Northern Gas Networks

A28 - NGN RIIO-2

Review of NGN's Financial Analysis for RIIO-GD2

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1 Summary and outline

Oxera is advising Northern Gas Networks (NGN) in relation to financial projections for RIIO-GD2. NGN has asked Oxera to peer review a financial model for RIIO-GD2 ('the model') in order to provide an independent assessment of NGN's conclusions. NGN's model has been constructed to assess financeability in RIIO-GD2 on a notional company basis. (It is not a preliminary presentation of its RIIO-GD2 business plan, which is still being developed.) NGN's analysis highlights concerns about financeability on the basis of a notional company from Ofgem's proposals for RIIO-GD2. One of NGN's main conclusions from its modelling is that it would need to reduce or delay dividend distributions in the next price control period in order to maintain its credit rating.

NGN also asked Oxera to review potential implications from forgoing or delaying dividend payments throughout RIIO-GD2. For this, Oxera has reviewed the theory and empirical evidence on the costs of delaying investor cash flows, and on investor preferences for dividend distributions.

The main conclusions from Oxera's analysis are as follows.

- At this stage, we view the RIIO-GD2 package as raising concerns about financeability for NGN on the basis of a notional company assessment. Whether or not the actual company is downgraded will depend on the precise calibration of the RIIO-2 package and on the holistic assessment of the quantitative and qualitative factors that underpin the assignation of the credit rating. However, we note that the modelling of NGN's AICR on a notional company basis, at around 1.3x for RIIO-GD2 is below the guidance threshold of 1.5x to 1.75x for BBB and A, respectively, by Fitch. It is also lower than the guidance AICR threshold range for A-rating by Moody's (i.e. 2.0–3.5x) and below the lower end of the 1.4–2.0x guidance threshold range for Baa rating by Moody's (see Table 2.2). We note, moreover, that in assessing financeability, regulators may target a 'comfortable' rating of around BBB+/Baa1 or A–/A3, which would imply some headroom in the financial metrics relative to the lowest bound consistent with a minimum investment-grade rating. Furthermore, while the financeability testing is undertaken on a notional basis, we also note that NGN has indicated that it has a bank covenant that sets an AICR floor at 1.3x. If the AICR falls below this level, it could therefore lead to a technical default, irrespective of whether a credit downgrade occurs within the holistic assessment of credit quality by CRAs. We note also that in other submissions to Ofgem, Oxera's analysis has highlighted that key cost of capital parameters, such as the cost of equity, may be too low in the context of the RIIO-2 price control for UK energy networks.[1]

- Tools to address financeabilty concerns, which Ofgem has suggested, are: reducing dividends, raising equity, refinancing current debt, and changes to the depreciation profile or capitalisation rates. In this report, we set out why the use of these tools may not be effective, may have practical consequences, and/or entail costs to equity holders.

- In particular, reducing or foregoing dividends is likely to entail significant costs to equity holders due to (i) a time inconsistency effect, (ii) a term premium effect, and (iii) a beta effect. Investors could expect a 17–75bp uplift on the

[1] See for example, Oxera (2018), 'The cost of equity for RIIO-2'. Prepared for Energy Networks Association, 28 February. Relative to Ofgem's working assumption of 4-5% (CPI-deflated, or approximately 3-4% RPI-deflated), the Oxera report recommended a range of 5.51 – 6.34% for the real (RPI-deflated) cost of equity for energy networks in Great Britain from 2021 onwards.

cost of equity from asset stranding risk due to the time inconsistency effect, while an indicative estimate of the term premium effect on the cost of capital would be around 90bp. Specific estimates of the cash- flow beta effect are not available; however, we have examined regulatory precedents on returns in relatively high growth phases (i.e. implying higher risk and longer-duration cash flows). We note that 20-25bp uplifts in allowed network returns have been observed for high growth phases (i.e. in decisions for RIIO-T1 and the Heathrow Q4 review).[2]

A detailed summary of our findings in relation to our peer review of NGN's model and dividend distributions follows.

1.1 Peer review of RIIO-GD2 financial model

Our peer review of NGN's financial model for RIIO-GD2 consisted of an audit of the calculations in the model (the 'mechanical audit') and an assessment of the reasonableness of the assumptions in the model (the 'conceptual audit'). Our review indicates that the calculations are correct and the assumptions made by NGN in relation to notional financial performance are reasonable.

We have also reflected on NGN's financeability concerns for the RIIO-GD2 price control by reference to the guidance provided to date by Ofgem on how it will assess the gas distribution networks' (GDNs) financeability in RIIO-GD2. Ofgem is likely to consider financial metrics published by credit rating agencies (CRAs) (Moody's, S&P and Fitch), along with a set of other quantitative and qualitative factors.[3]

Based on our analysis on a notional company basis in RIIO-GD2, using NGN's model and assumptions, we find that if the company were to distribute dividends at a yield of 4% of notional regulatory equity several financial metrics—the PMICR (or AICR), funds from operations (FFO)/net debt, retained cash flow (RCF)/net debt, and FFO interest cover—would fall. This downward pressure on credit metrics, implying metrics that are either below, or towards the minimum bound of the guidance threshold for BBB/Baa and A credit ratings (see Table 2.2), represents a risk to the notional company of a credit rating downgrade. As noted earlier, whether or not the actual company is downgraded will depend on the precise calibration of the RIIO-2 package and on the holistic assessment of the quantitative and qualitative factors that underpin the assignation of the credit rating.

