Review of RIIO-2 finance issues

Rates of return used by investment managers

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1 Summary

Over the past year, Oxera has been advising the Energy Networks Association (ENA) on the cost of equity parameters of the upcoming RIIO-2 price control. The assumed value of the total market return (TMR) parameter has been a particularly important area of discussion.

In the RIIO-2 sector-specific consultation, published on 18 December 2018, Ofgem proposed a CPIH-real TMR in the range of 6.25–6.75%.[1] This is almost 1% below Oxera's estimate of 7–7.5%.[2]

In deriving its TMR estimate, Ofgem relied on four sources of evidence, summarised below.

- The UKRN study, which recommended a 6–7% CPI-real TMR.

  This estimate diverges from prior regulatory practice by introducing a new interpretation of the inflation measure used to convert returns from a nominal to a real basis. The treatment of inflation in the calculation of historical real returns is not discussed in this report.

- Outturn average equity returns denominated in USD.

  As a cross-check, Ofgem considered geometric averages of historical returns for the UK and World equity markets, denominated in USD. Ofgem compared these returns directly to a geometric average of historical UK equity returns, denominated in GBP.[3]

- The TMR implied by a dividend discount model (DDM), at 5.5–6.5% CPI-real TMR.

  As a cross-check, Ofgem considered a TMR estimate implied by a two-period dividend discount model.[4]

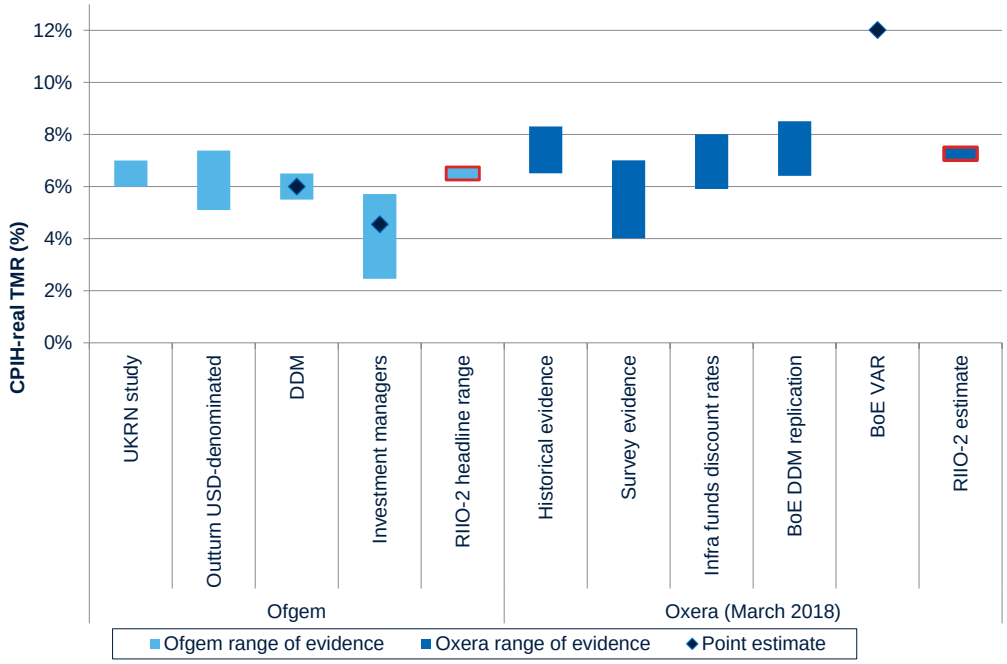
- TMR projections, published by the investment management industry.

  As a cross-check, Ofgem considered TMR estimates published by investment managers, as well as the rates of return prescribed by the FCA for the purposes of marketing retail financial products.[5] Ofgem used these projections in two places. First as a cross-check on the TMR range, and second as one of the cross-checks of the CAPM-implied cost of equity.

Figure 1.1 summarises the TMR evidence presented by Ofgem and Oxera.

