



A reply to the CMA's approach to the cost of equity in the NATS Provisional Findings

Please note

This report has been prepared for Anglian Water Services Limited (Anglian) by KPMG LLP and AGRF Ltd (a sub-contractor of KPMG LLP) under a private contract, set out in our Engagement Letter dated 18 February 2020 and should be read in conjunction with the Engagement Letter. KPMG has been commissioned by Anglian to provide an independent analysis of the CMA's approach to the cost of equity in the NATS (En Route) Plc / CAA Regulatory Appeal Provisional Findings (PFs) (hereafter NATS PFs).

The results of this analysis are summarised in this report for Anglian. KPMG understands that Anglian is planning to submit the final version of this report to the Competition and Markets Authority (CMA) and KPMG has given the company permission to do so as required under our engagement contract.

The information in this report is based upon publicly available information and reflects prevailing conditions and our views as of this date, all of which are accordingly subject to change. In preparing the report, we have relied upon and assumed, without independent verification, the accuracy and completeness of any information available from public sources. Nothing in this report constitutes a valuation or legal advice.

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1 Executive Summary

1.1 Background

- 1.1.1 Anglian Water Services Limited (Anglian) has requested a redetermination of its PR19 charge control settlement by the CMA. Anglian submitted its Statement of Case (SoC), for consideration by the CMA, on 2 April 2020.
- 1.1.2 The redetermination of Anglian's PR19 settlement has therefore commenced shortly after the CMA has published its Provisional Findings on the NATS appeal. The CMA has historically taken consistent decisions on the allowed weight average cost of capital (A-WACC), in proceedings that take place in close succession.
- 1.1.3 Anglian commissioned KPMG LLP and AGRF Limited, in which Professor Alan Gregory is a Director, to review Ofwat's approach to setting the A-WACC and provide an estimate of Anglian's A-WACC for PR19 (referred to as the KPMG/AGRF Report). The KPMG/AGRF Report is annexed to Anglian's SoC. The contents of the KPMG/AGRF Report have a direct read across to the provisional decisions taken by the CMA in the NATS case.
- 1.1.4 This report addresses the key common issues on A-WACC in both the Anglian CMA investigation and the NATS appeal, being:
- a) the CMA's methodology and (implicit) point estimate for TMR;
 - b) the CMA's methodology and point estimate for RFR;
 - c) the CMA's methodology for estimating beta; and
 - d) the CMA's statements regarding the impact of gearing on A-WACC.

1.2 Total Market Return

- 1.2.1 Both the CMA and KPMG/AGRF estimate TMR based on historical returns data, being averages of actual achieved returns from 1900 to 2018 (historical ex post approach) and expected returns over the same period (historical ex ante approach). The CMA provisionally derives a range of 5.0% to 6.0%, real RPI and an overall WACC from the mid-point of its range, therefore implicitly adopting a mid-point TMR of 5.5%, real RPI. The KPMG/AGRF Report derives a point estimate of 6.25%, real RPI.

Placing weight on CPI versus RPI Inflation between 1947 and 2018

- 1.2.2 An inflation series is needed for 1900 to 2018, in order to deflate the nominal returns over the same time series. Both the CMA and KPMG/AGRF use the consumer

expenditure deflator (CED) by O'Donoghue et al (2004)¹ to measure inflation between 1900 and 1947. However, there is a difference in position with regards to the appropriate historical inflation series to use between 1947 and 2018, in order to estimate TMR in real terms:

- a) The KPMG/AGRF Report² uses RPI, and therefore CED/RPI for the full 1900-2018 time series.
- b) The CMA provisionally concludes that "*all available inflation series have issues*" but that owing to its greater consistency over time, it concludes that using CPI for the period 1947-2018 is more robust. The CMA therefore uses the CED/CPI for the full 1900-2018 time series, with the CED/RPI being used as a cross-check.³

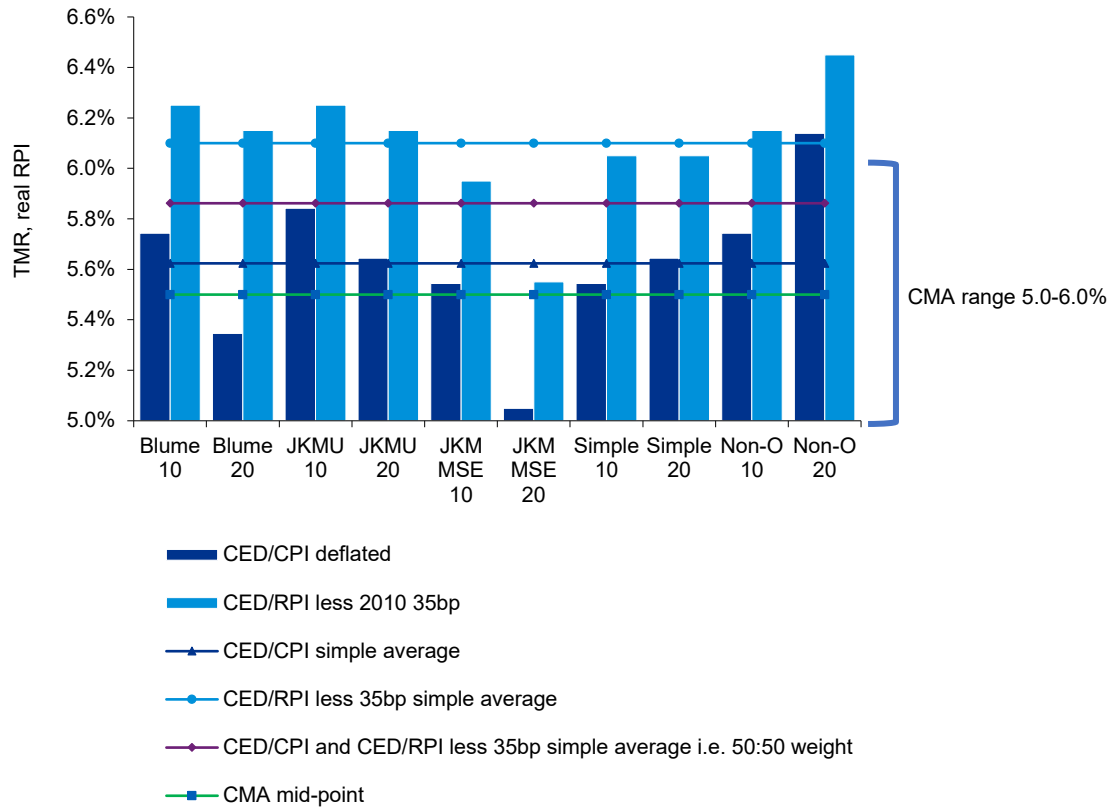
1.2.3 However, despite stating that the CED/RPI is used as a cross-check, the CMA's range and implicit point estimate of 5.5% in effect place 100% weight on estimates of TMR that are derived using the CED/CPI inflation series. This is illustrated in Figure 1 below, which takes the CMA's own results from the ex post returns analysis, using the CED/CPI and CED/RPI inflation series, and compares it to the CMA's range and implicit mid-point for TMR.

¹ O'Donoghue et al (2004), 'Consumer price inflation since 1750' (referred to as 'O'Donoghue et al (2004)' in future footnotes)

² KPMG (2020), 'Estimating the cost of capital for PR19' (referred to as 'KPMG/AGRF Report' in future footnotes)

³ CMA (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal: Provisional Findings' (referred to as 'NATS PFs' in future footnotes), paragraph 12.188

Figures 1: CMA ex post results using the CED/CPI and CED/RPI in real RPI terms, compared to its range and implicit point estimate for TMR



Note: The CMA's CED/RPI results are adjusted downwards by 35 basis points, to reflect the CMA's conclusion that the CED/RPI results are overstated by 30-40 basis points due to the 2010 change in the RPI formula. This chart also includes the CMA's CED/CPI results deflated by 1% using the Fisher Equation rather than the flat 1% reduction applied by the CMA (see Table 1).

1.2.4 Figure 1 above shows that:

- the CMA's range excludes all but one of the CED/RPI results (JKM MSE estimates over 10 and 20 years) and the simple average of the CMA's CED/RPI results lies outside the CMA's TMR range;
- the CMA's implicit point estimate of 5.5% is in line with the simple average of the CMA's CED/CPI results, which is 5.5%-5.6%;⁴ and
- the CMA's implicit point estimate of 5.5% is materially below the TMR estimate, if 50:50 weight is placed on the CED/CPI and CED/RPI, which is 5.9%.

1.2.5 The CMA's range and implicit point estimate is therefore (in effect) based solely on the CED/CPI results, despite the CMA stating that CED/RPI is useful as a cross-

⁴ 5.5% if non-overlapping returns are excluded and 5.6% if non-overlapping returns are included.

check. The impact of the CMA (in effect) placing 100% weight on CED/CPI versus CED/RPI is a reduction in TMR of c.70-100 basis points,⁵ which is highly material.

1.2.6 Identifying a robust historical inflation series is inherently difficult and, as recognised by the CMA, each of the available inflation series have shortcomings. KPMG/AGRF and the CMA both consider that O'Donoghue's CED is preferable over the COLI for the period 1900-1947. However for the period 1947-2018 the following challenges remain:

- a) CPI has only existed since 1988. Prior to 1988 an ONS back-cast has to be relied upon, which is used for 40 years of the relevant period. The ONS has previously cautioned against using these back-cast estimates. The academics that produced the back-cast characterise the outturn CPI estimates they derive as "*not unrealistic*" and "*only one realisation of a back series of this length for CPI.*"⁶ However, there is insufficient published information to test the sensitivity of the back-cast model to the author's assumptions. Further, in a recent announcement (October 2019) which does not appear to be referred to by the CMA in the NATS PFs, the ONS explains that it will be updating the back-cast for an input data error, and reiterates that the estimates are "*...for analytical purposes only and are not intended for official uses.*"⁷
- b) RPI, whilst an official statistic for the majority of the period, has experienced a number of changes in its formulation over time. For example, as the CMA notes, there is a well-documented change in the formulation in 2010, which the CMA considers has an impact of 30-40 basis points. There is uncertainty about the size of the 2010 change⁸ and to what extent it is offset by other changes in RPI over the relevant time period. For example, Wright and Smithers (2014) stated "*We therefore simply do not know whether, for example, this new source*

⁵ The simple average of the various averaging approaches over 10 and 20 year holding periods using the CMA's CED/RPI reported in table 12-14 is 6.5%, which is 100 basis points higher than the CMA's implicit point estimate of 5.5%. If the CMA's CED/RPI results are adjusted downwards for a 35 basis point change in RPI, the simple average of the various averaging approaches over 10 and 20 year holding periods is 6.1%, which is 70 basis points above the CMA's implicit point estimate of 5.5%.

⁶ O'Neill and Ralph (2013), p.7 and p10

⁷

<https://www.ons.gov.uk/news/statementsandletters/developingcpihandcpihistoricalesimatesbetween1947and1987>

⁸ This 30-40 bps deduction is based on the fact that the formula effect increased from 0.5% to 0.8-0.9% due to the 2010 change in the way clothing and footwear prices were calculated for RPI. However, there are two versions of the formula effect, coded DRA9 and CRFU. The former is a reconciliation between RPI and CPI that takes RPI as its base. It then takes the coverage differences between CPI and RPI and then calculates the effect of the CPI formula on the CPI. This is the version of the formula effect used by the CMA. However, the other formula effect, CRFU, identifies the effect of the RPI formula on RPI figures. In this way it is independent of CPI and is therefore the correct measure to use when looking at how the 2010 changes affect RPI. If CRFU figures are used rather than RPI, the formula effect increase from 2010 is from 0.35-0.4% to 0.65%, equating to 25-30 bps, rather than 30-40 bps.

of bias [referring to the 2010 change in RPI] may simply offset the impact of other biases in earlier data.”⁹

1.2.7 Whilst the CED/RPI formulation has changed over time, it was the measure of inflation which was used by the UK for the majority of the period from 1947-2018. Further, the RPI figures are based on reported, actual data and do not have to be estimated using data and assumptions made today. The RPI series is therefore not as heavily influenced by practitioner assumptions, present-day data inadequacies and possible hindsight bias in interpretation. This conclusion is consistent with O’Donoghue et al in the same paper where they derive the CED (albeit this is prior to the 2010 change in the RPI formulation):

“The decision is clear-cut. The retail prices index (RPI) is the preferred index over this period [1947 to 2003]. It is of the correct index form; it is available monthly back to June 1947; and it is the most familiar measure of inflation in the UK.”¹⁰

1.2.8 The CPI series (and the resultant real TMR estimate when this series is used), on the other hand, is heavily impacted by the back-cast estimates between 1947 and 1988.¹¹ In light of the ONS caution with regards to the back-cast estimates and the RPI being the official statistic for the majority of the period from 1947 to 2018, we consider that on-balance, RPI is the better series to use over the period from 1947 to 2018.

1.2.9 However, even if the CMA considers that weight should still be placed on CPI for this period, it would be hard for the CMA to justify, in effect, placing 100% weight on this series. This is particularly the case, in light of the recent ONS announcement regarding the input data error, within which the ONS reiterated that the back-cast series was not suitable for official uses. The CMA itself accepts that the CED/RPI is useful as a cross-check but the CMA’s range and implicit point estimate in the NATS PFs, are materially lower than the results from the CED/RPI. It is not clear, therefore, that the CMA has placed any weight on the evidence from the CED/RPI, when coming to a provisional decision on TMR. We consider that the CMA should revisit the weight it is placing on CED/CPI versus CED/RPI before reaching a final decision on TMR.

[Derivation of a point estimate from the results from different averaging approaches](#)

1.2.10 Setting aside the differing positions on how much weight should be placed on CED/CPI versus CED/RPI, the CMA’s derivation of its range and implicit point

⁹ Wright and Smithers (2014), ‘The cost of equity capital for regulated companies’, p.10

¹⁰ O’Donoghue et al (2004), p.39

¹¹ O’Neill and Ralph (2013), ‘Modelling a Back Series for the Consumer Price Index’ (referred to as ‘O’Neill and Ralph (2013)’ in future footnotes, Figure 2, p.12 shows how there is greater divergence between the actual CPI and RPI figures from 1988 onwards than between the backcast CPI and actual RPI figures prior to 1988.

estimate does not capture relevant averaging approaches and places weight on inappropriate averaging approaches. There are two main examples of this:

- 1.2.11 First, the CMA has excluded non-overlapping returns,¹² despite calculating these as part of its analysis. Whilst the non-overlapping returns have a small sample size, they are nonetheless important because the data points are independent observations and are therefore assumption-free regarding the distribution of returns and serial correlation.¹³ Further, it is inconsistent to exclude non-overlapping returns on the grounds of sample size, whilst also including overlapping returns. This is because the annual data points used in the overlapping returns are not independent data points (as they are rolling 10 and 20 year averages). We note that with the addition of the 2019 data, from the recently published 2020 DMS Yearbook (see paragraph 1.2.15 below), the sample sizes for the non-overlapping returns approach increase to 12 and 6 for the 10 year and 20 year holding periods respectively. Furthermore, the addition of the added data point means that the whole series can be used, with no need to exclude early years (or later years), see paragraph 3.6.3.
- 1.2.12 Second, when deriving estimates from the ex ante data, the CMA acknowledges that an adjustment is necessary, to move from the inherent geometric averaging in the ex ante estimates (referred to as the Bias Adjustment going forwards). However, it presents a range of 4.1-6.5%, where the lower end is not uplifted for the Bias Adjustment and is therefore a geometric average.¹⁴ As acknowledged by the CMA,¹⁵ the average for a 10/20 year holding period will be closer to the arithmetic average (which is the upper end of the range) than the geometric average (which is the lower end of the range). Further, Cooper (1996)¹⁶ notes that a bias adjusted discount rate will lie above the arithmetic average, not below it, suggesting that the arithmetic average itself should be considered as informing the range.
- 1.2.13 If geometric averages are excluded from the CMA's analysis and non-overlapping returns are included, its ranges become:
- a) Ex post CED/CPI: 5.0 to 6.2%, with a mid-point of 5.6%, real RPI. The upper end is 6.2%, rather than 5.9% due to the inclusion of non-overlapping returns.
 - b) Ex post CED/RPI: 5.9% to 6.5%, with a mid-point of 6.2%, real RPI. The upper end is 6.5%, rather than 6.2%, due to the inclusion of non-overlapping returns.
 - c) Ex ante returns: either the range of 4.1% to 6.5% should be adjusted to exclude the geometric averages, which would lead to a range of approximately 6.1-

¹² NATS PFs, paragraphs 12.201 and 12.202

¹³ See Technical Appendix 1 of Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory, 2 January 2020.

