



The cost of equity at PR19

**A report for
United Utilities Water Limited**

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1. Executive Summary

Determining an appropriate cost of equity at PR19 is important to maintaining the long term attractiveness of the sector as a place for investment, which is ultimately to the benefit of customers if capital can be raised on reasonable terms. It is right that Ofwat should consider this issue carefully and helpful that they have begun to do so at this early stage of the PR19 process.

Ofwat relies on analysis conducted for it by PwC. PwC presents analysis of the nominal cost of equity using various techniques, which it then deflates into real Retail Price Index (RPI) inflation stripped terms using expected long term inflation. The various estimates of the nominal total market return (TMR) are summarised in Table 1 below. The table also shows the overall nominal TMR range that Ofwat and PwC have proposed.

Table 1: PwC analysis of the nominal total market return

	Min	Max
PR14 ¹	9.75%	9.75%
Long run equity returns ²	9.5%	9.5%
Market to Asset Ratios ³	7.6%	8.1%
Dividend Discount Model ⁴	7.7%	8.3%
Survey data ⁵	8.1%	8.9%
Overall range for PR19 ⁶	8.0%	8.5%


Notes: (1) Calculated using a real risk-free rate of 1.25%, an equity risk premium of 5.5% and long term RPI inflation of 2.8%, all per PR14 Final Determinations; (2) PwC, p80; (3) PwC, p86, Table 15; (4) PwC, p83, though we note that various different estimates are presented in a range of up to 6.5 – 10.0%; (5) PwC, p89; (6) PwC, p92.

Based on this analysis Ofwat have stated that they expect the TMR parameters to be significantly lower at PR19 than at PR14 and, consequently, that the allowed cost of equity will be significantly lower at PR19 than at PR14. Ofwat and PwC place considerable weight on the argument that the UK economy is in a “lower for longer” interest rate environment and that ultra-low interest rates are likely to persist over the 2020-25 period. They argue that this means much less weight should be afforded to long-run historical data when determining what an appropriate TMR assumption is for PR19.

The evidence that PwC present is all central case “best estimates” and the range of uncertainty around those forecasts is not discussed. It is far from certain, however, that interest rates will remain low in the UK over the 2020-25 period. There is considerable uncertainty around the macroeconomic outlook as the UK negotiates an exit from the European Union. For example, the Bank of England itself has noted that there is significant uncertainty around the outlook for interest rates at the moment, while some independent forecasters have assumed that interest rates will rise much more quickly than in the central case analysis presented by PwC. PwC has not demonstrated that it is certain that UK interest rates will remain at ultra-low levels over the 2020-25 period.

PwC’s focus on interest rates as a basis for making inferences about the TMR overlooks the possibility that the Equity Risk Premium (ERP) may have increased at the same time as interest rates have fallen. However, historical evidence about TMRs in the UK indicates that the TMR is mean-reverting and stable over the long-term. Noting this, UK economic regulators, including the Competition and Markets Authority (CMA), have previously assumed the TMR to be broadly stable over the long-term. This is consistent with changes in the risk-free rate being offset by movements in the ERP, as noted in a range of academic studies. The Bank of England has also noted recently that one of the key drivers of low interest rates is the “very high equity risk premium”. This evidence suggests that even if the UK economy is in a lower for longer interest rate environment, the implications for the total market return are less clear given that the ERP has increased at the same time as interest rates have decreased.

Noting the above, it follows that PwC’s premise that total market returns – and therefore the cost of equity – has decreased significantly and will remain low over the 2020-25 period has not been adequately demonstrated.



We have also reviewed PwC's analysis and performed our own analysis of MARs and the DDM. We have also considered PwC's assessment of forecast inflation. Our views are as follows.

MARs: MARs are a legitimate reference point for analysing the allowed cost of equity for regulated water companies in England and Wales. However, interpreting what MARs imply about investors' required rates of return on equity is not straightforward and caution must be exercised when interpreting such analysis. The primary difficulty with inferring the cost of equity from MAR analysis is that there are a range of different sources of outperformance (e.g. totex, performance incentives, cost of debt, inflation, number of retail customers etc) which investors may have incorporated into their valuations, and it is difficult to estimate the extent of assumed outperformance in many cases. Because there are so many assumptions underlying the interpretation of MAR analysis, it is very difficult to draw precise inferences about the cost of equity. We also note that the analysis of MARs that PwC has undertaken does not take into account any outperformance of the allowed cost of debt that investors may have anticipated, or higher levels of gearing that investors may assume companies would adopt. This may have led to PwC estimating a lower cost of equity than would otherwise be the case.

DDM: While it is reasonable to have regard to DDM-derived estimates of the TMR, these estimates are sensitive to the assumptions made. In particular, assumptions about the long-term rate of GDP growth have a material impact on the implied TMR. Reflecting the sensitivity of the DDM to underlying assumptions, PwC's own estimate of the TMR using the DDM implies a wide range for the TMR of 6.5 – 10.0%. As such, it is difficult to derive robust estimates of the TMR from DDM estimates. The DDM is more useful for assessing changes in the TMR. In this regard we note that our estimates of the TMR using a DDM for the FTSE All Share have been broadly stable in a range of 6.0 – 7.0% (real) since 2012. PwC's own analysis shows DDM-implied market returns have been broadly stable over the same period. We therefore consider that the DDM does not provide robust and reliable evidence that the expected TMR has decreased since PR14.

Inflation expectations: In its methodology consultation paper, Ofwat confirmed its intention to begin transitioning away from RPI inflation to CPI or CPIH inflation for the purposes of indexing allowed revenues and RCV at PR19. Ofwat indicated it intended to adopt CPIH inflation (rather than CPI inflation) if CPIH was re-designated as a national statistic by the UK Statistics Authority. CPIH has subsequently been re-designated as a national statistic, so we assume Ofwat will adopt CPIH inflation at PR19. We have been unable to identify any independent forecasts of CPIH inflation by HM Treasury, Office of Budget Responsibility or the Bank of England. We note that CPI and CPIH inflation are closely correlated and one does not systematically exceed the other. It might therefore be possible to forecast CPIH inflation based on analysis of the difference ("wedge") between RPI and CPI inflation. RPI inflation has been around 0.8% p.a. higher than CPI inflation on average over the last 20 years, though there are various estimates which suggest the wedge may be closer to 1.0 – 1.3% in future. Based on the above, we conclude that PwC's proposal to adopt an RPI inflation estimate of 2.8% is not unreasonable if it is assumed that CPI and CPIH inflation will be close to the Bank of England's 2.0% target for CPI inflation over the long term and that RPI inflation will exceed CPI inflation by its long run historical average.

