



# **A Response to Ofgem's Proposals on the Cost of Equity and Debt for RIIO ED1**

**Prepared for ENA**

26 September 2014

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## Contents

<b>Executive Summary</b>	<b>i</b>
<b>1. Introduction</b>	<b>1</b>
<b>1.1. Scope of this report</b>	<b>1</b>
<b>1.2. Structure of the Report</b>	<b>1</b>
<b>2. Ofgem's Components of the Cost of Equity Do Not Add Up</b>	<b>3</b>
<b>3. NERA Response to Ofgem's Sources of Headroom</b>	<b>4</b>
<b>3.1. Latest Evidence from RAV Premia is Inconclusive</b>	<b>4</b>
<b>3.2. Reduction in Interest Rate Risk Exposure Under the Proposed "Trombone" Index</b>	<b>8</b>
<b>3.3. The "Halo Effect" Disappears After Correcting for the Tenor and Concavity Effects</b>	<b>9</b>
<b>3.4. Caution in CC Decision to Choose at the Top End of Its Range</b>	<b>12</b>
<b>3.5. Caution in TMR Estimate: DMS Proposition that Historical Returns May Overstate Expected Returns Going Forward</b>	<b>13</b>
<b>3.6. Beta Estimates</b>	<b>14</b>
<b>3.7. Forward Rates Show Persistence in Low Risk-Free Rates over the RIIO ED1 Period</b>	<b>17</b>
<b>4. Debt Indexation</b>	<b>19</b>
<b>4.1. Ofgem's July RIIO ED1 Proposals</b>	<b>19</b>
<b>4.2. Alternative Cost of Debt Index Averaging Periods</b>	<b>20</b>
<b>4.3. Conclusions</b>	<b>23</b>

### **Appendix A.Techical Note: Correction for the "Halo effect"**

**24**

## Executive Summary

This report considers whether there is evidence to support Ofgem's assumption that there is headroom in its cost of equity proposal for RIIO-ED1, which justifies its proposed under-recovery on the cost of debt. We conclude that there is no evidence to support headroom on the cost of equity, which means that the initial averaging period on the cost of debt index should be extended to allow DNOs to have the prospect of recovering debt costs.

### **Ofgem's proposals imply under-recovery of 17 bps on debt**

In its recent draft determination (DD), Ofgem acknowledged that its proposed cost of debt index (the “trombone” index) does not allow DNOs to recover their debt costs but Ofgem claims the under-recovery is justified due to the existence of headroom in its cost of equity estimate of 6%, as well as the “halo” effect.<sup>1</sup>

We calculate that the sector is likely to under recover debt costs by 17bps over the RIIO-ED1 period, although a number of DNOs will perform substantially worse. For the sector as a whole to break-even implies headroom in the cost of equity of at least 30bps, i.e. the true cost of equity would have to be as low as 5.7% (real pre-tax) relative to Ofgem's proposal of 6%.

### **There is no evidence to support headroom in the cost of equity of 6%**

In a recent financial issues working group, Ofgem set out a number of reasons why it considered there was headroom in its proposed cost of equity allowance of 6%. We do not consider that any of the reasons put forward by Ofgem provide such evidence:

- *Transaction premia*: We show that historical transaction premium were principally explained by outperformance on the cost of debt and (then) higher cost of equity allowances. There is no longer scope for debt or equity outperformance under RIIO-ED1, i.e. Ofgem has already addressed any reasons that may have contributed to premia.
- *Risk reduction under “trombone” index*: Ofgem has proposed the trombone index to mitigate (even greater) underperformance on the cost of debt; there is no reason to consider that the trombone creates headroom on the cost of equity. Moreover, drawing a comparison with the Competition Commission's (CC) Northern Ireland Electricity (NIE) decision, interest risk is greater under the proposed cost of debt index relative to NIE not least because the CC decision allows NIE to recover embedded debt costs (whereas many DNOs underperform on the index).
- *“Halo effect”*: We show that Ofgem's supposed halo effect is explained by the shorter period to maturity, and different distribution of tenor, for DNOs' bonds relative to the tenor of the bonds included in the index. Once these differences are controlled for the effect disappears.
- *Caution in CC decision to choose at top end of its range*: We consider that the different period covered by RIIO-ED1 (e.g. it finishes six years later than NIE), and the expected return to more normal economic conditions, means that Ofgem cannot directly translate

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<sup>1</sup> Ofgem (2014) DD, Financial Issues, para. 2.46

the CC decision to RIIO-ED1. Also, Ofgem's own advisers consider that the evidence does not support a total market return (TMR) below 6.5% (Ofgem's apparent TMR).

- *DMS proposition – historical returns may overstate expected returns.* Ofgem has stated that it has drawn on long run market evidence in setting its estimate of the total market return of 6.85% (net of its view of the RPI effect). However, it also appears to have introduced a further 30bps reduction to the long-run TMR derive a cost of equity of 6%. Therefore, it appears that it has already taken into account its view of lower market returns going-forward. Moreover, the DMS thesis was published in 2001 (so surprising that Ofgem should invoke this now).
- *Beta estimate is high.* Ofgem has set an equity beta of 0.9. We show that the current empirical evidence supports an equity beta of around 0.93 for listed UK utilities. Excluding the lower risk water utilities from this set implies an equity beta value of greater than 1.
- *Low risk-free rates over the RIIO ED1 period.* Ofgem has estimated a risk-free rate of 1.6%, drawing on long run market data. However, it has also made a downward adjustment of around 30bps, potentially to reflect low short-term risk-free rates. Comparing to CC NIE decision, Ofgem has adopted a TMR in line with the CC NIE decision; this is despite the expectation that debt costs/risk-free rate will be 25bps higher over RIIO-ED1 relative to the NIE regulatory period.

We also note that in deriving its cost of equity of 6%, Ofgem has assumed an RPI effect of 40bps which we consider overstates the effect. We consider that the evidence supports an RPI effect adjustment of 15bps. As stated above, Ofgem has also introduced an apparent reduction of 30bps to its long run TMR estimate of 6.85%

For the reasons set out above, we do not consider that the evidence supports Ofgem's assumption that there is headroom in its cost of equity proposal of 6%.

### **The conceptually correct initial averaging period is 20 years but 15 is the maximum available**

In the absence of any evidence of headroom in relation to Ofgem's proposed cost of equity, Ofgem should extend the initial trailing average period on the cost of debt index from 10 years to ensure that DNOs do not under-recover debt costs. The conceptually correct initial averaging period is 20 year to match DNOs' debt tenor, although data limitations allow for an initial averaging period of only 15 years.

Under a 15 year index, our analysis shows that the sector enjoys very moderate outperformance as a whole over the entire period, however, companies cost of debt is in line with the allowance towards the end of the period. However, if we assume that DNOs issue debt on average at BBB, consistent with Ofgem's financeability analysis, our analysis shows that companies' outperformance is immaterial over RIIO-ED1 under a 15 year index, and the sector underperforms by the end of RIIO-ED1.

We also show that at the very minimum a 13-year initial averaging period is required to ensure the industry as a whole is able to recover efficiently incurred debt costs.

## 1. Introduction

### 1.1. Scope of this report

This report provides further analysis of Ofgem's approach to setting the cost of equity and debt allowances at RIIO-ED1, drawing on previous NERA reports for the ENA.<sup>2</sup>

Specifically, this report addresses a number of issues raised in the recent financial issues working group between DNOs and Ofgem, held on the 15th September 2014.

In its recent draft determination (DD), Ofgem acknowledged that its proposed cost of debt index (the “trombone” index) underprovides for DNOs’ debt costs but it claims the under-recovery is justified due to the existence of headroom in its cost of equity estimate of 6%, as well as the supposed “halo” effect.<sup>3</sup>

In the financial issues working group, Ofgem set out the reasons why it considered there was headroom in its proposed cost of equity allowance of 6%. The reasons were as follows:

- *Transaction evidence of RAV premia;*
- *Reduction in interest rate risk exposure under the proposed “trombone” index ;*
- *Existence of the “Halo effect”;*
- *Caution in CC decision to choose at top end of its range;*
- *Caution in TMR estimate – DMS proposition that historical returns may overstate expected returns going forward;*
- *Ofgem’s beta estimate appears high in light of the risk protections the regulatory regime provides; and,*
- *Forward rates show persistence in low risk-free rates over the RIIO ED1 period.*

In the financial issues working group, Ofgem also provided an explanation of how it derived its proposed cost of equity allowance of 6%.

In this report, we demonstrate that the list of issues cited by Ofgem (as set out above) do not provide any evidence to support Ofgem’s claim that its proposed 6% cost of equity allowance includes headroom. We conclude that in the absence of headroom on the cost of equity, Ofgem should extend the initial averaging period on the cost of debt to ensure that DNOs have a reasonable prospect of recovering efficiently incurred debt costs.