[1] CEPA (2018), 'Review of cost of capital ranges for Ofgem's RIIO-2 for onshore networks', 18 February, Figure E.1.
[2] Oxera (2018), 'The cost of equity for RIIO-2', 28 February, p. 35. The figures refer to a 6–6.5% RPI-real range estimated by Oxera, plus a 1% expected wedge between RPI and CPIH.
[3] Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December, para. 3.67, Figure 9.
[4] Ibid., Appendix 3.
[5] Ibid., Table 10.

Figure 1.1 Summary of TMR evidence



Note: The outturn USD-denominated return is presented including the uplift from geometric to arithmetic average of 77bps on the low end and 177bps on the high end, as described in para. 3.70 of the finance annex. DDM—dividend discount model, BoE—Bank of England, VAR—vector autoregression.

Source: Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December; Ofgem (2014), Oxera (2018), 'The cost of equity for RIIO-2', 28 February.

As the figure illustrates, the evidence from the investment managers appears to be out of line with the rest of the evidence. This note explores the possible causes of this divergence and concludes that:

- the TMR estimates produced by investment managers have the primary purpose of providing prudent estimates of future returns to their clients, to ensure clients are managing their finances prudently. This is mainly a function of the regulatory framework, namely the FCA Conduct of Business Sourcebook, section 13, which states the maximum rates of return that financial services companies must use in their calculations when providing retail customers with projections of future benefits.[6] In contrast, it has been recognised that the costs of setting the allowed rate of return too low for regulated utilities may exceed the detriment from setting too high a regulated return relative to the true cost of capital.[7]
- if any weight is to be placed on this evidence, an upward adjustment has to be made to correct for the downward bias arising due to geometric averaging.

[6] Financial Conduct Authority (2017), 'Rates of return for FCA prescribed projections', p. 5.
[7] Ofcom (2016), 'Business Connectivity Market Review', 28 April, para. A30.238.

2 FCA regulation of market return assumptions

The FCA 'prescribes the **maximum** rates of return that financial services companies must use in their calculations when providing retail customers with projections of future benefits' [emphasis added].[8] The objective of setting these prescribed rates is to 'prevent consumers [from] being misled by inappropriately high rates'.[9] Therefore, when setting the prescribed TMR, the FCA has to be mindful of its role to protect consumers. There are two related issues with the FCA evidence presented by Ofgem, both of which are explained in this section.

- Issue 1: the FCA and Ofgem have different objectives that influence the appropriate weighting of different sources of TMR evidence.
- Issue 2: the FCA-prescribed equity market return of 6–7% (nominal) appears low relative to the range of evidence considered by the FCA.

2.1 Issue 1: the FCA and Ofgem have different objectives that influence the appropriate weighting of different sources of TMR evidence

Before using the FCA evidence on TMR for the purposes of setting the right rates of return to remunerate energy networks investment, it is important to note that the FCA and Ofgem are pursuing different objectives. Therefore, even if Ofgem and the FCA did use the same set of information to determine the appropriate TMR, the resulting final TMR estimates could potentially be different for the two regulators. This is because the objectives that each regulator faces will affect how one piece of evidence is weighed against another. Given the respective objectives of the two regulators, it is unclear that the TMR estimate appropriate for the FCA is also appropriate for Ofgem.

In particular, in prescribing its TMR estimate, the FCA 'aim[s] to prevent consumers [from] being misled by inappropriately high rates'.[10] In other words, the FCA projection rates are designed to minimise the chances of consumers suffering from overly optimistic performance forecasts.

The consumer detriment of investors overestimating the TMR is arguably higher than the cost of underestimating it. This asymmetry of estimation error cost makes it welfare-enhancing to lean towards the low end of the TMR range. There are two alternatives:

- presenting consumers with projection rates that are below the central estimate of the TMR will incentivise them to save more, reducing their short-term consumption. While oversaving may turn out to be an inconvenience, it will not put the consumer at risk after retirement;
- in contrast, presenting consumers with an overestimated TMR may lead to underinvestment and increase the risk that consumers do not save enough to meet their financial objectives. Moreover, the expectation of high returns may also cause consumers to pay less attention to the impact of fund management fees on investment returns.

[8] Financial Conduct Authority (2017), 'Rates of return for FCA prescribed projections', p. 5.
[9] Ibid.
[10] Ibid.