¹⁴ See for example NATS PFs, paragraphs 12.215 and 12.216

¹⁵ NATS PFs, paragraph 12.222

¹⁶ Cooper (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, Vol 2 No. 2, pp.157-167

6.5% (see paragraph 3.5.8). Or, alternatively, the CMA's qualitative conclusions with regards to the ex ante evidence and its point estimate for TMR should reflect the evidence that the reasonable TMR will be towards the upper end of the ex ante range.

[Update for the 2020 DMS Yearbook](#)

1.2.14 Given the timings of the NATS PFs and the KPMG/AGRF Report, both reports used the 2019 DMS Yearbook¹⁷, which had returns data from 1900 to 2018.

1.2.15 The 2020 DMS Yearbook is now available, which includes returns from 2019, which show a real equity return for 2019 of 16.3% (RPI). The CMA's analysis using both the CED/CPI and CED/RPI should be updated for this additional year of data. This serves to increase the estimates from the ex post approach by approximately 6 to 9 basis points, depending on the weight given to the different averaging approaches.

[Insufficient consideration given to regulatory consistency](#)

1.2.16 The CMA has reduced TMR by 100 basis points, compared to the TMR adopted in the Northern Ireland Electricity (NIE) case in 2014.¹⁸ However, consistently deflated returns have not changed since the NIE case. This material reduction is therefore predominantly a result of the CMA (in effect) placing 100% of weight on the CED/CPI series, in order to deflate the historical data, as opposed to the RPI series used in previous CMA cases.

1.2.17 As recognised by the CMA in its Final Determination (FD) for Bristol Water (the last water redetermination by the CMA), a consistent approach over time, i.e. between charge controls, is important when setting the A-WACC:

“An important part of this analysis [of the WACC] is the application of a consistent approach to setting the assumptions which form the basis of the calculation of the cost of capital. Both debt and equity investors make long-term financing decisions, including debt financing of up to 30 years’ maturity. This reflects investors’ expectations not just in respect of the immediate regulatory period, but of a consistent approach over the longer term...the financing environment is influenced by the stable approach to the estimation of the cost of capital, applied by both sector regulators and also in previous CC/CMA decisions.”¹⁹

1.2.18 In light of the benefits of a consistent and stable approach to setting the A-WACC, such a material departure from previous precedent should be based upon:

¹⁷ Dimson, Marsh, Staunton (2019), 'Credit Suisse Global Investment Returns Yearbook' (referred to as 'DMS (2019)' in future footnotes)

¹⁸ Competition Commission (2014), 'Northern Ireland Electricity Limited price determination' (referred to as the NIE FD in future footnotes)

¹⁹ CMA (2015), 'Bristol Water plc, A reference under section 12(3)(a) of the Water Industry Act 1991' (referred to as Bristol FD in future footnotes), paragraphs 10.6 to 10.7

- a) strong empirical evidence; and
- b) consideration of whether the benefits from the change outweigh the risks arising from breaking with precedent. In particular, whether the benefits in the form of lower customer bills in the short-term outweigh the negative effects on the overall financing environment within which regulated utilities operate.

1.2.19 With regards to consideration 'a' above, the historical inflation data is inherently imprecise. Further, in light of the well-documented imprecision in the CPI back-cast, it is difficult to describe the CED/CPI series as a strong evidential basis for materially reducing returns.

1.2.20 Turning to consideration 'b', we have not identified a section of the NATS PFs where the CMA has explicitly addressed the implications of its material departure from previous CC precedent. We consider that the issue of regulatory consistency should be explicitly considered by the CMA and the rationale as to why the benefits of the change in approach outweigh the costs should be consulted upon.

1.3 Risk-free Rate

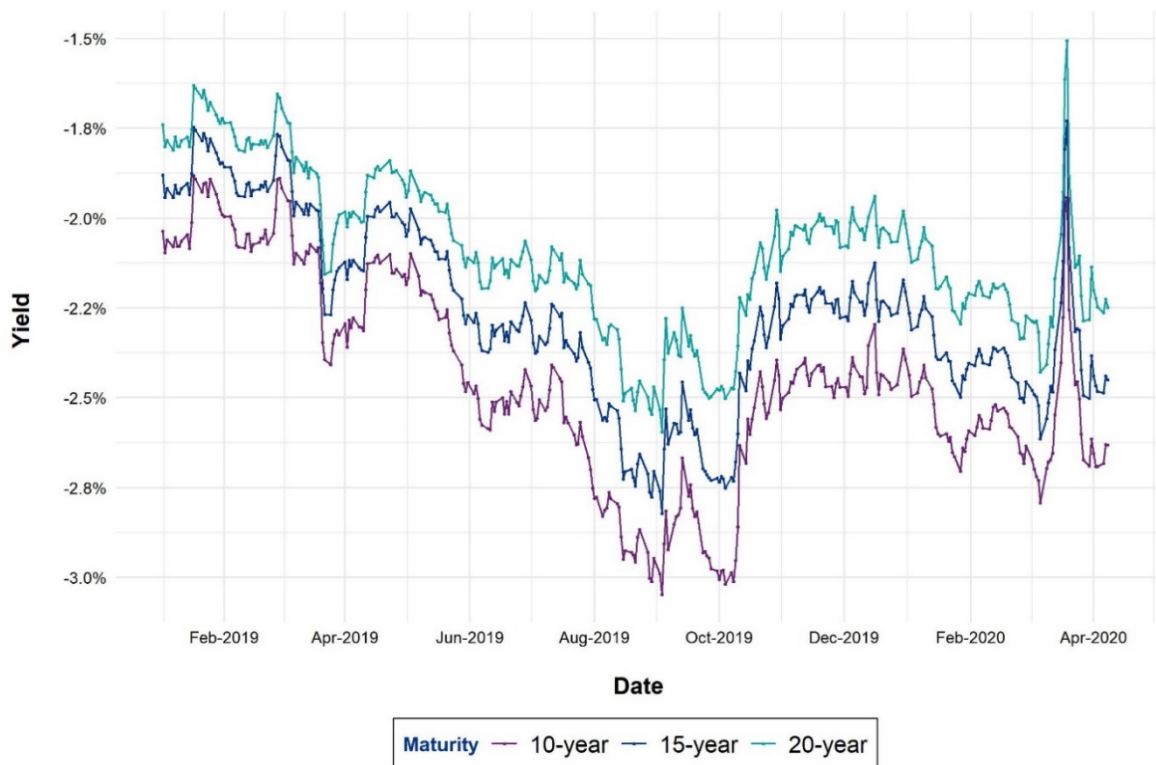
1.3.1 Regulators have, in the past, adopted a 'through the cycle' estimate of the RFR to look through current market distortions and to recognise the need to incentivise long-term investment. For example, in the NIE and Bristol Water cases, the CC adopted a RFR of +1.25% (RPI, real), despite rates at the time being zero/negative.

1.3.2 In the NATS PFs, the CMA has broken with previous CC/CMA precedent and set the RFR on the basis of spot yields on index-linked Gilts (ILGs), which it estimates as -2.40%. Spot yields are then uplifted for market expectations of rate rises over the NATS charge control period, deriving an estimate of -2.25%. This was based on CMA analysis using ILG data from 28 February 2020.

1.3.3 Locking in current spot rates into a fixed cost of capital allowance requires the CMA to be confident that the yields on ILGs as at 28 February 2020, will persist over the regulatory horizon.

1.3.4 However, in our view the CMA cannot be confident that the spot rates on ILGs in February 2020 will prevail for two main reasons.

1.3.5 First, the yield on ILGs is volatile over time, and particularly volatile at present due to the Covid-19 crisis. Evidence in this report demonstrates that whilst there was a period of lower than usual volatility between 2016 and autumn 2019, the UK is currently experiencing a period of heightened volatility, further exacerbating the volatility issue. This point is demonstrated graphically by Figure 2 below, which plots the yields on ILGs over the last two years.

Figure 2: 10, 15 and 20-year yields on ILGs from January 2019 to April 2020

Source: Bank of England, Yield Curves data

- 1.3.6 This volatility has resulted in the CMA's own RFR being 55 basis points different to the CAA's estimate of -1.70%, largely as a result of the analysis being undertaken only a few months later. This finding is not an isolated example. Analysis in this report demonstrates that if the CMA's approach to estimating the RFR had been applied over the period between 2010 and 2020, the resulting detrended RFR only 3 months after any particular estimation date would have deviated from its initial estimate by more than 25 bps on ~40% of occasions, and by more than 50bps on ~10% of occasions.
- 1.3.7 Second, the yields on ILGs are substantially below equilibrium levels. This is evidenced by the rates being below Bank of England (BoE) forecasts of the equilibrium RFR and the international evidence from US TIPS, which are between 0.2% and 0.5% real CPI or -0.8% and -1.0%, real RPI. This evidence from the BoE and the US is important because it suggests that the distribution of expected outturn RFR estimates are skewed to the upside.
- 1.3.8 The CMA dismisses the evidence on US TIPS on the basis that:
- a) international RFR data is not appropriate for a notional investor buying equity in a regulated UK asset that has pound sterling-denominated assets and cashflows; and

- b) there is no evidence of convergence between US TIPS and UK ILGs.
- 1.3.9 With regards to the CMA's first concern, we note that over 70% of the common shares outstanding in two major listed water companies are held by owners that are headquartered outside the UK. Therefore, yields on US TIPS are relevant to investors in UK utilities.
- 1.3.10 With regards to the CMA's second concern, the CMA has not set out why it considers that the current difference between US TIPS and UK ILGs will persist. Analysis of US TIPS and UK ILGs over time shows that the difference between the series was broadly constant until the start of 2013, as may be expected as a result of the International Fisher Effect. Since then, two events can be identified at which time the difference between UK and US inflation-linked yields deviated considerably from its long term average. These two events are a reduction in the US's Quantitative Easing programme (2013) and the results of the UK's 'Brexit' referendum on its membership of the European Union (2016). We consider that both events are exceptional in nature and therefore that the effects of these events on the difference between US TIPS and ILG yields are likely to be temporary.
- 1.3.11 In light of i) the international investor base of utilities and ii) the drivers of the current deviation in US and UK bond yields being exceptional events, the yields on US TIPS remain relevant for determining the equilibrium RFR and therefore whether the distribution for the outturn RFR is likely to be skewed towards higher values. In any case, the BoE has considered what the equilibrium RFR is in the UK. The BoE analysis supports a RFR of +0.5%, real CPI (or -0.5%, real RPI), which is broadly consistent with the US TIPS evidence.
- 1.3.12 It follows from the volatility of the yields on ILGs, and the material difference between the current ILG yields and the equilibrium evidence, that the CMA cannot be confident that its estimate of -2.25% will prevail over the regulatory horizon.
- 1.3.13 In light of this uncertainty, it is unclear how the CMA can be comfortable that it has met the Financeability duty. This is because the Financeability duty is asymmetric, in so far as the duty to ensure that an efficient company can finance its functions is only called in to question when the A-WACC, which is dependent on the RFR, is beneath the market WACC. Therefore, if the outturn RFR is higher than the CMA's fixed allowance and the CMA has calibrated all other parameters in the WACC in line with market evidence, the Financeability duty may be breached.
- 1.3.14 Rather than locking in current yields that are substantially below equilibrium levels and which are derived from a volatile series, we consider that a glide path to a forward-looking equilibrium RFR is preferable. This approach addresses the issues of volatility and rates being substantially below equilibrium levels, as follows:

- a) *ILG yields are currently substantially below equilibrium levels*: Placing weight on the equilibrium evidence recognises the current market distortions and the resulting possibility that rates will trend towards equilibrium levels over the regulatory horizon. The approach therefore mitigates the risk that the allowed RFR will be below the outturn RFR over the regulatory horizon.
- b) *ILG yields are volatile*: Adopting a glide path to equilibrium levels, smooths over any underlying volatility.

1.3.15 Assuming a glide path from current market rates to an equilibrium RFR suggests an appropriate RFR of c.-1.5% to -0.8% real RPI for use in the allowed cost of equity.

1.3.16 Furthermore, when calculating estimates of the RFR based on current UK yields, the CMA should place some weight on yields on alternative near risk-free assets, such as nominal gilts and interbank rates. This is because of the increased risk that ILG-specific market distortions may bias the CMA's RFR estimates. Placing weight on other UK instruments can increase the estimated RFR by up to approximately 30 to 50 basis points, depending upon the instrument and time period chosen.²⁰ If the CMA continues to place sole weight on current UK yields, an indexation (or reconciliation) mechanism should be considered.

1.4 Approach to estimating beta

1.4.1 Whilst the beta estimate is sector specific, the methodology adopted by the CMA may be used to estimate the beta used in the water appeals. We have three main concerns with the CMA's methodology for estimating beta:

- a) First, the CMA has not estimated monthly betas but instead relies on daily and weekly estimates. However, there is robust empirical evidence that higher frequency betas, such as the daily estimates, are downward biased and monthly estimates may therefore provide more robust beta estimates.
- b) Second, the CMA places too much weight on 2-year daily betas, which are not the best predictor of betas over long-run forward looking horizons. Instead, most weight should be given to betas estimated using the longest run of data since the last structural break.
- c) Third, the CMA's estimation procedure is not clear. The CMA only presents its beta estimates as asset betas. Asset betas cannot be estimated directly, only equity betas can be observed. We assume the CMA calculated equity betas from the raw returns data²¹ and then estimated the gearing and debt beta of the comparators to derive the asset betas which are presented. However, the

²⁰ See for example Table 4 of Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory.

²¹ Although it is not clear, another reading of the Figures is that the CMA simply took equity betas from Bloomberg.

underlying gearing and debt beta assumptions are not presented, so we cannot comment on the approach used to derive the asset betas. It would be helpful for interested parties, if the CMA were to publish the underlying assumptions behind its asset beta calculations going forwards.

- 1.2. A more detailed consideration of the approach to estimating beta for regulatory charge control purposes is set out in an academic paper submitted alongside this report, titled 'A Report on the Estimation of Beta for Regulatory Charge Control Purposes' by Gregory, Harris and Tharyan (2020).