Our testing of the model indicates that these ratios would not improve until the mid-2030s. The risk is heightened because Ofgem has indicated that it will reduce the cost of equity allowance in line with an expectation of outperformance by the notional company.[4] If the allowed cost of equity is lowered in expectation of outperformance—especially if there are challenging cost and output targets that reduce the probability and magnitude of outperformance in the first place—there would be limited headroom for financial metrics in the event of negative cost shocks or underperformance. Significant uncertainty remains in relation to

[2] The indicative estimates for the three effects discussed (i.e. the time inconsistency effect, term premium effect and beta effect) are not additive; there are inter-dependencies in the underlying drivers and estimation of the effects.
[3] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para. 4.14.
[4] '[G]iven that we believe investor expectations are positive, the logical consequence would be to select a point estimate in the lower half of this [cost of equity] range […] This would imply outperformance up to 50bp of additional equity return.' Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para. 3.165.

details of the RIIO-2 package—in particular regarding the expected range of net financial outcomes over the course of RIIO-GD2.

We have also tested the impact of assuming a notional dividend yield that is lower than the headline allowed cost of equity in RIIO-GD2. Assuming that some proportion of the allowed return on equity will be recovered via real growth of the RAV (instead of dividend yield within the period) would be in line with CMA precedent in financeability analysis.[5] We find that although the financial metrics improve with a lower dividend yield, the PMICR, FFO/net debt, RCF/net debt credit metrics remain under pressure in the notional company assessment, and the modelled AICR of 1.34x would remain below the guidance threshold for BBB/Baa and A by Fitch and Moody's (see Table 2.2). As noted earlier, it is also relevant to note in context that in assessing financeability, regulators may target a 'comfortable' rating of around BBB+/Baa1 or A–/A3, which would require some headroom in the financial metrics relative to the lowest bound consistent with a minimum investment-grade rating. Targeting a comfortable rating such that the financial metrics are higher than the minimum investment-grade credit rating would, moreover, allow for some headroom to deal with negative shocks within the price control period.

At the same time, Ofgem is consulting on the introduction of mechanisms to limit the negative financial impacts of downside scenarios, including the use of re-openers, indexation of the cost of equity, the return adjustment mechanism (RAM), and the cash-flow floor. If symmetric in design, such mechanisms could truncate the returns (potentially on both the upside and the downside) for networks. Stakeholders are evaluating the efficacy and incentive properties of the measures under consideration. We would note that it would be premature to conclude that these will be effective in limiting the severity of downside scenarios for networks.[6]

At this stage, we view the RIIO-GD2 package as raising concerns about financeability for the notional company. Also, financial metrics below the CRAs' guidance thresholds could result in a breach of bank covenants (that set a floor on AICR) in the case of the actual company.

Furthermore, to the extent that Ofgem's RIIO-GD2 package may be negatively skewed (e.g. as noted earlier, the focal point estimate for the allowed cost of equity proposal is at the lower bound of the range), then this raises concerns about whether the RIIO-GD2 package is appropriately calibrated. Financeability concerns will arise for the notional company, where allowed revenues are too low, i.e. prospective operational and financing allowances are insufficient. For example, as noted above, in other submissions to Ofgem, Oxera's analysis has highlighted that key cost of capital parameters, such as the cost of equity, may be too low in the context of the RIIO-2 price control for UK energy networks.[7]

Ofgem has indicated that if financeability issues arise, the onus will be on the companies to solve them. Ofgem has proposed that companies can address these issues in a number of ways, including by reducing dividend payments, increasing equity injections, refinancing or repaying existing debt, and, if

[5] See, for example, Competition Commission (2010), 'Bristol Water plc: Notice of Reference: Determination of Adjustment Factor for the period 2010-2015', 8 February, section O, para. 25.
[6] For example, S&P considers that the new mechanisms, such as the cash-flow floor and RAM, have 'limited credit value'. It also questions whether the introduction of the cash-flow floor mechanism could signal the regulator's willingness to allow credit quality in the industry to decline. See S&P Global Ratings (2019), 'Ofgem's Proposed RIIO-2 Regulatory Framework Will Test U.K. Energy Networks', 20 February, p. 1, 7.
[7] Oxera (2018), 'The cost of equity for RIIO-2'. Prepared for Energy Networks Association, 28 February.

appropriate, proposing alternative capitalisation and/or depreciation rates.[8] However, these tools may entail costs, be ineffective, or have practical consequences. Section 3 of this report discusses the costs of reducing dividend payments. Other tools to address financeability concerns, such as changes to the depreciation profile or capitalisation rates, may not be effective (if they are perceived as being neutral in net present value terms such that there is no impact on credit ratings),[9] and have practical consequences, including departing from cost-reflective pricing and driving intergenerational transfers between consumers.

We would also note that if the underlying cause of a financeability problem is an insufficiency in allowed revenues (i.e. if the price control is mis-specified, such as the cost of equity allowance being too low), then the proposed financeability remedies would not be appropriate. An alteration in the timing of cash flows, or changes in capital structure and dividend policy, are not seen as potential tools to increase the value of the firm, and thereby remedy a potential mis-calibration of the price control package itself.

1.2 Implications of postponing dividends to equity investors

The second part of our analysis focuses on reviewing the financial theories of dividend policy, in addition to empirical evidence, to assess the potential impacts of delaying and/or reducing dividend distributions to shareholders.

In the theoretical Miller–Modigliani (MM) framework, investors are indifferent between receiving dividend payments and reinvesting the funds in the company. However, in addition to MM, many theories have been developed on the determinants of the dividend policies of firms, including signalling effects, dividend clienteles, taxes, and transaction costs. The wider body of theoretical literature suggests reasons why postponing dividend payments, or increasing their duration, is likely to entail costs for investors. In the current context, there are three potential effects to consider: i) a time inconsistency effect; ii) a term premium effect; and iii) a beta effect. All of these may exacerbate the risk to which investors are exposed and imply a higher required return on equity.