The example above shows that the FCA has to exert extra caution to avoid *overestimating* the TMR. By implication, the FCA is likely to attribute less weight to the higher end of the TMR range.

2.2 Issue 2: the FCA-prescribed equity market return of 6–7% appears low relative to the range of evidence considered by the FCA

While in its consultation Ofgem reported the 6–7% (nominal) TMR range prescribed by the FCA, the FCA publication itself contains additional detail on the evidence underlying the prescribed TMR range. Some of that evidence points to a TMR that is significantly higher than 7%. The expectation that the welfare-enhancing TMR assumption for the purpose of investment advice would sit towards the lower end of the evidence is borne out by the data.

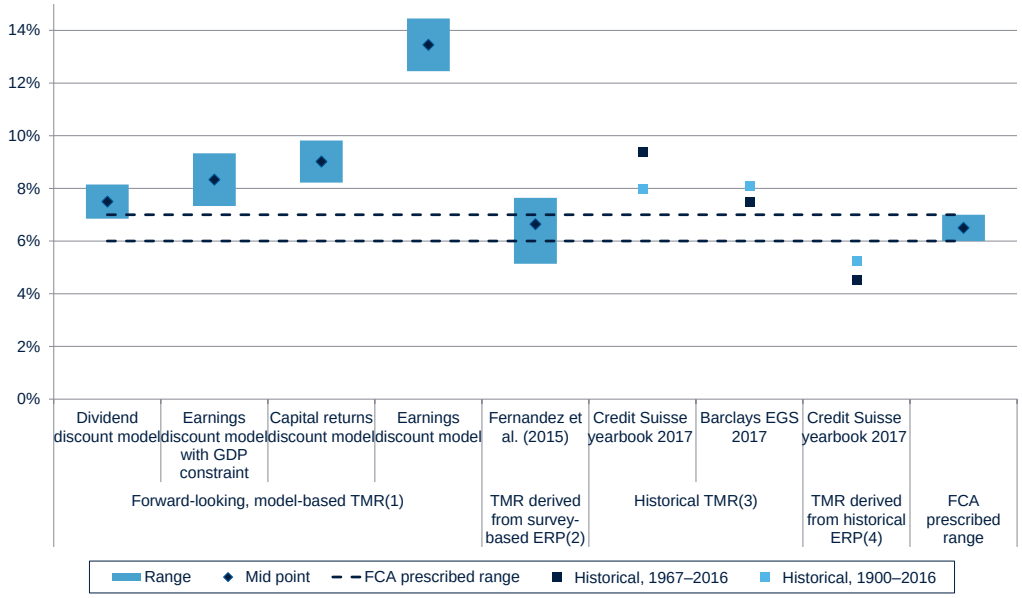
In examining the UK TMR, the FCA has relied on the following three sources of evidence.

- The TMR implied by forward-looking discounted cash-flow models, in particular:
  - the DDM;
  - the earnings discount model with GDP constraint;
  - the capital returns discount model;
  - the earnings discount model.[11]
- The TMR obtained from survey responses.
- The TMR based on historical returns.

Figure 2.1 illustrates the evidence on the UK TMR underlying the FCA-prescribed TMR.

[11] The FCA mentions that the earnings discount model is likely to overestimate the TMR. While the FCA reports the results of this model, it does not place significant weight on that particular estimate.

Figure 2.1 Summary of evidence underlying the FCA-prescribed nominal TMR



Note: (1) Nominal TMR calculated as the ERP implied by the FCA models (as reported by the FCA) and the FCA nominal risk-free rate assumption of 1.64%. (2) Nominal TMR calculated as the sum of the ERP reported in the survey and the nominal risk-free rate assumption of 1.64%. For the survey, see Fernandez, P., Pizarro, A.O., Fernandez, A.I., (2015), 'Discount rate (risk-free rate and market risk premium) used for 41 countries in 2015: a survey (November 19, 2015)'. (3) Nominal TMR calculated as the sum of the real historical geometric average TMR (as reported in the Credit Suisse Yearbook or Barclays EGS) and the FCA inflation assumption of 2.5%. (4) Nominal TMR derived as the sum of the historical ERP reported in the Credit Suisse Yearbook and the above-mentioned risk-free rate assumption of 1.64%.