Noting all of the points above, we would encourage Ofwat to revise its views on the TMR for PR19, taking into account the additional evidence presented in this report, to ensure that the sector remains able to attract and retain finance on the best value for money terms for customers.

2. Introduction

Ofwat, as well as other UK economic regulators and the Competition and Markets Authority (CMA), have traditionally estimated the cost of equity using a Capital Asset Pricing Model (CAPM) approach, a key input to which is the total market return i.e. the risk-free rate plus the equity risk premium. As part of its recent PR19 methodology consultation, Ofwat has set out some preliminary views on the total market return it may assume at PR19 and, combining those views with its PR14 assumption about the equity beta, set out an illustrative range for the cost of equity at PR19.

Ofwat relies on analysis conducted for it by PwC.¹ PwC presents analysis of the nominal cost of equity using various techniques, which it then deflates into real Retail Price Index (RPI) inflation stripped terms using expected long term inflation. The various estimates of the nominal total market return are summarised in Table 2 below. The table also shows the overall nominal total market return range that Ofwat and PwC have used, though it is not entirely clear how they derived this range from the various pieces of evidence presented.

Table 2: PwC analysis of the nominal total market return

	Min	Max
PR14 ¹	9.75%	9.75%
Long run equity returns ²	9.5%	9.5%
Market to Asset Ratios ³	7.6%	8.1%
Dividend Discount Model ⁴	7.7%	8.3%
Survey data ⁵	8.1%	8.9%
Overall range for PR19 ⁶	8.0%	8.5%

Notes: (1) Calculated using a real risk-free rate of 1.25%, an equity risk premium of 5.5% and long term RPI inflation of 2.8%, all per PR14 Final Determinations; (2) PwC, p80; (3) PwC, p86, Table 15; (4) PwC, p83, though we note that various different estimates are presented in a range of up to 6.5 – 10.0%; (5) PwC, p89; (6) PwC, p92.

Ofwat notes that the range above implies a nominal cost of equity of 6.7 – 7.4%, compared to 8.6% at PR14, assuming the same equity beta assumption as at PR14. Using this range for the nominal cost of equity and assuming that RPI inflation is expected to be 2.8% over the long term (the same rate used at PR14), Ofwat calculates that the implied RPI-stripped real cost of equity is 3.8 – 4.5%, significantly lower than the 5.65% assumed at PR14.²

Ofwat goes on to say “it is too early for us to take a definitive view on the cost of equity for PR19 and we have not undertaken work on some parameters such as betas for PR19 at this point. We will set out an initial view of the cost of capital including the cost of equity in our December methodology statement. However, we consider there is strong evidence that the allowance for total market returns will be much lower at PR19, as reflected in the recommended range from PwC.”³

The proposed reduction in the total market return at PR19 could, if it leads to the allowed cost of equity being set below the rate of return required by equity investors, undermine investor confidence in the sector and lead to a higher cost of capital in the longer term.

In this context, United Utilities Water Limited has commissioned EY to review and comment on Ofwat’s proposed range for the total market return at PR19 and the various pieces of evidence presented in support of that range over the longer term.

¹ See PwC (2017) [Refining the balance of incentives for PR19](#), Appendices A – D.

² See Ofwat (2017) [Delivering Water 2020: Consulting on our methodology for the 2019 price review](#), p208.

³ See Ofwat (2017) [Delivering Water 2020: Consulting on our methodology for the 2019 price review](#), p208.



Our approach

Ofwat has a number of duties it needs to balance. As part of striking this balance, it is reasonable for Ofwat to set the cost of equity to reflect market conditions so that customers do not pay more than is necessary, but that investors continue to receive a reasonable return on investment. Market conditions can change, so it is also reasonable for Ofwat to have regard to any such changes and consider how best to take those into account when setting the allowed cost of equity at PR19.

The question is, in the context of Ofwat's comments to date about the cost of equity at PR19, has Ofwat had regard to appropriate market evidence and has it interpreted that evidence appropriately?

In this document, we seek to answer these questions by reviewing and commenting on Ofwat's proposals and by presenting and discussing alternative and additional sources of evidence on these issues. To do that, this paper is structured as follows:

- ▶ Section 3 discusses "Is the UK economy in a "lower for longer" interest rate environment?";
- ▶ Section 4 considers "Have expected total market returns decreased since PR14?";
- ▶ Section 5 asks "Do Market to Asset Ratios (MARs) imply the cost of equity should be lower at PR19 than at PR14?";
- ▶ Section 6 considers whether evidence from the Dividend Discount Model (DDM) implies the cost of equity should be lower at PR19 than at PR14; and
- ▶ Section 7 discusses "What is an appropriate long-term inflation assumption?".



3. Is the UK in a “lower for longer” interest rate environment?

Ofwat and PwC consider that the UK economy is in a ‘lower for longer’ interest rate environment and that interest rates are not expected to rise significantly over the 2020-25 period covered by PR19.⁴

PwC states “the PR19 cost of equity will likely be set following a prolonged period of low interest rates. This contrasts to earlier regulatory determinations e.g. PR14 where the market evidence suggested that low interest rates were likely to come to an end”.⁵

PwC presents analysis of:

- ▶ Office of Budget Responsibility forecasts of the Bank of England’s base rate from 2013 and 2016, the latter implying base rate was expected to rise much more modestly than it had been in 2013;
- ▶ nominal and index-linked gilt yields, which showed that yields on these instruments had decreased over the period since 2000;
- ▶ a measure of the slope of the UK yield curve calculated as the 10 year nominal gilt yield minus the 2 year nominal gilt yield, which suggested that 10 year yields are now expected to be only around 1.5% higher than 2 year yields (down from about 3% in 2010);
- ▶ a measure of the 10 year gilt yield 10 years ahead, in both nominal and real terms over the period since 2000;
- ▶ a discussion of fundamental drivers of supply of and demand for government bonds, which may have contributed to a decrease in the real risk-free rate.

All of the evidence PwC presents are central case forecasts i.e. the market’s “best estimate” of what will happen. The evidence presented does not acknowledge that there is significant uncertainty around these forecasts, or that the UK economy and financial markets are in the midst of a period of prolonged volatility.