The time inconsistency effect is a key consideration for the GDNs as gas network assets may become stranded in the future, or under-utilised, at least in part. We provide indicative estimates of what the impact to the cost of equity would be for various levels of asset stranding risk. These calculations suggest that investors could expect a 17–75bp uplift on the cost of equity from asset stranding risk. A dividend holiday would increase the duration of cash flows to investors, exacerbating the time inconsistency effect from asset stranding risk.

A higher duration of cash flows would also be expected to increase investors' required returns due to the term premium effect from changes in the interest rate, and the beta effect from increased sensitivity to interest rate fluctuations and market risk. An indicative estimate of the term premium effect on the cost of capital would be around 90bp.

We have also assessed the finance literature in relation to the beta effect from increased sensitivity to interest rate fluctuations and market risk. The literature suggests that firms in a relatively high growth phase will tend to experience longer-duration cash flows. Therefore, while not directly analogous to the context for RIIO-GD2 (e.g. the scale of expected network growth has not yet been

[8] Ofgem (2018) 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para. 4.16.
[9] For example, Fitch has indicated that it does not view alternative capitalisation or depreciation rates as helping PMICRs. FitchRatings (2019), 'Fitch Rtgs: Ofgem's Credit-Enhancing Mechanisms Unlikely to Benefit Ratings', 28 February, https://www.fitchratings.com/site/pr/10064354.

determined), we have also considered whether there are any regulatory precedents that address the extent to which regulated returns face upward pressure in periods of high growth. We note that 20-25bp uplifts in allowed network returns have been observed for high growth phases (i.e. in decisions for RIIO-T1 and the Heathrow Q4 review).

We note that these indicative estimates for the three effects discussed (i.e. the time inconsistency effect, term premium effect and beta effect) are not additive; there are inter-dependencies in the underlying drivers and estimation of the effects, in examining the impact of extended duration on cash flows. Nonetheless, the finance literature and the analysis undertaken, suggests that the impact on the cost of capital from these three effects may be significant.

Finally, reducing or delaying dividends may reduce the relative attractiveness of UK regulated assets. Utilities have historically offered higher and more consistent dividend yields than other sectors. Investors in infrastructure assets would anticipate that equity returns would comprise capital appreciation, not just cash dividends. Nonetheless, some long-term investors in utilities, such as pension funds and endowments, may rely on stable dividend characteristics for several reasons, including to fund their operations, or to meet the liquidity requirements of their shareholders. Investor-catering effects are observed in the literature and may drive the relative attractiveness of utilities to equity investors.

We understand that if NGN were forced to reduce or delay dividends in RIIO-2 and beyond, then this may be in the context of an industry-wide trend of lower dividend yields by regulated GDNs, and potentially by other energy and water networks. If investors in the UK GDNs (and in the regulated energy and water networks more broadly) expect high and consistent dividend yields, such reductions may reduce the relative attractiveness of UK regulated assets within the international market for capital.

1.3 Outline of this report

- Section 2 discusses our review of NGN's RIIO-GD2 financial model. It presents the findings of our audit and considers NGN's concerns about financeability.
- Section 3 considers the potential costs of a dividend holiday that NGN has modelled in RIIO-GD2.

2 Review of NGN's RIIO-GD2 financial model

NGN has developed a RIIO-GD2 financial model to assess expected financial performance of the notional company during the control period. We understand that NGN's model has been constructed to assess financeability on a notional company basis, and it is not a preliminary presentation of its RIIO-GD2 business plan, which is still being developed. Its model demonstrates that a number of the quantitative financial ratios considered by Ofgem in assessing financeability, and considered by the CRAs in assessing credit rating strength, will fall significantly. This downward pressure on credit metrics, implying metrics that are either below, or towards the minimum bound of the guidance threshold for BBB/Baa and A credit ratings (see Table 2.2), represents a risk to the notional company of a credit rating downgrade. Whether or not the actual company is downgraded will depend on the precise calibration of the RIIO-2 package and on the holistic assessment of the quantitative and qualitative factors that underpin the assignation of the credit rating. To mitigate downward pressure on the credit rating, modelled dividend distributions are reduced or suspended for the period covered by RIIO-GD2, and part of the period covered by RIIO-GD3.

NGN's model was provided to Oxera for peer review and to critically assess the conclusions drawn about the notional company's financeability in RIIO-GD2. As a first step, we audited NGN's financial model to verify that the calculations were correct and the assumptions contained therein were appropriate. We found that the calculations in the model are correct and the assumptions are appropriate.

We found that under the current set of assumptions,[10] a number of the quantitative financial metrics are stretched to either falling below, or towards the minimum bound of the guidance thresholds on credit metrics consistent with BBB/Baa and A credit ratings (see Table 2.2). We note moreover that in assessing financeability, regulators may target a 'comfortable' rating of around BBB+/Baa1 or A–/A3 (e.g. the Ofgem debt index for setting the allowed cost of debt is specified with reference to an average of BBB-rated and A-rated corporate debt indices), which would imply some headroom in the financial metrics relative to the lowest bound consistent with a minimum investment-grade rating. Financial metrics would improve if dividends yields are reduced with a subsequent reduction in gearing. However, there would still be little 'headroom' in the case of negative shocks. Any tool that is used to address financeability concerns would also likely involve costs to investors.

