Helen Ferguson
4th Floor, Competition Group
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

By email to: ALF@ofcom.org.uk

NON-CONFIDENTIAL

20 May 2014

Dear Helen

Annual licence fees for 900 MHz and 1800 MHz licences: methodology to derive a discount rate consistent with CPI inflation

Hutchison 3G UK Ltd (Three) welcomes the opportunity to respond to Ofcom's consultation on the methodology to derive a discount rate consistent with CPI inflation.

Three has commissioned a report by Economic Insight to support our response. Please see appended.

In summary, we agree with Ofcom's proposal that if Ofcom were to adopt CPI as the inflation index for setting annual licence fees (ALFs), then Ofcom should derive the corresponding CPI-based real discount rate by deflating by CPI inflation, reflecting the wedge between the forecast rates of RPI and CPI.

However, we strongly disagree with Ofcom's proposed approach to the extent that it conflates discount-rate parameters estimated at different points in time.

Namely, Ofcom appears to derive the CPI-based real discount rate by adjusting the 2011 MCT decision discount rate by the current RPI-CPI wedge, rather than the implied RPI-CPI wedge at the time of the 2011 MCT decision. In particular, Ofcom substitutes its own RPI forecast at the time of the 2011 MCT decision, of 2.5%, with a current RPI forecast, of 3.3%. This has the direct effect of over-estimating the corresponding CPI-based real discount rate as at the time of the 2011 MCT decision.

Instead, at minimum, Ofcom should use discount rate parameters estimated at a consistent point in time.

In response to Ofcom's main ALF consultation, Three argued that Ofcom should update all relevant discount rate parameters to reflect that the underlying parameters had materially changed between the MCT determination and the 4G auction.[1]

Alternatively, if Ofcom were to continue using a discount rate derived in the 2011 MCT decision – and adjust this to derive the applicable CPI-based discount rate – then Ofcom should apply a RPI-CPI wedge that reflects forecast rates of RPI and CPI at the time of the 2011 MCT decision.

We would be pleased to discuss our response further, including Economic Insight's report.

With kind regards

Mark Falcon
Head of Economic Regulation

---

[1] Three's response to Ofcom's Annual Licence Fees for 900MHz and 1800MHz spectrum consultation, 16 January 2014, Section 6.

Deriving a discount rate consistent with CPI

A short report for Three on the key methodological issues and evidence

This note sets out our analysis and conclusions regarding Ofcom's proposed methodology for deriving a discount rate for setting annual license fees for 900MHz and 1800MHz spectrum using CPI. Ofcom's proposed approach is to inflate the real discount rate at the time of the March 2011 MCT decision by a higher level of RPI than was assumed at the time, and to then deflate the implied (higher) nominal discount rate by CPI. We have two concerns regarding this. First, that it implies Ofcom is ex post changing its view as to the wedge between RPI and CPI without committing to updating other discount rate parameters. Secondly, that based on our detailed evidence any revised wedge between RPI and CPI should be lower than Ofcom suggests, at around 0.9 percentage points.

Introduction

Ofcom has published a consultation regarding its proposed *methodology* for setting an annual license fee (ALF) with respect to 900 and 1800 MHz spectrum using a CPI measure of inflation within its assumed discount rate.[1] This follows a broader consultation, in which Ofcom sought stakeholder views regarding its approach to setting the ALF more widely.[2] In the current consultation, Ofcom has made it clear that it has not yet determined which inflation measure it will adopt – and nor has it determined any of the other fundamental methodological aspects of its approach to setting the ALF. Rather, the consultation seeks views on two specific questions:

» *"Question 1: Do you agree with this methodology for deriving a real discount rate consistent with the CPI measure of inflation?*

» *Question 2: Do you agree with our approach to deriving estimates of long-run RPI and CPI?"*

In the above context, Hutchison 3G UK Ltd (Three) asked Economic Insight to set out our views on the issues outlined in Ofcom's consultation and, where appropriate, to provide relevant analysis and evidence to support those views. This short report therefore addresses these matters – and is structured as follows:

– we firstly provide a summary of Ofcom's proposed approach to applying CPI to derive the discount rate for deriving the ALF;
– we then set out our views regarding Ofcom's suggested methodology; and
– finally, we set out a range of evidence regarding the 'wedge' between RPI and CPI that Ofcom is proposing within its consultation, which includes: (i) historical data regarding the actual size of the wedge; (ii) the future wedge implied by independent RPI and CPI forecasts; (iii) various third party evidence regarding the potential future size of the wedge; and (iv) our own bottom-up analysis of the possible future size of the wedge, based on an assessment of how its key drivers might vary over time.

Summary of Ofcom's approach

In the following we briefly summarise the main elements of Ofcom's proposed *methodology* for deriving a discount rate based on CPI, and the evidence Ofcom has drawn on with respect to its proposed *levels* of inflation.

Context

Ofcom has stated that the scope of its consultation is limited only to a consideration of its proposed approach for applying CPI to determine a discount rate for setting the ALF. Ofcom has further explicitly stated that the consultation does not, therefore, address:

» The issue of *which* inflation measure it should use for setting the ALF (i.e. whether ultimately Ofcom will apply CPI or RPI).

» The appropriate discount rate to be used for calculating the ALF from Ofcom's estimated lump sum values of the spectrum (i.e. in the responses to Ofcom's first consultation, relating to the appropriate methodology for determining the ALF, various parties put forward arguments in favour of both the risk free rate and the cost of debt, rather than the WACC).

» Whether and how Ofcom should update the other discount rate parameters (aside from the updates that relate specifically to inflation and the rate of corporation tax). For example, in our

---

[1] *'Annual licence fees for 900 MHz and 1800 MHz: methodology to derive a discount rate consistent with CPI inflation.'* Ofcom (2014).

[2] *'Annual licence fees for 900 MHz and 1800 MHz spectrum.'* Ofcom (2013).

report for Three,[3] which was included in its response to Ofcom, we suggested that whatever discount rate measure Ofcom decided to apply, it would be appropriate to use the latest available market evidence.

In its previous consultation, Ofcom indicated that it believed that the WACC parameters estimated in its March 2011 MCT determination represented the most appropriate proxy for the discount rate it should use to derive the ALF from the lump sum values. Ofcom's rationale for this was based on a number of factors, but importantly included: (i) the fact that the WACC used by bidders at the time of the 4G auction represented an important reference point; and (ii) that Ofcom had taken a long term view of the available data at the time of the MCT decision, and that therefore, it didn't think it would take a materially different view with respect to separately estimating a WACC for the ALF.[4] Therefore, for the purpose of deriving the ALF, Ofcom's proposed approach (as stated in the prior consultation) was to retain the MCT WACC parameters, save only for the rate of corporation tax, which Ofcom proposed to reduce from 24% to 20%, to reflect actual future tax rates. The 2011 MCT WACC included an assumed rate of inflation of 2.5%, which was based on RPI.