Source: Oxera analysis based on Financial Conduct Authority (2017), 'Rates of return for FCA prescribed projections'.

Figure 2.1 illustrates two important points.

First, the range for the TMR assumption prescribed by the FCA is towards the low end of the range of potential estimates. This weighting of the evidence could be explained by the FCA's objectives, as described in section 2.1. In this context the potential for consumer detriment is reduced by assuming a relatively low TMR.

Second, in examining the evidence, the FCA exclusively relies on the geometric rather than the arithmetic average of returns.[12] It has been well documented that the geometric averaging biases the TMR estimate downwards when used for the purpose of estimating discount rates.[13] This also indicates that the rates of return published by investment managers should be interpreted as forecasts of the compound average growth rate and require upward adjustment before being used to construct a discount rate, as explained in section 3.3.

[12] Financial Conduct Authority (2017), 'Rates of return for FCA prescribed projections', p. 51.
[13] See section 3.3.

3 Interpretation of investment manager forecasts

In addition to the FCA-prescribed projection rates, Ofgem has considered evidence published by individual investment managers. According to Ofgem, the objective of this was to consider evidence from '[i]nvestment professionals [that] estimate the TMR in order to advise clients and allocate funds'.[14] It is, however, important to account for the context of these forecasts before applying this evidence to RIIO-2.

3.1 The forecasts are presented on a non-reliance basis

There is no evidence that any of the publications quoted by Ofgem can in fact be used 'to advise clients and allocate funds'. In addition to the fact that none of the quoted publications represent official product offering documents, the quotes below provide explicit evidence against relying on the estimates reported therein.

- BlackRock states that the number used by Ofgem 'is not intended as [an] estimate […] of future performance'.[15]
- Vanguard states that the projections presented 'are hypothetical in nature'.[16]
- Aberdeen Asset Management states that '[the] document is strictly for information purposes only and should not be considered as an offer [or] investment recommendation.'[17]
- Schroders states that '[the publication] is not intended as a promotional material in any respect […] and should not be relied on for investment recommendations.'[18]
- JPM states that '[the] material does not contain sufficient information to support an investment decision and should not be relied upon by you in evaluating any securities or products'.[19]
- Aon Hewitt states that '[the] information is provided for informational purposes only and should not be considered tax, legal, or investment advice.'[20]

[14] Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December, para. 3.77.
[15] BlackRock (2018), 'Asset return expectations and uncertainty', December, https://www.blackrock.com/institutions/en-gb/insights/charts/capital-market-assumptions
[16] Vanguard (2018), 'Why investors need to prepare for lower returns', 17 January, https://www.vanguardinvestor.co.uk/articles/latest-thoughts/markets-economy/why-investors-prepare-for-lower-returns
[17] Aberdeen Standard Investments (2017), 'Long-term investment outlook', December, http://www.aberdeen-asset.co/static_files/documents/d7aa3904-a37e-4da5-bce0-5e0bf3601a84/1/54037-cd-long-term-investment-outlook---2018-gbp.pdf#_ga=2.16774262.1778392166.1539079636-1593114588.1539079636
[18] Schroders (2018), '30-year return forecasts (2018–47)', January, https://www.schroders.com/en/sysglobalassets/digital/insights/2017/pdf/2018_long_run_forecasts_cb.pdf
[19] J. P. Morgan (2017), '2018 long-term capital market assumptions', https://am.jpmorgan.com/gi/getdoc/1383498280832
[20] Aon Hewitt (2018), 'Capital Market Assumptions: As of 30 June 2018', http://www.aon.com/getmedia/ee7748ad-6c76-462b-ba45-63601949dd81/Capital-Market-Assumptions-30-June-2018.aspx

- Willis Towers Watson states that 'the contents are not intended to […] be construed as the provision of investment […] or any kind of professional advice, [...] or to form the basis of any decision.'[21]

3.2 Academics and practitioners put little weight on survey evidence

Academic research has found that forecasts made by professional market participants have poor predictive power.[22] Brealey and Myers sum this up in the following quote:[23]