2.1 Findings from the audit

Our review of NGN's financial model was twofold. First, we performed a mechanical audit, whereby we ensured that the calculations in the model were correct. Second, we performed a conceptual audit, whereby we assessed the appropriateness of the assumptions contained in the model. The next two sections describe in more detail our mechanical and conceptual audits in turn.

2.1.1 Mechanical audit

Our mechanical audit focused on ensuring that the calculations in the model were appropriate. Our audit covered the following areas.

- We checked that cell references and formulae were correct, that signs were appropriate, and that the inputs fed through the model correctly. We find that all the calculations run as intended.

[10] Including dividend yield at a level of 4% of notional regulatory equity.

- We checked that the assumptions were in line with the working assumptions for RIIO-2 indicated by Ofgem, such as the cost of equity, the cost of debt, the inflation forecast and asset lives. We find that the inputs are consistent with Ofgem's current guidance.
- We also cross-checked the calculations against the RIIO-GD1 PCFM template financial model provided by Ofgem. We find that the calculations are in line with the current template.[11]
- We checked that the financial ratios were calculated in line with the methodologies described by the CRAs.

2.1.2 Conceptual audit

The focus of the conceptual audit was to ensure that the model assumptions are in line with Ofgem's guidance, which at this stage emphasises modelling the notional company.[12] As such, we checked that the assumptions in the model were in line with the assumptions for the notional company suggested by Ofgem. NGN's assumptions are summarised in the table below.

Table 2.1 Summary of NGN model assumptions for the notional company

Cost of equity	Cost of debt (avg.)	CPIH Inflation (avg.)	CAPEX, OPEX, REPEX	Dividend yield	% index-linked debt	Opening debt	Incentive rewards/ penalties[1]	Interest rate hedges
4.00% (CPIH)	1.74% (CPIH)	2.04%	NGN's projections	4.0% of notional regulatory equity	25.0%	Reset to notional 60% gearing	None	No impact

Note: The assumptions for the financial and operational parameters are included on a without prejudice basis, to the ongoing discussion on the appropriate calibration of the various price control parameters for RIIO-2. [1] Includes TOTEX, business plan, and outcomes incentives.

We note two points regarding NGN's assumptions. First, we observe that the dividend yield is set such that it is equal to Ofgem's guidance for the allowed cost of equity. However, in the CMA's financeability review of Bristol Water,[13] the notional dividend yield is lower than the headline allowed cost of equity, under the assumption that part of the return on equity will be in the form of growth in the value of the equity stake. This is also consistent with the dividend assumption adopted by Ofgem during RIIO-GD1, which set the notional dividend yield at 5%, below the allowed cost of equity of 6.7%.[14] Second, we note that the TOTEX profile was taken as given from NGN, but that the results from the modelling are sensitive to the specific amounts and profile of CAPEX, OPEX, and REPEX. The

[11] We understand that Ofgem will provide a new PCFM template for RIIO-GD2, although this is not available at the time of writing.
[12] Ofgem has stated: 'We propose to consider the financeability of notional companies in-the-round considering all price control assumptions. As a proxy for the financeability of the actual companies, we will stress test the notional company base case. However, we do not intend to replicate individual company financial structures in detail.' We note that Ofgem has also proposed to include an assessment of companies on an actual capital structure basis, in testing financial metrics for RIIO-GD2. Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para 4.14.
[13] Competition Commission (2010), 'Bristol Water plc: Notice of Reference: Determination of Adjustment Factor for the period 2010-2015', 8 February, section O, para. 25.
[14] Ofgem (2012), 'RIIO-GD1: Final Proposals - Finance and uncertainty supporting document', 17 December, table 3.4 and para. 3.54.

TOTEX figures used in the model are broadly in line with NGN's average TOTEX in RIIO-GD1.[15]

Although Ofgem has stated that it will also consider the actual company scenario, there is not enough guidance at present to model the upside and/or downside with a sufficient degree of certainty. For instance, we understand that NGN holds a favourable position in a portfolio of interest rate swaps, which are not modelled for the notional company.[16] Adjusting the assumptions of the notional company by including the positive impact of the swaps would tend to improve NGN's financial metrics. On the other hand, there are other deviations in the actual company structure (relative to notional), which could imply countervailing pressure on the 'headroom' in quantitative financial metrics. For example, the notional scenario assumes that 25% of debt is index-linked debt (ILD), whereas NGN's actual share of debt classified as ILDs is close to zero.[17] Adjusting the percentage of ILD to zero would have a negative impact on the financial metrics. The net effect of modelling the actual capital structure is therefore not known at present.

2.2 Assessment of financeability

Having confirmed that the model runs as intended and that the assumptions are appropriate, we comment on NGN's financeability on a notional company basis over the RIIO-GD2 regulatory period.

For context, as Ofgem has highlighted in its Sector Specific Methodology, it has a statutory duty to ensure that the notional company is financeable:[18]

> Ofgem has a duty to have regard to the need to secure that companies are able to finance the activities which are the subject of obligations imposed by or under the relevant legislation.

For the purpose of assessing financeability during the period covered by RIIO-GD2, Ofgem has offered the following guidance in the Finance Annex to the RIIO-2 Sector Specific Methodology:[19]

> We expect a financeability assessment will include a suite of financial metrics commonly used in financial markets, including those identified in our March 2018 Framework Consultation and those used by rating agencies. However, **we do not propose to follow any one metric used by any particular rating agency and instead propose to assess the resulting quantitative metrics and qualitative factors as a whole. We do not expect to provide targets for any particular metrics** and would expect companies to assess financeability as a whole, including potential company actions.[20] [emphasis added]

Ofgem has not given explicit indicative ranges for where the financial metrics should lie for a company to be considered financeable. It has suggested that the assessment will comprise both quantitative and qualitative factors as a whole.