Ofcom's proposed inflation levels and evidence

In the current consultation, Ofcom has stated that – were it to adopt a CPI measure of inflation to derive the discount rate for setting the ALF - it would:

– assume CPI inflation of 2.0% (which Ofcom states reflects expected long-run CPI[5]); and
– base its view of the corresponding level of RPI on an assumed forward-looking 'wedge' between the two indices of 1.3 percentage points, which implies an RPI of 3.3%.

CPI based on Bank of England target

Ofcom has based its CPI assumption on the Bank of England's long-run CPI target of 2.0%, which has existed since 2003 (when the government first changed the remit of the Monetary Policy Committee to use CPI, rather than RPI). Ofcom noted that the target is symmetrical, and so inflation being below target motivates action as much as inflation above target. Whilst Ofcom accepted that the existence of the target does not mean that actual CPI inflation will be 2.0%, the fact that price stability is the primary objective of the MPC means that it is likely to be: *"the best estimate available to us as to what CPI inflation will be in the long-run."*[6]

RPI based on an assumed 'wedge' over CPI – reflecting the Bank of England's long-term view

Ofcom's assessment of assumed RPI is not based on any specific forecast of the index; but, rather, an assumed 'wedge' as to what RPI might be over and above CPI. The specific 'wedge' of 1.3 percentage points proposed by Ofcom (which implies RPI of 3.3%) reflects the Bank of England's long-run assessment, as set out in its February 2014 inflation report.[7] Ofcom notes that this is higher than the historic wedge (which it quotes as being 0.5% from 2005 to 2013), and attributes this to three factors:

» The formula effect, which is due to there being different statistical techniques in the aggregation of data for the prices of individual items within each index. Ofcom states that the contribution of

---

3   See *'A note on Ofcom's proposed WACC parameters for setting the ALF.'* Economic Insight (2013). We note that Three's position is that the risk free rate is the appropriate discount rate – and the scope of our earlier report was limited to an assessment of what the WACC parameters should be were Ofcom to apply a WACC and did not, therefore, address the question of what discount rate should be used.

4   Ofcom stated: "It is not clear that in estimating a WACC appropriate for a longer period, we would take into account different evidence or would arrive at a different WACC than that estimated for the MCT." See paragraph 5.71 of *'Annual licence fees for 900 MHz and 1800 MHz spectrum.'* Ofcom (2013).

5   Although we note that, significantly, Ofcom does not specify at what point in time it is seeking to capture forward-looking expectations regarding CPI or inflation more generally.

6   *'Annual licence fees for 900 MHz and 1800 MHz: methodology to derive a discount rate consistent with CPI inflation.'* Ofcom (2014). Page 7.

7   *'Inflation Report: February 2014.'* Bank of England (2014).

the formula effect to the wedge has increased since 2010, due to changes in how the ONS collects clothing price data.

» Mortgage interest payments and other housing costs are included in RPI but not CPI (the implication of this contributing to an *increase* in the future wedge would seem to be that that the Bank of England expects housing costs to increase more quickly than the RPI index overall).

» Various other differences in weights and coverage e.g. the weights used in the two indices are based on different sources and capture different consumer groups. Ofcom stated that, since 2005, the effect of these differences reflects (amongst other things) increases in energy and import prices, which have a smaller weight in RPI than in CPI, and so boosted RPI inflation by less than CPI inflation. Ofcom states that, in the long run, these items are expected to grow at rates consistent with CPI inflation at the 2% target, and the contribution from other differences to the wedge is expected to fall.

Finally, Ofcom notes that its assumed wedge of 1.3% is similar to that forecast by the Office of Budget Responsibility (OBR), which estimates a range of 1.3% to 1.5%. However, Ofcom also notes that *"discussions with market participants suggest that the long-run wedge priced into inflation breakevens is a little lower than the Bank staff estimate, at around 0.9 to 1 percentage points on average."*[8] We address this point subsequently in our review of third party evidence.

Ofcom's approach to deriving a discount rate using CPI

With an assumed CPI of 2.0% and a corresponding RPI of 3.3%, Ofcom's proposed approach to applying CPI in order to derive a discount rate for setting the ALF is set out below. For illustrative purposes, we focus on the example Ofcom provides with respect to using the WACC as the start point. However, we note that Ofcom has not determined whether it is the WACC (or some other discount rate) that is appropriate.

» Firstly, and as noted in our description of the relevant context, in its previous consultation, Ofcom indicated that – were it to use the WACC – it was minded to use that from the March 2011 MCT determination, updated only to reflect a lower rate of corporation tax of 20%.

» Secondly, in the current CPI consultation Ofcom is proposing to take the 'real' MCT 2011 WACC (or other measure of discount rate it might use), and apply a higher rate of RPI inflation (3.3%, as opposed to the 2.5%) than was originally set in that determination.

» The above, of course, has the effect of increasing the implied *nominal* post-tax 2011 MCT WACC (Ofcom's worked example shows that the nominal MCT WACC increases from 6.8% to 7.6%).[9]

» Thirdly, starting from the revised (higher) *nominal* WACC of 7.6%, Ofcom then deflates by CPI (at assumed CPI of 2.0%), which translates to a real post-tax WACC of 5.5%.

» The net result of Ofcom's methodology is that the real WACC being proposed to derive the ALF has actually *increased* from 4.1% to 5.5%.[10]

---

[8]   *'Annual licence fees for 900 MHz and 1800 MHz: methodology to derive a discount rate consistent with CPI inflation.'* Ofcom (2014). Page 8.

[9]   See Table 1 of: *'Annual licence fees for 900 MHz and 1800 MHz: methodology to derive a discount rate consistent with CPI inflation.'* Ofcom (2014). Page 9.

[10]   *'Annual licence fees for 900 MHz and 1800 MHz: methodology to derive a discount rate consistent with CPI inflation.'* Ofcom (2014). Page 10.

Our assessment of the appropriate methodology

The role that inflation plays in the cost of capital

In considering what the appropriate approach should be to applying CPI, it is helpful to address the role that inflation plays in discount rates (or here for illustrative purposes, the cost of capital) more generally. In particular, as investors typically think about returns in real terms (i.e. because they do not want the value of their investments to be eroded by inflation) we would suggest that their perspective would tend to be to ask: *"given my desired real rate of return, and my expectations of inflation, what nominal return do I need to achieve?"*

Given the above, *if* all WACC parameters could be accurately measured in real terms in the first instance, the appropriate methodology for deriving the nominal WACC would simply be to 'add' inflation to the real post-tax WACC. In this world, the effect of moving from an inflation assumption of 2.5% (RPI) to 2.0% (CPI) would be to leave Ofcom's proposed real WACC unchanged at 4.2%, although the nominal WACC would be lower.

In practice, however, the complication with the above perspective is that, whilst most WACC parameters are observable in nominal terms, the risk free rate can be observed in real terms, and on an RPI basis. This raises the question as to how 'accurately' the real parameters have been estimated in the first place, and therefore whether they can be used as the start point. We consider this issue further in our proposed alternative approach.