1.5 Gearing and the A-WACC

- 1.5.1 A number of the statements in the CMA's Appendix D, where the impact of gearing on the A-WACC is discussed, are inconsistent with theory and are based on an incomplete assessment of the impact of changes in gearing on WACC. The primary example of this is the CMA's conclusion that because the A-WACC (which the CMA/CAA have estimated) increases with gearing, it follows that asset beta must reduce with gearing.²² There are a number of reasons why the way in which the CMA/CAA has estimated the parameters in the A-WACC, leads to the perverse effect of the A-WACC increasing with gearing, which do not involve dismissing well-established theory. These are summarised below:
 - a) The CMA is using a RFR estimate which is materially below equilibrium levels. We note that flexing the RFR assumption to a more appropriate long-run estimate, alleviates the issue of the A-WACC increasing with gearing.
 - b) The CMA has only modelled the impact of gearing on equity beta and not on the debt beta. We would not expect a model that flexes both equity and debt beta with gearing to result in an A-WACC that increases materially with gearing.

2 Introduction

2.1 The authors

- 2.1.1 This report has been prepared for Anglian Water Services Limited (Anglian) by KPMG LLP, for submission as part of its appeal of Ofwat's Final Determination for PR19.
- 2.1.2 This report has been written in conjunction with Professor Alan Gregory, a Director in AGRF limited, which is a sub-contractor of KPMG LLP. Professor Gregory is a Professor Emeritus in Corporate Finance at the University of Exeter and a director of AGRF Ltd. His research interests are in the general area of market-based empirical

²² The CMA does not disclose what de-gearing assumptions it used to derive the asset beta, but we assume that it used the MM de-gearing formula for that purpose.

research, including the empirical estimation of cost of capital. From September 2001 to September 2009 he was a Reporting Panel Member of the UK Competition Commission (CC) where he was involved in a number of inquiries, including the merger investigation of two potential European takeover bids for the London Stock Exchange, and the groceries or “supermarkets” market investigation.

2.1.3 Professor Gregory was a member of the CC's cost of capital panel from 2009 to 2017 and continues to provide advice to the Competition and Markets Authority (CMA). In addition to more than thirty papers in peer-reviewed academic journals, he has contributed to an OECD Roundtable publication on Excessive Prices and is the author of the Financial Times book ‘Strategic Valuation of Companies’.

2.2 Purpose of this report

2.2.1 Anglian has requested a redetermination of its PR19 charge control settlement by the CMA and submitted its Statement of Case (SoC), for consideration by the CMA, on 2 April 2020. A report on the appropriate cost of capital for Anglian, prepared by KPMG LLP and AGRF limited was annexed to Anglian’s SoC (the ‘KPMG/AGRF Report’).

2.2.2 The KPMG/AGRF Report is closely aligned with the third party submission to the NATS appeal, titled ‘Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory’. However, the KPMG/AGRF Report reflects up to date data and information that has come to light during the course of the consultation processes. The rest of this report therefore refers back to the KPMG/AGRF Report, when summarising the position of KPMG/Professor Gregory on key areas.

2.2.3 Given the importance of the CMA’s decision on the cost of equity in the NATS case for Anglian’s case, we consider that the NATs Panel should be aware of the arguments in the KPMG/AGRF Report.

2.2.4 However, to assist the panel, this report does the following for each area that has read across from the NATs case to Anglian’s case:

- a) summarises our understanding of the CMA’s methodology in the NATS PFs;
- b) summarises the methodology used in the KPMG/AGRF Report;
- c) on the basis of the two approaches, sets out the key differences in methodology;
- d) sets out the rationale for the approach in the KPMG/AGRF Report, where a different approach has been adopted; and
- e) setting aside the differences in methodology between the CMA and KPMG/AGRF sets out concerns with the CMA’s application of its own approach.

2.3 Areas with read across from NATs to water

2.3.1 The following main areas have read across and are therefore addressed in this report:

- a) Total market return (TMR);
- b) Risk free rate (RFR); and
- c) The approach to estimating beta for regulatory charge control purposes, including the approach to de-gearing and re-gearing betas derived from comparator firms.

3 Total market return

3.1 Summary of the CMA's approach in the NATs PFs

3.1.1 In the NATs PFs, the CMA considers both historical ex post and historical ex ante methods of deriving Total Market Return (TMR). It does not place any weight on forward-looking approaches, noting that they are "...largely assumption-driven, with little evidence to support the use of one set of assumptions over others, and they produce a wide range of estimates."²³

3.1.2 The CMA derives TMR estimates using both 'CED/CPI' and 'CED/RPI' inflation series to deflate historic returns. In both cases the consumption expenditure deflator (CED) is used from 1900 to 1947 since neither RPI nor CPI existed and because the Office for National Statistics prefers CED to the cost of living index (COLI).²⁴ Subsequent to 1947, RPI and CPI are used, with the latter being composed of both actual data back to 1988 and then estimated 'back-casts' for the period between 1947 and 1988. The CMA places greater weight on CPI due to its view that:

- a) RPI is less robust due to use of the Carli formula which can cause an upward bias; and
- b) RPI is an inconsistent measure of inflation due to changes in the underlying methodology to calculate it, the clearest example of which was a significant increase in the formula effect in 2010.²⁵

3.1.3 As such, the CMA uses CED/RPI as a cross-check only and considers that CED/RPI is overstated by 30-40 bps, due to the change in the RPI formulation in 2010.²⁶

²³ NATs PFs, paragraph 12.166

²⁴ NATs PFs, paragraph 12.190

²⁵ NATs PFs, paragraph 12.192

²⁶ See footnote 8, for a note on the CMA's 30-40bp estimate

3.1.4 Table 1 shows the averaging approaches taken by the CMA and the results of its analysis using the historical ex post data.

Table 1: CMA's analysis of TMR using ex post data

Averaging method	Holding period (years)	CED/CPI, real CPI	CED/CPI, real RPI	CED/RPI, real RPI
Arithmetic mean	1	7.0%	5.9%	6.7%
Geometric mean	120	5.2%	4.2%	5.0%
Blume (1974)	10	6.8%	5.7%	6.6%
	20	6.4%	5.3%	6.5%
JKM (2005) unbiased	10	6.9%	5.8%	6.6%
	20	6.7%	5.6%	6.5%
JKM (MSE)	10	6.6%	5.5%	6.3%
	20	6.1%	5.0%	5.9%
Overlapping	10	6.6%	5.5%	6.4%
	20	6.7%	5.6%	6.4%
Non-overlapping	10	6.8%	5.7%	6.5%
	20	7.2%	6.1%	6.8%

Source: NATS PFs, Table 12-14, p.183 and KPMG analysis. The CED/CPI, real RPI has been added for comparability purposes and is derived by adjusting the CMA's CED/CPI series downwards by 100 basis points, using the Fisher equation.

3.1.5 In arriving at a range of 6.1% to 6.9% for CED/CPI (adjusted to 5.1% to 5.9% in real RPI terms, to account for the RPI/CPI wedge of approximately 100 bps) and 5.6% to 6.2% for CED/RPI from the data in Table 1, the CMA:

- a) excludes the arithmetic and geometric means as well as non-overlapping estimates;²⁷ and
- b) deducts 30-40 bps from the CED/RPI range of 5.9% to 6.6% due to the 2010 increase in formula effect, which results in a range of 5.6% to 6.2%.²⁸

3.1.6 Under the historical ex ante method, the CMA uses the Fama and French approach²⁹ with data from the 2018 Barclays Equity Gilt Study³⁰, adapted to use CED/CPI and CED/RPI inflation series. A Bias Adjustment of 1.3%, determined by Gregory (2011),³¹ is added to create the upper bound of both CED/CPI and CED/RPI ranges.

3.1.7 The CMA also uses the decomposition approach in Dimson, Marsh and Staunton (DMS) dataset³², again in conjunction with both CED/CPI and CED/RPI inflation

²⁷ NATS PFs, paragraphs 12.201 and 12.202

²⁸ NATS PFs, paragraph 12.208

²⁹ Fama and French (2002), 'The Equity Premium', Journal of Finance Vol 57, No 2

³⁰ Barclays Equity Gilt Study 2018, Figure 7, pp. 107-109

³¹ Gregory (2011), 'Expected Cost of Equity and the Expected Risk Premium in the UK', *Review of Behavioural Finance*, p.3

³² DMS (2019), p.34, Table 10

series. An uplift of 150 bps is added to both CED/CPI and CED/RPI ranges to derive the arithmetic mean, based on the uplift suggested in the DMS publication.³³

3.1.8 The range derived from all four approaches is 4.1% to 6.5%.³⁴

3.1.9 From the historical ex ante and ex post evidence, the overall TMR range is considered to be 5.0% to 6.0%, real RPI. The CMA notes that the discrepancy between this range and that of 5.0% to 6.5% calculated for the NIE Final Determination (FD)³⁵ is due to:

- a) the use of CED rather than COLI, as the measure of pre-1947 inflation; and
- b) the downward adjustment to the RPI deflated returns of 30-40 bps, due to the step change in the formula effect as of 2010.³⁶

3.1.10 The CMA does not come to a view on a point estimate for TMR.³⁷ However, it selects the overall WACC based on the mid-point of the WACC range, so implicitly adopts a TMR of 5.5%, real RPI (the mid-point of the 5.0% to 6.0% range), which compares to 6.5% in NIE (2014), where the upper end of the range was selected.³⁸

3.2 Summary of the approach in the KPMG/AGRF Report

3.2.1 The KPMG/AGRF Report places most weight on the historical ex post method of deriving TMR as it is the “...*only approach that is based on hard evidence and not affected by assumptions and forecasts*”,³⁹ but also considers the historical ex ante evidence as a cross-check.⁴⁰

3.2.2 The report undertakes analysis using:

- a) COLI/RPI, as it has been the inflation series used by regulators in the past; and
- b) CED/RPI, as there are known issues with the weightings used for different categories of consumer expenditure in the COLI.⁴¹

3.2.3 It places no weight on CED/CPI (or COLI/CPI). Instead, in order to derive a TMR in CPIH terms, the TMR in RPI terms is adjusted to account for the forward-looking RPI-CPIH wedge.⁴²

³³ NATS PFs, paragraphs 12.220 and 12.221

³⁴ NATS PFs, paragraph 12.233

³⁵ NIE FD, paragraph 13.141

³⁶ NATS PFs, paragraph 12.208

³⁷ NATS PFs, paragraph 12.280

³⁸ NATS PFs, paragraph 12.168

³⁹ KPMG/AGRF Report, paragraph 4.2.4

⁴⁰ KPMG/AGRF Report, paragraph 4.2.6

⁴¹ KPMG/AGRF Report, paragraphs 4.2.29 and 4.2.30

⁴² KPMG/AGRF Report, paragraph 4.2.22

- 3.2.4 Table 2 shows the averaging approaches taken in the KPMG/AGRF Report and the results of its analysis using the historical ex post data.

Table 2: KPMG’s analysis of TMR using DMS ex post data

Averaging method	Holding period (years)	COLI/RPI, real RPI	CED/RPI, real RPI
Arithmetic mean	1	7.0%	6.6%
Blume (1974)	10	6.9%	6.5%
	20	6.7%	6.4%
JKM (2005) unbiased	10	6.9%	6.6%
	20	6.8%	6.4%
JKM (MSE)	10	6.6%	6.3%
	20	6.1%	5.8%
Overlapping	10	6.7%	6.4%
	20	6.8%	6.5%
Non-overlapping ⁴³	10	7.2%	6.8%
	20	7.5%	7.1%

Source: KPMG/AGRF Report, Table 3, p.32 (percentages adjusted to 1 decimal place)

- 3.2.5 The KPMG/AGRF Report uses a combination of averaging techniques (as shown in Table 2) due to each approach having merits and demerits.⁴⁴ The results of the COLI/RPI approach continue to support a TMR of 6.5% consistent with the CC’s NIE decision, while a TMR of 6.25% is derived from using the CED/RPI approach.⁴⁵
- 3.2.6 Under the historical ex ante method, the report firstly uses the Fama and French approach and explicitly adopts the estimates of dividend growth and Bias Adjustment consistent with the theory and evidence found in Vivian (2007)⁴⁶ and Gregory (2011), giving a return of between 6.4% and 6.6%, real RPI.⁴⁷
- 3.2.7 As a second cross check, the DMS’ historical decomposition of the geometric mean real risk premium gives an expected return of 5.41% and with their recommended uplift of 150 bps (see paragraph 4.1.6), a forward estimate of 6.9% is suggested.⁴⁸ The report notes that this 6.9% real return is derived from an inflation series that is a composite of RPI and CPI and finds that the RPI adjusted real returns is 6.64%.⁴⁹

⁴³ As the data of annual returns between 1899 and 2018 does not divide in to 10 and 20-year periods without remainder, there is a choice as to which year is taken as the point of reference. Therefore, there may be a degree of difference between estimates using non-overlapping returns as calculated by the CMA and KPMG/AGRF. However, updated data of annual returns between 1899 and 2019 do not have this issue and so the choice of reference year is unambiguous.

⁴⁴ KPMG/AGRF Report, Technical Appendix 1, paragraphs A.1.16 and A.1.17

⁴⁵ KPMG/AGRF Report, paragraph 4.2.38

⁴⁶ Vivian (2007), ‘The UK equity premium: 1901-2004’

⁴⁷ KPMG/AGRF Report, paragraph 4.2.42

⁴⁸ KPMG/AGRF Report, paragraph 4.2.44

⁴⁹ KPMG/AGRF Report, paragraph 4.2.44 and footnote 73.

3.2.8 The final cross-check compares the dividend yield from the NIE FD (3.6%)⁵⁰ with the current yield in the UK (4.2%)⁵¹. The difference of 0.6% suggests that expected dividend returns are 0.6% higher now than during the NIE FD.⁵²

3.2.9 The report concludes that a downward adjustment from the NIE FD 6.5% estimate for use of the CED instead of the COLI is merited, deriving an estimate of 6.25%. The historical ex ante cross-checks uplifted for the Bias Adjustment corroborate this figure.⁵³

3.3 *Key differences in methodology*

3.3.1 It is evident from sections 3.1 and 3.2 that there are a number of similarities in the approach adopted by the CMA and in the KPMG/AGRF Report. These are:

- a) Both rely on historical ex post and ex ante returns and not forward looking evidence;
- b) Where historical ex post returns are used, both use the historical returns from the DMS 2019 Yearbook and apply various averaging techniques; being arithmetic, Blume, JKM (unbiased and MSE), simple and non-overlapping returns over holding periods of 10 and 20 years; and
- c) Both estimate historical ex ante returns, using a Fama French model and the DMS decomposition approach. When adopting the ex ante returns, both the CMA and KPMG/AGRF recognise that an uplift is needed for the Bias Adjustment. However, the CMA retains estimates, which have not been adjusted for the Bias Adjustment when deriving its range.