[15] The projected TOTEX in RIIO-GD2 is somewhat higher than the amounts in RIIO-GD1. NGN has indicated that the projected increase in TOTEX in RIIO-GD2 is driven mostly by an increase in the NTS exit unit rates.
[16] NGN (2018), 'Regulatory accounts 2017/2018', pp. 35–39.
[17] In 2018, NGN had a total long-term debt amount of £1.85bn, including a 'Loan note' for £70m with annual interest variable with RPI. The note amounts to 0.4% of NGN's long-term debt. NGN (2018), 'Regulatory accounts 2017/2018', p. 36.
[18] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para 4.1.
[19] Ibid. para 4.14.
[20] Ofgem has noted: 'At the beginning of 2019 we intend to provide more guidance to companies with regards to how they should assess financeability, including a draft financial model for RIIO-2.' Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para 4.14.

The financial metrics Ofgem outlined in the March 2018 Framework consultation are the following: [21]

- notional RAV/EBITDA;
- regulated equity/regulated earnings;
- gearing: net debt/RAV;
- PMICR (cash from operations - CAPEX)/interest;
- FFO interest cover;
- RCF/net debt.

In addition, we note that one of Ofgem's licence requirements for the GDNs is to maintain an investment-grade rating from the CRAs:

> The companies have licence requirements to take all appropriate steps within their power to maintain an investment-grade credit rating.[22]

In the context of financeability analysis, a comfortable investment-grade rating would tend to be higher than the minimum rating. The lowest investment-grade credit rating is BBB–/Baa3. Regulators may target a 'comfortable' rating of around BBB+/Baa1 or A–/A3 (e.g. the Ofgem debt index for setting the allowed cost of debt is specified with reference to an average of BBB-rated and A-rated corporate debt indices[23]), which would imply some headroom in the financial metrics relative to the lowest bound consistent with a minimum investment-grade rating.

As Ofgem has not provided explicit ranges or targets for the financial metrics,[24] we compared the forecasted financial metrics from NGN's model with the latest guidance from the CRAs.[25] The CRA guidance and the forecasted financial metrics from NGN's model are shown in Table 2.2.[26]

Table 2.2 Average financial metrics during RIIO-GD2 versus indicative ranges for investment-grade from the CRAs

Ratio	Fitch[1]		Moody's		Standard & Poor's[2]		Dividend yield	
							4%	2.4%
	A	BBB	A	Baa	A	BBB		
Net debt/RAV (%)	60	70	45–60	60–75	<70	>70	63	60
FFO interest cover (x)	4.5	3.5	4–5.5	2.8–4	>3.5	2.5–3.5	3.6	3.7
PMICR (or AICR) (x)	1.75	1.5	2.0–3.5	1.4–2.0			1.31	1.34
FFO/net debt (%)			18–26	11–18	>12	8–12	9.3	9.8
RCF/net debt (%)			14– 21	7–14			6.8	8.2

[21] Ofgem (2018), 'RIIO2 framework consultation', March, paras 7.69–7.71.
[22] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para 4.1.
[23] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para 2.1.
[24] Ibid., para. 4.14.
[25] Neither Ofgem nor the CRAs have not provided indicative ranges for the notional RAV/EBITDA ratio and for the regulated equity/regulated earnings ratio. As such, we have not included them in our assessment of financeability.
[26] Based on our discussions with the CRAs, we understand that the ranges reported in Table 2.2 are not strictly 'required thresholds'; rather, they form part of a holistic assessment that includes other considerations.

Note: [1] Fitch also considers other financial ratios, including lease-adjusted FFO/debt and lease-adjusted FFO/net debt. These measures have not been explicitly highlighted by Ofgem as measures of interest when assessing financeability. [2] Unlike Moody's or Fitch, S&P does not provide indicative ranges. The ranges interact with additional considerations such as the business risk profile and industry risk. See Standard & Poor's (2013), 'Criteria | Corporates | General: Corporate Methodology', Tables 3, 17–19. We have reported the indicative ranges provided by Ofgem during the RIIO-GD1 period. See Ofgem (2011), 'Decision on strategy for the next transmission and gas distribution price controls – RIIO-T1 and GD1 Financial issues', 31 March, p. 40. Notional company financial ratios were tested using v. 5.1 of NGN's model.

Source: Fitch (2018), 'Corporate rating criteria Sector Navigators', p. 165; Moody's (2017), 'Rating Methodology Regulated Electric and Gas Networks, 16 March 2017, p.19; Ofgem (2011), 'Decision on strategy for the next transmission and gas distribution price controls – RIIO-T1 and GD1 Financial issues', 31 March, p. 40.

As shown in Table 2.2, for the notional company with a dividend yield of 4% of regulatory equity, the PMICR (or AICR), FFO/net debt (in the case of Moody's), and RCF/net debt ratios fall below the guidance thresholds for an investment-grade rating indicated in the CRAs' ratings methodologies. FFO interest cover is close to the minimum threshold requirement specified by Fitch (at 3.6x relative to guidance threshold of 3.5x and 4.5x for BBB and A credit ratings, respectively) and thereby risks falling below the guidance requirement. Our testing of the model indicates that these ratios would not improve until the mid-2030s. We would note also that in the case of the actual company, breaching these thresholds could result in a breach of bank covenants.[27]

We also considered a sensitivity on the financial metrics of reducing the dividend yield to a level consistent with precedents. In line with the assumptions for notional dividend yields and growth rates adopted by Ofgem for RIIO-GD1 and by the CMA in the review of Bristol Water's financeability, [28] we assumed that the dividend yield would be lower than the headline cost of equity allowance to account for the impact of capital growth. We used a growth rate assumption of 1.6% based on forecasts of the UK's real GDP growth rate.[29] This results in an alternative assumed notional dividend yield of 2.4%, calculated as the difference between the allowed cost of equity in RIIO-GD2 of 4% and the dividend growth rate of 1.6%. Although the financial metrics improve when lowering the dividend yield, the PMICR and FFO/net debt remain below Moody's investment-grade guidance threshold range, while RCF/net debt falls to the lower end of Moody's range.