Our review of Ofcom's approach

In summary, we observe that Ofcom's proposed approach results in both the real and nominal post-tax WACC being higher than was set in the March 2011 MCT determination, which is not what one would expect if the only change in approach was one of RPI being replaced with CPI. Rather, it implies that Ofcom's view of the relativities between RPI and CPI has changed. Relatedly, we have a number of observations regarding the methodology Ofcom has set out relating to applying CPI in order to derive a discount rate for determining the ALF. These are as follows:

Revising expectations 'after the event' and potentially artificially increasing the real WACC

As set out above, Ofcom's approach is to re-calculate the *nominal* discount rate (in this case the 2011 MCT WACC) by applying a higher RPI of 3.3% rather than the 2.5% assumed in the original determination – and then deflating the revised (higher) nominal WACC by CPI inflation of 2.0%. At a high level, therefore, by starting from a historical WACC and then revising certain assumptions, Ofcom is effectively adjusting investor expectations *after the event.* We think it is important to consider Ofcom's calculation steps from the perspective of an investor – as at present, Ofcom's approach appears to have the potential to artificially increase the real WACC.

» Investor's originally expected a real (post tax) return of 4.2% (the post-tax real WACC of the MCT decision) which, in nominal terms (with assumed or expected inflation of 2.5%) meant they expected returns of 6.8% (or, indeed, vice versa).

» By re-calculating the nominal 2011 MCT WACC through the imposition of a higher rate of RPI inflation of 3.3%, Ofcom is effectively implying: (i) that investor's expectations in <u>real terms</u> at the time of the MCT decision represent the appropriate start point; and (ii) that it is appropriate to (ex-post) adjust investor's nominal expectations to reflect a *higher* expected rate of inflation of 3.3%. Put simply, Ofcom's approach now assumes that investors actually expected inflation of 3.3%.

» Ofcom's final step is to deflate the adjusted nominal WACC down by CPI of 2.0%. This, we suggest, may be somewhat at odds with Ofcom's second step, as it implies that, in fact – now starting from a nominal position, investors expected the relevant rate of inflation to be 2.0%, not 3.3%. We suggest that this may not be internally consistent.

An alternative way of characterising the above might be to say that Ofcom is ex-post adjusting its view of the 'wedge' between RPI and CPI, from 0.5% implied at the time of the March 2011 MCT

decision (RPI of 2.5% less CPI of 2.0%, which as set out subsequently, is broadly consistent with the current observed wedge and, indeed, Ofcom's own stated assessment of the historical long-term wedge) to 1.3% as proposed in its current consultation. Regarding this, we note that the OBR's medium term forecast of CPI as of March 2011 stood at 2.0%[11] and Ofcom's view of RPI at the time was – as stated in the March 2011 MCT determination – 2.5%.

The need to reflect latest market data

In our view, and as set out in our previous report to Three on this matter, we think it is appropriate that (irrespective of the *measure* of discount rate Ofcom uses) Ofcom should base its decision on the latest available market data to reflect current investor expectations (or at a minimum, expectations at the time of the UK 4G auction). Consequently, if Ofcom were to use a WACC, it is important not to update only certain parameters selectively (such as the tax rate and rate of inflation) and in isolation of other WACC parameters. At present, therefore, there appears to be the potential for some inconsistency in Ofcom's approach in this regard.

Consistent with the above, it seems to us that any ex-post amendments to the implied 'wedge' are not conceptually valid unless Ofcom is also committed to updating all other relevant discount rate parameters. However, as Ofcom has separated the current consultation from the wider question as to what discount rate it should apply, we do not know whether this will be the case in practice.

Our alternative proposed methodology

To reflect the complication that the risk free rate can be observed in real terms (because government bonds are index linked to RPI) whereas other parameters are observed in nominal terms, we think a further alternative appropriate approach is to:

» Re-state the real risk free rate based on CPI inflation of 2.0%. For internal consistency the CPI used should correspond to the point at time at which the risk free rate was estimated. As stated in our previous report for Three, our view is that it is appropriate to update *all* relevant WACC parameters to reflect current market expectations. Here, however, for illustrative purposes, we are using the risk free rate as stated in the March 2011 MCT determination and assuming that CPI inflation of 2.0% was consistent with that.

» Then to re-calculate the real WACC reflecting an overall inflation rate of 2.0% rather than 2.5% leaving all other parameters unchanged.

We do not, therefore, consider that Ofcom's intermediate step of inflating the real MCT WACC by a higher rate of RPI to be appropriate. The following table sets out the detail of our proposed approach and compares it to that put forward by Ofcom.

---

[11]   *'Economic and fiscal outlook.'* OBR (March 2011). *Here we note that – at the time – the OBR expected a wedge of 1.2% points – but what is of relevance here is the implied view that Ofcom itself took regarding expectations at the time of the MCT decision and the difference under its proposals set out in the current consultation.*

Table 1 Illustrating our approach to applying CPI

WACC parameter	Ofcom's proposed ALF values in first consultation (MCT with 20% tax rate)	Ofcom's proposed approach with 3.3% RPI inflation	Our alternative approach
Real risk-free rate	1.5%	1.5%	2.0%[12]
Inflation	2.5%	3.3%	2.0%
Nominal risk free rate	4.0%	4.8%	4.0%
Gearing	30%	30%	30%
Equity risk premium	5.0%	5.0%	5.0%
Asset beta	0.56	0.56	0.56
Cost of equity (post tax)	7.8%	8.6%	7.8%
Debt premium	1.5%	1.5%	1.5%
Overall nominal post-tax cost of debt	4.4%	5.1%	4.4%
Corporation tax rate	20.0%	20%	20%
Post tax nominal WACC	6.8%	7.6%	6.8%
Real post-tax WACC	4.2%	4.1%	**4.7%**
Real post-tax WACC after deflating adjusted nominal WACC for CPI	NA	**5.5%**	NA

Source: Economic Insight

Ultimately we see that, by first inflating the 2011 WACC by a higher level of RPI (3.3%), and then deflating by CPI (2.0%) Ofcom arrives at a real post-tax WACC of 5.5%, as set out in its consultation document. In contrast, our proposed approach, which is to re-state the real risk free rate on a CPI basis, and then change the overall rate of inflation used in the calculations to 2.0%, results in lower real post-tax WACC of 4.7%, which could then be used to derive the ALF.

We also think that Ofcom's proposed approach raises wider questions. For example, it would appear to call into question whether it now considers the WACC it set in the March 2011 MCT determination to be appropriate – particularly if it now believes that the appropriate inflation expectation at the time was 3.3%.

Finally, in reviewing the above, it should be noted that under our proposed approach we have left all other WACC parameters unchanged. This is for illustrative purposes and in no way affects: (i) Three's position that, in fact, it is the risk free rate, and not the WACC that should be used to determine the ALF; or (ii) our view that, were a WACC to be used, all parameters should be updated

---

[12] *Adjusted so that the risk free rate is expressed in real terms based on CPI of 2.0%, rather than RPI of 2.5%. Put simply, we are not changing the RPI deflated level of the risk free rate, but merely are translating that into CPI terms so that the implied wedge between RPI and CPI at the time of the March 2001 MCT determination of 0.5 percentage points is unchanged.*

to reflect the latest market evidence (and that therefore, the appropriate real WACC would be lower than is indicated in the above table).