The UK economy is in a state of unprecedented uncertainty with the future of the relationship between the UK and the European Union (EU), and the rest of the world, in the process of being re-negotiated before the UK leaves the EU in March 2019. There may be a transitional period that applies after the UK leaves the EU before any new arrangements come into place. Depending on the outcome of the negotiations, the UK may continue to have free trade with the rest of the EU or trade could be materially less free than it has been. Trade with the rest of the world could increase if new free trade agreements can be negotiated. The exchange rate could appreciate or depreciate depending on the outcome of these negotiations. And interest rates could go up, particularly if inflation rises or if the UK was to have its credit rating downgraded as a consequence of the agreement reached with the EU.

The Bank of England, in its May 2017 Inflation Report, has recently highlighted the uncertainty around the interest rate outlook:⁶

“The persistence of these factors will be crucial for the long-term outlook for UK real interest rates and for the path of monetary policy over coming years. Demographic effects are likely to persist for a long time yet. And global productivity growth may well remain below pre-crisis rates for some time to come. But the future rate of productivity growth is highly uncertain, and market expectations of interest rates can change quickly and may be influenced by perceptions of risk. There is, therefore, considerable uncertainty over how persistent the period of low global interest rates will be.”

The Bank of England’s own analysis indicates there is significant uncertainty around the outlook for the economy. Figure 1 shows the Bank of England’s analysis of CPI inflation

⁴ See Ofwat (2017) [Delivering Water 2020: Consulting on our methodology for the 2019 price review](#), p208.

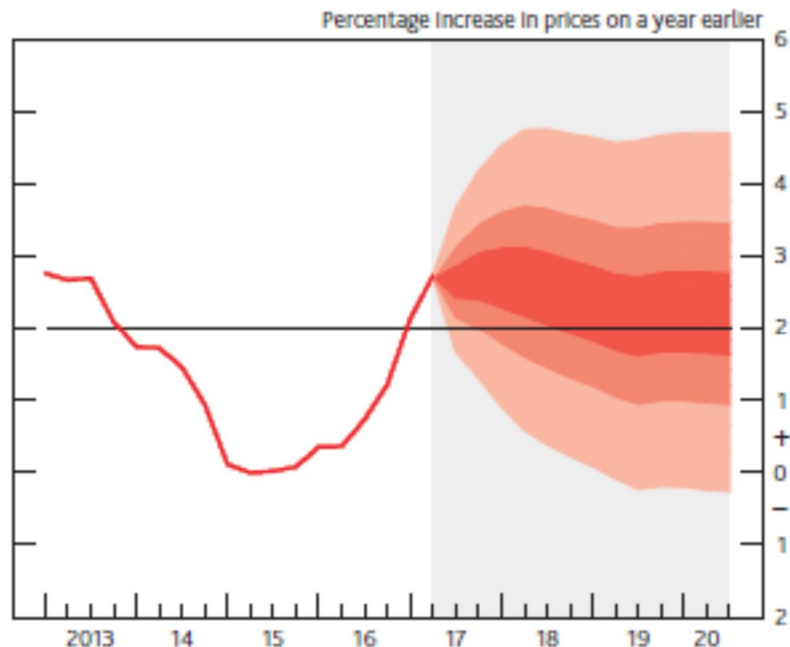
⁵ See PwC (2017) [Refining the balance of incentives for PR19](#), p72.

⁶ See Bank of England (2017) [Inflation Report](#), May, p7.



projections based on market interest rate expectations. This analysis shows that CPI inflation could be within a wide range from about 0 – 5% over the 2018–20 period based on current interest rate expectations. The higher that CPI inflation is, the more likely it is that the Bank of England might raise interest rates to reduce inflation back towards its target.

Figure 1: Bank of England analysis of market-implied outlook for CPI inflation



Source: Bank of England Inflation Report, August 2017, p32.

Independent forecasts of bank rate can provide another indicator of the uncertainty around the outlook. HM Treasury publishes medium-term independent forecasts of various economic indicators on a quarterly basis. In the most recent medium-term forecasts from June 2017, the range of forecasts for bank rate in 2021 ranges from 0.1 – 3.3%.⁷ By comparison, the range of bank rate forecasts in November 2014 – just before PR14 Final Determinations – was in a narrower range of 1.1 – 3.7%.⁸

As another indication of the uncertainty around the outlook for interest rates, we note that the EY ITEM Club⁹ – the only non-governmental economic forecasting group to use the HM Treasury model of the UK economy – is forecasting bank rate could rise much more quickly than the market-implied data presented by PwC (see Figure 2 below).

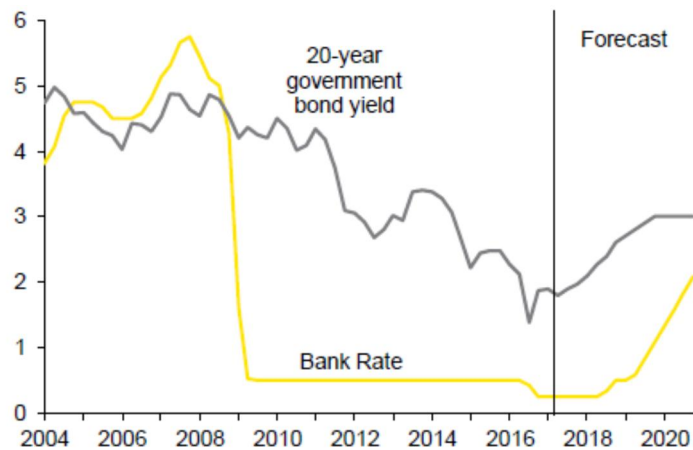
⁷ See HM Treasury (2017) [Forecasts for the UK economy: a comparison of independent forecasts](#), June, p19.

⁸ See HM Treasury (2014) [Forecasts for the UK economy: a comparison of independent forecasts](#), November, p19.

⁹ See EY (2017) [EY ITEM Club Summer Forecast](#), July, p13.



Figure 2: EY ITEM Club forecasts of bank rate (Summer 2017)



Source: EY ITEM Club

Noting the uncertainty around the economic outlook, it is difficult to be confident that interest rates and the cost of equity will not rise before or during the 2020-25 period.

To ensure an appropriate balance of risks between investors and other stakeholders, and that investors are properly compensated for the risks they bear and to ensure the ongoing financeability of the sector, the cost of equity should be set taking into account the considerable uncertainty around the economic outlook. An assumption that interest rates will definitely remain low over the 2020-25 period does not, in our view, seem to strike an appropriate balance of risk given the considerable uncertainty around the outlook for the economy and interest rates in particular.