Tools to address financeability

Ofgem has suggested that there are other tools to address financeability concerns, including changes to dividend policy, equity injections, debt refinancing, alternative capitalisation rates and/or depreciation rates.[30] However, it is not clear how effective or practicable some of these tools would be. Refinancing debt is likely to entail a buyback premium, and it would not be effective if the embedded debt had been financed on terms that are equal to or better than the current rates available to the company. Changes to the depreciation profile or capitalisation rates may not materially affect financial metrics. For example, Fitch has indicated that it does not view alternative capitalisation or depreciation rates as helping PMICRs.[31] Changes to the

[27] For example, NGN has indicated that it has a bank covenant that sets an AICR floor at 1.3x. If the AICR falls below this level, it could lead to a technical default.
[28] Competition Commission (2010), 'Bristol Water plc Determination of Adjustment Factor for the period 2010-2015', 8 February, Section O, para. 25.
[29] Average forecasted GDP growth rate for the period 2021–23. IMF (2018), 'World Economic Outlook', October.
[30] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', December 18, para. 4.16.
[31] FitchRatings (2019), 'Fitch Rtgs: Ofgem's Credit-Enhancing Mechanisms Unlikely to Benefit Ratings', 28 February.

depreciation profile or capitalisation rates will also raise concerns about departing from cost-reflective pricing within the price control period, or of driving intergenerational transfers between consumers.

In NGN's view, the only practical tool to alleviate pressure on financial metrics or address financeability concerns would be to carry out an equity injection or change the dividend policy. Both options are likely to involve costs to equity investors. The impact to the cost of capital of changing the dividend policy is the subject of section 3 of this report.

Ofgem will also introduce mechanisms to limit downside scenarios, including the use of re-openers, indexation of the cost of equity, the RAM, and the cash-flow floor. If implemented in a way that limits the severity of upside and downside scenarios symmetrically, these mechanisms can be expected to truncate excessively positive and negative returns for the GDNs. However, as the efficacy and incentive properties of the measures under consideration are being evaluated by stakeholders, it would be premature to conclude that these will be effective in limiting the severity of downside scenarios for networks. For example, S&P considers that the new mechanisms, such as the cash-flow floor and RAM, have 'limited credit value'. It also questions whether the introduction of the cash-flow floor mechanism could signal the regulator's willingness to allow credit quality in the industry to decline.[32]

Overall, we consider that the downward pressure on credit metrics, implying metrics that are either below, or towards the minimum bound of the guidance threshold for BBB/Baa and A credit ratings (see Table 2.2), represents a risk to the notional company of a credit ratings downgrade, particularly if outturn performance across the package is less than expected. Whether financial ratios that fall below the CRAs' investment-grade guidance ranges in Table 2.2 above translate into ratings downgrades for the actual company remains unclear. Both Ofgem and the CRAs have stated that they do not expect companies to meet each ratio in each year.[33] The CRAs consider financial ratios as a part of a holistic assessment of credit quality, and the quantitative analysis is supplemented by a qualitative assessment. The agencies consider other broader factors including the companies' operational performance and consistency of the regulatory framework. The CRAs may show some degree of flexibility towards the financial ratio ranges; we understand that these ranges are generally not construed to be 'red lines', particularly if the ratios are close to the range.

As summarised in the box below, the CRAs view the RIIO-GD2 package at this stage as weakening credit quality, while highlighting that significant questions remain about the details of the package. It is worth noting also that for the actual company, breaching the CRAs' thresholds could result in a breach of bank covenants and lead to technical defaults.

Box 2.1 Recent commentary on RIIO-GD2 from the CRAs

Moody's

[32] See S&P Global Ratings (2019), 'Ofgem's Proposed RIIO-2 Regulatory Framework Will Test U.K. Energy Networks', 20 February, p. 1, 7.
[33] Ofgem (2011), 'Decision on strategy for the next transmission and gas distribution price controls - RIIO-T1 and GD1 Financial issues', 31 March, paras 4.9 and 4.12.

Moody's recently commented that it expects credit quality to weaken during RIIO-GD2.[34] It highlighted that 'Ofgem's proposal suggest [sic] a larger-than-anticipated reduction in allowed returns and constraints on outperformance that would, if reflected in final determinations, weaken interest coverage metrics at most gas network groups'.[35] In Moody's modelling, NGN's average AICR would fall from 1.9x in 2017/18 to an average of 1.4x during RIIO-GD2 for the actual company, assuming no under- or outperformance.[36] In line with Ofgem's revised assumptions in relation to notional gearing, Moody's modelling of the notional company shows that the AICR would increase slightly from a RIIO-GD1 average of 1.3x to an average of 1.4x in RIIO-GD2, mainly due to the adoption of CPIH indexation. However, this assessment is based on Moody's base case for the cost of equity and the cost of debt during RIIO-2, which are higher than Ofgem's guidance.[37] It is therefore unclear to what extent Moody's assessment is reflective of the notional company. If the cost of equity and debt allowance has been overestimated, Moody's estimates of the AICR would be similarly overestimated.

