to the recent yields on UK government nominal bonds.

Figure 1. UK nominal government bond yields



Source: Bank of England

The yield on the 10 year maturity bond, which is commonly used to estimate the cost of capital, is currently below 2%. Relying just on current rates can introduce volatility in WACC estimates and can make it harder to ensure consistency between the different parameters in the WACC. Therefore as Plum Consulting highlights there is merit in taking a longer-term view on the estimates.

Table 2 shows the average yields over the past 3, 5 and 10 year. The 10 year average of the 10 year maturity government bond is 3.5%. This is higher than the current values but still significantly lower than the Plum Consulting range of 4.8% to 5.4%.

Table 2. UK nominal government bond yields

Maturity	5 Year	10 Year	20 Year
Past 3 years	1.3%	2.3%	3.1%
Past 5 years	1.6%	2.7%	3.4%
Past 10 years	2.9%	3.5%	3.9%

Source: Bank of England

The other issue to consider is that the estimated WACC should be appropriate for the period 2015 to 2025. Therefore it is valid to consider the likely trend in government rates over the period. Based on the shape of the yield curve it is possible to estimate financial market expectations of 10 year government bond yield in 2025.

Using data over the past year (to avoid undue market volatility) we estimate that the market expects yields to increase from 1.8% currently to 3.7% by 2025. Based on a simple average this implies an average bond yield over the period of 2.7%.

This evidence taken together is summarised in **Table 3**. This confirms that the Plum Consulting range is materially higher than either the backward looking historic estimate or a projection of the rate that will apply over the regulatory period.

Table 3. Summary of evidence on nominal risk-free rate

	Nominal risk-free rate (10 year maturity)
Historic evidence – past 10 years	3.5%
Market implied forecast – 2015-2025	2.7%
Plum Consulting range	4.8% - 5.4%

Source: Bank of England. Frontier calculations

The next sections consider the impact of this on the cost of equity and the cost of debt. We argue that the impact on the cost of equity estimate is not material but that the cost of debt figure is over-stated.

Cost of equity

Plum Consulting estimate the cost of equity based on the Capital Asset Pricing Model (CAPM). The CAPM formula is as follows:

$$CoE = \beta e * ERP + rfr,$$

where βe, ERP and rfr are equity beta, equity risk premium and risk-free rate respectively.

Non-diversifiable, or systematic risk, measured by β, is part of the total risk of the company that is related to the market: when the return on the market moves up or down, the return on the company's equity will move by more than the market return (if β is greater than 1 in absolute terms) or less than the market return (if β is less than 1 in absolute terms).

CAPM's clear theoretical foundations and simplicity make it a widely used tool for practical cost of capital estimation – by both companies and by regulators. We have applied our assessment using the CAPM framework.

Risk-free rate, ERP and the total market return

The risk-free rate and the equity risk premium are market wide parameters that do not depend on the sector under consideration. As a result it is valid to compare these values across different regulatory sectors. The total market return (TMR) is the sum of these two and represents the return that investors expect on a portfolio of equities.

Table 4 shows the Plum Consulting estimate of the total market return is between 6.0% and 7.0%.

Table 4. Plum Consulting estimate of total market return

	Real return
Risk-free rate	1.5% - 2.0%
Equity Risk Premium	4.5% - 5.0%
Total Market Return	6.0% - 7.0%

Source: Plum Consulting

This range is consistent with the TMR estimates from other recent regulatory decisions in the UK. These are shown in **Table 5**. The regulatory decisions range from 6.25% to 6.75%, which is narrower but consistent with the Plum Consulting range.

Table 5. Recent regulatory determinations on the market return on equity

Sector	Subsector / company	Year	Market equity return
Water	Ofwat PR14	2014	6.75%
Energy	Ofgem – electricity distribution	2014	6.5%
Telecoms	Ofcom – fixed access	2014	6.3%
Energy	CMA - NIE	2014	6.5%
Aviation	CAA – Heathrow / Gatwick	2014	6.25%
Rail	ORR Network Rail	2013	6.75%

Source: Regulatory publications

These figures are consistent even though Plum Consulting is adopting a high figure for the risk-free rate. The explanation for this is that there is evidence of longer-term stability in the TMR. In other words, during periods where the risk-free rate is lower there is a tendency for the ERP to be higher, and vice versa. Given that the ERP is typically assessed over a long time series (100 years or more) it is consistent to take the risk-free rate over the same period.