> Do not trust anyone who claims to know what returns investors expect. History contains some clues, but ultimately we have to judge whether investors on average have received what they expected

The uncertainty of such projections has also been recognised in the regulatory environment, with the (former) Competition Commission explicitly expressing concerns about relying on the opinions of individual organisations for the purposes of determining cost of capital parameters:[24]

> the results of such surveys tend to depend on the identity and outlook of the respondents and how they interpret the questions being asked. […] In this report we have preferred to consider the underlying data on which survey respondents presumably base their views

Given that Ofgem is 'mindful of the benefit to investors and consumers of predictability and stability in regulatory policy and judgements',[25] it appears appropriate to attribute more weight to historical evidence rather than to the individual forward-looking projections.

3.3 Geometric averages require upward adjustment

Finally, if any weight is to be placed on survey evidence, including that reported by Ofgem in Table 10, the projected growth rates reported therein must be adjusted for the downward bias embedded within such estimates. The bias arises when an estimate of an uncertain return is compounded and averaged over time. While the vast majority of publications cited by Ofgem do not disclose the exact averaging method used in their calculation, in the absence of further evidence it is reasonable to assume that the returns represent a geometric average or CAGR.[26] This is because the clients of investment managers are primarily interested in the net growth of the portfolio by the end of the specified investment horizon. Whether the value of the portfolio was higher in the middle of the investment horizon is inconsequential to the ultimate investment result. Thus, the estimates quoted by Ofgem are

[21] Willis Towers Watson (2017), 'Five-year capital market outlook', April, https://www.willistowerswatson.com/-/media/WTW/PDF/Insights/2017/04/five-year-capital-market-outlook-2017.pdf
[22] For example, see Ang, A. and Beckaert, G. (2006), 'Stock return predictability: is it there?', *The Review of Financial Studies*, **20**:3, pp. 651–707; Goyal, A. and Welch, I. (2002), 'Predicting the equity premium with dividend ratios', *Journal of Empirical Finance*, **17**:4, pp. 539–551; Lanne, M. (2002), 'Testing predictability of stock returns', *The Review of Economics and Statistics*, **84**:3, pp. 407–415; Torous, W., Valkanov, R. and Yan, S. (2004), 'On predicting stock returns with nearly integrated explanatory variables'. *The Journal of Business*, **77**:4, pp. 937–966.
[23] Brealey, R., Myers, S., Allen F. (2016), *Principles of Corporate Finance*, 12th edition, McGraw-Hill International Edition, p. 169; BlackRock (2018), 'Asset return expectations and uncertainty', December.
[24] Competition Commission (2014), 'Northern Ireland Electricity Limited price determination', 26 March, para. 13.156.
[25] Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December, para. 3.80.
[26] Compound average growth rate.

likely to be geometric averages and are therefore likely to ignore the impact of volatility in annual returns.

Academic literature extensively documents the existence of the bias that arises when using the geometric averaging of returns to inform estimates of the discount rate. While there is debate about which averaging method is the more appropriate to correct for the bias, the literature is broadly supportive of placing more weight on the arithmetic averages.

Indeed, DMS write:[27]

> This [the arithmetic mean risk premium] is our estimate of the expected long-run equity risk premium for use in asset allocation, stock valuation, and corporate budgeting applications.

DMS's view is consistent with a number of analytical studies that suggest that greater weight should be placed on arithmetic than on geometric estimates of returns.[28] Cooper (1996) analyses the properties of three approximately unbiased estimators of expected returns from the academic literature, and notes that:[29]

> the geometric mean is a significantly downward biased estimate of discount rates even when 'market overreaction' is taken into account

and that:[30]