### 1.2. Structure of the Report

This report is structured as follows:

<sup>2</sup> NERA (2014) A Response to Ofgem’s Cost of Equity Estimates in the RIIO-ED1 Draft Determination, A Report for ENW, NPG, SPEN and SSEPD and NERA (2014) Analysis of Ofgem’s Cost of Debt Draft Determination for RIIO-ED1

<sup>3</sup> Ofgem (2014) DD, Financial Issues, para. 2.46

- Section 2 sets out our understanding of how Ofgem has derived its cost of equity estimate of 6% drawing on Ofgem's explanation in the recent financial issues working group;
- Section 3 addresses each of Ofgem's points as to why it considers there is headroom in the cost of equity;
- Section 4 sets out the expected under-recovery on Ofgem's proposed cost of debt indexation mechanism, and discusses alternative initial averaging periods which allow the industry to recover costs.

## 2. Ofgem's Components of the Cost of Equity Do Not Add Up

In our earlier report on Ofgem's approach to the cost of equity, we assumed that Ofgem's proposed 6% cost of equity was based on a translation of the Competition Commission's (CC) cost of capital estimate for the Northern Ireland Electricity (NIE) to DNOs, as described in Ofgem's draft determination (DD).<sup>4</sup>

However, at the financial issues working group Ofgem stated that its proposed cost of equity was not based on a translation of the CC's cost of capital for NIE. Instead, Ofgem stated that its cost of equity estimate was based on an equity beta of 0.9, a long-run risk-free rate of 1.6%, and an ERP of 5.25%, equating to a total market return (TMR) estimate of 6.85%.

In addition, Ofgem confirmed that it continued to base its cost of equity assumption on long run market evidence. It explained that its risk-free rate assumption of 1.6% was based on its view of an upper-bound long run risk-free rate of 2% based on historical data, with a downward adjustment of 40bps to reflect its view of the RPI effect.<sup>5</sup>

The assumptions as stated by Ofgem in the financial issues working group result in a cost of equity of 6.325%, i.e.:

Ofgem's stated derivation of the cost of equity:  $1.6\% + 0.9 * 5.25\% = \underline{\underline{6.325\%}}$

Therefore, it still remains unclear how Ofgem derived its cost of equity estimate of 6% for the DNOs for its August Draft Determination (DD). We assume that Ofgem has made a further downward adjustment of around 30bps, but it is unclear to us the basis for this further downward adjustment.

In addition, as set out in a separate report for ENA, we do not consider that Ofgem's downward adjustment to the risk-free rate of 40bps for the RPI effect is a reasonable interpretation of the evidence.<sup>6</sup> We consider that a more reasonable adjustment for the RPI effect would be 15 bps. Using an RPI effect of 15bps but otherwise drawing on Ofgem's stated assumptions results in a cost of equity of 6.575% ( $=6.325\%+40\text{bps} - 15\text{bps}$ ).

For both these reasons (i.e. the implied 30bps downward adjustment and the RPI effect), we do not consider that there is any headroom in Ofgem's 6% cost of equity. In the following section, we also set out why we do not consider that there are other reasons to believe there is headroom.

<sup>4</sup> Ofgem (2014) DD, Financial Issues, Table 2.2. p.7.

<sup>5</sup> This statement is in line with its February 2014 decision on the methodology for assessing market returns. See: Ofgem (February 2014) Decision on our methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls. Link: <https://www.ofgem.gov.uk/publications-and-updates/decision-our-methodology-assessing-equity-market-return-purpose-setting-riio-ed1-price-controls>

<sup>6</sup> NERA (2014) A Review of Ofgem's Estimate of the RPI Effect

### **3. NERA Response to Ofgem's Sources of Headroom**

In this section, we consider each one of Ofgem's stated reasons for headroom in its cost of equity estimate.

#### **3.1. Latest Evidence from RAV Premia is Inconclusive**

Ofgem considers that the existence of transaction premia in the utility sector provides one indicator of headroom in the cost of equity, as it is difficult to reconcile these premia in the absence of outperformance on the cost of equity.

Transaction premia in the network energy sector were around 1.25 to 1.3 (as a multiple of the regulated asset base) prior to the introduction of the RIIO-framework.<sup>7</sup> However, the most recent (and only) transaction in the energy sector since the introduction of RIIO – in relation to CKI's acquisition of West and Wales Utilities (WWU) – shows a substantive decrease to around 1.15.<sup>8</sup>

We consider that transaction premia in the network energy sector will continue to be low given the changes to the cost of debt and equity allowance:

- companies' ability to outperform the cost of debt allowance was a key driver of premia, and this is no longer possible under the cost of debt indexation mechanism, as recognised by Ofgem.<sup>9</sup>
- past premia were based on expectation of a higher cost of equity (say of 6.7%, as set by Ofgem at successive reviews). However, as set out in the DD, Ofgem proposes to reduce the cost of equity allowance to 6%.

In addition, premia are explained by non-financing issues, such as expectations on outperformance on cost assumptions, revenues associated with incentive mechanisms, as well as values associated with non-regulated businesses. Therefore, the existence of premia do not entail that the allowed rate of return is set higher than the cost of capital.

Overall, we consider that the pre-RIIO evidence on premia is not relevant given Ofgem's changes to the cost of debt and equity allowances, and the only recent energy network transaction does not provide any evidence to support headroom in relation to a cost of equity allowance of 6 per cent.

<sup>7</sup> For example, the sale of EDF Energy Networks to CKI (July 2010) at a MAR of 1.27, and the sale of Central Networks to PPL (March 2011) at a MAR of 1.3. Sources: <http://uk.reuters.com/article/2010/07/30/uk-edf-ukgrids-idUKTRE66T0MP20100730>; <http://www.bloomberg.com/news/2011-03-02/ppl-to-buy-central-networks-business-from-e-on-for-5-6-billion.html>

<sup>8</sup> Source: <http://www.thedeal.com/content/energy/cheung-kong-infrastructure-affiliates-pay-3b-for-wales-west.php#ixzz2sYVfEE2W>. MAR based on own calculation: "Wales & West's regulated asset value as of March 31 was £1.7 billion", "Sales price £1.96 Billion"

<sup>9</sup> Ofgem's own modelling shows that their proposed CoD index underprovides for the DNO's forecast cost of debt. See para 2.44 in RIIO ED1 Draft Determination, accessed here: <https://www.ofgem.gov.uk/ofgem-publications/89072/riio-ed1draftdeterminationfinancialissues.pdf>

### **3.1.1. Past transaction premium were partly based on cost of debt outperformance**

One factor that has explained past transaction premia is that the cost of debt allowance set at successive price reviews has in hindsight turned out to be much higher than outturn debt costs.

The cost of debt outperformance has led to additional returns to equity investors, which would have been reflected in the premiums that investors were willing to pay. Financial analysts have estimated the transaction premia associated with debt outperformance at least 5-10%.<sup>10</sup> Similarly, we have estimated outperformance on debt of around 100bps which corresponds to a premium of around 10%.<sup>11</sup>

However, no such debt outperformance will be available for DNOs under the RIIO framework as recognised by Ofgem.<sup>12</sup>

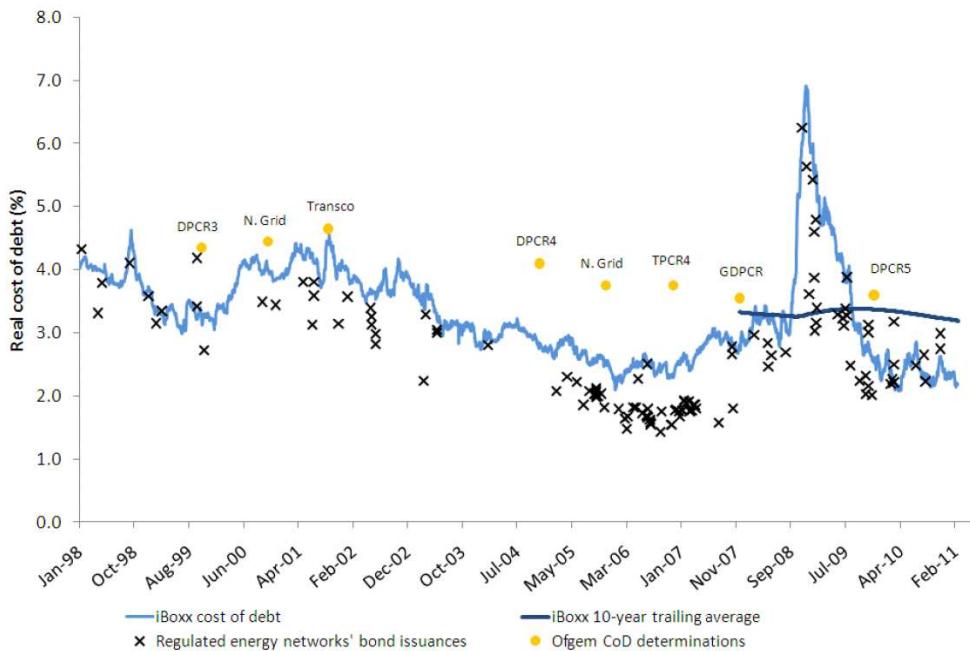
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<sup>10</sup> See for example: Macquarie (2014) Subject: Consultation on the methodology for assessing the equity market return for the purpose of setting RIIO price controls, para. 4(e)