If a more recent view on the risk-free rate is used in the cost of equity estimation then it is appropriate to adjust the ERP. For example the CAA in the Heathrow and Gatwick cases adopted a real risk-free rate of 0.5% but a higher ERP of 5.75%.

Therefore we conclude that if Plum Consulting had adopted a lower figure for the risk-free rate then it would have been appropriate to link this to a higher figure for the ERP, leaving the total market return unchanged.

Equity beta estimate

The other component of the cost of equity is the beta value. As outlined above the beta measures the riskiness of the company or activity and specifically the (systematic) risk that cannot be diversified by holding a diversified portfolio. The beta value increases with the gearing level of the activity, reflecting the fact that the risk is being spread across a smaller amount of equity. Plum Consulting adopted an equity beta of 1.0 at a gearing level of 35%.

This was based on the following evidence.

- Consistency with the 2006 Ofcom decision for broadcast transmission, which was also 1.0 at 35% gearing.

- Evidence from a sample of towers businesses estimated in a study for Comreg[5]. This implied an equity beta of 0.85 based on evidence over the past two years and an equity beta of 1.0 based on a longer term view.

We consider that the estimate used by Plum Consulting is reasonable, though at the top of the range implied by the available evidence. The evidence from the current beta estimates and also from regulatory precedent would support a lower range estimate of 0.85 to go alongside a higher range figure of 1.0.

Cost of debt

Plum Consulting estimated a cost of debt for based on the risk free rate and an estimate of the debt spread for Arqiva. This is shown in **Table 6**. The range of 7.0% to 7.6% was based on a long term view on the risk-free rate and a current view on the debt spread.

Table 6. Plum Consulting cost of debt estimate

	Cost of debt
Nominal risk-free rate	4.8% - 5.4%
Debt spread	2.2% - 2.2%
Nominal cost of debt	7.0% - 7.6%
Inflation	3.3%
Real cost of debt	3.7% - 4.3%