Ofcom's approach links expected RPI and CPI measures

Notwithstanding the above, from a practical perspective Ofcom's approach raises a further challenge. Namely, that under Ofcom's methodology, it is important that the assumed rates of RPI and CPI are internally consistent and, in particular, reflect investor expectations of the two indices. As set out in the next section, we do not think that this is the case and that market data indicates a lower expected wedge than the one Ofcom is proposing. The risk is that Ofcom's approach is artificially increasing the real post-tax WACC – and therefore, ultimately, the ALF.

Evidence on the size of the wedge

Notwithstanding the issues we identified above regarding Ofcom's overall approach, we separately consider that a range of evidence suggests that (were Ofcom to retain its proposed methodology) it would be appropriate for Ofcom to assume a somewhat *lower* wedge than the 1.3 percentage points it has set out. In particular, we think that Ofcom may not have given sufficient consideration to the high level of uncertainty regarding the likely size of the wedge, and the wider available evidence relating to this. In this section we therefore set out a range of analyses to inform this issue, which includes:

– historical evidence relating to the actual wedge between RPI and CPI;
– the future wedge between RPI and CPI that is implied by a range of independent forecasts of the two indices;
– third party evidence as to the likely future size of the wedge (which includes other regulatory determinations);
– the RPI-CPI wedge implied by current market breakeven rates; and
– our own 'bottom up' analysis of the potential future size of the wedge, based on data regarding forecasts for key inputs into the indices.

Historical evidence

As Ofcom notes in its consultation, there are some reasons as to why the historical 'wedge' between RPI and CPI may not be an accurate predictor of the future wedge. In particular, the formula effect and the fact that components within one index may follow a different trend than components in the other. Nonetheless, we consider that historical data is relevant – and so in the following we set out a range of evidence relating to this.

Firstly, when one examines the indices over a very long period, it is clear that the CPI measure of inflation is typically lower than the RPI measure – although CPI has actually been higher on a number of occasions. The chart below shows both indices over the period April 1993 – March 2014 inclusive (21 years).

Figure 1 Long-term CPI and RPI data
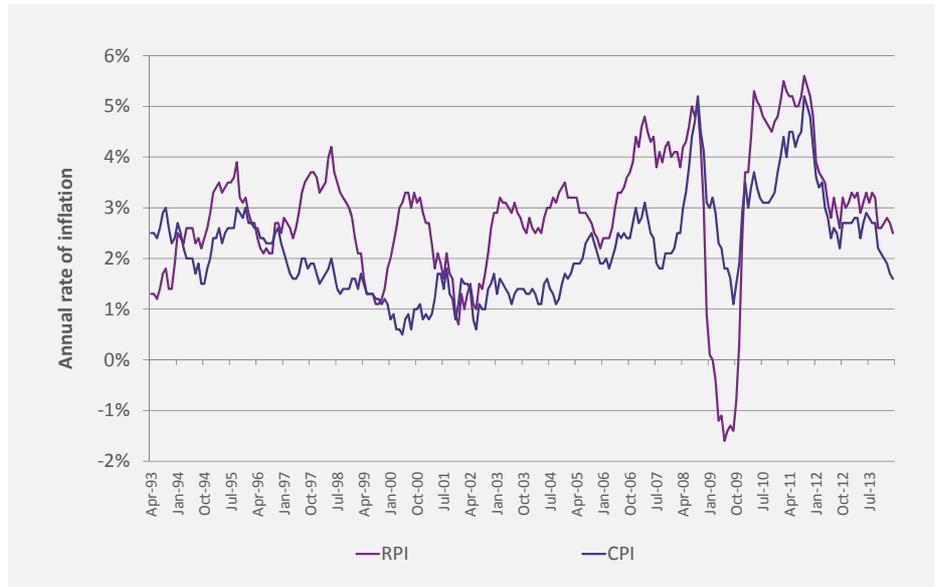
Source: ONS

Consistent with the above, the wedge (i.e. RPI less CPI) has also varied considerably over the long-term – and, in fact, is highly seasonal. Over the whole 21 year time period shown to March 2014, the average wedge has been 0.7 percentage points, which is substantially lower than the 1.3 percentage points proposed by Ofcom.

Figure 2 Historic wedge over the long-term
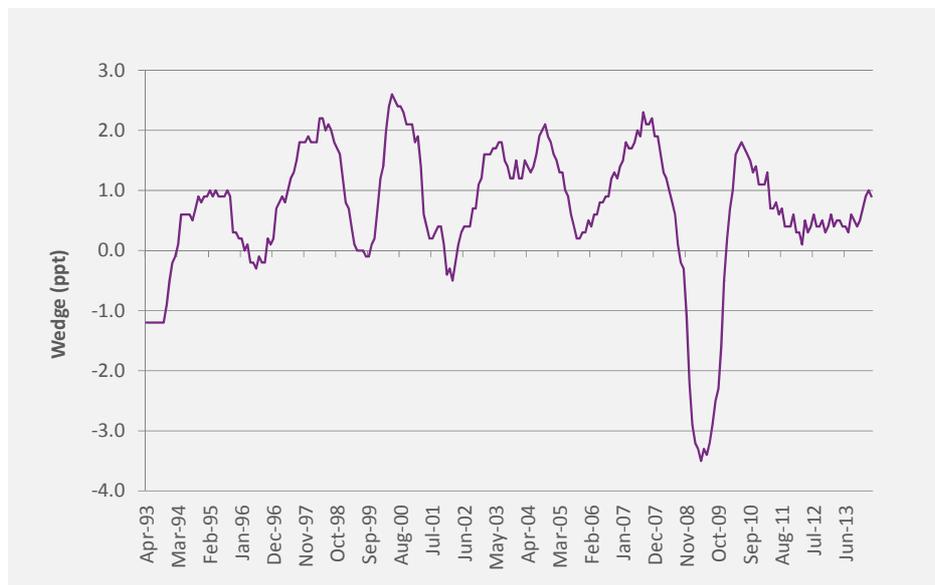
Source: ONS

Whilst the long-term historical wedge has been well below that proposed by Ofcom, it is important to take into consideration the relatively recent (in 2010) methodological changes to how the ONS collects clothing pricing data (which in part matter because clothing has a higher weight in CPI than in RPI). Regarding this, the Bank of England states: *"During 2010, the ONS changed how it collects clothing prices, leading to a considerable increase in their contribution to the formula effect... That*

change led Bank staff to revise up their estimate of the contribution of the formula effect to the long-run wedge to 0.9 percentage points."[13]

According to the ONS, the improvements to its collection of clothing related price data were implemented in January 2010.[14] Consequently, to the extent that this is considered to be the main driver of the formula effect's contribution to an increase in the long-term wedge, we think it important to focus on the historical data pre and post 2010. The following table therefore shows the wedge in the four years up to March 2010 (inclusive) and the four years from April 2010 to March 2014 (inclusive).[15]

Table 2 RPI-CPI percentage point 'wedge' pre and post 2010 ONS methodological changes

	2006 / 07	2007 / 08	2008 / 09	2009 / 10	Av	2010 / 11	2011 / 12	2012 / 13	2013 /1 4	Av
RPI-CPI wedge	1.2	1.9	-0.8	-1.8	**0.1**	1.4	0.5	0.4	0.6	**0.7**

Source: ONS

The data shown in the above table indicates that, consistent with the Bank of England and OBR's analysis, the RPI-CPI wedge has widened (on average) somewhat since 2010, reflecting the increased impact of the formula effect. Indeed, we find that, on average, the wedge was 0.1 percentage points in the four years up to 2010, and then rose to 0.7 percentage points on average for the four years from 2010 to date. However, and significantly, the key point is that even when we focus on the period of time *after* which the increased impact of the formula effect *should* have fed through, the wedge remains below that proposed by Ofcom – and actually, is consistent with the 21 year long-term average presented earlier. Furthermore, it is not the case that the wedge has persistently widened post-2010. In fact, it is now lower than it was in 2011. This, in our view, seems to somewhat call into question an assumed wider future 'wedge' where, at least in part, the rationale for that rests on an increased impact arising from the formula effect.