<sup>11</sup> Our estimate of 100bps outperformance on debt is based on our own analysis of water sector company performance, and published company statements. Specifically, we have compared Ofwat's risk-free rates for the final determinations for PR94, PR99 and PR04 to the yields on 10-year UK index-linked gilts based on daily yield data taken from the Bank of England. Our estimate of outperformance is consistent with company stated outperformance. See for example, United Utilities expected outperformance over the period 2010-15. Source: UU (2014) Annual Report and Financial Statements, KPIs. Link: <http://annualreport2013.unitedutilities.com/Keyperformanceindicators.aspx>

<sup>12</sup> Ofgem's own modelling shows that their proposed cost of debt index underprovides for the DNO's forecast cost of debt. See Ofgem (2014) DD, Financial Issues, para 2.44. Link: <https://www.ofgem.gov.uk/ofgem-publications/89072/riio-ed1draftdeterminationfinancialissues.pdf>

**Figure 3.1**  
**Historical Transaction Premia Have Been Explained By Debt Outperformance<sup>13</sup>**



Source: Figure 3.9 in Ofgem (2011), Decision on strategy - RIIO-T1 and GDI Financial Issues<sup>14</sup>

### 3.1.2. Past premia reflect the higher cost of equity allowance than Ofgem's proposals

The historical premia also reflected the market's expectations of a higher allowed rate of return of, say, at least 6.7%, as set by Ofgem at successive reviews.<sup>15</sup>

The decline in the proposed allowed cost of equity to 6% will result in lower premia going-forward. In other words, the headroom observed in the premia has been taken into account by Ofgem in setting a lower cost of equity at RIIO-ED1.

Our calculation of the impact of a reduction in the allowed cost of equity from 6.7% to 6% shows that the transaction premia going-forward will be lower by around 5%. Taking CKI's

<sup>13</sup> The Figure understates utility companies' debt costs (and overstates the difference between utility debt costs and the iBoxx index) as it ignores companies' issuance costs, as well as the cost associated with wrapped debt issues. Utility companies also issued high-levels of index-linked debt compared to the index over the period. We do not consider that companies will be able to issue such levels going-forward (for reasons, see NERA (2014) Analysis of Ofgem's Cost of Debt Draft Determination for RIIO-ED1, slides 14 and 16).

<sup>14</sup> Source: <https://www.ofgem.gov.uk/ofgem-publications/48262/gd1decisionfinance.pdf>

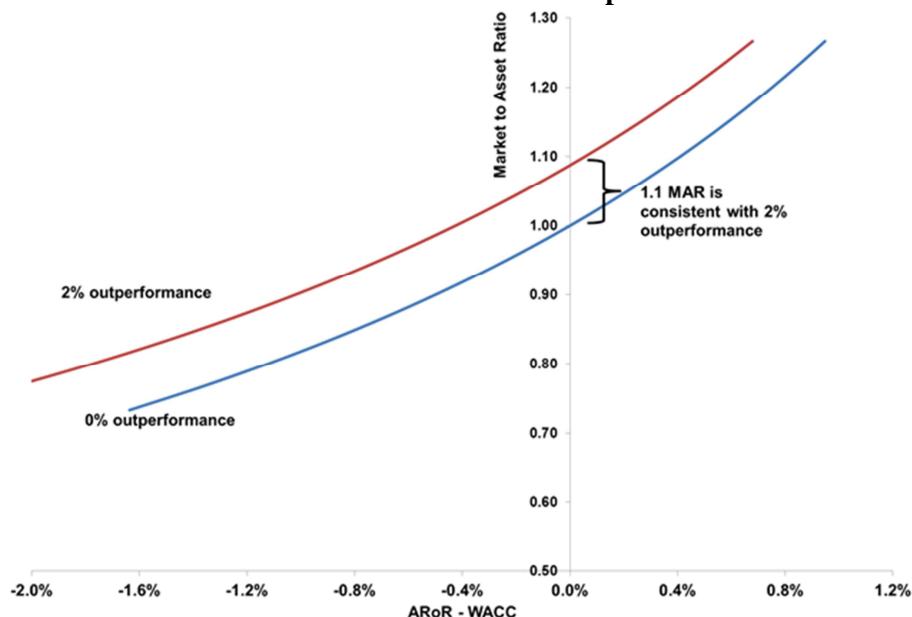
<sup>15</sup> [Citation required]

WWU premium of 1.15 as an example, we would anticipate the premium declining to 1.1 to reflect the lower cost of equity.<sup>16</sup>

### 3.1.3. Premia also reflect expectations of cost outperformance

In addition, any transaction premium is likely to account for expected outperformance on cost allowances and incentive mechanisms. For example, Figure 3.2 shows that a MAR of 1.1 can be explained an investor anticipating 2% cost outperformance.<sup>17</sup>

**Figure 3.2**  
**A MAR of 1.1 is Consistent with Cost Outperformance of 2%**



Source: NERA illustration.

### 3.1.4. Conclusion

The changes under RIIO mean that Ofgem should not place reliance on transaction premia which occurred under the pre-RIIO framework as an indication of headroom in the cost of equity. A substantive element of the past premia can be explained by expected outperformance on the cost of debt, and expectations of a higher cost of equity (say, 6.7%). These factors no longer hold.

In addition, transaction premia can be reasonably explained by cost outperformance, rewards associated with incentive mechanisms, and the value of non-regulated businesses.

<sup>16</sup> Premium derived based on 65% gearing level, 7% capex/RAB ratio and 2.5% annual depreciation, assuming constant RAB from year 9 onwards. We also assume that investors would have expected 6.7% in perpetuity but now anticipate 6% in perpetuity.

<sup>17</sup> E.g. Dee Valley Water and United Utilities in 2009/10 have achieved similar outperformance in the UK water sector.

Adjusting the recent transaction of 1.15 for CKIs acquisition of WWU for Ofgem's proposed cost of equity of 6% (which results in a decline of 5%), and a reasonable assumption on cost outperformance of 2% (which explains a further 10%), suggests that the premia would be close to zero, and there is no evidence of headroom in the cost of equity.

Finally, we also note that the CKI WWU premium relates to a specific company (WWU), and a different sector (i.e. gas distribution), and the premium (including any implied prospects for cost outperformance) does not provide any evidence of prospective cost outperformance or premia for the electricity distribution sector.

### **3.2. Reduction in Interest Rate Risk Exposure Under the Proposed “Trombone” Index**

In its presentation on 15 September Ofgem stated that the “*modified cost of debt index de-risks exposure to interest rates.*”<sup>18</sup>

It is not clear to us why Ofgem considers that the proposed trombone index provides for headroom on the cost of equity. As noted by Ofgem, the introduction of the trombone is designed principally to address the otherwise substantive under-recovery on the cost of debt, arising from the mis-match of the tenor of DNOs’ debt relative to the 10 year trailing average.<sup>19</sup> It is not clear why the trombone therefore also provides headroom on equity.

More generally, as set out in previous work,<sup>20</sup> the risk profile of a cost of debt index actually has a pro-cyclical component against the backdrop of the RIIO-ED1 period, increasing equity risk (rather than creating headroom). This is driven by two aspects of Ofgem’s cost of debt index:

- An index with less than 20Y tenor “overreacts” to changes in debt costs. That is, an increase in the cost of debt index over RIIO-ED1 is likely to benefit DNOs (as shown by Ofgem’s own analysis<sup>21</sup>) whereas a decrease will reduce allowances by more than the fall in funding costs;
- The central driver of the trajectory of interest rates over the RIIO-ED1 period will be central banks’ willingness to unwind their asset purchase programmes in light of the economic recovery,<sup>22</sup> suggesting that an increase in allowed rates will be associated with an economic expansion.

<sup>18</sup> Ofgem (15 Sep 2014): Financial issues workshop RIIO-ED1 presentation, slide 5.

<sup>19</sup> Ofgem (2014) DD, Financial Issues, para. 2.42

<sup>20</sup> NERA (March, 2014), “The Cost of Equity for Scottish Power’s Distribution Network Operators at RIIO-ED1”, A report for Scottish Power, Appendix E.

<sup>21</sup> Ofgem (2014) DD, Financial Proposals, Figure 2.1

<sup>22</sup> IMF (2014): G20 Statement: „ "The Fed will need to gradually adjust the pace and composition of asset purchases to reflect evolving economic conditions while continuing its careful policy communication to mitigate the risk of excessive market volatility"

As such, the impact from the debt index on achievable equity returns is likely to be strongly pro-cyclical throughout the RIIO-ED1 period<sup>23</sup> adding to the expected beta of DNOs' returns compared to DPCR5 and other price controls that do not index the cost of debt (e.g. the CC's NIE price control, Ofwat's PR14 and the CAA's Q6 price control for Heathrow and Gatwick).

We also note that compared to the CC's approach for NIE, the DNOs will face "level risk". Unlike for NIE, where the CC sets the embedded debt cost allowance equal to the company's actual cost,<sup>24</sup> a number of DNOs will significantly under-recover their debt costs even when the index is extended, as acknowledged by Ofgem:

*"Some [DNOs] are likely to experience a material divergence in any event due to a large value of outstanding bonds issued at a time of relatively high interest rates in the 1990s."*<sup>25</sup>

There is therefore no evidence that Ofgem's proposed "trombone" index creates headroom in the cost of equity allowance. The trombone index also implies greater risk relative to CC's approach for NIE.