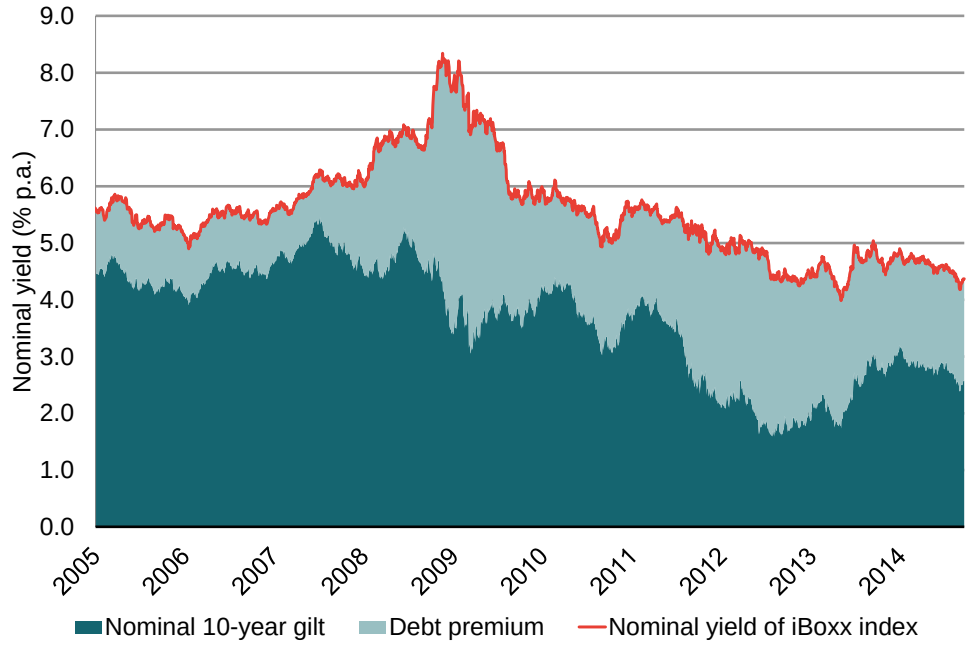
Source: Plum Consulting

The concern with this approach is two-fold. First, that the long-term risk-free rate does not reflect the debt financing costs facing Arqiva. Second, there is potential inconsistency in applying a current debt spread to the long-term risk-free rate.

To illustrate the second point **Figure 2** below shows the yields on the iBoxx corporate bonds index and the risk-free rate (ten-year government bond).

5 Europe Economics, *Cost of capital for mobile, fixed line and broadcasting price controls*, April 2014.

Figure 2. The relation between risk-free rate and debt premium



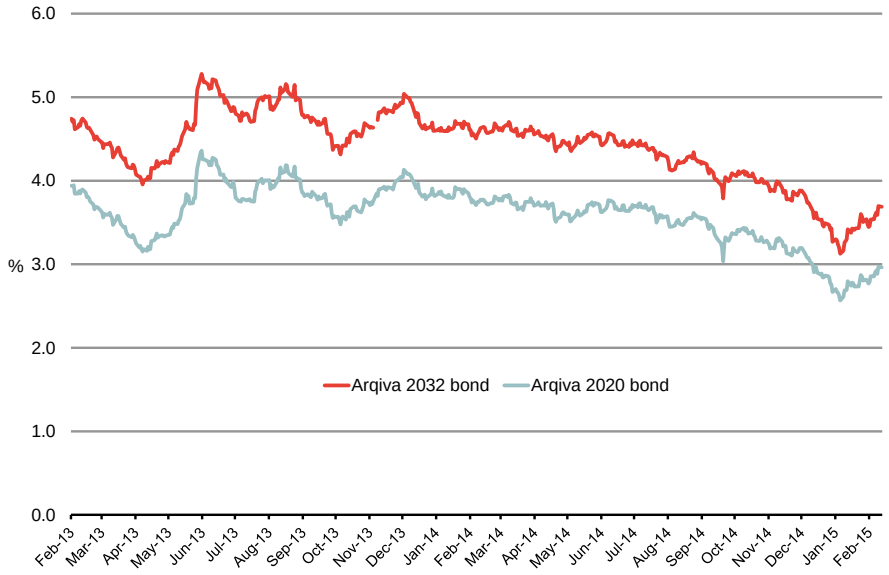
Source: Data from the Bank of England and Markit, Frontier Economics analysis

This shows that the debt premium moves in the opposite direction to the RFR, offsetting its effect on the total bond yield. Therefore a long-term risk-free rate combined with a debt spread measured when the risk-free rate is low would tend to over-state the cost of debt.

To estimate the scale of the impact we have considered evidence reflecting Arqiva's actual cost of debt.

Figure 3 shows the current yield on Arqiva's BBB rated corporate bonds. These yields are well below the Plum Consulting range of 7.0 to 7.6%.

Figure 3. Yields on Arqiva corporate debt



Source: Bloomberg

The average nominal yield on Arqiva's bonds over the past two years has been around 4.0% as shown in **Table 7**.

Table 7. Yield on Arqiva corporate bonds

Bond maturity	2020	2030	2032	Average
Last 12 months	3.40%	4.58%	4.15%	4.04%
Last 24 months	3.59%	N/A	4.40%	4.00%

Source: Bloomberg, Frontier calculations

However, it would not be reasonable to base the cost of debt estimate solely on this evidence. Arqiva, in common with other infrastructure businesses, will issue long-term date and fix the interest rate exposure to reflect the longer term duration of its assets and contracts. As a result we would expect that Arqiva would have issued fixed rate debt when interest rates were higher.

We have considered two methods, commonly used by regulators, to estimate the cost of debt.