In summary, the historical data shows that:

– over the long-term the RPI-CPI wedge has been 0.7 percentage points;
– in the period since the ONS' methodological changes that have increased the formula effect (i.e. post 2010) the wedge has also been 0.7 percentage points – consistent with the long-term data; and
– in the most recently available data (i.e. for March 2014); the wedge is 0.9 percentage points.

We think that the most reasonable interpretation of the historical data – regarding its potential relevance to setting inflation within the discount rate used to derive the ALF – is to focus on the post-2010 period. As such, the historical evidence is most consistent with an RPI-CPI inflation wedge of 0.7 percentage points.

The wedge implied by independent forecasts of RPI and CPI

Notwithstanding our views that historical data is a valuable source of information regarding the likely long-run wedge between RPI and CPI, it is helpful to also consider forward looking evidence. In this regard, one obvious source is to compile RPI and CPI inflation forecasts and calculate the 'wedge' implied by these.

[13] *'Inflation Report: February 2014.' Bank of England (2014). Page 34.*

[14] *'CPI and RPI: increased impact of the formula effect in 2010: ONS Information note.' (2011).*

[15] *We have examined data up to March as this is the most recent month for which it is available for 2014.*

Short-term forecasts

Each month HM Treasury publishes a comparison of independent forecasts of macroeconomic variables. Banks, consultancies and research institutions contribute their forecasts. The majority of contributors forecast both CPI and RPI for Q4 of the next full year. The chart below, therefore, shows the most recent implied forecasted wedge, for 2015 Q4.

Figure 3 Implied 2015 Q4 'wedge' based on independent inflation forecasts
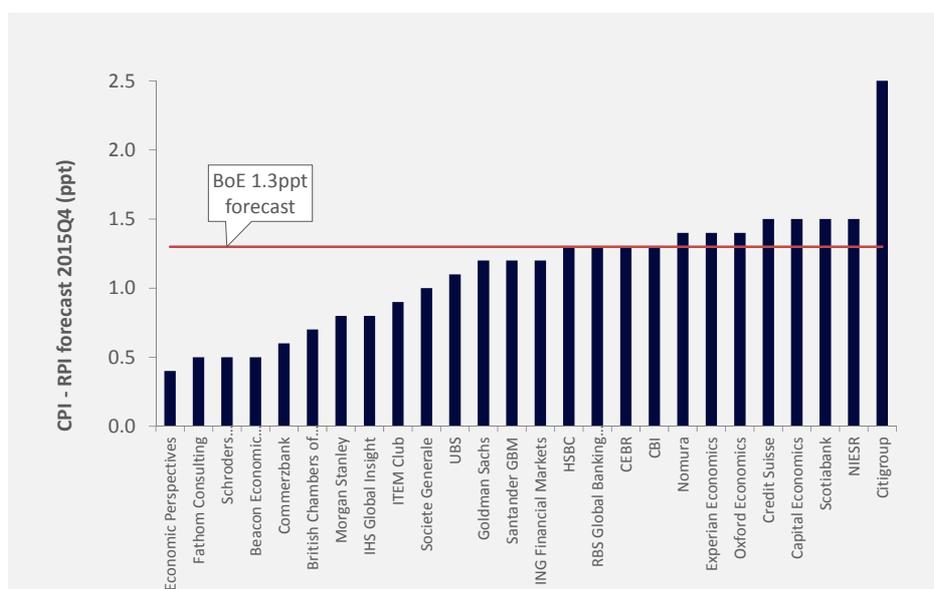
Source: HM Treasury comparison of independent forecasts April 2014

As can be seen, the majority of institution's forecasts for 2015 Q4 is that the wedge will be below the Bank of England's long-term prediction of 1.3 percentage points. Indeed, across the various forecasts compiled by HM Treasury, the 2015 Q4 expected wedge is 1.1 percentage points on average. For comparison, the OBR expects the wedge to be 1.5 percentage points in 2015 Q4.

Long-term forecasts

At less frequent intervals HM Treasury also publishes more long term independent inflation forecasts. The most recent, in February 2014, contains predictions of both CPI and RPI (although only a subset of institutions still predict RPI). The following chart shows the implied RPI-CPI wedge based on these forecasts. The data reveals a wide variation in the implied wedge across forecasters. Focusing on 2018 (as we are particularly interested in the long-run wedge) we note that:

–   only two institutions (Experian and Oxford Economics) expect a wedge of greater than 1.3 percentage points; and
–   that the average wedge in 2018 across all institutions is 1.1 percentage points – again, below the wedge proposed by Ofcom and predicted by the Bank of England.

Figure 4 Implied 'wedge' based on longer-term inflation forecasts
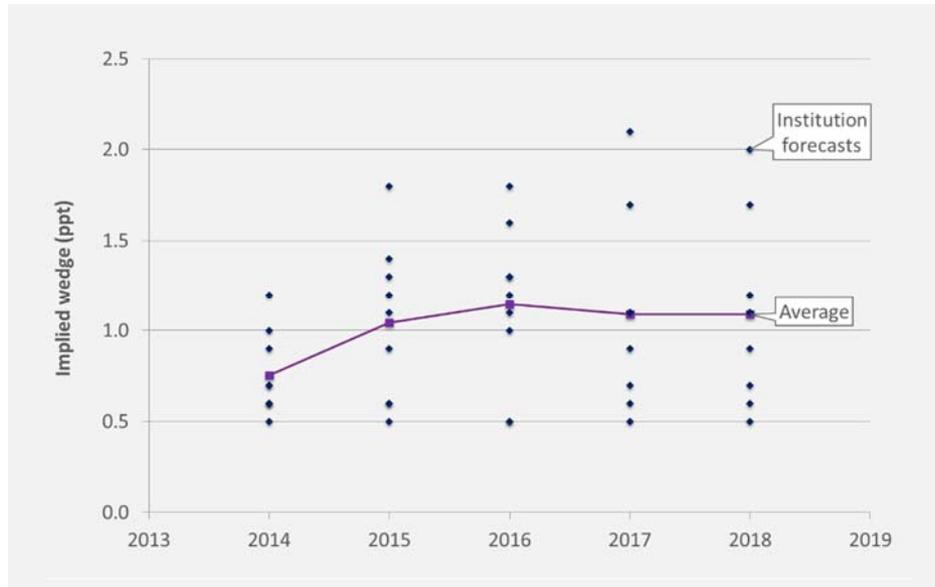
Source: Economic Insight analysis of HM Treasury consensus forecasts – Feb 2014