### 3.3. The "Halo Effect" Disappears After Correcting for the Tenor and Concavity Effects

In the financial issues working group, Ofgem acknowledged that its analysis presented in the August 2014 DD paper overlooked the "tenor" effect as identified by NERA.<sup>26</sup> However, Ofgem stated that it would need to consider the extent to which accounting for differences in tenor fully explained the halo effect; i.e. Ofgem accepts it has made an error but does not (yet) accept that the error entirely accounts for the halo effect.

In our report on the halo effect for the ENA,<sup>27</sup> we argued that Ofgem's alleged halo effect can be explained by two separate issues with Ofgem's calculation, which imply that Ofgem has not compared like-for-like spreads on the iBoxxx index and its constructed DNO index. In this section, we show that accounting for these issues implies that there is no halo effect.

#### 3.3.1. The tenor issue

Ofgem compares the spreads of the iBoxx index over the 20Y gilt rate<sup>28</sup> to a DNO constructed benchmark index spread over the same 20Y gilt rate. While the average maturity of the iBoxx index is 20Y over the observation period, as shown in Figure 3.3, the average

<sup>23</sup> Also see First Economics (2012): The Riskiness of the Electricity DNOs under RIIO Relative to Other Regulated Networks

<sup>24</sup> Competition Commission, NIE Ltd price determination, Final Determination, 26 March 2014.

<sup>25</sup> Ofgem (2014): Decision on our methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls, p.14.

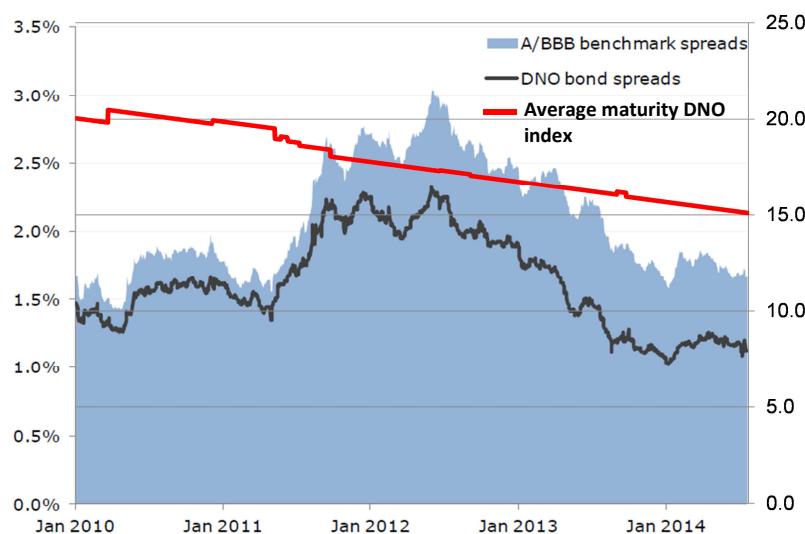
<sup>26</sup> NERA (2014) Analysis of Ofgem's Cost of Debt Draft Determination for RIIO-ED1

<sup>27</sup> NERA (2014) Analysis of Ofgem's Cost of Debt Draft Determination for RIIO-ED1

<sup>28</sup> We assume that Ofgem used the same tenor for the gilt rate as the iBoxx index, though this is not expressly stated in the DD paper. See para 2.60, accessed here <https://www.ofgem.gov.uk/ofgem-publications/89072/riio-ed1draftdeterminationfinancialissues.pdf>

maturity of the DNO index falls from 20 years in 2010, when the difference between the iBoxx and the DNO spread is very small, to 15 years at present, where the difference in the spreads becomes increasingly larger. This indicates that the tenor mismatch is a significant driver of the difference between the iBoxx and the DNO benchmark spreads, as Ofgem has recognised.

**Figure 3.3**  
**Ofgem's Halo Effect In Part Reflects the Shorter Period to Maturity of DNO Bonds Relative to the 20 Year Index**



### 3.3.2. The concavity issue

A second issue with Ofgem's choice of a DNO benchmark is that it contains bonds with much shorter maturity than the IBoxx index, which skews the spread estimates via the so-called "concavity" effect.

The concavity effect arises due to the fact that the yield curve has a concave shape, i.e. it increases as the tenor of the bonds increases, but at a decreasing rate, as shown in Figure 3.4. This means that the average yield of two bonds with a maturity of say 5 years and 25 years is not the same, but is in fact smaller than the yield on a 15-year bond (i.e. a bond with their average maturity). The result is due to the fact that the reduction in the yield on a 5 year bond vis-à-vis the 15-year bond is *greater* than the increase in yield on the 25 year bond vis-à-vis the 15-year bond, due to the concave feature of the yield curve. We estimate that on 18 August, 2014, this effect accounted for 45bps for UK gilts for the above combination. This thus implies that a portfolio of bonds with a high variability in the tenor of the composite bonds will have a lower average yield than a portfolio with a low variability, even if the bonds had *the same average tenor*.

Our analysis shows that indeed Ofgem's DNO benchmark index included a significant number of bonds which have less than 10-years maturity, i.e. the minimum maturity of the iBoxx benchmark. This means that even if the DNO index had an average maturity of 20-years (i.e. abstracting from the tenor issue for the moment), the inclusion of short-term bonds

(<10 Years to maturity) skews the average yield downwards, because the short term bonds pull the average portfolio yield downward without there being a compensating effect from the bonds at the higher end of the tenor spectrum.

**Figure 3.4**  
**A Concave yield Curve Implies that the Average of the yields on any two bonds on the curve is lower than the yield of the bond with their average tenor**

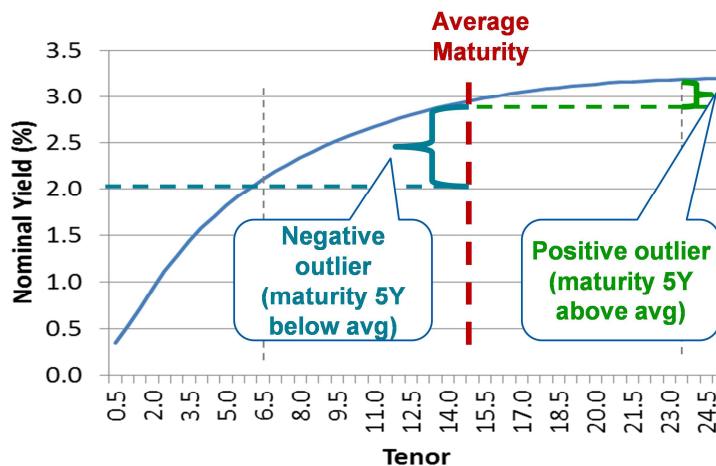
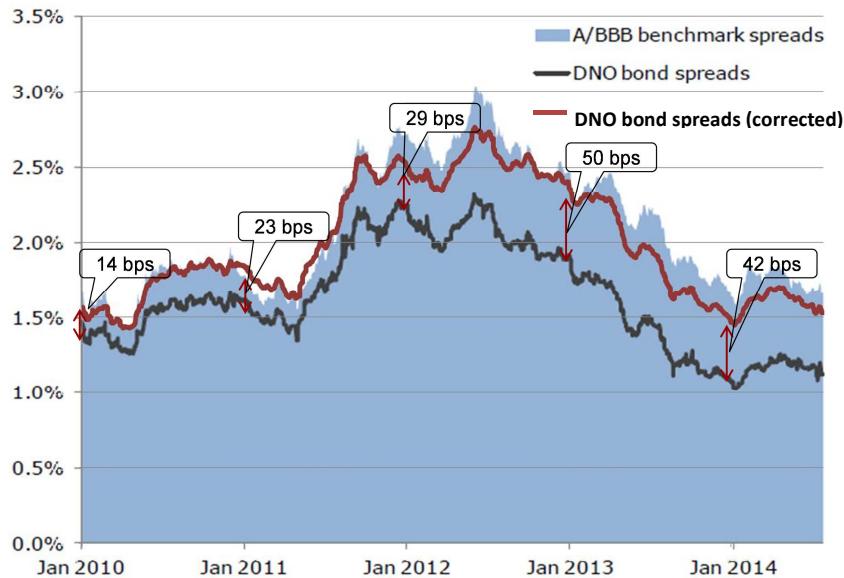


Figure 3.5 shows our correction of Ofgem's "halo effect" calculation. As shown, taking account for the tenor and concavity effects substantially eliminates the halo effect over RIIO-ED1 (as shown by the shift upwards of Ofgem's blue line to the adjusted red line). The remaining difference between our DNO costs (adjusted for tenor and concavity) and the iBoxx index cost is around 5bps on average over the period of analysis. We consider that this nominal remaining difference is likely to be explained by a number of assumptions that we make in adjusting for the tenor and concavity effects, as we explain in Appendix A.

In conclusion, the absence of a halo effect means that there is no headroom to compensate for underperformance on the cost of debt (as Ofgem claim). In addition, the absence of a halo implies that Ofgem's overall approach fails to compensate companies for debt issuance costs.