- The first approach considers the actual cost of existing fixed rate debt combined with an estimate of the cost of new debt that will be issued in the period. This is the approach used by Ofwat and the CMA.

- The second approach considers just the historic cost of debt based on a benchmark debt index. This is the approach used by Ofgem.

For the first approach, we have considered the average interest rate on Arqiva debt based on information published in the accounts. This is shown in **Table 8** below. The debt is held in a mix of nominal and inflation-linked debt. Converting all the debt to a nominal basis implies a nominal interest rate of 6.29%. If we add 0.2% for issuance fees, which is at the top end of allowance typically made by regulators, this implies a current **nominal cost of debt of 6.5%**. This is closer to, but still materially lower than, the range of 7.0% to 7.6%.

Table 8. Arqiva debt portfolio - December 2014

	Inflation linked swaps	Interest swaps	Total
Amount	£1,312m	£1,023m	£2,335m
Nominal interest rate	6.35%	**6.21%**	6.29%
Inflation	3.3%	3.3%	
Real interest rate	**2.95%**	2.82%	2.89%

Source: Arqiva Financial Report - Six months ended 31 December 2014

Given that the cost of capital figure should reflect the period 2015 to 2025 it is also important to consider how this cost of debt will develop. **Figure 3** shows that the current yield on Arqiva debt is around 3.5%. Given the expected increase in government bond yields over the period, this would be expected to increase. Assuming that there is no fall in the bond spread (which is a conservative assumption) this would imply a cost of debt by the end of the period of 5.5% and an average across the period of 4.5%. Including issuance fees this gives a cost of new debt of 4.7%.

To estimate an overall cost of debt for the period 2015 to 2025 we combine the cost of existing and the cost of new debt, taking account of the proportion of new debt. This proportion would reflect the need to finance new investment and also to re-finance existing debt (for example, the corporate bond that matures in 2020). In the water sector Ofwat estimated that new debt would represent 25% of total debt over a five year period. In taking a range of 20% to 40% for the ten

year period we have taken account of the argument that Arqiva may aim to reduce its gearing level over the period.

The results are shown in **Table 9**. This shows that nominal cost of debt for the period, including issuance fees would lie between 5.8% and 6.1%.

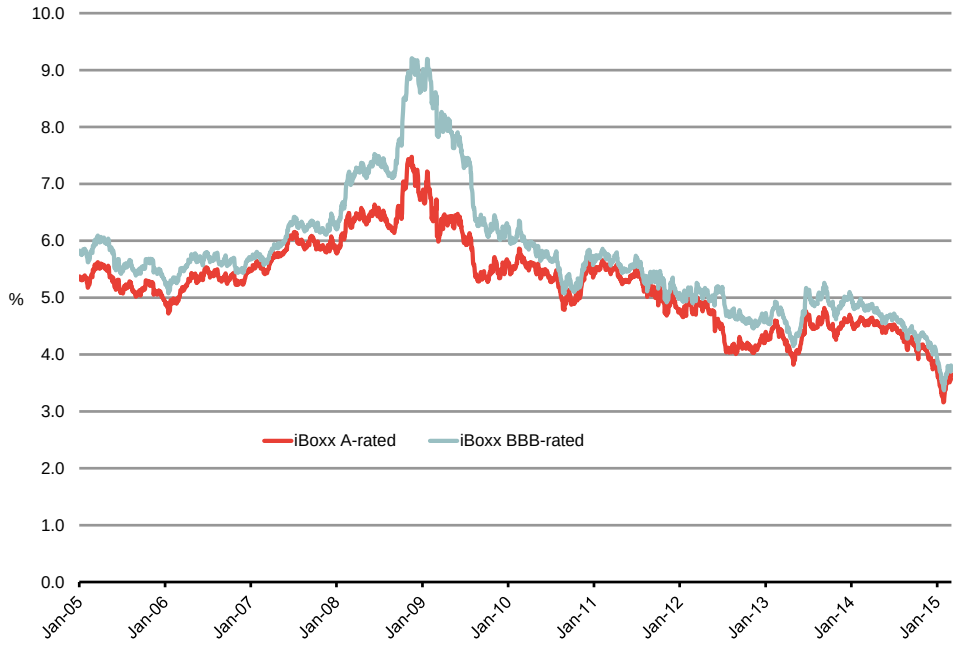
Table 9. Estimate of Arqiva cost of debt: 2015 – 2025