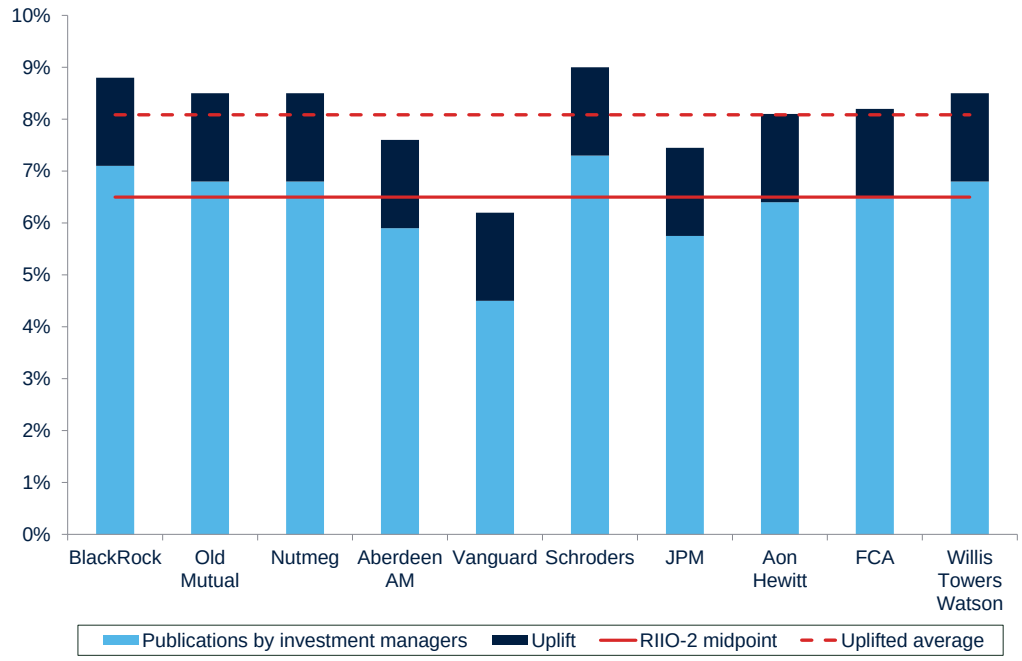
> Unbiased discount factors have been derived that correct for both these effects. In all cases, the corrected discount rates are closer to the arithmetic than the geometric mean.

This conclusion is further supported by Jacquier, Kane and Marcus (2003), who derive a relatively simple formula for a correct estimator for the expected future ERP.[31] The authors suggest a weighted average between the arithmetic and geometric means, with the weight on the geometric mean being the ratio of the investment horizon to the sample period. This means that, for short investment horizons, the best estimator is very close to the arithmetic mean, whereas for long investment horizons the weight of the geometric mean increases. The estimator by Jacquier, Kane and Marcus (2003) has been used in regulatory discussions—for example, in the Competition Commission referrals concerning Bristol Water[32] and NIE.[33]

[27] Dimson, E., Marsh, P. and Staunton, M. (2015), 'Credit Suisse Investment Returns Sourcebook 2015', p. 34.
[28] For further details, see Cooper, I. (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, **2**:2, p. 157.
[29] Ibid., p. 165.
[30] Ibid.
[31] Jacquier, E., Kane, A. and Marcus, A. J. (2003), 'Geometric or Arithmetic Mean: A Reconsideration', *Financial Analyst Journal*, November/December.
[32] Competition Commission (2010), 'A reference under section 12(3)(a) of the Water Industry Act – Report presented to Ofwat on 4 August 2010', Appendix N, http://webarchive.nationalarchives.gov.uk/20121212135622/www.competition-commission.org.uk/our-work/directory-of-all-inquiries/bristol-water-plc-water-price-limits-determination, accessed 15 December 2017.
[33] Competition Commission (2014), 'Northern Ireland Electricity Limited price determination – A reference under Article 15 of the Electricity (Northern Ireland) Order 1992', Final determination, 23 March, https://assets.digital.cabinet-office.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf, accessed 15 December 2017.

Applying this methodology to DMS figures, where the geometric mean is 5.5% and the arithmetic mean is 7.3%,[34] both measured over 1900–2016,[35] we obtain the adjusted TMR estimate of 7.2%,[36] implying that a geometric average has to be uplifted by 1.7%. Applying this uplift to evidence presented by Ofgem increases the average TMR estimate from 6.4% to 8.1%, as illustrated in Figure 3.1.[37]

Figure 3.1 Adjustment to Ofgem's evidence on TMR estimates by investment managers



Note: It appears that Ofgem has double-counted the inflation in JPM's estimate. In particular, Ofgem has added inflation to a nominal estimate. See Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December, p. 30, footnote 23. Correcting for this decreases the unadjusted average TMR from 6.59% to 6.39%. The chart presents the corrected JPM estimate.