3.3.2 However, the following key differences in approach remain:

- a) The relative merits of CED/CPI versus CED/RPI. KPMG/AGRF place 100% weight on the CED/RPI. The CMA qualitatively explains that it has placed most weight on CED/CPI and used CED/RPI as a cross-check. However, as explained in Section 3.5 below, in deriving its range and (implicit) point estimate, the CMA has in effect placed 100% of weight on the CED/CPI.
- b) Whether a downward adjustment for the 2010 change in RPI is required, as the CMA reduces the CED/RPI returns by 30-40 basis points for this change whereas the KPMG/AGRF Report does not.
- c) The derivation of the range from the ex post and ex ante results and where in that range a point estimate should be selected. The KPMG/AGRF Report

⁵⁰ NIE FD, paragraph 13.144

⁵¹ This figure is from the value-weighted FTSAI in London Business School (September 2019), 'Risk Measurement Service Publication', p.8.

⁵² KPMG/AGRF Report, paragraph 4.2.45

⁵³ KPMG/AGRF Report, paragraph 4.2.47

derives a point estimate of 6.25%, real RPI, based on the appropriately averaged CED/RPI ex post returns data. However, the CMA report instead derives a range for the TMR of 5.0% to 6.0%, real RPI, which excludes; arithmetic averages, non-overlapping returns and the results from the CED/RPI analysis.⁵⁴ The CMA then implicitly adopts the mid-point from this range.

3.4 Rationale for KPMG/AGRF Report approach on areas of difference

Placed weight on the unadjusted CED/RPI, rather than the CED/CPI

- 3.4.1 An inflation series is needed for 1900 to 2018, in order to deflate nominal returns over the same time series. Identifying a robust historical inflation series is inherently difficult and each of the available inflation series have shortcomings.
- 3.4.2 Whilst both KPMG/AGRF and the CMA consider that O'Donoghue's CED is preferable over the COLI for the period 1900-1947, for the period 1947-2018 the following challenges remain:
- a) CPI has only existed since 1988. Prior to 1988 an ONS back-cast has to be relied upon. The ONS has previously cautioned against using these back-cast estimates. Further, in a recent announcement, from the ONS that it will be updating the back-cast for an input data error, the ONS reiterates that the estimates are "...for analytical purposes only and are **not intended for official uses**."⁵⁵ There is no means of robustly testing the sensitivity of the back-cast results to input assumptions (see paragraph 3.4.8 below).
 - b) RPI, whilst an official statistic for the majority of the period, has experienced a number of changes in its formulation over time. For example, as the CMA notes, there is a well-documented change in the formulation in 2010, which the CMA considers has an impact of 30-40 basis points.⁵⁶
- 3.4.3 The KPMG/AGRF Report, placed 100% weight on RPI for the period 1947 to 2018. The rationale for this approach is set out in detail at paragraphs 4.2.8 to 4.2.31 of the KPMG/AGRF Report. However, at a high-level, there are three main reasons why this approach was adopted, as opposed to using the CPI series.
- 3.4.4 First, the CPI series (and the resultant real TMR when this series is used), is heavily impacted by the back-cast estimates between 1947 and 1988. The ONS has previously explained that caution should be applied when using the back-cast series.

⁵⁴ With one exception being the JKM MSE estimator over a 20 year holding period, which is 5.8% and therefore falls within the CMA's range.

⁵⁵

<https://www.ons.gov.uk/news/statementsandletters/developingcpihandcpihistoricalestimatesbetween1947and1987>

⁵⁶ See footnote 8 for a discussion of the CMA's use of the DRA9 version of the formula effect rather than CRFU.

- 3.4.5 “...the results of the estimation procedure are analysed in order to make a broad assessment of whether or not the estimates appear reasonable. It is difficult to assess the accuracy of the series, as **the true CPI can never be known**. For that reason it is also worth emphasising that these modelled estimates can only be considered as broad indications of the level of the CPI series at best and **caution should be exercised when using these series**. For the same reason, these estimates are not National Statistics.”⁵⁷
- 3.4.6 Further, in a recent announcement, from the ONS that it will be updating the back-cast for an input data error, the ONS reiterates that the estimates are not intended for official uses:
- 3.4.7 “The ONS previously published indicative modelled estimates for the CPI between 1947 and 1987. **These estimates are for analytical purposes only and are not intended for official uses**. The models used were based on the subsequently revised CPI modelled data for 1988 to 1996. The ONS will therefore produce new indicative estimates for the CPI between 1947 and 1987 alongside the planned CPIH estimates, based on the corrected CPI data. This will give users a consistent set of modelled indices. These new estimates will be published by the end of 2020.”⁵⁸
- 3.4.8 The use of the back-cast CPI series for the 40 year period from 1947 to 1987 is the key driver of the difference between the RPI deflated and CPI deflated results. However, if the published document supporting this back-cast is examined it is clear that:
- a) The authors are presenting just one ‘not unrealistic⁵⁹’ scenario for historical CPI. In the section of the paper, where ‘Alternative Assumptions’ are considered, the authors conclude “By pointing out these choices we hope to emphasise that the series constructed here represents only one realisation of a back series of this length for CPI.”
 - b) The results are sensitive to the models and input assumptions used.⁶⁰ However, because the model itself is not published and there is limited sensitivity analysis in the published document, it is difficult to determine the impact on the outturn CPI series of flexing the author’s assumptions.
- 3.4.9 Second, RPI was the UK’s preferred measure of inflation, and was an Official Statistic for the longest part of the historical period over which returns are being deflated. As such, RPI was the familiar measure of inflation in the UK upon which

⁵⁷ O’Neill and Ralph (2013), p.7

⁵⁸

<https://www.ons.gov.uk/news/statementsandletters/developingcpihandcpihistoricalestimatesbetween1947and1987>

⁵⁹ O’Neill and Ralph (2013), p.7

⁶⁰ O’Neill and Ralph (2013), p.10, ‘Alternative Assumptions’ section

business and investment decisions were made. The fact that UK Government financial instruments (e.g. index-linked gilts; National Savings Products) were constructed using this series further supports that this was the key measure of inflation. To impose today's view on inflation back over time therefore serves to impose a different measure of inflation on the UK economy than was being reported and acted upon. If reported inflation had been measured differently in the past, it is possible that investors may have made different asset allocation decisions, which in turn could have impacted returns. It follows that for internal consistency if one is aiming to deflate historical returns, then the most appropriate inflation series to use is the one that was the reported official statistic for the longest part of the historical period.

- 3.4.10 This is consistent with the position adopted by O'Donoghue et al (2004), the authors of the CED paper. Albeit the O'Donoghue paper is a 2004 publication, so their conclusion applies for the period 1947 to 2003,⁶¹ where they state:

*"The decision is clear-cut. The retail prices index (RPI) is the preferred index over this period [1947 to 2003]. It is of the correct index form; it is available monthly back to June 1947; and it is the most familiar measure of inflation in the UK."*⁶²

- 3.4.11 Third, because RPI is available for the longest part of the period, in the form of reported, actual data, it does not have to be estimated using data and assumptions made today. The RPI series is therefore not as heavily influenced by practitioner assumptions, present-day data inadequacies and possible hindsight bias in interpretation.

- 3.4.12 The KPMG/AGRF Report recognises that there are changes in the RPI formula over time as consumer behaviour changes and new modelling techniques became available. However, consistent with Wright and Smithers (2014) we consider that adjusting the RPI based TMR downwards for a particular event, such as the change in the formula in 2010, over a 120 year series overlooks the inherent uncertainty in the inflation data. As stated by Wright and Smithers (2014):

- 3.4.13 *"We therefore simply do not know whether, for example, this new source of bias [referring to the 2010 change in RPI] may simply offset the impact of other biases in earlier data."*⁶³

- 3.4.14 The CMA's approach instead adjusts the RPI series downwards for the 2010 change in the formulation, which it estimates to be 30-40 basis points. Whilst our position is that on-balance there should not be an adjustment to the published series, it should

⁶¹ 2003 is the last year of date that the 2004 paper relies upon.

⁶² O'Donoghue et al (2004), p.39

⁶³ Wright and Smithers (2014), 'The cost of equity capital for regulated companies', p.10

be noted that the impact of the 2010 adjustment is uncertain, with the evidence supporting a range of estimates.⁶⁴

Derivation of a point estimate from the range of averaging results

- 3.4.15 In deriving a point estimate, KPMG/AGRF consider that weight should be placed on the most robust evidence.
- 3.4.16 With regards to TMR, geometric averages are not appropriate for estimating a TMR over the regulatory horizon, as recognised by the CMA in the NATs PFs.⁶⁵ No weight should therefore be given to these estimates (be they geometric averages derived from ex ante or ex post returns).
- 3.4.17 Most weight should instead be placed on appropriately averaged (using the range of averaging techniques for 10/20 year holding periods), ex post returns, assuming that this figure is consistent with the historical ex ante cross check. The KPMG/AGRF Report therefore estimates a point estimate of TMR, based on the appropriately averaged returns over 10 and 20 year holding periods which is 6.25%. This is comparable to the 6.5% estimate from NIE, less the reduction that arises from using the CED, rather than the COLI as the pre-1947 inflation measure.
- 3.4.18 The CMA's approach to deriving an (implicit) point estimate, instead relies on deriving a range for TMR and then selecting an A-WACC from the mid-point of its range. Such an approach may be reasonable if, inter alia, a) the range is closely linked to the empirical results and b) the estimates at either end of the range are equally robust. This is not the case for the CMA's range of 5.0% to 6.0%. This is discussed in further detail at paragraphs 3.5.3 to 3.5.16 below.

3.5 Concerns with CMA approach

- 3.5.1 The previous section has summarised our rationale for the key areas of difference between the KPMG/AGRF Report and the CMA's provisional approach. In this section, we set aside these differences in position and set out concerns with the CMA's application of its own methodology.

The range and mid-point do not reflect the CMA's own results

- 3.5.2 Evidently the CMA and KPMG/AGRF currently have a different position as to the weight which should be placed on CED/RPI versus CED/CPI.
- 3.5.3 However, setting aside the differences in position on the weight that should be placed on CED/RPI versus CED/CPI, the CMA's range is not representative of its own results and conclusions for three main reasons.

⁶⁴ See footnote 8 for a discussion of the CMA's use of the DRA9 version of the formula effect rather than CRFU.

⁶⁵ NATS PFs, paragraph 12.222

- 3.5.4 First, the upper end of the CMA's range of 5.0-6.0% is lower than the upper end of the range from the CMA's preferred series being the CED/CPI, which is 6.2% because the CMA has excluded non-overlapping returns,⁶⁶ despite calculating these as part of its analysis. Whilst the non-overlapping returns have a small sample size, they are nonetheless important because the data points are independent observations and are therefore assumption free regarding the distribution of returns and serial correlation.⁶⁷ Further, it is inconsistent to exclude non-overlapping returns on the grounds of sample size, whilst also including overlapping returns. This is because the annual data points used in the overlapping returns are not independent data points. We note that with the addition of the 2019 data from the recently published 2020 Yearbook, the sample sizes for the non-overlapping returns approach increase to 12 and 6 for the 10 year and 20 year holding periods respectively (see Section 3.6).
- 3.5.5 Second, the CMA's range and implicit point estimate effectively place zero weight on the CED/RPI and 100% weight on CED/CPI, despite the CMA saying that "*all the available inflation series have issues*"⁶⁸ and that CED/RPI is useful as a cross-check.⁶⁹ Including the CED/RPI (adjusted downwards for the CMA's view on the impact of the 2010 change in RPI) would lead to a range of 5.0-6.8% (if non-overlapping returns are included) and 5.0-6.6% if non-overlapping returns are not included. The simple average of the results where equal weight is placed on the CMA's CED/RPI (adjusted downwards for the CMA's view on the impact of the 2010 RPI change) and CED/CPI results is 5.9%.
- 3.5.6 Figures 3 below illustrates points 1 and 2 graphically, using the CMA's own data from its ex post results.

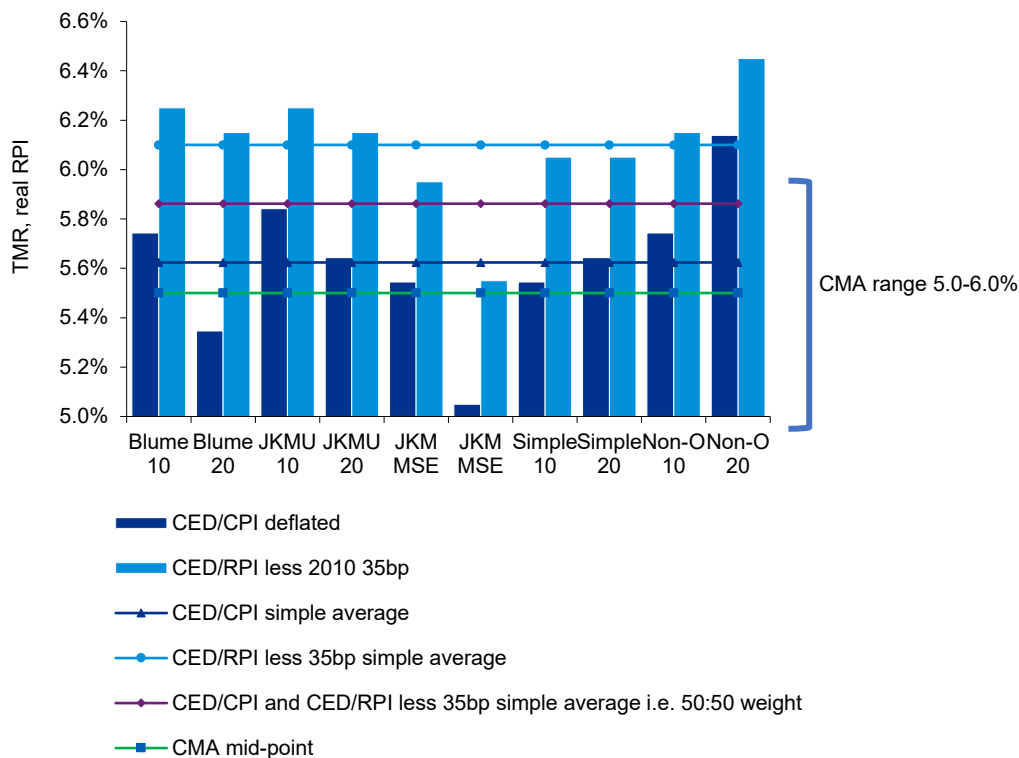
⁶⁶ NATS PFs, paragraphs 12.201 and 12.202

⁶⁷ See KPMG/AGRF Report, Technical Appendix 1, paragraphs A.1.18 and A.1.19.

⁶⁸ NATS PFs, paragraph 12.188

⁶⁹ NATS PFs, paragraph 12.191

Figure 3: CMA ex post results using the CED/CPI and CED/RPI in real RPI terms, compared to its range and implicit point estimate for TMR



Source: KPMG analysis

Note: The CMA's CED/RPI results are adjusted downwards by 35 basis points, to reflect the CMA's conclusion that the CED/RPI results are overstated by 30-40 basis points. This chart also includes the CMA's CED/CPI results deflated by 1% using the Fisher Equation rather than the flat 1% reduction applied by the CMA (see Table 1 above).