4. Have expected Total Market Returns decreased since PR14?

PwC argues that “current market interest rate conditions, and as a consequence returns, are expected to diverge from long-run historical averages for an *extended* period of time, covering multiple control periods”¹⁰ and that “historical approaches [to estimating total market returns] are not necessarily a good guide to future returns given that the history of equity returns does not contain a comparable period of ultra-low interest rates”.¹¹ They conclude that new approaches to estimating the TMR are required “which can better match return assumptions to current financial market expectations”.¹²

The crux of PwC’s assessment seems to be that the expected TMR changes over time (i.e. “it is not a constant concept”¹³) and that the expected TMR is currently lower than long-run historical averages as any decrease in risk free rates over the past decade or so has not been fully offset by an increase in the Equity Risk Premium (ERP).

PwC’s approach questions the stability of the TMR identified by a number of studies, such as Wright, Mason and Miles (2003)¹⁴ and Wright and Smithers (2014),¹⁵ which have argued that the TMR is much more stable than either the risk-free rate or the ERP and that it was therefore appropriate to estimate the cost of equity for regulated companies using a stable TMR estimate. Wright and Smithers (2014) considered whether the TMR may have decreased in recent years for Ofgem as part of the RIIO-ED1 price review in 2014 and concluded that the total market return continued to be more stable and predictable than the risk-free rate or the equity risk premium and:¹⁶

“We conclude that, with unchanged methodology the assumed real market cost of capital feeding into WACC calculations would be lowered by around ½% point (or at most ¾ % point). Based on Ofgem’s previous assumptions, this would bring it down to around 6¾ %, or (at the lowest) 6 ½%.”

These views are reinforced by the underlying stability of long-term rates of return on the UK equity market. Using Dimson, Marsh and Staunton (2017) data we have calculated compound annual growth rates (CAGRs) of equity returns on the FTSE over 10 year, 20 year and 30 year horizons since the data set began in 1899. This analysis, summarised in Figure 3 and Table 3 below, clearly shows that 30 year returns are much more stable than 10 year returns. This property of mean reversion is one of the reasons that many academic papers have found an inverse relationship between the risk-free rate and the ERP.¹⁷ It is also consistent with the Bank of England having noted that one of the key drivers of low interest rates is the “very high equity risk premium”.¹⁸

This evidence suggests that even if the UK economy is in a lower for longer interest rate environment, the TMR may not have decreased given that the ERP has increased at the same time as interest rates have decreased.

¹⁰ See PwC (2017) [Refining the balance of incentives for PR19](#), p79.

¹¹ See PwC (2017) [Refining the balance of incentives for PR19](#), p80.

¹² See PwC (2017) [Refining the balance of incentives for PR19](#), p80.

¹³ See PwC (2017) [Refining the balance of incentives for PR19](#), p79.

¹⁴ See Wright, Mason and Miles (2003) [A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the UK](#).

¹⁵ See Wright and Smithers (2014) [The Cost of Equity Capital for Regulated Companies: A Review for Ofgem](#).

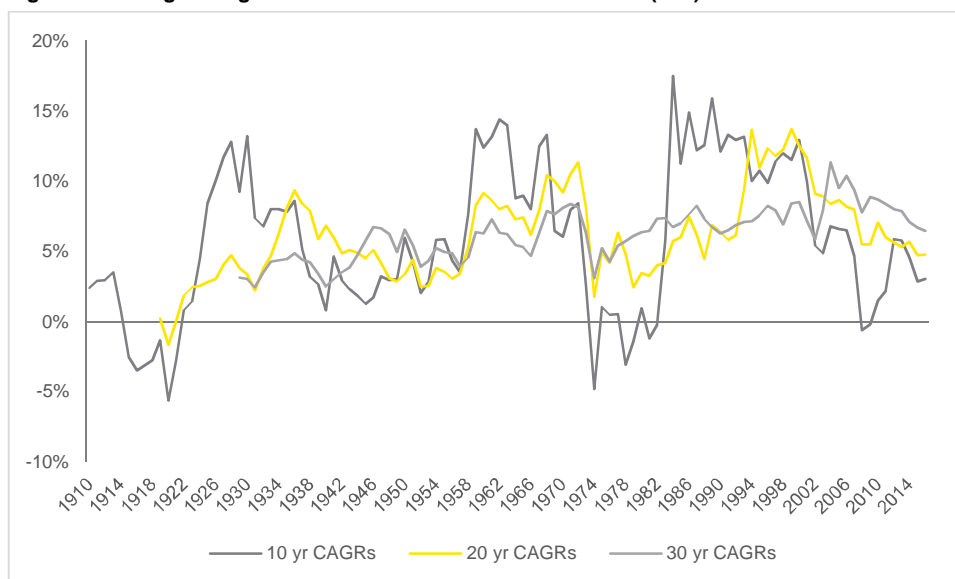
¹⁶ See Wright and Smithers (2014) [The Cost of Equity Capital for Regulated Companies: A Review for Ofgem](#), p2.

¹⁷ See, for example, Graham and Harvey (2016) [The Equity Risk Premium in 2016](#), August, p12 which found a negative correlation of 51.7% between the ERP and real government bond yields using US data, which they attributed to investors engaging in a “flight to safety and accept[ing] low or negative ... yields – and at the same time demand[ing] a high risk premium for investing in the equity market”. See also De Paoli and Zabczyk (2009) “Why do risk premia vary over time? A theoretical investigation under habit formation”, Bank of England Working Paper No. 361 and Damodaran (2016) [Negative Interest Rates: Impossible, Unnatural or Just Unusual?](#), March, which argued that negative real interest rates should be accompanied by assumptions of slower long-term economic growth and higher risk premiums.

¹⁸ See Reuters (2016) [Carney speaks about Brexit and BoE’s response](#), July.