Similar independent forecasts were also made in November 2011, the same time the OBR published its working paper on the long-run difference between RPI and CPI. As noted previously, at that time the OBR expected the wedge to be between 1.3 and 1.5 percentage points. The next chart provides a summary of: the independent forecasts from February 2014; November 2011; the OBR's expected range; and the actual wedge (for calendar years ending in December).[16]

Figure 5 Implied 'wedge' based on longer-term inflation forecasts
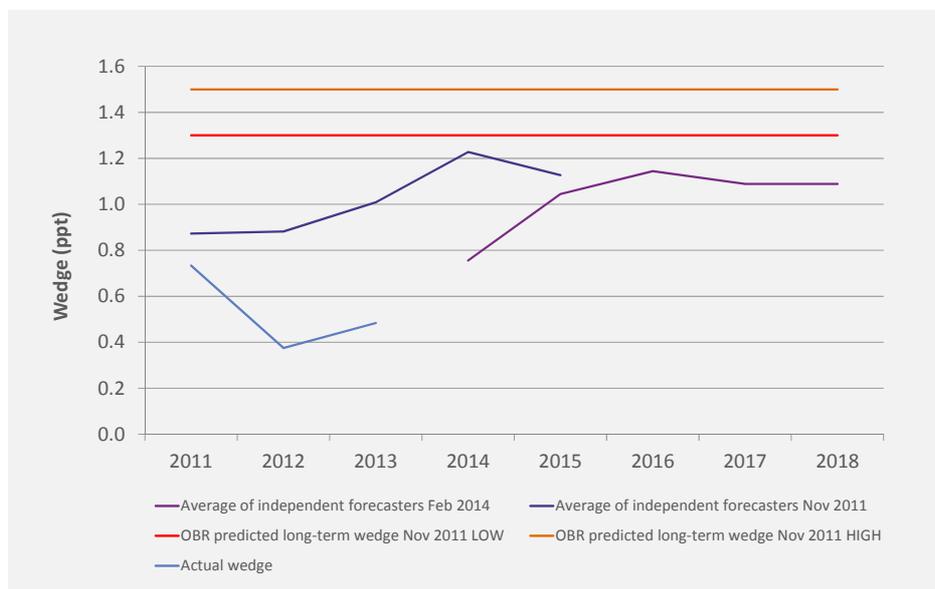
Source: various

As can be seen, independent forecasts are consistently *below* the long-term prediction made by the OBR in 2011, and have been revised downwards recently. The actual wedge between RPI and CPI has been well below all forecasts, although is currently standing at 0.9 (March 2014) – which is broadly in line with independent long-term forecasts.

---

[16]   *Note the data shown previously relating to the actual wedge was for years ending in March so as to make use of the latest available data.*

Breakeven yields

The difference between nominal and (RPI) index-linked UK government bonds provides a measure of the 'breakeven' rate of inflation for investors. By deducting Ofcom's proposed RPI-CPI wedge we can infer market expectations for CPI – and conversely, by deducting an assumed market expectation of CPI, we can infer market expectation for the wedge on a forward-looking basis.

To examine this we calculated the latest implied 'breakeven' RPI inflation for 10 year UK index-linked bonds. From these we then calculated the implied 'expected' CPI inflation by deducting Ofcom's proposed 1.3 percentage point wedge. The chart below shows the results of our analysis.

Figure 6 Implied market expected CPI given current breakevens and Ofcom's proposed wedge
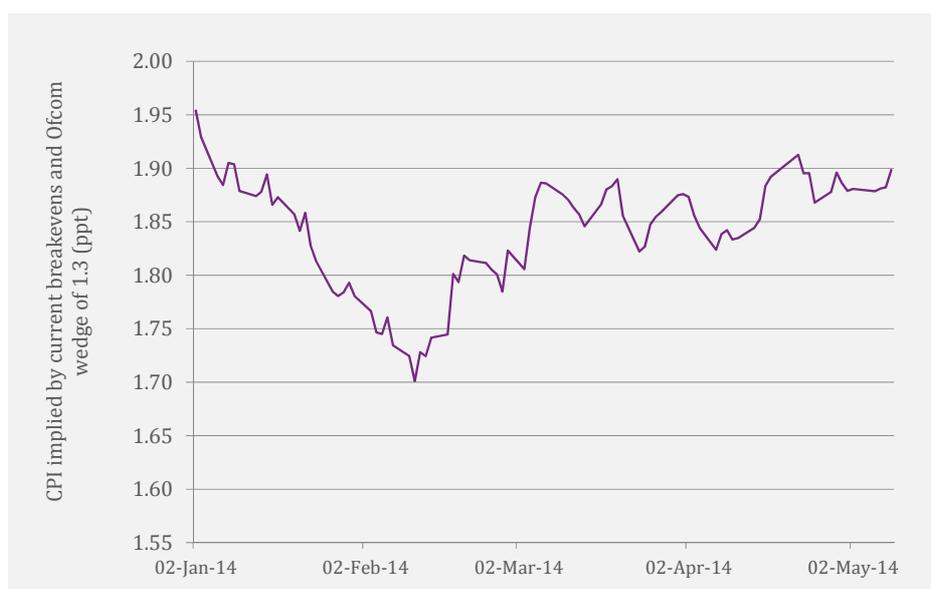
Source: Economic Insight analysis of Bank of England data

The above data shows that, at current breakevens, Ofcom's proposed RPI-CPI wedge of 1.3 percentage points would imply that markets currently expect CPI inflation materially below the 2.0% assumed by Ofcom (and targeted by the Bank of England). In fact, on average over 2014, the implied market expectation of CPI from the above would be 1.6%.

Given that it is reasonable to suppose that markets price inflation efficiently, our view is that the implied level of expected CPI of 1.6% is too low to be plausible – the inference being that the proposed wedge of 1.3 percentage points is too high.

Using the same data, if we instead assume that markets expect CPI inflation of 2.0% in the long-run and deduct this from the breakeven rate, we calculate an implied market expectation of the RPI-CPI wedge to be 0.9 percentage points (which is also consistent with Ofcom's assessment of the wedge implied by breakeven rates). This estimate of the wedge is much more in line with long-run historical data and the various independent forecasts described previously.

Third party evidence as to the size of the wedge

In addition to the historical and forecast wedge data set out previously, there is also a range of third party evidence that either explicitly or implicitly sets out a view as to the likely future RPI / CPI wedge. This evidence: (i) highlights the uncertainty regarding the future size of the wedge; and (ii) indicates that the appropriate assumed wedge should be lower than the 1.3 percentage points proposed by Ofcom. In this section we provide a summary of this third party evidence.