3.5.7 Third, when deriving estimates from the ex ante data, the CMA acknowledges that a Bias Adjustment is necessary. However, it presents a range of 4.1-6.5%, where the lower end is not uplifted for the Bias Adjustment and is therefore a geometric average.⁷⁰ The CMA then concludes that “the reasonable range of TMR is likely to be above the bottom end of this range and below the top end.”⁷¹

3.5.8 Applying the full Bias Adjustment produces an arithmetic average, so appropriately averaged returns for a 10/20 year holding period may be lower than the upper end of the CMA's 4.1-6.5% range. This is because the upper end of the range includes the full Bias Adjustment and is therefore an arithmetic average.⁷² However, as acknowledged by the CMA,⁷³ the average for a 10/20 year holding period will be closer to the arithmetic average than the geometric average. This is clear from the

⁷⁰ See for example NATS PFs, paragraphs 12.213, 12.216 and 12.233

⁷¹ NATS PFs, paragraph 12.233

⁷² Albeit Cooper (1996) notes that an appropriate discount rate will lie above the arithmetic average, not below it, suggesting that the arithmetic average itself should be considered as informing the range.

⁷³ NATS PFs, paragraph 12.222

ex post returns results in Table 1, where the averages over 10/20 years (using Blume, JKM etc.) are closer to the arithmetic average than the geometric average. This makes sense as 10/20 years is closer to 1 year than 120 years. The CMA's conclusion with regards to the ex ante range, repeated at paragraph 3.5.7 is therefore inconsistent with the empirical evidence. A conclusion that is consistent with the empirical evidence would have instead been "*the reasonable range of TMR is likely to be towards the upper end of the range*". To illustrate this point, if an uplift is applied from the lower end of the CMA's range that is broadly in line with the uplift implied from the ex post returns data, then the lower end of the range would, instead be 6.1%, with the upper end of 6.5% reflecting an arithmetic average.⁷⁴

3.5.9 If geometric averages are excluded from the CMA's analysis and non-overlapping returns are included, its ranges become:

- a) Ex post CED/CPI: 5.0 to 6.2%, with a mid-point of 5.6%, real RPI.
- b) Ex post CED/RPI: 5.9% to 6.5%, with a mid-point of 6.2%, real RPI.
- c) Ex ante returns: either the range of 4.1% to 6.5% should be adjusted to exclude the geometric averages, which would lead to a range of approximately 6.1-6.5% (see paragraph 3.5.8). Alternatively, the CMA's qualitative conclusions with regards to the ex ante evidence and its point estimate for TMR should reflect the evidence that the reasonable TMR will be towards the upper end of the ex ante range.

3.5.10 We note that the ex post ranges at paragraph 3.5.9 and presented in Figure 3 are prudent in so far as they exclude arithmetic averages (CED/CPI: 5.9%, real RPI and CED/RPI 6.7%, real RPI). Cooper (1996) notes that an appropriate discount rate will lie *above* the arithmetic average, not below it, suggesting that the arithmetic average itself should be considered as informing the range.

3.5.11 In conclusion, as the CMA acknowledges, the robustness of the evidence forming the range should inform where in that range a point estimate is selected.⁷⁵ When non-overlapping returns are included and zero weight is placed on geometric returns, the weight of the CMA's own evidence supports numbers at the top end of its range. Further, despite stating that "*all the available inflation series have issues*" and that the CED/RPI is useful as a cross check, the CMA has, in effect, placed zero weight on the CED/RPI results and 100% weight on the CED/CPI series (see Figure 3). The CMA's range and point estimate should reflect its conclusions in the text and the robustness of the evidence forming its range.

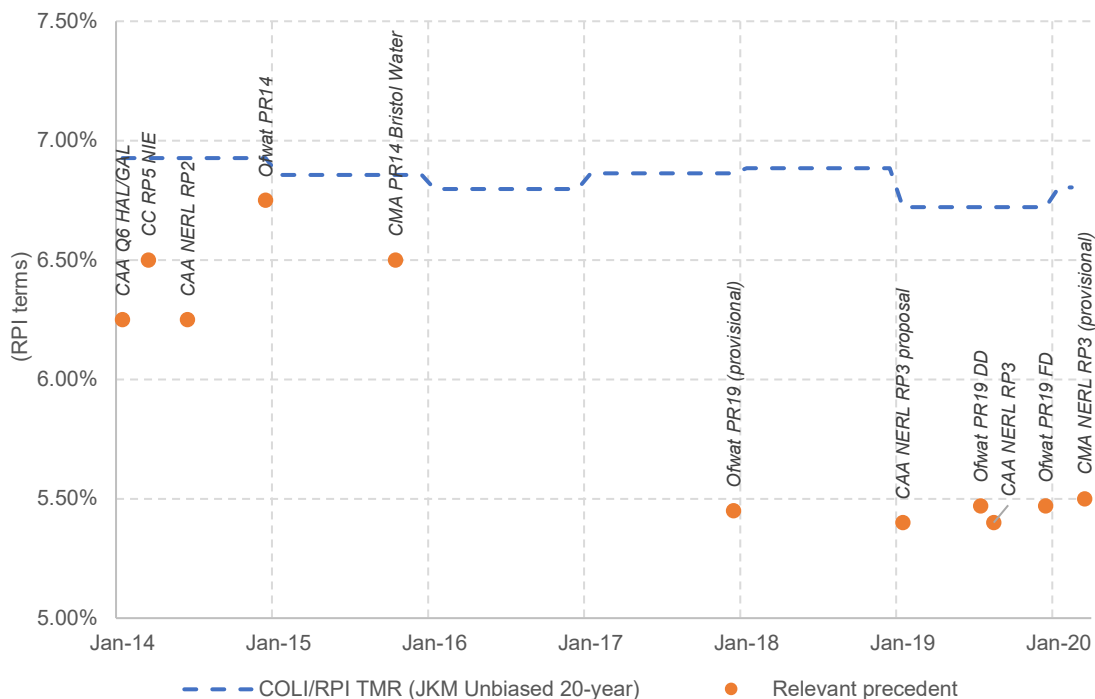
⁷⁴ This figure is the average uplift of 84% from all the CED/CPI and CED/RPI ex post estimates between the geometric and arithmetic means applied to the CMA's ex ante range of 4.1% to 6.5%.

⁷⁵ NATS PFs, paragraph 12.283

Insufficient consideration of regulatory consistency

3.5.12 As Figure 4 below shows, consistently deflated returns haven't changed since the CMA (or CC) last determined a TMR in NIE (2014).

Figure 4: Consistently deflated TMR data and key regulatory decisions by the CAA and CMA



Source: KPMG analysis of DMS returns and CAA/CMA/Ofwat decisions

3.5.13 However, the CMA has provisionally reduced TMR by 100 basis points since the NIE decision in 2014, largely on the basis of placing 100% weight on a different historical inflation series.

3.5.14 It may be appropriate to adjust parameters such as TMR if information comes to light demonstrating that past decisions were based on erroneous data. However, the historical inflation data going back to 1900, is inherently imprecise as recognised by the CMA.⁷⁶ To adopt a different position on how much weight to place on different inflation series is therefore a different judgment, rather than a correction of errors in the CC's data/analysis in 2014.

3.5.15 Where the evidence upon which a new judgment is being made is weak, there should be explicit consideration as to whether the resulting material reductions in TMR and therefore WACC are appropriate in light of:

- a) The impact that significantly reducing returns on the basis of a taking a different judgment, has on investor's perception of regulatory risk and the overall

⁷⁶ NATS PFs, paragraph 12.188

financing environment within which regulated utilities operate. Traditionally, a stable and consistent approach to regulation has been adopted. This stable and consistent approach has benefits in terms of investor confidence and incentives to invest. This was captured by the CMA in its redetermination of Bristol Water:

*“An important part of this analysis [of the WACC] is the **application of a consistent approach to setting the assumptions which form the basis of the calculation of the cost of capital.** Both debt and equity investors make long-term financing decisions, including debt financing of up to 30 years’ maturity. This reflects investors’ expectations not just in respect of the immediate regulatory period, but of a **consistent approach over the longer term...the financing environment is influenced by the stable approach to the estimation of the cost of capital, applied by both sector regulators and also in previous CC/CMA decisions.**”⁷⁷*

To adopt an inconsistent approach on the basis of different judgments compared to a previous CC panel, without strong evidence and reasoning as to why the judgement has changed, would be to dismiss the benefits that a consistent approach over time has on the sector’s ability to attract finance.

- b) The impact that the reduced stability in the regime will have on long-run financing costs. Credit rating downgrades have occurred in a number of sectors, following the significant reduction in cost of equity allowances by sector regulators in 2019.⁷⁸ The CMA has in effect provisionally endorsed the material driver of these cost of equity reductions, being the reduction in TMR arising from placing weight on the historical CPI series. Reductions in credit ratings, have a direct and tangible impact on the cost of debt, which will, all else equal, raise the cost of finance in the long-run. Further, the inter-period regulatory processes are a driver of risk in regulated sectors. The step change in the TMR adopted by sector regulators, and provisionally endorsed by the CMA may heighten the perception of regulatory risk and therefore the long run cost of equity.
- c) The information with regards to the assessment of historical inflation being, in principle, available to the CC at the time of the NIE decision. The new

⁷⁷ CMA (2015), ‘Bristol Water plc, A reference under section 12(3)(a) of the Water Industry Act 1991’ (referred to as Bristol FD in future footnotes), paragraphs 10.6 to 10.7

⁷⁸ See for example, https://www.unitedutilities.com/globalassets/z_corporate-site/investors-pages/25-february-standard-and-poors-rating-report.pdf and https://www.moodys.com/research/Moodys-reviews-12-UK-water-groups-for-downgrade--PR_415722

information, which has been produced since, are the further announcements from the ONS that the back-cast estimates need to be revised.

3.5.16 However, the CMA has not explicitly addressed whether it is comfortable with making such a material reduction in returns, on the basis of a judgment call with regards to historical inflation. We consider that the issue of regulatory consistency should be explicitly considered by the CMA and the rationale as to why the benefits of the reduction outweigh the costs should be consulted upon.

3.6 Update for DMS 2019 data

3.6.1 The 2020 DMS Yearbook was published during February 2020. It shows that the annual return in RPI terms between 2018 and 2019 was 16.3%. Given that significant weight is placed on the DMS returns data, in deriving the TMR range by both CMA and KPMG/AGRF, the ex post estimates should be updated.

3.6.2 KPMG/AGRF find that the average impact on the ex post results from the inclusion of the latest returns data is between 6 and 9 bps, depending on the weight that is placed on the various averaging approaches.

3.6.3 Changes in estimates based on non-overlapping returns may depend on the reference year from which subsequent 10 and 20-year returns were calculated. However, as annual returns using the updated data from 1899 to 2019 can be divided in to 10 and 20-year periods without remainder, this ambiguity ceases to be an issue. The estimates using non-overlapping returns increase by 6-13 bps from the CMA's equivalent figures, depending on whether a 10 or 20 year holding period is assumed.

3.6.4 We consider that the CMA should update its results and outturn TMR range for the 2019 returns, included in the 2020 Yearbook.

3.7 Summary

3.7.1 In summary:

- a) The CMA's approach of (in effect) placing 100% weight on the CED/CPI i) disregards ONS advice that the CPI back-cast is '*not intended for official purposes*' and ii) is inconsistent with its own position in the text that all historical inflation series have issues and that CED/RPI is useful as a cross check. If 50:50 weight is placed on CED/RPI and CED/CPI, the CMA's own results support a TMR estimate of 5.9%, real RPI. The KPMG/AGRF Report concluded that most weight should be given to the CED/RPI, which supports a TMR estimate of 6.25%, real RPI.
- b) The CMA excludes non-overlapping returns and does not apply sufficient uplift for the Bias Adjustment in the ex ante estimates. Including non-overlapping

returns and excluding geometric averages but using the CMA's own results, supports a point estimate for TMR at the top of the CMA's own range.

- c) The CMA should update the ex post returns for the 2019 data, given that the 2020 DMS Yearbook has been published.
- d) The CMA should explicitly consider the cost-benefit analysis of making a material reduction in TMR, on the basis of inherently imprecise inflation evidence.

4 Risk-free rate

4.1 Summary of the CMA's approach in NATs PFs

- 4.1.1 The CMA considers that yields on ILGs provide the most appropriate basis for the measurement of a notional investor's achievable risk-free returns.⁷⁹
- 4.1.2 Evidence provided by nominal gilts is largely disregarded on account of the CMA's view that nominal yields include an inflation risk premium and therefore that the use of unadjusted deflated nominal yields would be inappropriate when inflation risk is largely passed on to NATS' customers. It finds that, given the level of uncertainty in the inflation risk premium, appropriately adjusted nominal gilt yields are not materially different from estimates provided by ILGs, with ILG-based estimates having the advantage of being directly observable.⁸⁰ Alternative UK-related market instruments are not considered.
- 4.1.3 Additionally, the CMA disregards evidence of long-run interest rate expectations that is provided by data from two sources:
 - a) the market for US Treasury Inflation-Protected Securities (US TIPS); and,
 - b) the BoE's estimate of the long-run 'trend' component of the equilibrium real interest rate, R^* .
- 4.1.4 Evidence provided by US TIPS is disregarded by the CMA as a result of its view that international RFR data is not appropriate for a notional investor buying equity in a regulated UK asset that has pound sterling-denominated assets and cashflows.⁸¹
- 4.1.5 The CMA dismisses evidence provided by the BoE's R^* estimate because it does not consider there is any evidence to suggest that risk free investment returns will reach or trend towards this figure within the period in question.⁸²

⁷⁹ NATS PFs, paragraph 12.251

⁸⁰ NATS PFs, paragraph 12.252

⁸¹ NATS PFs, paragraph 12.255

⁸² *ibid.*

- 4.1.6 The CMA's estimate for the RFR is based on spot yields on ILGs with a 10-year maturity. Spot and three- and six-month trailing averages for yields at 10, 15 and 20-year maturities are qualitatively described as a cross check. However, in fact they drive a significant portion of the CMA's estimated range of -2.60% to -2.20%. The midpoint of this range, -2.40%, is used by the CMA as a basis for its RFR assumptions.⁸³
- 4.1.7 The figure of -2.40% is subsequently adjusted upwards to account for anticipated increases in yields between now and the middle of RP3. The CMA's approach uses implied forward gilt yields at different maturities for the period covering RP3 and estimates the adjustment to be 0.15%, based on an average of six months of end-of-month yields. This therefore results in a real RFR in RPI terms of -2.25%.⁸⁴
- 4.1.8 The CMA does not consider any further adjustment to current market expectations, or the introduction of an indexation mechanism, to account for the possibility that current market rates are in disequilibrium and/or that current yields are subject to significant volatility.

4.2 Summary of the approach in the KPMG/AGRF Report

- 4.2.1 The approach taken in the KPMG/AGRF Report is proposed with the regulatory problem in mind: to estimate a fixed RFR that shall remain appropriate over the regulatory horizon, where no method of indexation of the RFR is present. A detailed discussion is in Section 4.5 of the KPMG/AGRF Report.
- 4.2.2 The KPMG/AGRF Report considers that an appropriate solution to the regulatory problem outlined above is to place weight on estimates of the RFR that are expected to prevail over the long run. Under this approach, whilst outturn values of the RFR over the charge control may deviate from the estimate, the long-run equilibrium estimate will broadly reflect the outturn RFR on average.
- 4.2.3 The KPMG/AGRF Report incorporates four sources of evidence in deriving its estimate for the RFR:
- a) the BoE's estimate of the long-run 'trend' component of the equilibrium real interest rate, R^* , which is +0.5% in CPI terms⁸⁵;
 - b) yields on US TIPS, which are CPI-linked securities having real yields-to-maturity of +0.18% at 10 years, +0.37% at 20 years, and +0.53% at 30 years as of 12 December 2019⁸⁶;

⁸³ NATS PFs, paragraphs 12.258 and 12.259 and Table 12-15

⁸⁴ NATS PFs, paragraphs 12.260 and 12.261

⁸⁵ BoE (2018), 'Inflation Report November 2018', Box 6, p.37-43

⁸⁶ <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=realyield>

- c) estimates of long-run bond data provided by DMS (2019), that show a UK average real bond return of +1.8% and +2.7%, on geometric and arithmetic average bases respectively⁸⁷; and
- d) one-year trailing averages of yields on UK assets with negligible risk at September 2019, which produce RFR estimates of between -1.2% and -1.8% real RPI.