**Figure 3.5**  
**Correcting for the Tenor And Concavity Effects Substantially Eliminates Ofgem's  
 "Halo effect"**



Source: NERA Analysis

### 3.4. Caution in CC Decision to Choose at the Top End of Its Range

Ofgem considers that its proposed cost of equity of 6% - at the top end of the range of the CC's decision for NIE of 4.3% to 6.3% - implies that there is headroom in its proposed cost of equity.

However, as we set out in our first cost of equity report for ENA, Ofgem should not read directly across from the CC decision on the total market return (TMR) as the RIIO-ED1 period starts 3 years later and finishes 6 years later relative to NIE. Over the RIIO-ED1 period, there is an expectation of a return to more normal market conditions which support a higher TMR than the CC NIE decision. As set out in our first report on the cost of equity, we consider that the evidence over RIIO-ED1 supports a TMR of around 7%, higher than CC assessment of NIE of 6.5%.

It is also worth noting Ofgem's conclusions from the February 2014 decision that:

*we acknowledge that the CC's position on the cost of equity in its provisional determination should be viewed in light of its position on the cost of debt. (...) Taking this wider context into account, we believe it would be inappropriate to adjust cost of*

*equity assumptions by the full 0.8 per cent (...) that would be implied by a direct translation of the CC's methodology on the equity market return.<sup>29</sup>*

We also note that the Smithers (2014) paper, which Ofgem commissioned as part of its review of assessing equity market returns, concluded that the evidence does not support an TMR below 6.5% (which we assume is Ofgem's assumption).<sup>30</sup>

In addition, even if we were to accept that the NIE CC decision provides a plausible range for RIIO-ED1 (which we do not), UK regulators (including Ofgem at previous price controls<sup>31</sup><sup>32</sup>) have accepted that the cost of equity should be set towards the top-end of any plausible range given the asymmetric costs of setting a rate of return that is too low relative to one that is high.<sup>33</sup><sup>34</sup>

For these reasons, we do not consider that the CC NIE range provides a reason for concluding that the Ofgem cost of equity proposal incorporate headroom.

### **3.5. Caution in TMR Estimate: DMS Proposition that Historical Returns May Overstate Expected Returns Going Forward**

Ofgem also quotes findings from 2001 that outturn returns may have been higher than forward-looking returns as evidence in support of headroom in its COE estimate:

*Alternatively, it has been suggested by economists Elroy Dimson, Paul Marsh and Mike Staunton (DMS) that equity investors in the 20th century may have benefitted from higher than expected returns, in which case the history of achieved returns may overstate expectations of future returns.<sup>35</sup>*

We note that the DMS proposition was published in 2001 and Ofgem has not relied on this evidence in any of its determinations following its publication. It therefore appears selective

<sup>29</sup> Ofgem (February, 2014), Decision on methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls, accessed at: <https://www.ofgem.gov.uk/ofgem-publications/86366/decisiononequitymarketreturnmethodology.pdf> pp. 11-12.

<sup>30</sup> Wright & Smithers state: [...] 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 6¼ %, or (at the lowest) 6 ½%. This figure is at the very top of the CC's assumed range of 5 to 6½%. (...) We conclude that there is no plausible case for any further downward adjustment in the assumed market cost of equity based on recent movements in risk-free rates (or indeed any other "recent market evidence"). Source: Wright & Smithers (2014): The Cost of Equity Capital for Regulated Companies: A Review for Ofgem, p.2.

<sup>31</sup> See Para 1.10 'Ofcom's approach to risk in the assessment of the cost of capital', Ofcom, August 2005 and Para 18.8 'Airports Price Control Review – Initial Proposals for Heathrow Gatwick and Stansted', CAA, December 2006.

<sup>32</sup> Ofgem (2006): Transmission Price Control Review: Final Proposals, p.11

<sup>33</sup> Para 1.10 'Ofcom's approach to risk in the assessment of the cost of capital', Ofcom, August 2005

<sup>34</sup> Para 18.7 'Airports Price Control Review – Initial Proposals for Heathrow Gatwick and Stansted', CAA, December 2006.

<sup>35</sup> Ofgem (17 Feb 2014): Decision on our methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls, p.7. (Emphasis added)

to rely on it now to justify headroom in the cost of equity. Moreover, Ofgem itself has recently voiced its scepticism about the robustness of this proposition:

*However, we recognise the need to be cautious about placing weight on these hypotheses given that there is no consensus on these issues.<sup>36</sup>*

Finally, we note that that Ofgem appears to be implicitly using a TMR of around 6.5% (as we explain in section 2), which appears to include a downward adjustment of 30bps to take into account that historical returns may overstate returns going forward; despite the fact that it previously cautioned against it.

Given that Ofgem has made a downward adjustment to its long-run view of the TMR (of 6.85%) to potentially reflect market returns going-forward, there is no evidence to suggest that the cost of equity of 6% provides further headroom for this factor.

### 3.6. Beta Estimates

Ofgem considers that its equity beta assumption of 0.9 is higher than empirical evidence. In its February 2014 decision document on assessing market returns<sup>37</sup>, Ofgem presents evidence suggesting that equity betas of network companies may be no higher than 0.5. This evidence is derived from an earlier RIIO financeability study by Imrecon<sup>38</sup>, carried out in 2012.

Ofgem repeated such evidence at the RIIO-ED1 financial issues working group.

Imrecon estimate raw equity betas for five comparator companies that they consider representative for RIIO regulated energy networks. Its analysis shows betas between 0.4-0.6 during the last year and between 0.5-0.75 in the previous three years. The equity betas are based on the comparators' actual level of gearing and are not adjusted to reflect Ofgem's notional gearing level of 65 (see Figure 3.6).

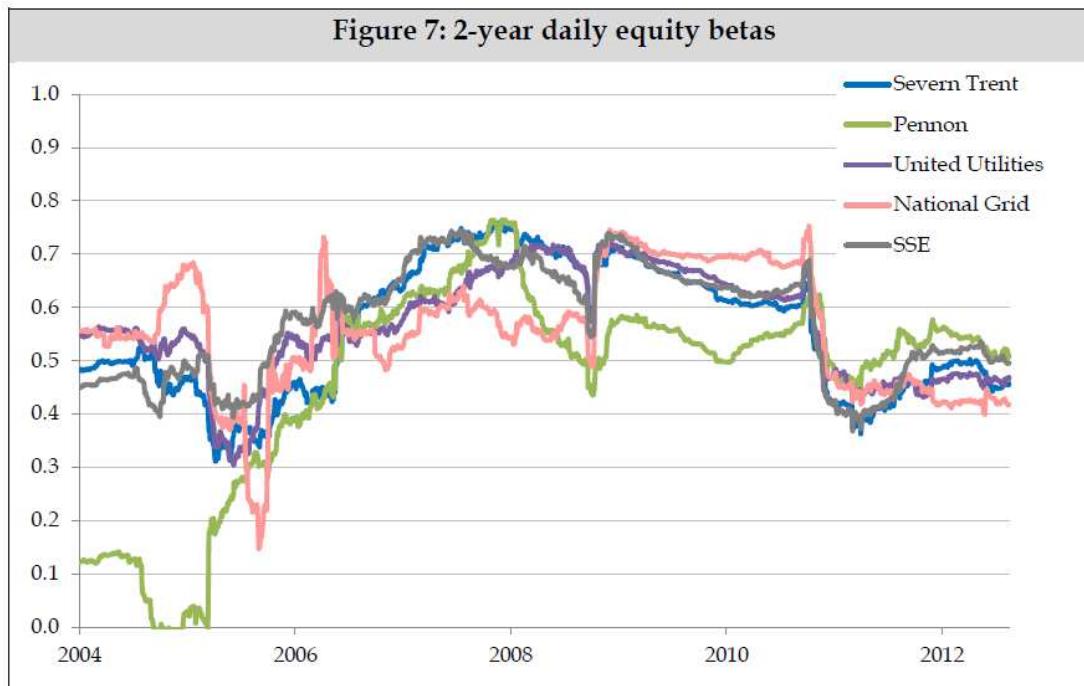
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<sup>36</sup> Ofgem (17 Feb 2014): Decision on our methodology for assessing the equity market return for the purpose of setting RIIO-ED1 price controls, p.7. (Emphasis added)

<sup>37</sup> <https://www.ofgem.gov.uk/ofgem-publications/86366/decisiononequitymarketreturnmethodology.pdf>

<sup>38</sup> Imrecon and Economic Consulting Associates (2012): RIIO reviews, Financeability study, November 2012. Accessed at: <https://www.ofgem.gov.uk/ofgem-publications/53607/9riiofinanceabilitystudydec12.pdf>