	Low range	High range
Current cost of debt	6.5%	6.5%
New cost of debt	4.7%	4.7%
% of debt that is new	40%	20%
Total cost of debt	5.8%	6.1%

Source: Frontier calculations

The alternative method to estimate the cost of debt is to rely solely on historic data. This is the method adopted by Ofgem, which takes a 10 year rolling average of the iBoxx corporate bond yield to estimate the cost of debt.

Figure 4. iBoxx corporate bond yields



Source: iBoxx

The Ofgem approach, which applies to regulated energy networks, is based on the average of the A-rated and BBB-rated indices. This data is shown in **Figure 4**.

To apply this approach to broadcast transmission we focussed on the BBB-rated index, recognising that the sector is higher risk than the regulated energy networks.

Table 10. iBoxx corporate bond yields

	Average past 10 years
A-rated corporate debt	5.24%
BBB-rated corporate debt	5.72%

Source: iBoxx, Frontier calculations

Table 10 shows the average for the BBB-rated index has been 5.7% over the past 10 years. This period is suitable as it covers the period over which Arqiva has been financing investment in upgrading and maintaining network access. Adding issuance fees to this figure gives a cost of debt of 5.9%.

Taking these two methods together indicates that a range of 5.8% to 6.1% is appropriate for the cost of debt for Arqiva. This is consistent with both the historic approach and the forward looking approach and ensures that the allowance is reasonable to cover the cost of debt.

Gearing

Plum Consulting adopted a gearing figure of 35% for the cost of capital calculation. We consider that this figure is reasonable.

We would note though that Plum Consulting estimate that the current level of gearing of Arqiva (based on senior debt only) is 53%. This implies that the cost of debt figures that we have relied relate to a higher level of gearing and may over-state the cost of debt at 35% gearing. We would not expect this impact to be significant but it reduces the risk that our estimated allowance for the cost of debt would be insufficient.

Summary on the WACC estimates

Table 11 below provides our estimate of the WACC range for network access, in comparison with the Plum Consulting range. The differences in the estimates are due to:

- a lower cost of debt range, based on the actual cost of debt information for Arqiva, and

- a range of the equity beta that reflect all of the available evidence and not just the higher end of the range.

Our estimated range is 5.6% to 7.0%, compared to the Plum Consulting range of 6.6% to 7.5%.

Table 11. WACC estimates for broadcast transmission

	Plum Consulting		Frontier Economics	
	Low	High	Low	High
Risk-free rate (real)	1.5%	2.0%	1.5%	2.0%
Risk-free rate (nominal)	4.8%	5.4%	4.8%	5.4%
Equity risk premium	4.5%	5.0%	4.5%	5.0%
Equity beta	1.0	1.0	0.85	1.0
Cost of equity (post-tax)	**9.3%**	**10.4%**	**8.7%**	**10.4%**
Cost of debt	**7.0%**	**7.6%**	**5.8%**	**6.1%**
Gearing	35.0%	35.0%	35.0%	35.0%
Tax rate	20.0%	20.0%	20.0%	20.0%
Inflation	3.3%	3.3%	3.3%	3.3%
WACC (nominal pre-tax)	**10.1%**	**11.1%**	**9.1%**	**10.6%**
WACC (real pre-tax)	**6.6%**	**7.5%**	**5.6%**	**7.0%**

Source: Plum Consulting, Frontier Economics

Regulatory precedent on WACC decisions

This section considers the evidence from WACC decisions made by Ofcom and other regulators, to assess whether they support the reduction in the WACC implied by our analysis above.