Moody's also recently downgraded the outlook for Southern Gas Networks (Baa1 rating), citing the risk that AICRs would fall below its guidance level of at least 1.4x for the current rating as a result of the current proposals for RIIO-GD2.[38] Moody's also indicated that it may revise its guidance for the AICR as the RIIO-GD2 package progressed. It stated:

> Adjusted interest cover ratio guidance for the current rating of at least 1.4x at Southern GN and Scotland GN and 1.2x at SGN MidCo may be revised as Ofgem's price review progresses. Any revision will take into account factors including any changes in Moody's assessment of the stability and predictability of the regulatory framework, potential revenue volatility for companies and the incremental basis risk resulting from the change in indexation of Scotland GN's revenues as compared to its liabilities.[39]

Fitch

Fitch views Ofgem's current RIIO-2 draft methodology as putting 'significant pressure on the credit profiles of network companies'. It notes that the proposed cut to the allowed and expected return would result in credit rating pressure for most issuers. In the rating agency's view, the pressure is only partially offset by cost of equity indexation, return adjustment mechanisms and the cash-flow floor. In its view, some of Ofgem's proposed measures to improve financeability, including the use of alternative capitalisation or depreciation rates, would not help PMICRs. Fitch has also stated that lower dividends and equity injections could leave companies facing a difficult choice between keeping current ratings or cash dividend distributions.[40]

S&P

S&P views the reduction in the cost of equity allowance, as well as the change in inflation indexation and the shorter regulatory period in RIIO-2, as eroding 'limited headroom' on the networks' credit ratios.[41]

2.3 Conclusion

At this stage, we view the RIIO-GD2 package as raising some concerns about financeability for the notional company. Our review of NGN's model confirms NGN's conclusion that the notional company's financial metrics are under pressure in RIIO-GD2. The downward pressure on credit metrics, implying metrics that are either below, or towards the minimum bound of the guidance threshold for BBB/Baa and A credit ratings (see Table 2.2), represents a risk to the notional company of a credit rating downgrade. Whether or not the actual company is downgraded will depend on the precise calibration of the RIIO-2 package and on the holistic assessment of the quantitative and qualitative

[34] This is in contrast to a lowering of the AICR from RIIO-GD1 to RIIO-GD2 predicted by NGN's model. The difference is likely to be attributed to differences in assumptions. Moody's (2019), 'Credit quality likely to weaken in RIIO-GD2 regulatory period', 14 February, p. 4.
[35] Ibid. p.1.
[36] Ibid. p. 8.
[37] Ibid. p. 7.
[38] Moody's Investor Service (2019), 'Rating Action: Moody's changes outlook on Southern Gas Networks and Scotland Gas Networks ratings to negative', 28 January.
[39] Ibid.
[40] FitchRatings (2019), 'Fitch Rtgs: Ofgem's Credit-Enhancing Mechanisms Unlikely to Benefit Ratings', 28 February.
[41] S&P Global Ratings (2019), 'Ofgem's Proposed RIIO-2 Regulatory Framework Will Test U.K. Energy Networks', 20 February, p. 1.

factors that underpin the assignation of the credit rating. We note that the modelling of NGN's AICR on a notional company basis, at around 1.3x for RIIO-GD2 is below the guidance threshold of 1.5x and 1.75x for BBB and A, respectively, by Fitch. It is also lower than the guidance threshold range for A-rating by Moody's (i.e. 2.0–3.5x) and below the lower end of the 1.4–2.0x guidance threshold range for Baa rating by Moody's.

We note, moreover, that in assessing financeability, regulators may target a 'comfortable' rating of around BBB+/Baa1 or A–/A3, which would imply some headroom in the financial metrics relative to the lowest bound consistent with a minimum investment-grade rating. Targeting a comfortable rating such that the financial metrics are higher than the minimum investment-grade credit rating would also allow for some headroom to deal with negative shocks within the price control period.

Furthermore, to the extent that Ofgem's RIIO-GD2 package may be negatively skewed (e.g. as noted earlier, the focal point estimate for the allowed cost of equity proposal is at the lower bound of the range), then this raises concerns about whether the RIIO-GD2 package is appropriately calibrated. Financeability concerns will arise for the notional company, where allowed revenues are too low, i.e. prospective operational and financing allowances are insufficient. For example, in other submissions to Ofgem, Oxera's analysis has highlighted that key cost of capital parameters, such as the cost of equity, may be too low in the context of the RIIO-2 price control for UK energy networks.[42]

Ofgem has indicated that if financeability issues arise, the onus will be on the companies to solve them. Ofgem has proposed that companies can address these issues in a number of ways, including by reducing dividend payments, increasing equity injections, refinancing or repaying existing debt, and, if appropriate, proposing alternative capitalisation and/or depreciation rates.[43] However, these tools may entail costs, be ineffective, or have practical consequences. Section 3 of this report discusses the costs of reducing dividend payments. Other tools to address financeability concerns, such as changes to the depreciation profile or capitalisation rates, may not be effective (if they are perceived as being neutral in net present value terms such that there is no impact on credit ratings),[44] and have practical consequences, including departing from cost-reflective pricing and driving intergenerational transfers between consumers.

We would also note that if the underlying cause of a financeability problem is an insufficiency in allowed revenues (i.e. if the price control is mis-specified, such as the cost of equity allowance being too low), then the proposed financeability remedies would not be appropriate. An alteration in the timing of cash flows, or changes in capital structure and dividend policy, are not seen as potential tools to increase the value of the firm, and thereby remedy a potential mis-calibration of the price control package itself.