Figure 3: Rolling averages of historical UK total market returns (real)



Source: EY analysis of Dimson, Marsh and Staunton (2017) data

Table 3: Rolling average CAGR of UK market returns over various maturity lengths

	Annual returns	10-year CAGR	20-year CAGR	30-year CAGR
Average	7.3%	5.8%	6.1%	6.2%
Standard Deviation	19.5%	5.2%	3.1%	1.8%

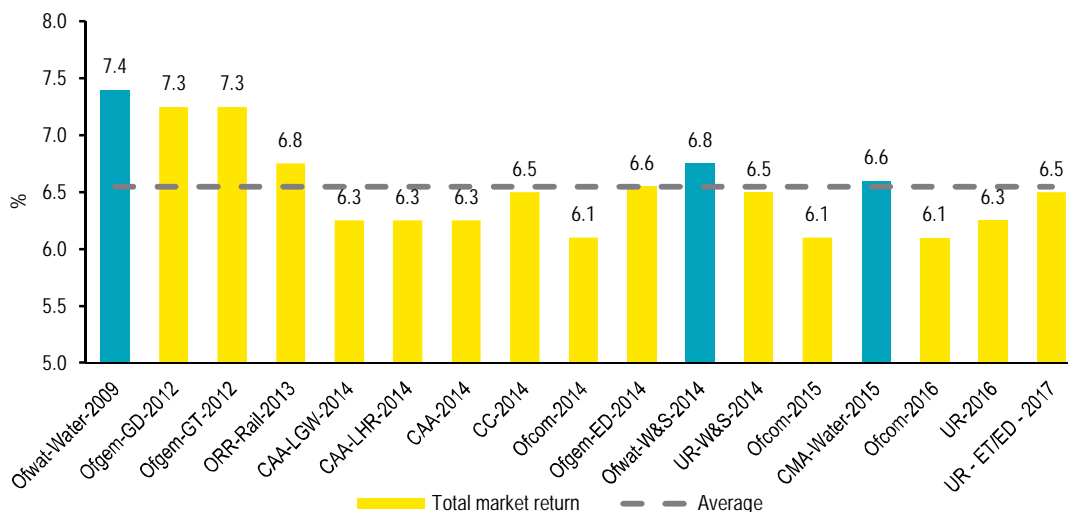
Source: EY analysis of Dimson, Marsh and Staunton (2017) data

Moreover, the analysis shows that there have been previous periods where 10 year CAGRs of returns decreased (e.g. during World War I and II and the oil price shocks of the 1970s), but eventually rates of return increased and long term trailing averages reverted back towards their mean. Indeed, in each of the three episodes mentioned, 10 year rolling averages of market returns exceeded historical averages in the years following the period of unusually low rates of return, suggesting that returns might “catch up” some of the low returns experienced during those periods. These past episodes suggest that the current period of low equity returns is not unprecedented by historical standards – indeed, returns have been much lower in some past episodes, but have subsequently bounced back – and therefore this is not a reason to expect that rates of return will not increase again over the 2020-25 period.

PwC’s approach also questions the approach adopted by numerous economic regulators in the UK. As illustrated in Figure 4 below, most UK economic regulators have used a very similar range for the TMR – since 2014, all but Ofwat’s PR14 Final Determination and the CMA’s subsequent consideration of Bristol Water’s appeal, have been in a range of 6.0 – 6.5% (real, post-tax).



Figure 4: Past regulatory decisions on total market return



Source: UKRN, Cost of Capital Annual Update Report 2017 and various regulators' price control determinations

The issue of whether the TMR has decreased or not in recent years has also been considered. In the final determination of NIE's appeal in 2014, the CC considered that the TMR may change over time, but even though interest rates had been at historical lows for many years and were not expected to return to "normal" levels for several years, the CC only reduced its assessment of the TMR from 5.0 – 7.0% to 5.0 – 6.5%.¹⁹ Subsequently, and even more recently, in Bristol Water's appeal of PR14, the CMA confirmed the range adopted in the NIE appeal.²⁰ In both of those cases the CC / CMA chose a point estimate for the TMR at or towards the top of its range. Even in very recent regulatory determinations in 2016 and 2017, a TMR of 6.1 - 6.5% (real, post-tax) has been adopted.²¹

Overall, while market conditions will change from price review to price review, history shows that significant deviations in market rates of return from long-term averages have been transitory. Consistent with this view, there is regulatory precedent and academic support for assuming a stable TMR in the range of 5.0 to 6.5% when estimating the cost of equity for UK regulated utilities, with more weight towards the top of that range. It is not clear that there is robust and reliable evidence to support a lower TMR assumption for the 2020-25 period (noting even if interest rates have fallen, this is likely to have been offset by an increase in the ERP).

¹⁹ See Competition Commission (2014) [Northern Ireland Electricity price determination](#), paragraph 13.146.

²⁰ See Competition and Markets Authority (2015) [Bristol Water plc](#), p332.

²¹ See for example Ofcom (2017) [Wholesale Local Access Market Review](#), April, p281, paragraph A16.75 and UREGNI (2017) [Northern Ireland Electricity Networks Ltd: Transmission and Distribution 6th Price Control \(RP6\)](#), June, p223.



5. Do Market to Asset Ratios (MARs) suggest the cost of equity should be lower at PR19 than at PR14?

PwC presents analysis of MARs (i.e. the ratio of market value to Regulatory Capital Value (RCV)) from transactions involving UK regulated utilities over the 1989-2017 period and of MARs derived from listed water companies over the period from April 2015 to March 2016.²² PwC state the average MAR on the transactions they considered is around 1.25x RCV, but that recent transactions have achieved higher premiums to RCV. PwC's analysis of MARs for the listed water companies suggests an average MAR of about 1.26x or 1.27x RCV for Severn Trent Water and United Utilities, respectively, over the April 2015 to March 2016 period.

PwC attempts to derive investors' cost of equity implied by the MARs. While recognising that a host of assumptions have to be made about investors' expectations of performance relative to Ofwat's allowances, they calculate that the cost of equity implied by MARs is significantly lower than at PR14.

MARs are a legitimate reference point for analysing the allowed cost of equity for regulated water companies in England and Wales. Ofwat has previously had regard to MARs (e.g. at PR04),²³ though it placed relatively little weight on this evidence at PR09 and PR14.²⁴ In Bristol Water's appeal of PR14, the CMA considered MARs as a cross-check on other evidence.²⁵

Interpreting what MARs imply about investors' required rates of return on equity is not straightforward and caution must be exercised when interpreting such analysis. The primary difficulty with inferring the cost of equity from MAR analysis is that there are a range of different sources of outperformance (e.g. totex, ODIs/PCs, CMeX/DMeX, cost of debt, inflation, number of retail customers etc) which investors may have incorporated into their valuations, and it is difficult to observe or estimate the extent of assumed outperformance in many cases. While equity analysts' reports and other commentary can sometimes provide insight into the assumed levels of outperformance of some aspects of the regulatory framework, their forecasts are typically in a wide range and necessarily reflect a degree of subjectivity. The true underlying market value of a company may also be difficult to measure: while market valuations can be observed, these may not always solely reflect investors' expectations about the performance of the business e.g. investors may pay a premium for a controlling stake or to avoid a competition auction process. There is also debate in the academic literature about whether mergers create the value acquirers expected them to.²⁶ Because there are so many assumptions underlying the interpretation of MAR analysis, it is very difficult to draw precise inferences about the cost of equity. Because of these difficulties we have not attempted to infer what the MAR evidence we have gathered implies about the cost of equity.