Table 12 below shows Ofcom's decisions for BT made in 2005 compared to the broadcast transmission estimate made in 2006. It shows that the estimate for broadcast transmission lies between the estimate for Openreach and that for the 'rest of BT'. It is closer to the estimate for Openreach. The Table also shows the more recent regulatory decisions for BT.

Table 12. Ofcom decisions on real cost of capital (pre-tax)

Sector	2005/06	2011	2014
BT – copper access (Openreach)	7.3%	5.6%	5.2%
Change compared to 2005/06		*-1.7%*	*-2.1%*
BT – other	8.7%	6.5%	7.3%
Change compared to 2005/06		*-2.2%*	*-1.4%*
Broadcast transmission	7.7%		

Source: Ofcom regulatory determinations

The reduction in the WACC for BT between 2005/06 and 2014 is driven by a number of factors.

- **Economy-wide factors.** These include a reduction in government bonds yields, a lower rate of corporation tax and a slightly higher Equity Risk Premium.

- **BT specific factors.** These include a higher gearing assumption, high debt premium and lower Beta value. These factors account for the remainder of the reduction.

The changes in economy-wide factors would also apply to the cost of capital for broadcast transmission. Also note that the changes in BT specific factors may also be relevant to broadcast transmission. For example, one feature of the financial crisis has been an observed reduction in the Beta value of all regulated infrastructure assets. Therefore the reduction applied to BT may also apply to broadcast transmission.

We have also reviewed decisions in other regulated sectors including energy, water and airports. These results are shown in **Table 13** below.

Table 13. Ofgem and Ofwat WACC decisions

	Year	Real pre-tax WACC[6]
Electricity transmission	2006	6.65%
	2012	5.4%
	Change	*-1.2%*
Gas distribution	2007	6.0%
	2012	5.0%
	Change	*-1.0%*
Electricity distribution	2009	5.5%
	2014	4.3%
	Change	-1.3%
Water & sewerage	2009	6.25%
	2014	4.27%
	Change	*-2.0%*
Airports (Heathrow)	2007	6.2%
	2014	5.35%
	Change	*-0.85%*

Source: Ofgem, Ofwat, CAA

In all cases there has been a reduction in the WACC over the period, ranging from 0.85% in the case of airports to 2.0% in the case of the water sector.

From this we can conclude the following:

- First, the decline in cost of capital across all of the regulated sectors has generally been between 1% and 2%. This is more consistent with the decline implied by the mid-point of our range for broadcast transmission (a decline of 1.4% from 7.7% to 6.3%) than implied by the mid-point of the Plum Consulting range (a decline of 0.7% from 7.7% to 7.0%).

- Second, to justify that the top of the range from the Plum Consulting estimates is appropriate (which represents a reduction of just 0.2% from the

6 Where the pre-tax real WACC has not been stated in the decision we have used the prevailing corporation tax rate to convert from post-tax to pre-tax WACC.

2006 figure) it would need to be shown that there was a material increase in risk for broadcast transmission.

This is considered in the last section.

Treatment of specific risk

The consultation paper and the Plum Consulting report identify a potential increase in specific risk. The consultation states that:

> *"Specific risk is relevant here as Arqiva's ability to provide NA is directly related to future spectrum availability, which is uncertain. In the Ofcom work of 2006 there was no consideration that the life of Digital Terrestrial Television ("DTT") might be finite. Since then Channels 61 and 62 have been cleared of DTT, and it now looks very likely that the 700 MHz spectrum will also be lost to DTT. The remaining spectrum for DTT looks to be available until 2030 but with a review in 2025. Furthermore, if DTT ceases the NA assets will become redundant. This "cliff edge" would make investors increasingly wary and would lead to the introduction of a premium to cover this risk."*

The proposed response in the consultation to deal with this risk is to make an allowance on top of the WACC. In practice the proposal is to set the WACC at the top of the range (7.5%) rather than at the mid-point (7.0%), an allowance for the risk of 0.5%.

We have assessed the case for making an adjustment to take account of this risk. We consider that there is no clear case to support an adjustment of this scale. Our reasons for this are set out below.