**Figure 3.6**  
**Imrecon's Equity Beta Estimates**



*Source: Imrecon: RIIO reviews, November 2012.*

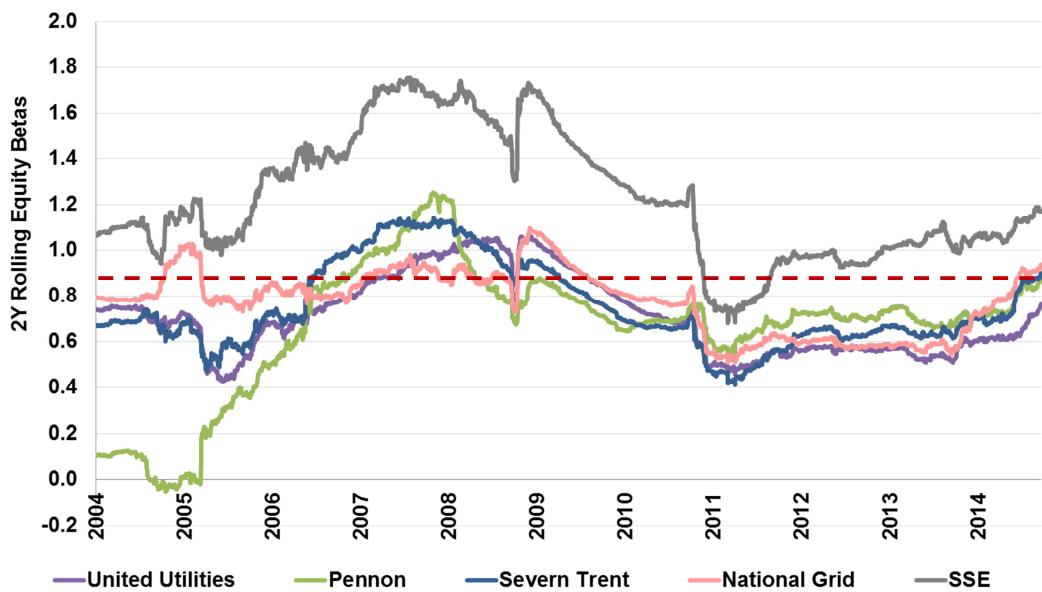
The comparators Imrecon use do not have the same gearing as that assumed by Ofgem, which stands at a notional level of 60% to 65%. Therefore, Imrecon's equity betas are not a like-for-like comparison with Ofgem's equity beta.<sup>39</sup>

We adjust the betas for the notional gearing of 65% that Ofgem used in the RIIO-GD1 decisions. Figure 3.7 below shows the resulting equity betas.

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<sup>39</sup> The equity beta is a function of the (systemic) business risk faced by the company and its level of gearing. Consistency of the gearing and the equity beta is crucial, because in theory the WACC is unaffected by gearing (except from the effect via the tax shield). Increasing gearing increases the weight on cost of debt (which is relatively lower than the cost of equity), but this increases the riskiness of cashflows to equity holders as higher interest payments imply lower profits after interest, thereby increasing the equity beta and the required return by equity investors. In theory, these two effects balance each other out, leaving the WACC unaffected by the capital structure of the company. This fundamental result is known as the Modigliani –Miller theorem. Applying different gearing for the WACC and the equity beta breaks this fundamental relationship.

**Figure 3.7**  
**We Calculate an Average Equity Beta of 0.93 at DNOs Notional Gearing of 65%**



Source: NERA Analysis.

As shown, the current estimates of the 2Y betas lie in the range of 0.76–1.17, and have an average of 0.93, which is in line with Ofgem's allowance of 0.9. Moreover, the 2Y rolling beta estimates over the last year, and over the recent two year period have exhibited similar variation, lying within the range of 0.63 – 1.08 in the last year, and within the range of 0.58 – 1.05 in the last two years. Therefore, adjusting for the notional gearing level shows that the equity betas of the Imrecon comparator set are broadly in line with Ofgem's beta decision of 0.9.

We also note that the CC set NIE's asset beta at the top of its narrowed range from 0.35 to 0.4, implying an equity beta of 0.9 to 1.1 at DNO's notional gearing of 65% (and a debt beta of 0.05). In concluding on this range for an electricity T&DNO, the CC selects beta estimates significantly above those implied by the financeability study prepared by ECA and Imrecon for Ofgem in 2012.<sup>40</sup>

In addition, we would expect the CMA to focus on the beta estimates for energy as opposed to water networks in determining a beta for DNOs. The CC has previously considered water networks as lower risk.<sup>41</sup>

<sup>40</sup> Imrecon and ECA (Nov 2012): Financeability study, submitted to Ofgem.

<sup>41</sup> Competition Commission (Aug 2010): Bristol Water – Final Decision, Annex 6, p N42.

As set out in Figure 3.7, the empirical evidence shows that asset betas are higher for energy than water. Indeed, the CC calculates an asset beta of 0.43 for SSE (one of the two energy network companies) in its NIE decision.

On the basis of the above there is no reason to conclude that Ofgem's beta decision contains any headroom.

### **3.7. Forward Rates Show Persistence in Low Risk-Free Rates over the RIIO ED1 Period**

Ofgem further noted that forward rates show persistence in low risk-free rates.

It is not clear to us why Ofgem consider low risk-free rates provide headroom in its cost of equity estimate. As it stated in the financial issues working group, Ofgem continues to draw on long-run market evidence to set the cost of capital, i.e. the basis for its assumption of a 1.6% risk-free rate and ERP of 5.25%, corresponding to a TMR of 6.85%. In addition, we note that Ofgem appears to have a downward adjustment to the TMR of around 30bps to derive its cost of equity of 6%. It is plausible, although not stated by Ofgem, that the downward adjustment is to reflect Ofgem's view of short-term market conditions, including a low risk free rate.

In addition, Ofgem's approach appears to use a very similar TMR estimate to the CC NIE decision (i.e. Ofgem appears to use a TMR of 6.5% equal to the CC NIE decision)<sup>4243</sup>, although economic conditions over the RIIO-ED1 period are expected to be significantly closer to normal than for the NIE regulatory period.

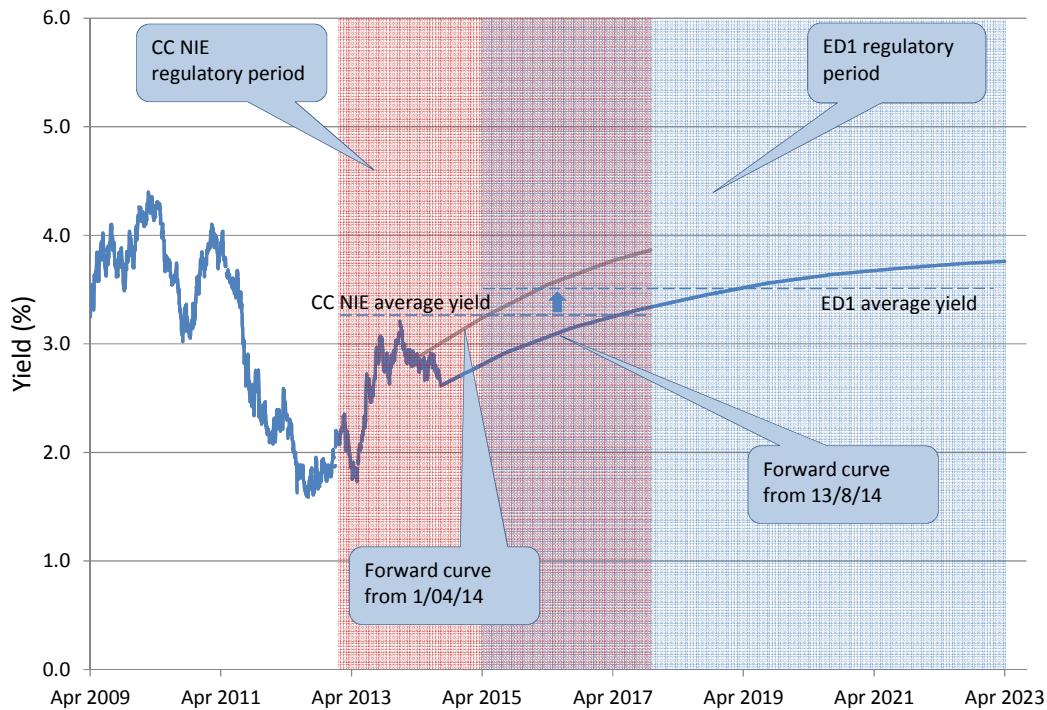
For example, Figure 3.8 shows that projected risk-free rate over RIIO-ED1 is expected to be around 25bps higher than market expectations at the time of the CC NIE decision. It therefore appears implausible that current low risk free rates could imply headroom in Ofgem's proposed cost of equity for RIIO-ED1, and certainly not relative to the CC NIE decision where the expected risk-free rate was lower.

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<sup>42</sup> NERA (2014): A Response to Ofgem's Cost of Equity Estimates in the RIIO-ED1 Draft Determination

<sup>43</sup> It is irrelevant at this stage whether this is because Ofgem's approach is a direct translation of the CC decision or coincidentally reaching the same conclusion.

**Figure 3.8**  
**Expected risk-free rates for the RIIO-ED1 and NIE RP regulatory periods**



Source: Bloomberg, Bank of England, NERA calculation

In conclusion, it appears implausible to us that a persistent low risk-free rate provides a valid explanation for headroom in the cost of equity given that: (I) Ofgem's approach is to use long-run data, although it also appears to have made a downward adjustment of around 30bps to reflect current market conditions; and (II) the expected risk-free rate will be higher over RIIO-ED1 than NIE regulatory period, although Ofgem has assumed the same TMR as CC NIE.

## 4. Debt Indexation

In this section, we explain why the cost of debt index should start with an averaging period of at least 13 years (to ensure that DNOs as a whole recover historical debt costs), and that the conceptually correct starting average period is 16 years (the longest starting period possible).