There are two further issues with PwC's analysis which may suggest investors' cost of equity is higher than PwC's analysis suggests. First, the analysis of MARs that PwC has undertaken does not take into account any outperformance of the allowed cost of debt that investors may have anticipated, or higher levels of gearing that investors may assume companies would adopt. Second, stock prices of listed water companies fell by around 10% between 31 May 2017 and 24 August 2017.²⁷ All else equal, this implies investors' expected cost of equity is higher than the range used by Ofwat which is based on stock price data prior to those dates.

²² See PwC (2017) [Refining the balance of incentives for PR19](#), pp83-85.

²³ See the [PR04 Final Determination](#), p224 and p280 which note some of the difficulties with interpreting evidence from these ratios.

²⁴ The Final Determinations of both [PR09](#) and [PR14](#) do not mention MAR analysis.

²⁵ See Competition and Markets Authority (2015) [Bristol Water plc](#), p336.

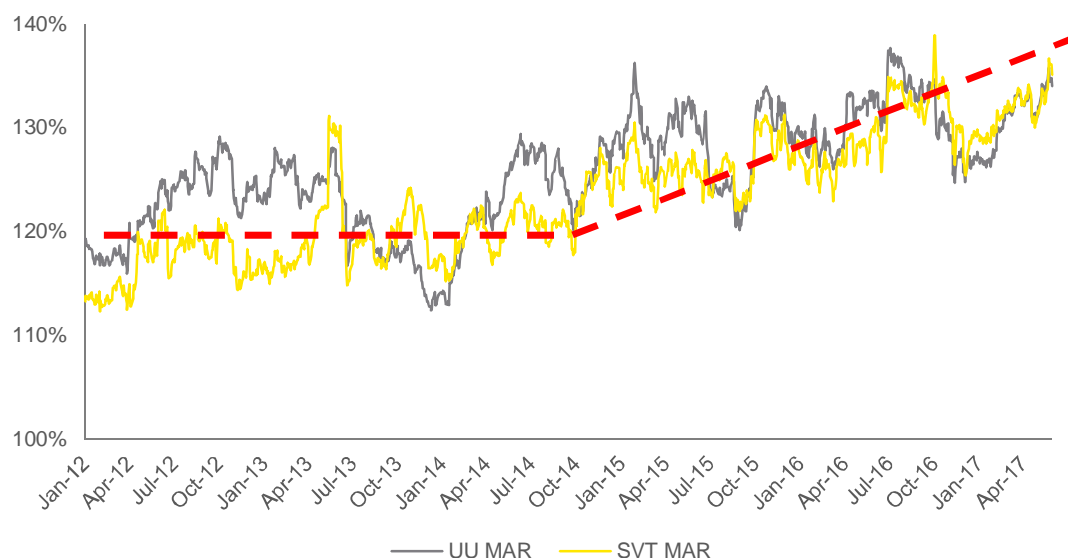
²⁶ See, for example, Andrade, Mitchell and Stafford (2001) [New Evidence and Perspectives on Mergers](#), Journal of Economic Perspectives, Volume 15, Number 2 for a discussion of whether mergers create or destroy value for acquirers and targets.

²⁷ EY analysis of London Stock Exchange data for United Utilities and Severn Trent Water.



We also note that the relationship between RCV and market value appears to have changed in recent years (since PR14) for the listed water companies (see Figure 5 below).²⁸ While MARs have increased from around the 110 – 115% range to closer to 130% over the period since PR14, during this period RCV growth for these companies has been very limited while the wider stock market – and water company share prices – have risen to close to all-time high levels. A different relationship between the market valuation and the RCV appears to have emerged over this period.


Figure 5: Market to Asset Ratios from listed water companies



Source: EY analysis of Bloomberg and Ofwat data up to 31 May 2017.

It is also not clear that MARs derived from M&A transactions have increased recently, as PwC suggest. There have only been a handful of transactions since PR14 and even fewer since the outcome of Ofwat’s Water 2020 programme (setting out the proposed approach to PR19) has been published. It is difficult to draw firm conclusions about shifts in the level of MARs on the basis of such a small sample of transactions. Further, in any case, the premiums over RCV on M&A transactions involving water companies have only increased by a relatively small amount since PR14: on our analysis, the average premium to RCV since PR14 has been about 38%, compared to a long term average of about 30%. Noting the small number of transactions which have taken place since PR14 and that premiums fluctuate from transaction to transaction, there is, in our view, insufficient evidence to conclude that transaction premiums are markedly higher than they were prior to PR14.

²⁸ We focus on United Utilities (UU) and Severn Trent Water (STW) because these two companies undertake relatively little non-regulated activity i.e. the Appointed water company comprises the vast majority of the corporate group. These companies can be regarded as close to “pure play” and their MARs reflect an assessment of the performance of the water business. In contrast, South West Water (SWW) is a smaller proportion of Pennon Group and its MAR would be influenced by an assessment of performance of its non-regulated business, including Viridor – a UK waste business.



6. Does evidence from Dividend Discount Models (DDMs) imply the cost of equity should be lower at PR19 than at PR14?

The DDM, which calculates the cost of equity as the discount rate which equates a company's stock price with the present value of its forecast dividend payments, is a well understood model and one that has previously been considered by UK economic regulators when estimating the market rate of return or the ERP.²⁹ It is reasonable for Ofwat to consider whether the DDM may provide useful evidence about the cost of equity at PR19.

There are various different ways in which the DDM can be calculated. In its simplest form the DDM estimates the cost of equity equal to the dividend yield plus an expected long-term growth rate of dividends. More complex, multi-stage DDMs can also be applied if reliable forecasts of future dividends can be obtained.