Morgan Stanley UK Economics and Strategy Report (2012)

In 2012 Morgan Stanley published its own analysis of the likely future wedge between RPI and CPI. Morgan Stanley's assessment is that the wedge is likely to be materially below the 1.3% that Ofcom is proposing to apply. In particular, Morgan Stanley concluded: *"Over the next 12 months, we expect the RPI-CPI wedge to remain somewhere in the 0.5 – 1ppt range… in the medium/long term, we don't see the wedge rising to the range estimated by the OBR."*[17]

Further to the above Morgan Stanley expects the long run wedge to be less than 1 percentage point: *"Thinking in terms of the medium/long term, while plausible, we would be very surprised to see the wedge rising close to the 1.3-1.5pp range as is currently envisaged by the OBR."* The report continues: *"The likelihood is that the wedge will continue to be close to its historical norm [which Morgan Stanley quotes as being 0.9% points] in the long-run."*[18] Morgan Stanley set out a number of reasons as to why it holds this view:

» First, it believes that the ONS' analysis of clothing price measurement will reduce the formula effect back to more historical norms.

» Second (at the time of writing in 2012) it was expected that a number of components included within RPI would be introduced into CPI. This included vehicle excise duty, trade union subscriptions and TV license fees. The increased standardisation of components included in the indices (all else equal) should narrow the wedge. We have checked and, consistent with Morgan Stanley's expectations at the time, found that vehicle excise duty and trade union subscription costs were incorporated into CPI in February 2012. This increases the validity of Morgan Stanley's analysis.

» Finally, and critically, Morgan Stanley state that: *"If the difference between RPI-CPI is expected to stay wider indefinitely, then (assuming the market prices RPI swaps using an expectation of CPI plus a wedge) we could see a re-pricing of breakevens as RPI expectations adjust."*[19] Put simply, assuming markets price rationally, a persistent wider wedge should be reflected in breakevens – but Morgan Stanley noted, this did not appear to be the case (as of 2012).

Regarding the above, we note the following. Firstly, that Ofcom itself has acknowledged that breakevens currently do not reflect a wedge as large as that suggested by the Bank of England or the OBR; but, rather, are more consistent with a future wedge of 0.9 to 1.0 percentage points. Consequently, assuming markets are pricing inflation efficiently, a lower wedge than 1.3 percentage points is appropriate. Secondly, the Morgan Stanley analysis suggested that, whilst the formula effect might have widened the wedge post 2010, it was not anticipating it to widen further (for the reasons set out above). The historical data we summarised previously is consistent with this in that it showed that – although on average the wedge post 2010 was somewhat higher than the four year wedge prior to 2010: (i) the wedge has not persistently widened since 2010; and (ii) the average post-2010 wedge is in line with the long-run historical wedge.

Ofwat / PwC analysis for the PR14 water price control (2013)

As part of the PR14 price review process in the water industry, Ofwat (the water regulator) set out a number of core economic assumptions that it wanted the companies to apply consistently for the purpose of undertaking risk modelling and analysis. To this end, Ofwat commissioned PwC to provide advice as to what those assumptions should be, and the evidence on which they should be based. In July 2013 PwC published its report setting out these economic assumption in full.[20]

PwC's recommended inflation assumptions, which Ofwat required the water and sewerage companies to apply for PR14 risk modelling purposes, imply an RPI-CPI wedge of 0.8 percentage points. PwC specifically stated: *"Consensus Economics is also the source for the base case RPI*

---

[17]   *'[UK Economics and Strategy: A New RPI-CPI Wedge?](#)'* Morgan Stanley (2012). Page 1.

[18]   *'[UK Economics and Strategy: A New RPI-CPI Wedge?](#)'* Morgan Stanley (2012). Page 4.

[19]   *'[UK Economics and Strategy: A New RPI-CPI Wedge?](#)'* Morgan Stanley (2012). Page 2.

[20]   *'[Economic Assumptions for PR14 Risk Analysis.](#)'* PwC (July 2013).

inflation numbers… Consistent with the base case projection of stable GDP growth, it is assumed that the RPI rate of inflation will also remain fairly stable at around 3% during the forecast period. Assuming a wedge of around a 0.8% difference between RPI and CPI…"[21]

PwC cost of capital report for CAA (2013)

In its Cost of Capital report for the CAA to support the Q6 price control for Heathrow, Gatwick and Stansted, PwC also assumed a forward-looking RPI-CPI wedge of 0.8 percentage points: *"When converting from nominal to real returns, we use an inflation estimate of 2.8%. We consider this estimate to be appropriate over Q6. This is based on a review of historical and forward looking expectations of trends in inflation based on the RPI, the CPI and the GDP deflator. Our proposed approach for calculating inflation adds the long-term RPI-CPI wedge of 0.8% to the Government's target rate of CPI inflation of 2.0%. The estimate is the same as the figure used by CAA in Q5 and consistent with broader market evidence from various sources."*[22]

CEPA cost of capital report for ORR (2013)

In its report to the ORR regarding the appropriate cost of capital for Network Rail, CEPA set out evidence regarding the appropriate real risk free rate. In doing so, CEPA assumed a wedge between RPI and CPI of 0.7 percentage points.[23]

Our 'bottom-up' analysis of the wedge based on forecasts for key input parameters

To predict the long term wedge the Bank of England has analysed the contribution of different factors over time. The chart below shows the effect different components have had on the overall wedge. As can be seen, mortgage interest payments have had a significant impact on the wedge historically, and more recently the formula effect has been the main driver.

Figure 7 Implied wedge based on bottom up component analysis
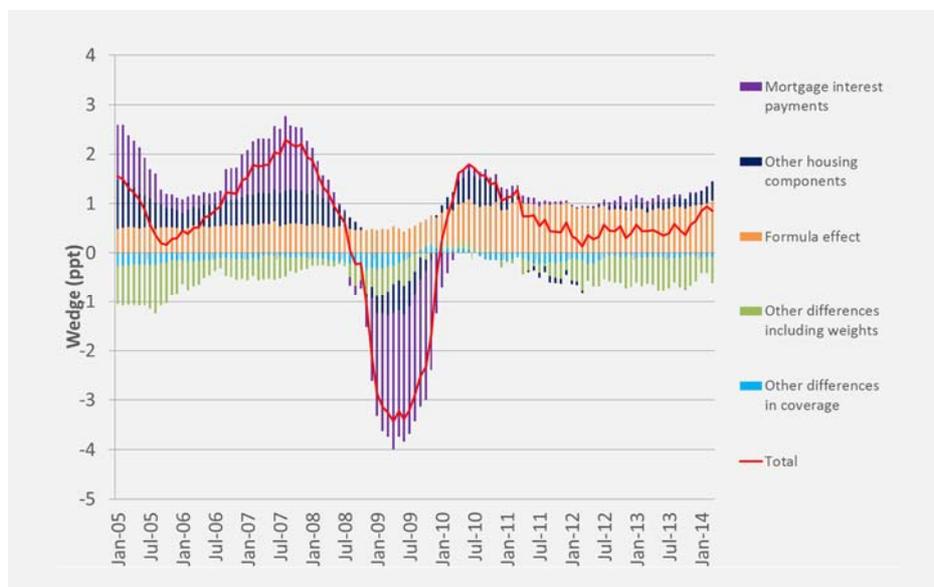
Source: Economic Insight analysis of Bank of England data