The analysis set out in this section draws heavily on our cost of debt indexation report for ENA.<sup>44</sup>

### 4.1. Ofgem's July RIIO ED1 Proposals

In its July 2014 DD, Ofgem proposed to calculate allowed CoD using a 10-year initial average of the iBoxx A/BBB index extending to 20-year average over time ("trombone index"). In the DD, Ofgem acknowledges that its proposed index fails to recover DNOs' debt costs but it justifies this under recovery by arguing:<sup>45</sup>

- There is a 'halo' effect, where DNOs are able to issue debt at a cost below the iBoxx index;<sup>46</sup> and
- Ofgem has allowed headroom on the cost of equity<sup>47</sup>

As part of cost of debt indexation report for ENA, we replicated Ofgem's modelling and confirmed Ofgem's conclusion that companies do not recover their debt costs based on the 10Y initial average index. Specifically, we replicated Ofgem's analysis of the index with a 10-year initial average, increasing to 20 years by the final year of RIIO-ED1, and concluded that; (I) Ofgem's proposed index would lead to significant underperformance of 17bps for the industry on average; (II) that there is substantial industry variation, and some DNOs underperform significantly more.

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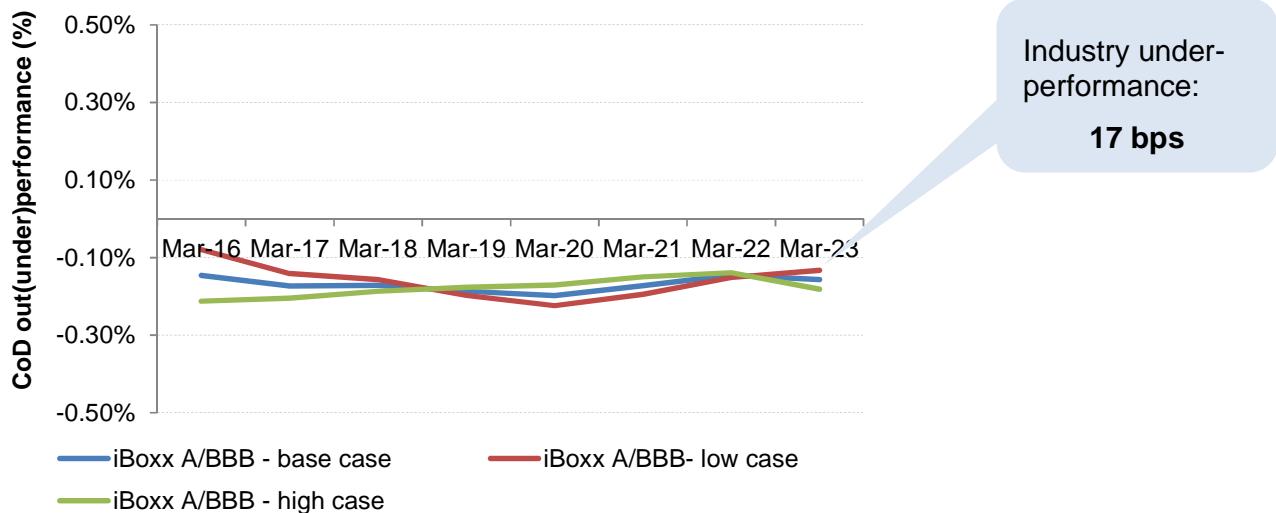
<sup>44</sup> NERA (22 August 2014) Analysis of Ofgem's Cost of Debt Draft Determination for RIIO-ED1

<sup>45</sup> *[Citation required.]*

<sup>46</sup> Source: Ofgem DD – Financial Issues, para 2.46, p12

<sup>47</sup> Source: Ofgem DD – Financial Issues, para 2.47, p13

**Figure 4.1**  
**NERA Replication of Ofgem Estimate of Industry Out/Under-performance<sup>48</sup>**



Source: NERA calculations based on DNO data.

As set out in section 3, we do not find support for Ofgem's conclusion that there is headroom in the cost of equity which provides a reason for justifying under-recovery of debt costs.

In the following section, we set out cost of debt indices based on longer tenor.

## 4.2. Alternative Cost of Debt Index Averaging Periods

### 4.2.1. 15Y Index is conceptually correct

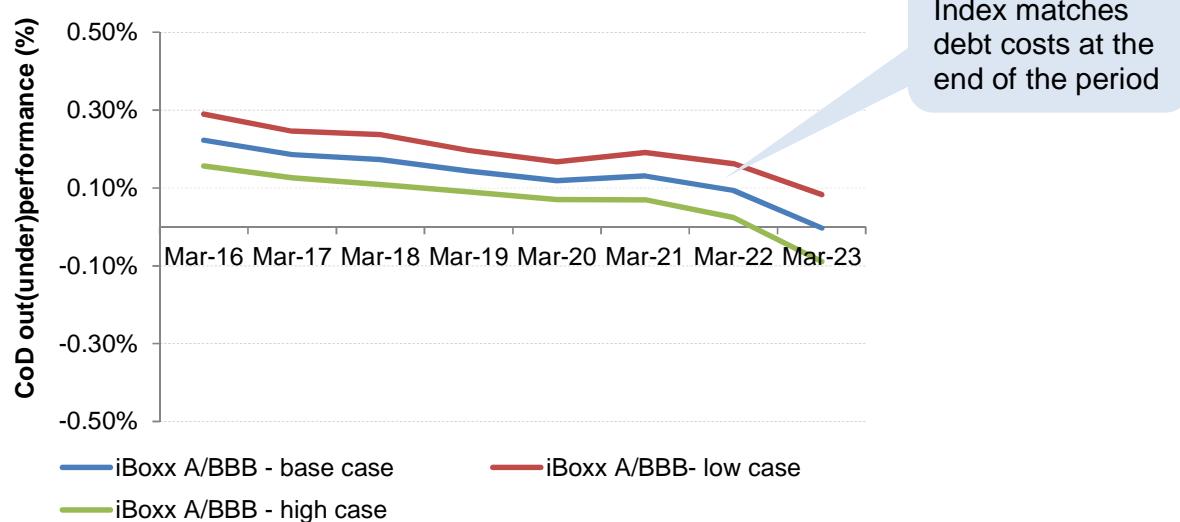
In principle, using the average maturity of DNO debt, which is 20 years, is the most conceptually sound approach to determining the initial averaging period. Ofgem explicitly acknowledges this by proposing an index which extends to a 20-years average over time.

We note that there are only 15 full years of data available for the A/BBB iBoxx index, so in practice the maximum initial averaging period is 15 years.

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<sup>48</sup> Our modelling assumes issuance costs of 20 bps on both embedded (in line with Ofgem's assumption), as well as new issuances (which Ofgem ignores). If we were to ignore issuance costs on new debt as per Ofgem, then the difference between the index value and DNO debt costs would be around 5bps less at around 12 bps on average over the period.

**Figure 4.2**  
**Industry Out (Under) Performance Using Initial 15Y Averaging Period**



Source: NERA calculations based on DNO data.

Using a 15Y initial averaging period is the best available approach because (based on the data available) it most closely matches the tenor of the DNOs' debt

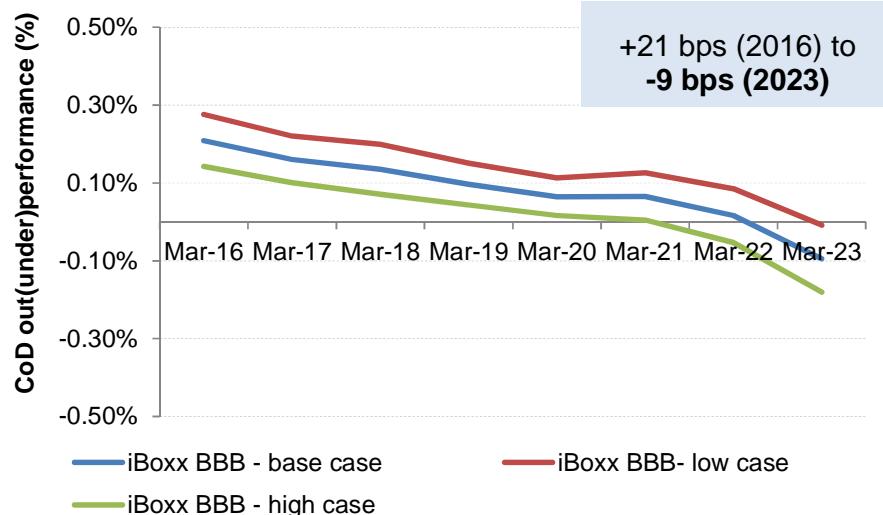
After a period of transition, this index will closely match DNO debt costs once companies have re-financed a significant amount of existing debt

We also consider that there is strong reason to believe that companies' ability to outperform the cost of debt allowance will be much less than set out in the Figure above. Ofgem's own financeability analysis shows that "*there is a risk of one-notch downgrade for many of the DNOs as a consequence of lower than threshold PMICR*", implying that the overall financial package is consistent with a BBB credit rating for a number of companies.<sup>49</sup>

Under such scenario, where companies issue at BBB consistent with Ofgem's financial package, the industry underperforms at the end of the period even under a 15Y initial averaging period (and there is only very modest outperformance over the period as a whole).