4.2.4 The KPMG/AGRF Report concludes that for the purposes of setting a fixed allowed return for the RFR, a glide path from estimates using current yields on UK assets with negligible risk to equilibrium rates should be adopted.⁸⁸ The effect of this approach is to place weight on both equilibrium and current market estimates, with most weight placed on the former.

4.2.5 The KPMG/AGRF Report concludes that a range of -1.50% to -0.80% in real RPI terms is appropriate. On a CPIH basis, this translates into a CPIH-based RFR of -0.5% to 0.2% if a forecast 100 basis point difference between RPI and CPIH is assumed.

4.3 *Key differences in methodology*

4.3.1 In their estimation of the RFR, the following key differences in methodology exist between the approaches taken by the CMA and the KPMG/AGRF Report:

- a) The CMA considers that no weight should be placed on forward-looking long-run equilibrium evidence that is provided by the BoE's estimate of R^* , or on current yields of US TIPS with maturities in excess of 10 years. KPMG/AGRF on the other hand consider that a glide path approach between current market yields and long-run equilibrium rates is most appropriate. KPMG/AGRF therefore place weight on evidence provided by the BoE's estimate of R^* , and on current yields of US TIPS, with maturities in excess of 10 years.
- b) The CMA derives a point estimate for the RFR, based on the midpoint of the data from current yields on ILGs and uses this point estimate for both the upper and lower end of its WACC range. The CMA therefore i) has no range for the RFR in its outturn WACC range and ii) makes no allowance for the volatile nature of its approach. The KPMG/AGRF Report on the other hand has a range for the outturn RFR, based on placing different weights on equilibrium evidence versus current market data.

4.3.2 The rationale behind the approaches taken in the KPMG/AGRF Report and our concerns with the CMA's approach are discussed in Sections 4.4 and 4.5 below.

⁸⁷ The 2020 DMS edition estimates are 1.9% and 2.7% on geometric and arithmetic bases respectively.

⁸⁸ KPMG/AGRF Report, paragraph 4.5.21

4.4 Rationale for KPMG/AGRF Report approach on areas of difference

- 4.4.1 The KPMG/AGRF Report proposes that an appropriate approach to setting a fixed RFR for regulatory charge control purposes, is to place weight on estimates of the RFR that are expected to prevail over the long run. Under this approach, whilst outturn values of the RFR over the charge control may deviate from the estimate, the long-run equilibrium estimate will broadly reflect the outturn RFR on average.
- 4.4.2 In contrast to the CMA, KPMG/AGRF stresses the importance of not basing the estimation of the RFR solely on current market ILG yields. It is broadly accepted that current yields on UK market instruments with negligible risk provide an appropriate basis on which to derive an estimate for the current instantaneous WACC. However, it will not, in general, be the case that an estimate based on current yields will remain appropriate for an estimate of the WACC over the regulatory horizon. This is because current yields provide estimates of the RFR that are dependent on current available information, so are therefore likely to experience considerable volatility and may be distorted by current market conditions. It is likely that these short-term estimates will vary significantly over short periods, and there is no reason to expect that current yields will reflect the outturn RFR on average.
- 4.4.3 KPMG/AGRF consider that there are at least three reasons why regulators cannot be confident that current ILG yields will persist. These are discussed below.
- a) The 'International Fisher Effect' posits that in open economies, *real* interest rates across countries should be equal. This is because if risk free assets are readily transportable and instantly transferrable then the prices of these assets should be identical in a manner akin to the theory of Purchasing Power Parity (PPP). Therefore, it suggests that long-run expectations for real interest rates in the UK will be influenced by those of other countries.⁸⁹ Data from yields on US TIPS illustrates that rates on UK riskless assets are significantly beneath those of the US and therefore that they may be expected to rise over the long term.
 - b) Current market yields on UK assets with negligible risk are substantially negative and inconsistent with equilibrium evidence from the BoE, which is positive in real CPI terms. Notwithstanding the arguments in Wright et al (2018)⁹⁰, it has hitherto been unusual to find any arguments to support the rationalisation of a negative RFR. The normal assumption is that time preference for consumption now rather than consumption in the future would ensure a positive real interest rate. The "neo-classical" assumption is that this

⁸⁹ KPMG/AGRF Report, paragraph 4.5.17

⁹⁰ Wright et al (2018), 'Estimating the cost of capital for implementation of price controls by UK Regulators' (referred to as 'Wright et al (2018)' in future footnotes)

rate would be close to the long run steady-state GDP growth rate (e.g. Taylor (1993))⁹¹.

- c) Yields on ILGs are volatile. This volatility is heightened at present due to Brexit and Covid-19 related issues. Therefore, it is likely that estimates based solely on current market yields will deviate materially from outturn RFR values.⁹²

4.4.4 In light of the yields on ILGs being substantially below equilibrium levels and the high volatility of current yields, a glide path from current market rates to an equilibrium RFR should be used, when setting a fixed allowance for the cost of equity. Given the inherent uncertainty in forecasting the RFR, a range should be derived by placing differing weights on the current market evidence and the equilibrium data. Disregarding the current distortions in UK yields and the volatility of the series, runs the real risk that the allowed RFR differs to the outturn rate. This is discussed in further detail in Section 4.5 below.

4.5 Concerns with CMA approach

4.5.1 Setting aside the position in the KPMG/AGRF Report that weight should be given to the equilibrium evidence, we now address further the issues with CMA's approach of locking in a spot estimate from a volatile series, as well as concerns with the CMA's dismissal of certain pieces of evidence.

4.5.2 As set out in Section 4.1, the CMA's estimate for the RFR is based solely on a midpoint of the range given by current and short-term trailing averages of yields on ILGs with maturities of between 10 and 20 years that have been uplifted for market-based expectations of rate increases during the charge control. This approach is not suitable for determining an estimate of the RFR that is appropriate for use in a fixed A-WACC for a number of reasons, which include:

- a) Yields on UK assets with negligible risk are volatile, which increases the risk that the outturn RFR will deviate from its estimate on any particular day;
- b) Disregarding or not considering other UK assets with negligible risk besides ILGs introduces market- or ILG-specific distortions into estimates of the RFR;
- c) Disregarding equilibrium evidence from the BoE and the international evidence provided by US TIPS ignores the fact that the distribution for the outturn RFR is likely to be skewed towards higher values; and
- d) Selecting a single RFR estimate based on current yields, ignores asymmetric considerations, such as the one-sided Financeability duty.

⁹¹ Taylor, J (1993): 'Discretion versus policy rules in practice', *Carnegie-Rochester Conference Series on Public Policy*, no 39, pp.195–214

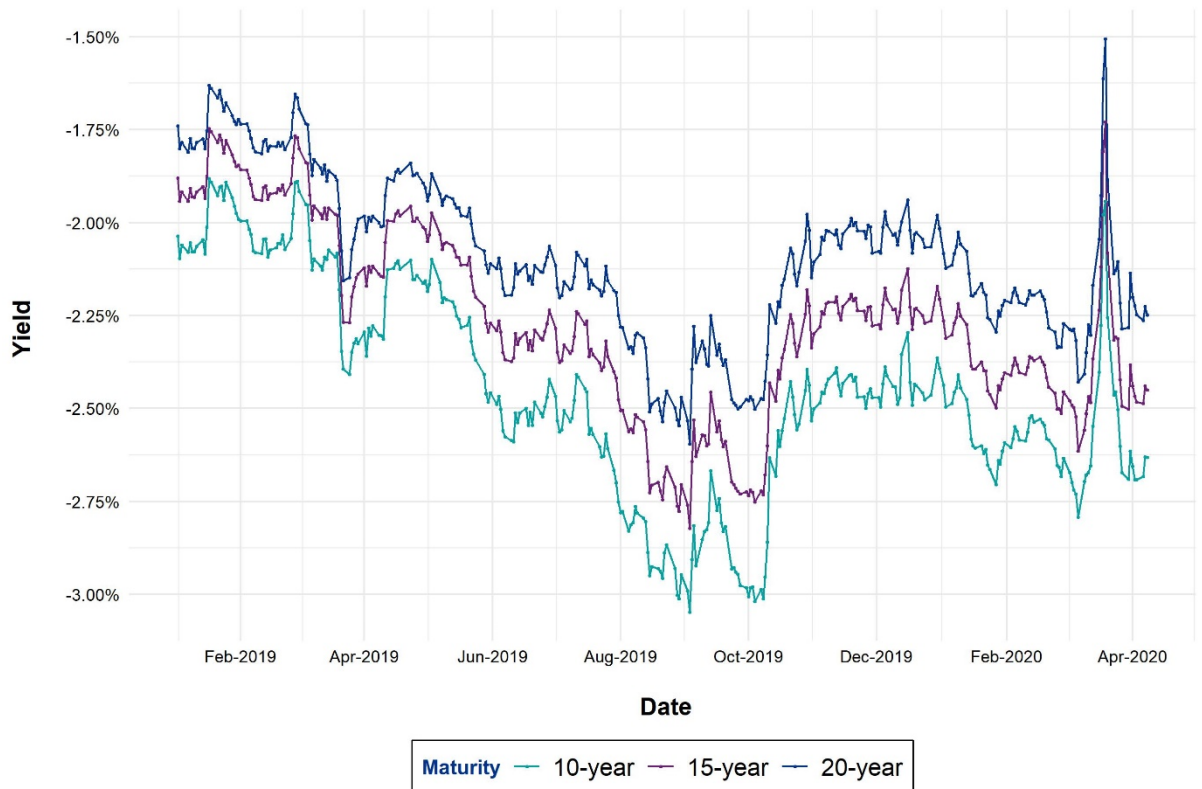
⁹² KPMG/AGRF Report, paragraph 4.5.18

4.5.3 The issues set out above are discussed in detail in the remainder of this section.

Yields on ILGs are volatile

4.5.4 Yields on longer-term ILGs have been, and continue to be volatile. Figure 5 shows 10-, 15- and 20-year ILG spot yields between January 2019 and April 2020. It highlights that the pre-adjusted RFR estimate in the CMA’s Provisional Findings (-2.40%) is already outdated, with 15-year spot rates varying between -1.73% and -2.61% in March 2020. Following the CMA’s approach, the ILG spot rate estimate could have changed by an amount between -21 bps and +67 bps in March compared to its -2.40% estimate, simply by virtue of the date at which the CMA carried out its analysis.

Figure 5: 10, 15 and 20-year yields on ILGs from January 2019 to April 2020

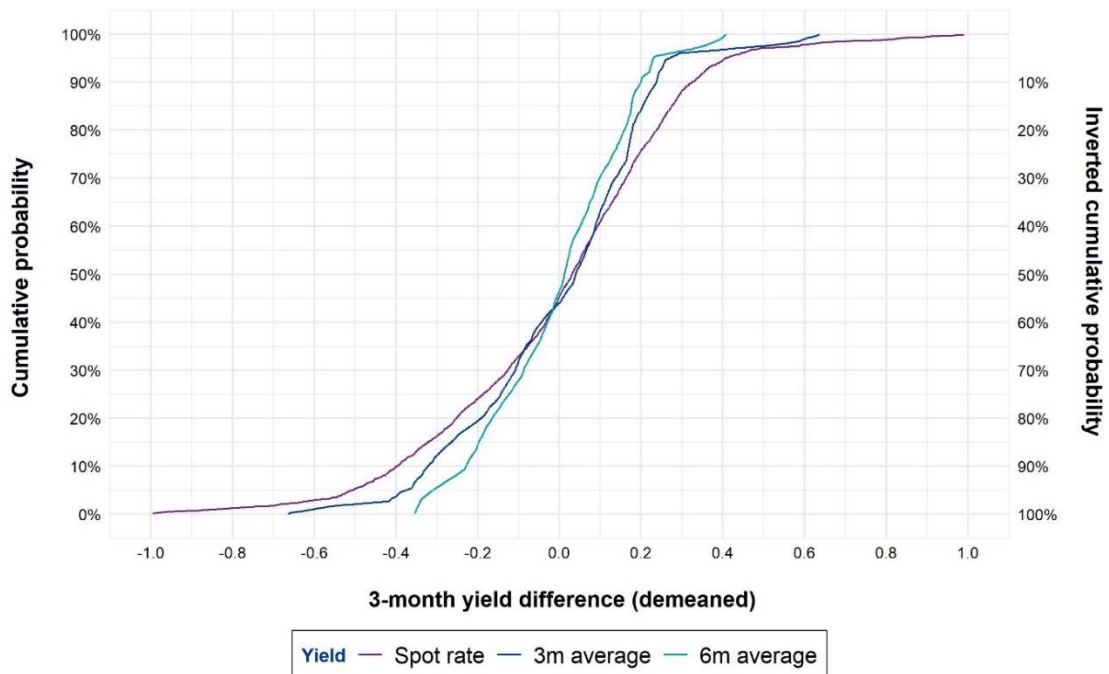


Source: Bank of England, Yield Curves data

4.5.5 Setting a fixed assumption for the RFR over the charge control period using volatile current data, such as ILG yields, introduces the risk that the outturn RFR will deviate from the regulator’s fixed assumption. Figure 6 illustrates that between January 2010 and April 2020, the resulting RFR only 3 months after any particular estimation date

would have deviated from its initial estimate (after detrending⁹³) by more than 25bps on ~40% of occasions, and by more than 50bps on ~10% of occasions.⁹⁴

Figure 6: Cumulative distribution of the deviation between yields and their 3-month lag from January 2010 to April 2020



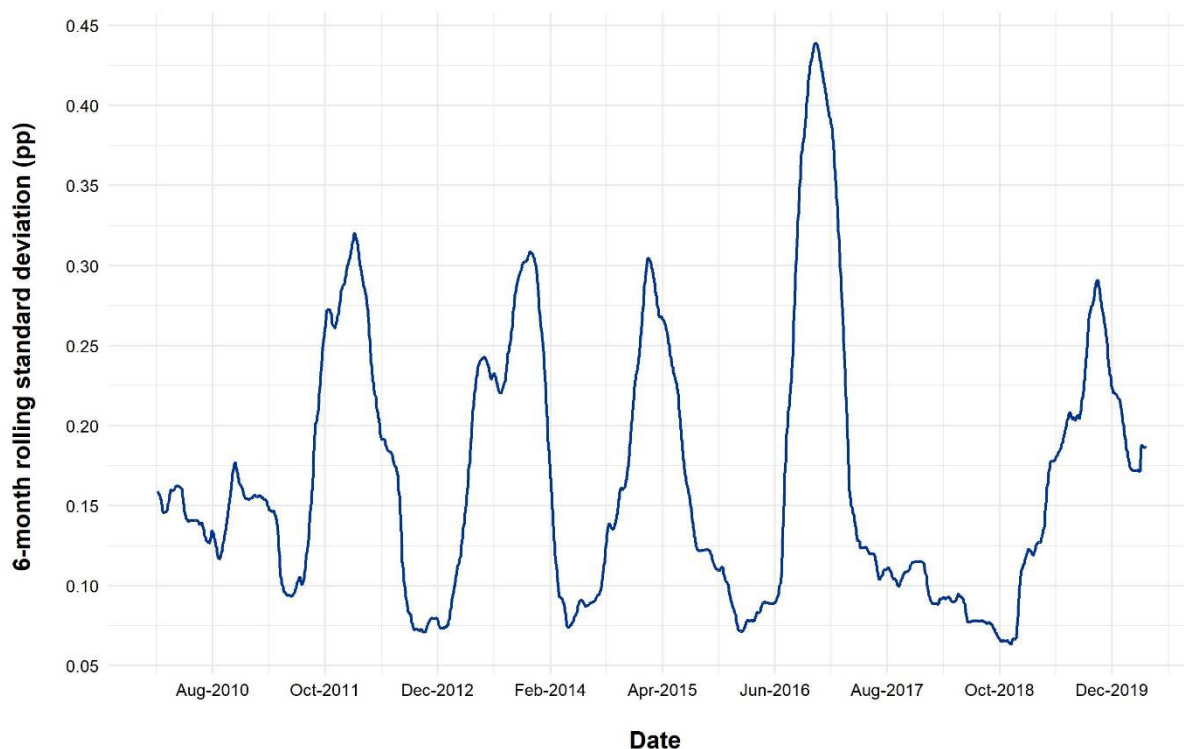
Source: Bank of England, Yield Curves data and KPMG analysis

Notes: 3-month difference is defined as the difference between an observed yield and its 90-working day lag. The mean difference in yields during the relevant charge control period is subtracted from raw differences. Average 3m (6m) yield is defined as the 90- (180-) working day trailing average yield. All yields refer to 15-year ILGs.