PwC calculate the cost of equity using a multi-stage DDM, combining analysts' forecasts of expected dividends for the first five years with a long-term forecast of divided growth. PwC assume long-term nominal dividend growth is equal to the long-term trend nominal growth rate of GDP.³⁰

The assumption that long-term GDP growth equals long-term dividend growth has been debated in the past. For example, the CMA has stated that it considers the assumption that long-term dividend growth will be equal to long-term GDP growth as "essentially arbitrary" and that the growth rate should be lower and may be around 0.0 – 0.5% based on historical dividend growth rates.³¹

The DDM derived TMR is sensitive to the long-term growth rate assumption. To illustrate this point, our calculations using our own single-stage DDM indicate that if the long-term dividend growth rate was assumed to be 0.5% as the CMA suggests, the cost of equity would be around 1.5 – 2.0% lower than if the DDM implied TMR is calculated using independent forecasts of real GDP growth which are in a range of around 2.0 – 2.5% p.a.³² PwC's own analysis confirms the sensitivity of the DDM to its input assumptions, as they suggest the DDM implied market return is in a wide range of 6.5 – 10.0%.³³

Noting the above, caution should be exercised when interpreting the results of DDM analysis to infer the appropriate market return. The DDM may, however, be a more useful tool for identifying *changes* in the market return i.e. trends and changes in DDM estimates may provide useful information about trends and changes in the TMR. In this regard, we note that our DDM analysis (setting long-term dividend growth equal to GDP growth forecasts) suggests the expected market return on the FTSE All Share has been fairly stable in a range of about 5.5 – 7.0% (real, post-tax) over the period since 2012 (see Figure 6 below). PwC's own analysis produces similar results.³⁴

²⁹ See, for example, Competition Commission (2014) [Northern Ireland Electricity price determination](#), page A13(2)-3.

³⁰ See PwC (2017) [Refining the balance of incentives for PR19](#), p102.

³¹ See Competition and Markets Authority (2015) [Energy market investigation: Analysis of cost of capital of energy firms](#), February, para 33.

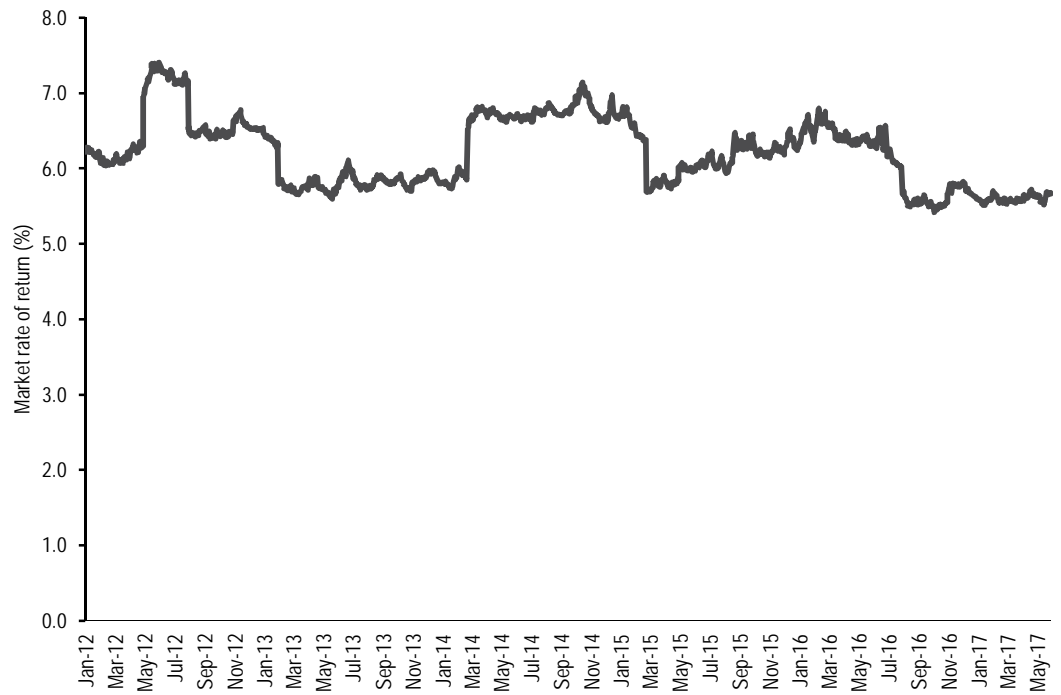
³² See HM Treasury "[Independent forecasts of the UK economy](#)". Using the 5-year ahead real GDP growth forecast from the February, May, August and November's editions of this publication, real medium term GDP growth forecasts appear to have been 2.7% in 2012, 2.2% in 2013, 2.4% in 2014, 2.3% in 2015, 2.0% in 2016 and 1.9% in 2017 (February and May publications only).

³³ See PwC (2017) [Refining the balance of incentives for PR19](#), p83.

³⁴ See PwC (2017) [Refining the balance of incentives for PR19](#), Figure 25, p82 which shows a nominal total market return in a range of about 8.0 – 9.0% over the period since 2012. Over the period since 2000, PwC's estimates of the nominal total market return have been in a range of about 8.0 – 11.0% except briefly during the global financial crisis.



Figure 6: DDM-based estimates of the total market return (FTSE All Share)



Note: Data up until 31 May 2017

Source: Bloomberg, HM Treasury data, EY analysis



7. What is an appropriate assumption about long-term inflation expectations?

Ofwat and PwC calculate the cost of equity in nominal terms and then deflate it into real RPI-stripped and CPI-stripped terms using forecasts of long-term inflation.³⁵

The implied real cost of equity would be too high if the assumed rate of inflation was underestimated and too low if the assumed rate of inflation was over-estimated. Accordingly, the long-term inflation forecast is an important input to their assessment of the real cost of equity.

In this regard, it is important that the inflation forecast used is internally consistent with the estimate of the nominal cost of equity e.g. a long-term estimate of the nominal cost of equity based on interest rates remaining low over a prolonged period, might need to be deflated by a long-term estimate of inflation that was also based on interest rates remaining low over a prolonged period. All else equal, low interest rates might be expected to be accompanied by higher inflation. It is not clear if PwC have assumed that the low interest rates they expect to persist over the long term will not lead to higher inflation over the long term, or that they have not taken the relationship between interest rates and inflation into account.