<sup>49</sup> Ofgem (2014) DD, Financial Issues, para. 3.14, p. 18.

**Figure 4.3**  
**At BBB Rating, Companies Underperform Index By End of Period**



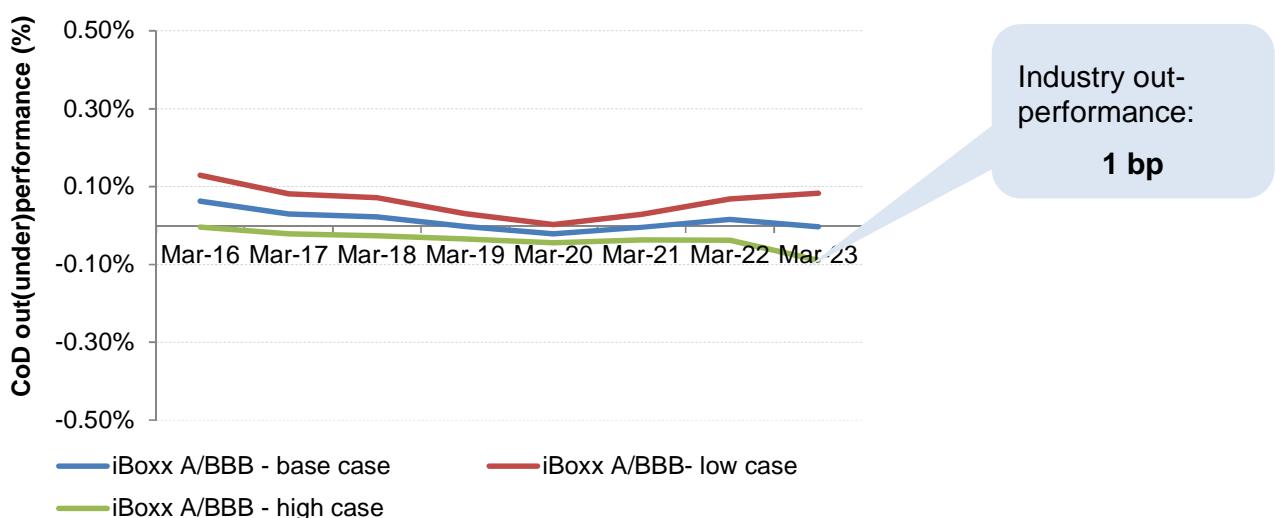
Source: NERA calculations based on DNO data.

#### 4.2.2. 13Y index results in cost-recovery for DNOs

NERA's analysis shows a 13Y initial averaging period is the minimum that allows the industry to *just* recover its debt costs:

However, there is industry variation in performance, so some DNOs would still underperform under this 13Y index. In addition, the 13Y index does not fully match the tenor of DNOs' debt, and there is no theoretical argument for supporting a 13Y average. Also, the industry will underperform where the overall financial package is consistent with a BBB rating.

**Figure 4.4**  
**DNOs Break-Even Under 13Y Averaging Period**



### 4.3. Conclusions

Ofgem justifies the underperformance under the 10-year averaging period by arguing it allows headroom on the cost of equity and that DNO issuances exhibit a halo effect. As set out in section 3, our analysis shows that both of these arguments are incorrect and there is no additional headroom.

Our analysis shows the sector as a whole underperforms by 17bps using a 10-year initial average, although some DNOs have substantively worse performance than average.

Ofgem does not justify a 10-year initial averaging period for the index. The average maturity of DNO debt is 20 years and Ofgem explicitly acknowledges this by proposing an index which extends to a 20-year average over time. Around 29% of issued value of DNO debt at the beginning of RIIO-ED1 was issued prior to 2004 – the first year covered by the allowance under the 10-year initial average.

The theoretically sound method is to match the averaging period to DNO average tenor of 20 years, or as close as possible (given data limitations). Based on the data available, we consider that Ofgem should adopt a 15-year initial averaging period as the longest available. Our analysis shows that the sector outperforms as a whole over the entire period, however, companies cost of debt is in line with the allowance towards the end of the period. In addition, if we assume that Ofgem's financial package is consistent with a BBB credit rating, our analysis shows that companies' outperformance is immaterial over the period, and there is substantive underperformance by the end of RIIO-ED1.

At the very minimum, a 13-year initial average is required to ensure the industry as a whole is able recover its efficiently incurred debt costs.

## Appendix A. Technical Note: Correction for the “Halo effect”

Figure A.1 shows our correction of Ofgem’s “halo effect” calculation. A starting point for this calculation is Ofgem’s own constructed DNO benchmark spread (dark blue line in Figure A.1), to which we correct for both the tenor and concavity effects, as explained above, to arrive at a “corrected” benchmark (red line in Figure A.1) that we compare to Ofgem’s iBoxx spread (blue shaded area in Figure A.1):

- 1) We calculate a “corrected” spread for the DNO benchmark index, by taking the correct difference between each DNO benchmark bond and the respective gilt rate of the same tenor. This means that the calculated spread excludes issues that would arise due to a mismatch of the maturity of the bonds, as spreads over the respective gilt rate solely reflect the excess corporate risk on top of government risk, embedded in the given credit rating.<sup>50</sup> The difference in the dark blue line and the red blue line (see Figure A.1) is partly explained by this correction.
- 2) We additionally recognize that Ofgem’s own iBoxx benchmark spread subtracts the constant 20Y gilt rate from the IBoxx index, despite the fact that the IBoxx itself is comprised of a range of bonds with a minimum maturity of 10years and average of 20 years. Since we want to compare spreads that are *independent* of the tenor of the bonds for both the iBoxx and the DNO benchmarks, we make a similar correction to the iBoxx index. We thus calculate corrected spreads of the iBoxx index, assuming that the iBoxx index has a composition with average maturity of 20years, and with a uniform variance of +/- 5 years around this average<sup>51</sup>

We apply both corrections to the DNO benchmark index, in order to be able to compare it to Ofgem’s original iBoxx spread. Thus, the dark red line indicates the explained difference between Ofgem’s original DNO benchmark spread (dark blue line) and Ofgem’s original iBoxx spread (shaded blue region). The difference between the red line and the blue shaded region in Figure A.1 is the difference that remains after having applied those two corrections.

As shown in Figure A.1, taking account for the tenor and concavity effects substantially eliminates the halo effect over RIIO-ED1. Any difference is likely to be explained by the fact that:

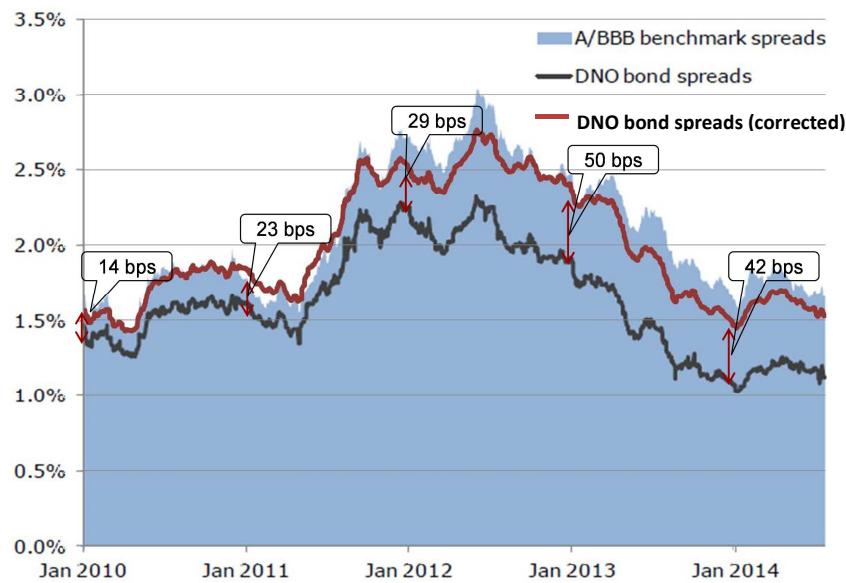
- 1) We correct the iBoxx spreads only partially, i.e. assuming that the tenor varies between 15 and 25 years uniformly. In fact, the iBoxx index contains bonds with a minimum maturity of 10years, and it is likely that the maturity distribution is not uniform around the 20-year average. Therefore our calculated spread does not fully remove the effects arising from the variability in tenor of the bonds.

<sup>50</sup> We assume that corporate spreads over the risk-free rate are constant **across all maturities** and that the difference between the corporate bond and the government bond of the same maturity account for corporate risk only (i.e. removes any risk associated with the holding period). This means that we can then compare average spreads across any maturity.

<sup>51</sup> In fact the IBoxx index has a minimum tenor of 10years but we make this simplifying assumption due to data limitations on the higher end of the curve (BoE does not provide 30Y gilt yields).

- 2) There may be some variation in the *spreads* above the risk-free rate, along the yield curve. We have not investigated this effect further given that the magnitude of this effect, if present, is small.

**Figure A.1**  
**Correcting for the Tenor and Concavity Effects Substantially Eliminates Ofgem's  
 "Halo effect"**



Source: NERA Analysis



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