4.5.6 It can also be seen that spikes in volatility are not uncommon. Figure 7 shows that the 6-month trailing standard deviation of 15-year ILG yields has oscillated fairly periodically between approximately 5bps and more than 30bps, during the period from January 2010 until April 2020. This demonstrates that no potential lull in volatility can be expected to last for a significant period of time.

⁹³ Historical observations of the changes in the RFR have been demeaned so that the resulting empirical distribution is representative on a forward-looking basis.

⁹⁴ Whilst it could be the case that the resulting RFR may deviate from estimates based on equilibrium and international data by a similar amount, equilibrium estimates are designed to reflect the resulting long term RFR on average, so over time the deviations should cancel out. This is not the case with estimates based solely on current yields.

Figure 7: 6-month trailing standard deviation of 15-year ILG yields

Source: Bank of England, Yield curves data and KPMG analysis

Notes: 6-month rolling standard deviation is defined as the standard deviation of yields over the trailing 180-business day period.

- 4.5.7 It should be noted that the introduction of a trailing average does serve to lower the volatility of the RFR estimate driven by current ILG yields. However, it is no more likely to reflect the outturn RFR over the charge control. This is because it does not capture any more information on forward-looking considerations, than the spot yield on a given day.
- 4.5.8 Current UK macroeconomic issues that revolve around Brexit and the Covid-19 crisis result in ILG yields that are particularly volatile by historical standards. This exacerbates the issues concerning estimate volatility that are discussed above.
- 4.5.9 Locking in a fixed allowance based on yields on a volatile series runs the risk that the RFR allowance differs from outturn values, in either direction. This is illustrated by the CMA's own estimate for the RFR being 55bps beneath the CAA's Final Decision for RP3⁹⁵, with the change being driven primarily by an update in yield data.
- 4.5.10 Absent an indexation or reconciliation mechanism the allowed cost of equity is therefore likely to differ to the market cost of equity over the relevant time horizon. Whilst this difference in outturn values may be in either direction i) the equilibrium evidence suggests that the likely distribution is skewed to the upside and ii) there are

⁹⁵ NATS PFs, paragraphs 12.238 and 12.261

asymmetric considerations with regards to over/under estimating the WACC, which are discussed at paragraphs 4.5.35 and 4.5.36.

Sole use of ILGs introduces asset-specific distortions into estimates of the RFR

4.5.11 As outlined in paragraph 4.1.1, the CMA chooses to rely solely on evidence provided by longer-term ILG yields. Evidence from yields on nominal gilts is disregarded on the basis that nominal yields include an inflation risk premium, and therefore that the use of unadjusted deflated nominal yields would be inappropriate when inflation risk is largely passed on to their customers. Alternative UK assets with negligible risk are not considered.

4.5.12 KPMG/AGRF consider that relying solely on yields on longer-term ILGs may not be appropriate for the reasons set out below.

4.5.13 First, in the presence of inflation swap markets, it is unlikely that an inflation premium will render (appropriately deflated) nominal gilt yields materially higher than ILG yields. This is because the cashflows on both nominal and index-linked Gilts can be constructed so that they are equivalent:

- a) A nominal Gilt plus an inflation swap would lead to nominal cash-flows, linked to the outturn rate of UK inflation; and
- b) An ILG pays nominal cash-flows, which are linked to the outturn rate of UK inflation.

4.5.14 As both cashflows are equivalent, we would not expect a material wedge between ILG and nominal yields due to inflation premia.

4.5.15 An analogous argument to the CMA's in this regard would be to suggest that a US investor choosing to invest in UK gilts would demand a higher risk premium than a UK investor on the basis that he must be rewarded for exchange rate risk. However, they both clearly agree on the price at which a UK gilt should be purchased as large notional amounts of UK gilts are bought by international investors on a daily basis.

4.5.16 Second, the demand for ILGs may be distorted by market-specific factors when compared to alternative UK assets with negligible risk for the following reasons:

- a) The eligibility of ILGs for use as collateral in secured lending transactions by wholesale market participants may attract a convenience adjustment depressing yields downwards;
- b) Regulatory constraints may result in different investor bases preferring to hold ILGs over alternative near risk-free assets such as nominal gilts;
- c) The outstanding notional value of nominal gilts is larger than that of index-linked gilts. Therefore, any embedded compensation for liquidity risk is likely to

be larger for index-linked than for nominal gilts, which may distort observed yields. This has been observed by Ofwat, and estimated to be 8 basis points as of February 2019.⁹⁶

4.5.17 Third, the BoE's 'Working Group on Sterling Risk-Free Reference Rates' endorses the use of the interbank benchmark SONIA⁹⁷ (and related OIS swaps) as its preferred near risk-free interest rate benchmark.⁹⁸

4.5.18 Therefore, KPMG/AGRF consider that a prudent approach to estimating the RFR directly from current UK market data would be to place weight on all alternative UK assets, which have negligible risk. Placing weight on other UK instruments serves to increase the estimated RFR by an order of approximately 30 to 50 basis points, depending upon the instrument and time period chosen.⁹⁹

Disregarding international evidence provided by US TIPS and equilibrium evidence from the BoE

4.5.19 As outlined in paragraph 4.4.3(a), the evidence provided by US TIPS is important. This is because the 'International Fisher Effect' suggests that long-run expectations for real interest rates in the UK will be influenced by those of other countries. Data from yields on US TIPS illustrates that rates on UK riskless assets (after adjusting for the different methods of indexation) are significantly beneath those of the US and therefore that they may be expected to rise over the long term.

4.5.20 The CMA disregards evidence provided by US TIPS on the basis that:

- a) International RFR data is not appropriate for a notional investor buying equity in a regulated UK asset that has pound sterling-denominated assets and cashflows.
- b) There is no evidence of convergence between US TIPS and UK ILGs.

4.5.21 The assertion that international data is not relevant is inconsistent with the evidence provided by publically available shareholder registers of certain regulated UK equity assets. Table 3 below shows that over 70% of the common shares outstanding in two major listed water companies are held by owners that are headquartered outside the UK. As the majority of the ownership of these companies are international investors, it is inconsistent for the CMA to disregard the evidence on US TIPS on the basis that it is not relevant for a notional investor buying equity in a regulated UK asset.

⁹⁶ Ofwat, PR19 Draft Determinations: Cost of capital technical appendix, p.23. It should be noted that distortions due to liquidity issues are likely to actually increase measured yields above the RFR. However, the issue still reflects overall reliability concerns of using index-linked gilt yields as a proxy for the RFR.

⁹⁷ SONIA (Sterling Overnight Index Average) is an interest rate benchmark that reflects the average of the interest rates that banks pay to borrow sterling overnight from other financial institutions.

⁹⁸ The Working Group on Sterling Risk-Free Reference Rates, 'SONIA as the RFR and approaches to adoption', June 2017, p.1

⁹⁹ See for example Table 4 of Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory.

Table 3: The proportion of shares in Severn Trent plc and United Utilities plc that are owned by international investors

Company	% of shares outstanding held by owners headquartered outside the UK
Severn Trent plc	74%
United Utilities plc	72%

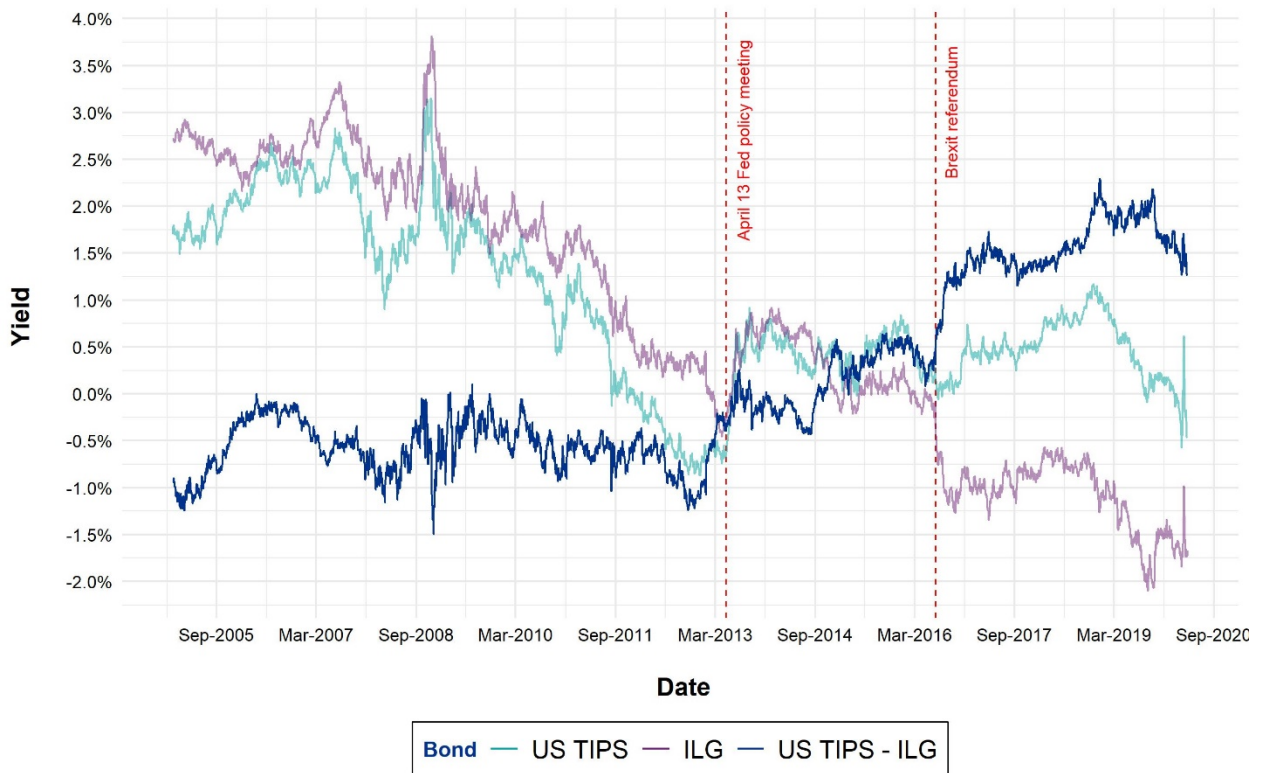
Source: Capital IQ

- 4.5.22 Turning to the lack of evidence that the yields on US TIPS and UK ILGs will converge, the CMA notes that ‘US TIPS yields have remained above UK ILG yields (normalised for their different inflation adjustment methods) for a number of years, with no evidence of convergence between them’¹⁰⁰. However, there is little discussion of the CMA’s approach to assessing the convergence of the two series.
- 4.5.23 In order to address the question of whether yields on US TIPS and UK ILGs are likely to converge in the long term, we investigate the potential drivers of any observed difference between current yields of equal maturities, and consider the likelihood that that these differences will persist.
- 4.5.24 KPMG/AGRF accept that the differences in inflation indexation adjustment methods between US TIPS and UK ILGs will mean that, in general, a non-zero difference in yields is to be expected over the long term. However, it is not the absolute level of this long term difference that is important for our purposes, but rather whether the recent deviations away from this long term difference may be expected to persist.
- 4.5.25 Figure 8 shows the observed yields on UK ILGs and US TIPS with a 10-year maturity between 2005 and 2020. The difference between the series was broadly constant until the start of 2013, as may be expected as a result of the International Fisher Effect. Since then, two events can be identified at which time the difference between UK and US inflation-linked yields deviated considerably from its long term average. These events are set out below.
- 4.5.26 Firstly, in the period between policy meetings of the US Federal Reserve in April and June 2013, US policymakers revealed their intention to reduce the magnitude of their Quantitative Easing programme. Yields on 10-year US TIPS rose by approximately 50bps more than equivalent UK yields during this period.¹⁰¹

¹⁰⁰ NATS PFs, paragraph 12.251¹⁰¹ Between the day before the 30 April/1 May 2013 policy meeting and the day after the 18/19 June 2013 policy meeting, ILG yields (US TIPS yields) increased from approximately -0.29% (-0.67%) real CPI, to +0.34% (+0.46%) real CPI.

4.5.27 Secondly, in June 2016, the UK held its 'Brexit' referendum on its membership of the European Union. Following the result, yields on UK ILGs fell by approximately 1 percentage point.¹⁰²

Figure 8: Yields on UK ILGs and US TIPS with a 10-year maturity from 2005 to 2020



Notes: ILG yields converted from real-RPI to real-CPI on the basis of a 1% RPI-CPI wedge.

Source: Federal Reserve Economics Department, Federal Reserve Bank of St. Louis

4.5.28 Changes to US monetary policy and the negotiation of the UK’s ongoing arrangement with the European Union are exceptional events, the effects of which may be temporary in nature.

4.5.29 Therefore, in light of i) the international investor base of utilities and ii) the drivers of the current deviation in US and UK bond yields being exceptional events, the yields on US TIPS remain relevant for determining whether the distribution for the outturn RFR is likely to be skewed towards higher values.

4.5.30 The CMA also dismisses evidence provided by the BoE’s R* estimate because it does not consider there is any evidence to suggest that risk free investment returns will reach or trend towards this figure within the period in question.

¹⁰² 10-year ILG yields dropped from -0.08% on 23 June 2016 to -1.05% on 10 August 2016, in real CPI terms. The BoE introduced a number of measures to mitigate the potential impact of the referendum result, such as a reduction in the official Bank Rate and an extension of its Quantitative easing programme.