The Bank of England's central long-run estimate of the wedge is comprised of the following elements:

---

[21]   *'Economic Assumptions for PR14 Risk Analysis.' PwC (July 2013). Page 7.*

[22]   *'Estimating the cost of capital in Q6 for Heathrow, Gatwick and Stansted.' PWC (2013). Page 1.*

[23]   *'Advice on Estimating Network Rail's Cost of Capital.' CEPA (2013). See footnote 14 on page 14.*

Table 3 Component contributions to wedge

Component	Contribution to the RPI-CPI wedge
Formula effect	0.9
Mortgage interest payments and other housing components	0.6
Other differences	-0.2
Total	1.3

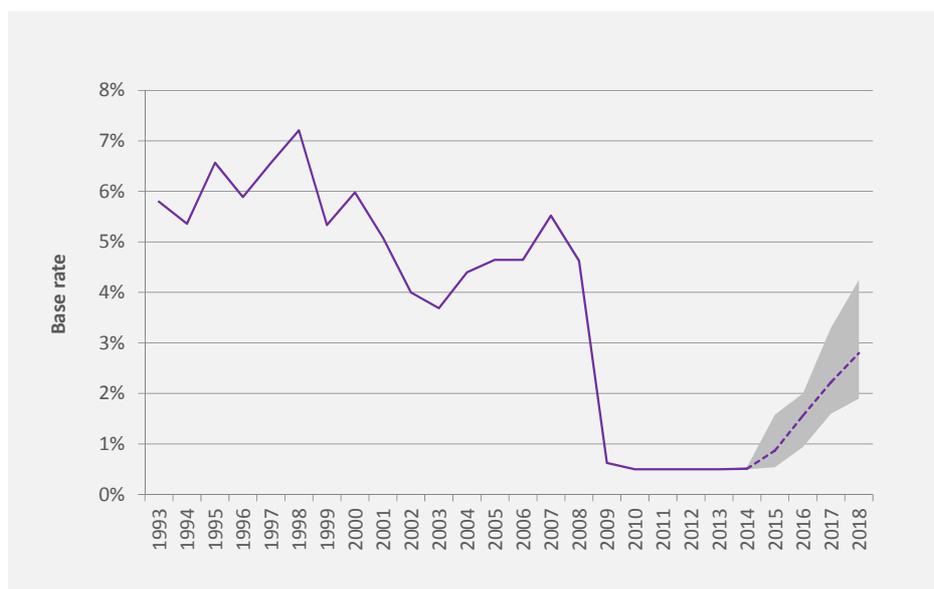*Source: Bank of England data*

Assuming that the Bank has accurately estimated the formula effect and impact of other differences, we have investigated the robustness of their estimate of the impact of housing costs. They assume that in the long-run interest rates will be broadly stable, so that the contribution of mortgage interest payments will depend on house prices – which also determines housing depreciation. We have therefore built a simple econometric model that relates the housing costs element of the wedge to interest rates and house prices.[24]

Higher house price inflation will result in higher mortgage interest payments and higher depreciation charges. Higher interest rates will further increase mortgage interest payments – with certain assumptions on elasticities. Our simple OLS model relates the Bank of England base rate and house price inflation (as measured by Nationwide) to the housing cost wedge, and finds the two positive relationships. From this model we have used two different sets of forecasts to determine the likely contribution that housing costs will make to the future wedge.

The following figure (overleaf) shows the spread of interest rate consensus forecasts as reported by HM Treasury. Our model uses the average in order to predict the implied contribution of housing costs to the RPI-CPI wedge.

---

[24] *The model is based on monthly data from January 2005 to March 2014. Both parameters, interest rate and house price inflation, are highly significant with t-statistics of 7.56 and 9.66 respectively. The model has an R2 of 0.65.*

Figure 8 Consensus interest rate forecasts

Source: HM Treasury consensus forecasts

The table below shows our two predictions of the housing cost wedge, which are both 0.3. The consensus forecasts provided by HM Treasury give predictions for both the Bank of England base rate and house price inflation for 2014 to 2018. Using these figures with our estimated parameters gives an average housing cost wedge over the period of 0.3. In their own forecasts, the Bank of England has assumed that house prices will grow at about 4.5% (average historical wage growth), which is on the cautious side compared with consensus forecasts. Using the Bank of England's assumption of house prices gives our second prediction of the housing cost wedge, which is also 0.3 percentage points. The results of our bottom up analysis are shown in the table below and indicate that, assuming the Bank of England's other parameters are unchanged, the expected future wedge is likely to be 1.0 percentage points. Again we note that this is consistent with the wider evidence set out elsewhere in this report.

Table 4 Economic Insight 'bottom up' estimates of housing cost contribution and impact on wedge

Component	Bank of England prediction	Prediction based on consensus forecasts	Prediction based on Bank of England assumption and consensus forecasts
Formula effect	0.9	0.9	0.9
Mortgage interest payments and other housing components	0.6	0.3	0.3
Other differences	-0.2	-0.2	-0.2
Total	1.3	1.0	1.0

Source: Economic Insight analysis and Bank of England data

Conclusions and recommendations

Reflecting the evidence and analysis set out here, our view is – firstly – that it is not appropriate to retrospectively adjust the MCT nominal WACC upwards to reflect a higher level of RPI than was originally assumed. This is because, by doing so, Ofcom is – in essence – effectively revising investor expectations from those that would have prevailed at the time of the MCT decision. Instead, we think Ofcom should strongly consider retaining its estimated real post-tax WACC of 4.2%. Alternatively, it could re-state the March 2011 MCT WACC for CPI inflation of 2.0%, which results in a post-tax real WACC of 4.7%, compared to that implied by Ofcom's approach of 5.5% (noting that, as per our separate report for Three on WACC parameters, our view is that were Ofcom to use a WACC to derive the ALF all parameters should be updated; and that, therefore, the WACC would in fact be lower than the 4.7% reported here).

Notwithstanding the above, were Ofcom to retain its proposed approach, a range of evidence suggests that it should apply a smaller RPI – CPI wedge than the 1.3 percentage points it is proposing. In particular, we consider that a more appropriate figure would be between 0.7 and 1.1 percentage points (with a mid-point of 0.9) as this reflects the fact that:

» Post 2010, the RPI-CPI wedge has averaged 0.7 percentage points (which includes the period post the increase in the formula effect).

» Independent long-run forecasts imply a wedge of 1.1 percentage points.

» Current market breakeven rates imply an expected wedge of 0.9 percentage points.

» Third party evidence is consistent with a wedge 0.7-0.9 percentage points.

» Our own 'bottom-up' analysis implies a wedge of 1.0 percentage points.

Further information

Please contact:

Sam Williams
e: sam.williams@economic-insight.com
t: +44 (0) 207 100 37 46
m: +44 (0) 7807 571 441

Economic Insight Limited
88 Wood Street
London
EC2V 7RS

www.economic-insight.com