Source: Oxera analysis based on Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December.

Considering the median, rather than the average of the sample results in TMR of 6.65% on the original sample and a TMR of 8.35% on the uplifted sample.[38]

Expressing the TMR on an arithmetic average basis (mean of 8.09% and median of 8.35%) and deducting a 3% RPI inflation forecast produces a 5.09–5.35% estimate of the RPI-deflated TMR. This is 65–115bps lower than the bottom end of the 6.0–6.5% range presented in Oxera (2018).[39]

[34] Both figures are RPI-real.
[35] Dimson, E., Marsh, P. and Staunton, M. (2017), 'Credit Suisse Global Investment Returns Yearbook 2017', p. 14.
[36] In our case, the sample period is 116 years, since the DMS database contains 116 years of data. Assuming a five-year duration for RIIO-2, the weight on the geometric mean would be 5/116 = 4%.
[37] It appears that Ofgem has double-counted the inflation in JPM's estimate. In particular, Ofgem has added inflation to a nominal estimate. See Ofgem (2018), 'Consultation on RIIO-2 Sector specific methodology annex: Finance', 18 December, p. 30, footnote 23. Correcting for this decreases the unadjusted average TMR from 6.59% to 6.39%. The chart presents the corrected JPM estimate.
[38] Both figures assume a corrected value for the nominal JPM estimate. See the note to Figure 3.1.
[39] Oxera (2018), 'The cost of equity for RIIO-2', 28 February, p. 3. As explained in this report, in light of the fact that both the financial theory and the empirical evidence support a relatively stable TMR with an estimate towards the top end of the range (6.5%), we recommend a range of 6.0–6.5% for the RPI-real TMR.

4 Conclusions

In setting the TMR range within the RIIO-2 sector-specific consultation, Ofgem has considered the FCA-prescribed projection rates, as well as publications by a selection of investment managers. We have reviewed the evidence and identified a number of limitations.

With regard to evidence from the FCA, the 6–7% nominal range for the TMR is likely to be below a central estimate of the expected TMR, for at least two reasons.

First, the FCA-prescribed range was designed to ensure that consumers did not suffer from overly optimistic performance forecasts. In contrast, it has been recognised that the costs of setting the allowed rate of return too low for regulated utilities may exceed the detriment from setting too high a regulated return relative to the true cost of capital.[40] It is therefore unclear that the FCA-prescribed TMR range is appropriate for RIIO-2.

Second, the expectation that the welfare-enhancing TMR assumption for the purpose of investment advice would sit towards the lower end of the evidence is borne out by the data. For example, all of the estimates presented by the FCA based on DDMs are higher than the top end of the FCA-prescribed TMR. Moreover, when examining the evidence, the FCA relies on the geometric rather than the arithmetic average.

With regard to the evidence from investment management firms, it is recommended that no weight is placed on these observations, due to the limitations summarised below.

First, in contrast to Ofgem's original intention, it is unclear whether the evidence presented can be used 'to advise clients and allocate funds'. In fact, the majority of the underlying publications explicitly state that the figures presented therein cannot be used as estimates of future returns.

Second, academic research and precedents from practitioners show that survey evidence should be attributed little weight. Given that Ofgem recognises the benefit of predictability and stability in regulatory policy, it appears appropriate to attribute more weight to historical evidence than to the individual forward-looking projections.

Finally, if any weight is to be placed on this evidence, the projected growth rates reported therein must be adjusted for the downward bias embedded within such estimates. Academic literature suggests that the adjustment amounts to c. 2%.

In sum, the evidence from the investment managers appears to be out of line with the rest of the evidence. In this note we have explored the possible causes of this divergence and conclude that:

- it is unclear that the TMR estimates produced by investment managers are appropriate in the context of a price control; and
- if any weight is to be placed on this evidence, an upward adjustment has to be made, to correct for the downward bias from geometric averaging.

[40] Ofcom (2016), 'Business Connectivity Market Review', 28 April, para. A30.238.

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