PwC assess that appropriate forecasts of CPI and RPI inflation to use at PR19 are 2.0% and 2.8%, respectively.³⁶ In coming to this conclusion, PwC review forecasts of RPI and CPI inflation from HM Treasury, the Bank of England and the Office for Budget Responsibility (OBR) among others, RPI inflation expectations implied by comparing gilt and index-linked gilt yields and by considering the historical “wedge” between RPI and CPI inflation.

In its PR19 methodology consultation, Ofwat indicated it is minded to adopt CPIH inflation instead of CPI inflation, assuming that CPIH is re-designated as a national statistic.³⁷ Subsequently, the UK Statistics Authority has re-designated CPIH as a national statistic, so we assume Ofwat will use CPIH inflation at PR19.³⁸

Adopting CPIH means that Ofwat will need to forecast CPIH inflation, or at least the wedge between CPIH inflation and RPI inflation. However, to our knowledge, there are no published forecasts of CPIH inflation from bodies such as the Bank of England, HM Treasury or the OBR.

The absence of readily available forecasts raises a question about how best to forecast CPIH or the wedge between RPI and CPIH inflation.

Economic regulators have typically forecast long-run RPI inflation by assuming that CPI inflation will average close to the Bank of England’s 2.0% target over the long-term and adding on a “wedge” for the expected difference between RPI and CPI inflation.³⁹ Adopting a similar approach for forecasting CPIH inflation would require a forecast of the expected wedge between CPIH and RPI inflation.

Adopting this approach would need to take account of the differences between the RPI, CPIH and CPI rates of inflation. The difference between RPI and CPI inflation has been significant over many years, particularly since a number of changes to RPI inflation around 2010, but

³⁵ In our view it would be more appropriate to estimate the TMR in RPI-stripped real terms directly and then inflate that figure into CPIH-stripped real terms based on the RPI / CPIH wedge. This would be more consistent with regulatory precedent and reduces the number of parameters that have to be estimated (since RPI-inflation and CPIH-inflation do not need to be estimated, just the wedge between them). However, for present purposes we adopt the same convention as Ofwat and PwC.

³⁶ See PwC (2017) [Refining the balance of incentives for PR19](#), p98.

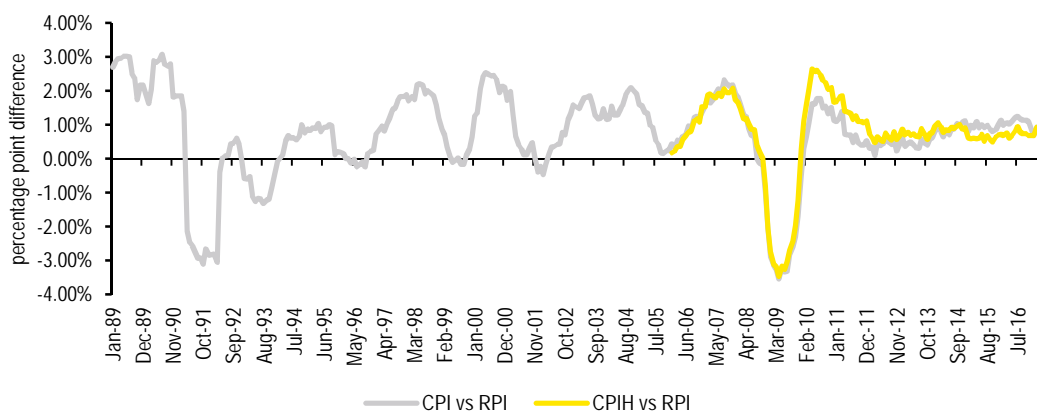
³⁷ See Ofwat (2017) [Delivering Water 2020: Consulting on our methodology for the 2019 price review](#), p212.

³⁸ See Office for Statistics Regulation (2017) [National Statistics status of Consumer Price Index including Owner Occupiers' Housing Costs](#) (CPIH), July.

³⁹ We note that a range of medium-term forecasts of RPI inflation are publically available and forecast long-run RPI inflation can also be derived from financial market data such as the difference between long-term gilt and ILG yields, but the typical approach has been to start with a long-term forecast of CPI inflation and add on an estimate of the “wedge” between RPI and CPI inflation.

CPI and CPIH inflation have been closely correlated and one does not seem to be systematically higher than the other. These differences are illustrated in Figure 7 below.

Figure 7: CPI vs. RPI inflation since 1988, CPIH vs RPI inflation since 2006



Source: Bloomberg, EY analysis

This might suggest that one way to forecast CPIH inflation would be to consider the wedge between RPI and CPIH. Table 4 below presents historical averages of the differences between RPI and CPI inflation, and RPI and CPIH inflation, over various time frames and the difference between them. The data suggests that RPI inflation exceeds CPIH inflation by around 0.7 – 0.8% on average over the long run and that this “wedge” has been fairly stable over time.

Table 4: Historical averages of the difference between RPI and CPI / CPIH inflation

Period to 31 May 2017	RPI minus CPI	RPI minus CPIH
6m	0.8%	0.8%
12m	1.0%	0.8%
2 year	1.0%	0.7%
5 year	0.8%	0.7%
10 year	0.5%	0.7%
20 year	0.8%	0.7%

Source: ONS, EY analysis

We note that there are various estimates of the expected difference (or wedge) between RPI and CPI / CPIH. A number of these estimates are summarised below.

Table 5: CPI / RPI wedge estimates

Source	Long-run RPI-CPI wedge
Moody's	1.3%
Office for Budget Responsibility	1.0%
Pension Protection Fund	1.1%
Bank of England	1.3%

Sources: Moody's (2016), UK Transition to CPI: Redefining real: adoption of CPI will transform index-linked debt market, Office for Budget Responsibility (2015), Economy and Fiscal Outlook, Pension Protection Fund (2015), Funding Strategy Review, Bank of England (2014), February Inflation Report.

These estimates suggest that the long-run wedge between RPI and CPI may be about 1.0 – 1.3% i.e. RPI exceeds CPI by about 1.0 – 1.3% on average over the long-run. Noting CPI and CPIH inflation have been closely correlated historically, this might suggest that the wedge between RPI and CPIH will also be larger in future than it has been historically.

Noting the above evidence, PwC's proposal to adopt an RPI inflation estimate of 2.8% is reasonable if it is assumed that CPI and CPIH inflation will be close to the Bank of England's 2.0% target for CPI inflation over the long term and that RPI inflation will exceed CPI inflation by its long run historical average.

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