- 4.5.31 KPMG/AGRF considers that the CMA's finding in this regard is inconsistent with the construction of the BoE's estimate for R^* itself, and the CMA's reliance on yields provided by ILGs.
- 4.5.32 The BoE states that when estimating R^* : *'one approach is to use market-based measures implied by long-term government bond yields. As explained in the box on pages 6–7 of the May 2017 Report, 'term structure' models can be used to decompose these yields into expected future short-term interest rates and term premia, which are the additional compensation that investors require for holding longer-maturity assets.*¹⁰³
- 4.5.33 It is therefore the case that estimates of R^* are computed by the BoE using the same underlying principle and evidence base as that of the CMA when estimating the RFR; namely that yields on long-term UK government bonds provide an estimate of expected risk-free rates in the future.
- 4.5.34 Therefore, KPMG/AGRF considers that weight should be placed on evidence provided by the BoE's estimate for R^* . This equilibrium evidence is important and it again, in conjunction with the data provided by US TIPS, suggests that the distribution for the outturn RFR is likely to be skewed towards higher values.

[Taking a mid-point estimate of the RFR ignores asymmetric considerations](#)

- 4.5.35 The CMA takes the midpoint from its estimated range from ILG yields of -2.25%, and uses this as both the lower and upper bound for its WACC range.¹⁰⁴ This overlooks:
- a) The inherent uncertainty in estimating the RFR over the regulatory horizon, in light of the distorted and volatile UK yields, as explained at paragraphs 4.5.4 to 4.5.18 above; and
 - b) The asymmetric considerations with regards to the allowed RFR being above or below the outturn RFR.
- 4.5.36 The asymmetric considerations, with respect to setting the overall WACC too high versus too low are discussed in detail in 'Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory'.¹⁰⁵ However, the following two concerns are particularly pertinent to the risks arising from locking in a spot RFR from a volatile series.
- a) First, the Financeability duty¹⁰⁶ is asymmetric, in so far as the duty to ensure that an efficient company can finance its functions is only called in to question

¹⁰³ <https://www.bankofengland.co.uk/inflation-report/2018/august-2018/prospects-for-inflation>

¹⁰⁴ NATS PFs, Table 12-17

¹⁰⁵ Setting the Cost of Equity in UK Price Controls, by Professor Alan Gregory, 2 January 2020, Section 11.

¹⁰⁶ We note that the wording of the financeability duty differs between the version that applies in relation to NATS under the TA 2000 and the version that applies to Ofwat under the WIA 1991. However, we consider that the point made at 4.5.36(a) is relevant to both.

when the fixed allowance, which is dependent on the RFR, is beneath the actual WACC. Therefore if the outturn RFR is higher than the CMA's fixed allowance and the CMA has calibrated all other parameters in the WACC in line with market evidence, the Financeability duty may be breached.

- b) Second, whilst there is debate as to whether the allowed WACC should be above the mid-point, it should not be controversial that an allowed WACC that is below market rates, will lead to reduced investment. If the outturn RFR is higher than the CMA's fixed allowance and the CMA has calibrated all other parameters in the WACC in line with market evidence, then incentives to invest will be dampened.

4.6 Summary

4.6.1 This section has demonstrated that:

- a) The CMA's approach, of locking in rates based on current yields on ILGs, risks the allowed RFR differing to the outturn RFR, as a result of the volatility in the series.
- b) The CMA's sole use of ILG's overlooks asset specific distortions in ILGs. A wider range of instruments should be used in order to estimate current yields on risk-free assets.
- c) The CMA's disregard of US TIPS and BoE equilibrium evidence is inconsistent with the evidence and serves to overlook evidence that the distribution for the outturn RFR is likely to be skewed towards higher values.
- d) The CMA's approach overlooks the asymmetric consequences of the outturn RFR being higher/lower than the fixed allowance.

4.6.2 A more appropriate approach for a fixed allowance in a regulatory charge control, is to adopt a glide path from current yields to a forward looking equilibrium RFR. This approach recognises the volatility and distortions in current ILG yields as well as the asymmetric consequences of setting the WACC too low versus too high.

5 Estimating beta

5.1 Summary of the CMA's approach in the NATs PFs

5.1.1 The CMA relies on betas that are calculated using 2-year and 5-year time horizons. This is consistent with the approach taken by NERL and the CAA, and is "consistent

with normal practice".¹⁰⁷ Where the data is available, current betas as well as 1-year, 2-year and 5-year averages are assessed to reduce the risk of error.¹⁰⁸

- 5.1.2 Regarding the appropriate choice of sampling frequencies when calculating beta estimates, the CMA considers only daily and weekly frequencies. There is no consideration of monthly data.¹⁰⁹
- 5.1.3 The CMA considers that there is insufficient evidence to suggest that daily data are likely to be inaccurate due to the presence of autocorrelation or a lack of liquidity in the market.¹¹⁰
- 5.1.4 Beta estimates are only presented as asset betas.¹¹¹
- 5.1.5 The CMA has concerns about the use of the standard Modigliani and Miller (MM) approach to re-lever betas to the 60% gearing figure used by both the CAA and NERL as this approach results in a WACC that strictly increases with gearing.¹¹² In the NATs case, the CMA addresses this by adopting a notional gearing figure of 30%, which is broadly consistent with the gearing of the comparators.¹¹³

5.2 Summary of the approach in the KPMG/AGRF Report

- 5.2.1 The KPMG/AGRF Report considers that the chosen forward-looking time horizon should be long-term in nature because this reflects the asset lives of the underlying infrastructure into which investment is received.¹¹⁴ To reflect this, unconditional beta estimates which are not unduly affected by recent volatility in market data are required.¹¹⁵ In order to estimate an unconditional beta, the longest run of data since the last structural break should be used. In the case of the water sector, the report considers that the last structural break occurred at or around the start of PR14, which equates to a 5-year time horizon.¹¹⁶
- 5.2.2 Raw equity betas at daily and monthly frequencies over 5 years are estimated. Based on empirical analysis from Gilbert et al (2014)¹¹⁷ and Gregory et al (2018)¹¹⁸ and the fact that an information lag in asset returns creates 'noise' which biases daily returns downwards, most weight is placed on monthly betas.¹¹⁹

¹⁰⁷ NATS PFs, paragraph 12.78

¹⁰⁸ NATS PFs, paragraphs 12.89 and 12.91

¹⁰⁹ NATS PFs, paragraphs 12.77 and 12.80

¹¹⁰ NATS PFs, paragraph 12.81

¹¹¹ NATS PFs, paragraphs 12.94 and 12.122

¹¹² NATS PFs, paragraph 12.120

¹¹³ NATS PFs, paragraph 12.120

¹¹⁴ KPMG/AGRF Report, paragraph 3.5.2

¹¹⁵ KPMG/AGRF Report, paragraph 4.6.11

¹¹⁶ KPMG/AGRF Report, paragraph 4.6.12

¹¹⁷ Gilbert et al (2014), 'Daily data is bad for beta: Opacity and frequency-dependent betas'

¹¹⁸ Gregory et al (2018), 'In search of beta'

¹¹⁹ KPMG/AGRF Report, paragraph 4.6.16

- 5.2.3 The report recognises the statistical instability of beta estimates and explains that weight should be placed on Vasicek-adjusted betas where estimation variance is high.¹²⁰
- 5.2.4 In order to attain a notional equity beta, the raw equity betas calculated are de-gearred at the gearing levels of the listed comparators and re-gearred at the notional gearing level. The basic MM approach, which is standard in finance texts, is used to adjust estimates for differences in gearing.¹²¹

5.3 Key differences in methodology

- 5.3.1 The KPMG WACC Report estimates raw equity betas at daily and monthly frequencies, with most weight placed on monthly frequencies. However, the CMA presents betas calculated from daily and weekly data, with greater emphasis on daily data and no consideration of monthly data.
- 5.3.2 KPMG/AGRF consider that a 5-year time horizon is most appropriate, whereas the CMA uses beta estimates over a combination of both 2-year and 5-year time horizons.
- 5.3.3 KPMG/AGRF outline how the equity betas are derived from the raw data and the gearing (and debt beta) assumption(s) used to subsequently calculate the asset beta. The CMA simply presents asset betas with little discussion as to how they were derived.
- 5.3.4 KPMG/AGRF consider that analysis of the variance of the beta results should be undertaken and that the Vasicek adjustment should be applied in cases where the variance is high. The CMA does not consider any such adjustment.
- 5.3.5 KPMG/AGRF use the MM approach to both de-lever and re-lever betas. It is unclear what approach the CMA uses to de-lever raw equity betas but it has concerns with application of the MM approach to re-lever betas.

5.4 Rationale for KPMG/AGRF Report approach on areas of difference

- 5.4.1 KPMG/AGRF recognises that a greater number of observations may result in an estimate with a smaller level of uncertainty. Despite this, KPMG/AGRF considers that most weight should be placed on betas observed at monthly frequencies because of the downward bias that is associated with higher frequency observations, which encompass both weekly and daily observations. In other words, a less accurate unbiased estimate should be preferred to a more accurate biased estimate, as it is unclear to what extent biased estimates should drive final allowances.¹²² It is also the

¹²⁰ KPMG/AGRF Report, paragraph 4.6.20

¹²¹ KPMG/AGRF Report, paragraph 4.6.5

¹²² KPMG/AGRF Report, paragraph 4.6.15

method used by CMA in the Energy Market Investigation and suggested by Wright et al (2018).¹²³

- 5.4.2 Vasicek adjustment¹²⁴ of beta estimates utilises information that is available prior to sampling, together with the sample information, to minimize expected estimation error. This is a standard approach in publications such as the LBSRMS. The idea is to place more relative weight on the firm beta when estimation variance is low, and less weight when estimation variance is high. It should be noted that the purpose of this adjustment does not revolve around mean reversion, but is rather a method for dealing with 'noisy' estimates.
- 5.4.3 KPMG/AGRF use unconditional betas which are not unduly affected by recent market volatility in order to estimate beta over a long-term forward-looking time horizon. Short-run conditional betas are likely to be volatile and there is no guarantee that short-run conditional betas will reflect outturn values over the long run.¹²⁵ This is consistent with the CC's view in the NIE FD that long run data is most appropriate when estimating betas¹²⁶.

5.5 Concerns with the CMA approach

- 5.5.1 Setting aside the differences in approach with respect to how much weight should be placed on monthly betas and the appropriate time window for estimating betas for regulatory charge controls, we next turn to our concerns with the CMA's application of its own approach.

The estimation approach is unclear

- 5.5.2 The CMA only presents its beta estimates as asset betas. Asset betas cannot be estimated directly, only equity betas can be observed. We assume the CMA calculated equity betas from the raw returns data¹²⁷ and then estimated the gearing and debt beta of the comparators to derive the asset betas which are presented. However, the underlying gearing and debt beta assumptions are not presented, so we cannot comment on the approach used to derive the asset betas.

Monthly betas have not been calculated

- 5.5.3 As explained above, there is evidence that daily betas are downward biased and monthly estimates provide more robust beta estimates. The CMA has noted that daily data may understate beta, but has only provided weekly estimates to account for this and has not estimated monthly betas for comparison or acknowledged the downward

¹²³ CMA (2016), 'Appendix 9.12: Cost of capital' to the CMA's energy market inquiry, paragraph 48

¹²⁴ Vasicek (1973), 'A note on using cross-sectional information in Bayesian estimation of security betas', Journal of Finance, 28, pp.1233–1239

¹²⁵ Wright et al (2018), p.52

¹²⁶ NIE FD, paragraph 13.183

¹²⁷ Although it is not clear, another reading of the Figures is that the CMA simply took equity betas from Bloomberg.

bias in the final figures. The downward bias becomes apparent when the calculations are undertaken. It is unclear how the CMA is able to comprehensively dismiss the presumption that betas using daily frequencies are distorted downwards if monthly estimates have not been calculated.

5.5.4 Furthermore, the CMA's dismissal of the evidence that daily is downwardly biased is incomplete. It reviewed the daily data for evidence of autocorrelation and lack of liquidity,¹²⁸ but these are only two of the reasons behind the downward bias in daily data. Further, the evidence in the Donald Robertson paper appears to have been given substantial weight but there is little/no assessment of its contents.

5.5.5 For a more detailed consideration of sampling frequency and the findings of Robertson, please see the academic paper submitted alongside this report, 'A Report on the Estimation of Beta for Regulatory Charge Control Purposes' by Gregory, Harris and Tharyan (2020).

The appropriate time horizon

5.5.6 We cannot identify detailed consideration by the CMA of the time horizon over which betas should be estimated, in order for the resulting estimate to be an appropriate estimate of beta over the regulatory horizon. The rationale for the use of a 2-year time horizon appears to be that both the CAA and NERL used that time period and that it is consistent with normal practice.¹²⁹

5.5.7 For a more detailed consideration of the appropriate historical time series to use when estimating betas for regulatory purpose, please see the academic paper submitted alongside this report, titled 'A Report on the Estimation of Beta for Regulatory Charge Control Purposes', by Gregory, Harris and Tharyan (2020).

The CMA's conclusions regarding the impact of gearing on WACC

5.5.8 A number of the statements in the CMA's Appendix D are inconsistent with finance theory and are based on an incomplete assessment of the impact of changes in gearing on WACC. The primary example of this is the CMA's conclusion that because the A-WACC increases with gearing, it follows that asset beta must reduce with gearing.¹³⁰

5.5.9 There are a number of reasons why the way in which the CMA/CAA estimate the parameters in the A-WACC, leads to the perverse effect of the A-WACC increasing with gearing, which do not involve dismissing well-established theory. These are

¹²⁸ NATS PFs, paragraph 12.81

¹²⁹ KPMG/AGRF Report, paragraph 3.5.2

¹³⁰ The CMA does not disclose what de-gearing assumptions it used to derive the asset beta, but we assume that it used the MM de-gearing formula for that purpose.

explained below. When the parameters in the A-WACC are properly calibrated the (vanilla) A-WACC should not increase materially with gearing:

- a) The substantially negative RFR used by the CMA/CAA is distorting the relationships between gearing and the cost of equity. We note that adopting a RFR of around -1%, real RPI results in an A-WACC that does not increase with gearing.¹³¹ If a more appropriate approach to RFR is adopted, then the issue of WACC increasing with gearing falls away. In essence, the problem is that the assumed debt beta is regarded as “implausible” by the CMA. But this result only comes about because the combination of the assumed RFR and TMR generate a high risk premium which in turn appears incompatible with the observed debt cost. The CMA’s extreme view of the real RFR automatically implies a negative real return on a zero beta asset. But this is simply another way of saying that the current returns on ILGs are not an appropriate measure of the “true” RFR. If the CMA instead adopts the position that a long run equilibrium RFR is a better proxy for the expected return on a zero beta asset, the so-called “implausible debt beta” problem falls away.
- b) The CMA models the impact of changes in gearing on equity beta but fails to model the impact of changes in gearing on the debt beta. The CMA’s analysis of how gearing impacts the WACC is therefore incomplete. As gearing increases, the systematic risk migrates from equity to debt holders. The result is an increase in debt beta as gearing increases, which has not been factored into the CMA’s assessment. A Black-Scholes option pricing approach can be used to model the relationship between equity beta, debt beta and asset beta as gearing changes.

¹³¹ Flexing the RFR assumption in the CMA’s Figure D-1 will illustrate this point.

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