Specific risk is already captured in the WACC estimate

The first point to note is that allowance for specific risk is already captured within the cost of capital estimates. The analysis in the Plum Consulting report correctly identifies that, in the CAPM framework, equity investors do not require an additional return for specific risk. The CAPM framework is built on the proposition that equity investors diversify these risks through holding a portfolio of assets.

Therefore an increase in specific risk would only affect the cost of debt and the level of gearing. However, any impact from this is already captured within the estimates of the WACC. The cost of debt figures take account of the latest information on yields for Arqiva debt. The trend in the yields on this debt since 2013 (shown in **Figure 3** above) does not indicate any material increase in perception of risk over this period. In relation to gearing, the WACC estimates are based on a gearing figure of 35%, which already allows for a reduction in gearing from the current level of above 50%. Therefore, the WACC estimates appear to take account of current market perceptions of specific risk.

Level of specific risk is not necessarily higher than in previous periods

The analysis in this paper shows that broadcast transmission has given a higher cost of capital than other regulated infrastructure sectors. For example, the mid-point of our estimated range of 6.3% is substantially higher than the WACC for water or electricity (4.3%), Heathrow (5.3%) or Openreach (5.2%). This reflects the nature of the regulatory regime and the level of risk that broadcast transmission in exposed to.

However, it is not necessarily the case that the risks facing broadcast transmission are higher now than they were in 2006. At that point in time the sector faced a number of material risks, including:

- the risks associated with the rollout of digital transmission, on time and on budget;
- the risks associated with the viability of DTT services; and
- the risks associated with asset recovery over long lifetimes and with a new regulatory regime.

Since then some of these major risks have been removed or resolved. Digital rollout has been completed, remaining asset lives are now shorter and the regulatory regime is established and well understood.

The emergence of a specific risk relating to spectrum reallocation, which the consultation admits is a small risk, does not justify a higher premium compared to other regulated activities than existed in the past.

Adjustment to cashflows to deal with specific risk

The Plum Consulting report argues that specific risk associated with technological change could be reflected in the cashflow projections rather than the WACC allowance. We agree with this proposition that it is preferable to deal with these risks within the cashflow projections.

In doing so the cashflow projections should reflect both upside as well as downside scenarios. The regulatory regime applied to broadcast transmission allows for the network operator to benefit from upside risks (such as extensions to economic asset lives). It is not necessarily the case that the risks faced are asymmetric or that the regulatory regime does not already reflect these specific risks.

Higher WACC has provided compensation for this type of risk

As outlined above the level of specific risk facing the sector is not necessarily higher than it was 10 years ago. In addition, the WACC that has been allowed for broadcast transmission recognised that asset stranding was one of the risks faced by the sector. Therefore investors have already been compensated for a

degree of asset stranding risk and would be double-counting to make a further adjustment for this risk when a specific example of it materialises.

Such an approach would be asymmetric as there is no scope to clawback returns in the event that stranding risk does not materialise.

Adjustment is required to maintain incentives for investment

Regulators in different sectors have identified setting a cost of capital in the upper half of an estimated range is justified in order to promote investment in essential infrastructure services. In this case it is not clear that the proposed adjustment to the WACC would achieve this aim.

- **Specific uncertainty is more likely to result in delay to investment.** If there is a specific uncertainty over future demand or policy then typically the optimal response of the provider is to defer the investment until the uncertainty is resolved or reduced. This would normally be the optimal strategy even if there was a WACC premium available. If a regulator is concerned about the risk of delayed investment then the preferred method is to place separate rewards / penalties on the delivery of investment on time.

- **Proposed WACC allowance includes sufficient headroom.** Our estimates of the WACC based on longer term data. For example the cost of debt allowance is materially higher than the current or foreseeable cost of debt. Therefore, there is sufficient headroom in the WACC figures over the period to encourage and support investment.

Overall, the case for an uplift to the WACC for specific risk is weak. It is not clear that the level of risk is higher in previously periods or that the estimated WACC allowance (which is substantially higher than other infrastructure sectors) does not adequately compensate for the level of risk.