Additionally, financial metrics below the CRAs' guidance thresholds could result in a breach of bank covenants in the case of the actual company. Specifically, NGN has indicated that it has a bank covenant that sets an AICR floor at 1.3x. If the AICR falls below this level, it could therefore lead to a technical default,

[42] Oxera (2018), 'The cost of equity for RIIO-2'. Prepared for Energy Networks Association, 28 February.
[43] Ofgem (2018) 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, para. 4.16.
[44] For example, Fitch has indicated that it does not view alternative capitalisation or depreciation rates as helping PMICRs. FitchRatings (2019), 'Fitch Rtgs: Ofgem's Credit-Enhancing Mechanisms Unlikely to Benefit Ratings', 28 February, https://www.fitchratings.com/site/pr/10064354.

irrespective of whether a credit downgrade occurs within the holistic assessment of credit quality by CRAs.

Financial metrics would improve in the notional assessment of financeability if dividend yields are reduced with a subsequent reduction in gearing. However, there would still be little 'headroom' in the case of negative shocks. The tools Ofgem has suggested to improve financial metrics and address financeability may have limited effectiveness or practicality or entail significant costs. In particular, delaying dividends, which NGN views as the most practical tool, would likely entail costs. This is discussed in greater detail in section 3.

3 Implications of postponing dividends to equity investors

3.1 Introduction

Within the options considered by Ofgem to address financeability concerns, NGN has considered that it would have to forgo dividends or substantially reduce dividend yields in RIIO-GD2 and beyond. As explained in section 2, this is in anticipation of significant costs, or the impracticality and/or ineffectiveness of other options (i.e. refinancing debt, revising depreciation policy or altering the capitalisation policy).

Forgoing or reducing dividend yields would be unusual in the context of NGN's steady dividend distributions, and such a policy change is likely to have a meaningful impact on NGN's investors. In this section, we discuss the impacts that a dividend holiday could have on the cost of equity. First, we introduce the theoretical prediction that the timing of dividends does not matter based on the Miller–Modigliani (MM) framework. We then discuss the reasons why a dividend holiday would be likely to increase risks for investors in the gas distribution industry, particularly in the context of heightened asset stranding risk due to heat decarbonisation in the UK. A dividend holiday would extend the duration of cash flows,[45] which is likely to affect the cost of capital through three channels: (i) a time-inconsistency effect, (ii) a term premium effect, and (iii) a cash-flow beta effect. Finally, we consider the practical reality that utility investors have a strong preference for the relatively high and consistent dividend yields provided by utilities, consistent with the investor-catering explanation of dividend policy.

3.2 Miller–Modigliani theory and assumptions

In the MM framework, investors are indifferent between receiving dividends or selling company shares due to the 'dividend irrelevance proposition'.[46] If the company reinvests in NPV-positive projects the funds it would have otherwise paid out as dividends, its share price will increase by a proportional amount. This means that investors can create an 'artificial dividend' by selling the appreciated share, and as such they are indifferent between receiving dividends today or reinvesting the funds in the company.[47]

The MM framework is based on the assumption of perfect capital markets. In order for the dividend irrelevance proposition to hold, the following assumptions are made:

- the firm's investment policy is fixed and known by investors;
- individuals can costlessly buy and sell securities;
- there are no personal or corporate income taxes;
- no asymmetries of information exist;
- there are no agency costs between managers and outside investors.[48]

[45] We define the duration of cash flow as follows. For a single cash flow, duration is the time to realisation of that cash flow. For cash flows at multiple points in time, duration is the money-weighted average time to realisation.
[46] Da Silva, L.C., Goergen, M. and Renneboog, L. (2004), *Dividend policy and corporate governance*, Oxford University Press, p. 36.
[47] Berk, J. and DeMarzo, P. (2016), *Corporate Finance*, Pearson, July, pp. 637–638.
[48] Da Silva, Goergen and Renneboog (2004), op. cit., p. 36.

However, a number of the MM assumptions are unlikely to hold in the context of RIIO-GD2 for NGN. For instance, the assumption of no transaction costs in relation to selling an ownership stake, especially in the context of privately held companies, does not hold in practice.

More importantly, the notion that investors are indifferent to a deferral in current dividends (because they can create an artificial dividend by selling the appreciated shares) relies on the assumption that the GDNs would be able to yield higher cash flows in the long term. In practice, this assumption is subject to some degree of uncertainty due to a time-inconsistency effect, as discussed below.[49]

3.3 Time-inconsistency and asset stranding risk

The essence of the time-inconsistency problem is that regulators cannot offer binding commitments that their successors will honour in full any pledges that they make today regarding expected future returns.

There are three categories of time inconsistency, in terms of uncertainty about:

- how the regulator will act in the future, given the current regulatory framework;
- whether the regulatory framework will resist political pressure;
- how to address events not covered by the current regulatory framework.[50] [51]

We note that the issue of time-inconsistency is relevant regardless of whether regulatory risk is systematic.

First, even if regulatory risk is not a factor priced by investors (as assumed by the capital asset pricing model, CAPM), it would be expected to have an impact on the expected (probability-adjusted) cash flows, and hence the value of the regulated company. It would be necessary to include an allowance for this effect in the determination of allowed revenue. Whether this is incorporated in the regulatory allowance for the cost of capital or elsewhere in the price control is a separate issue.

Second, the inter-temporal CAPM (ICAPM) developed by Brennan and Xia (2006) (the 'BX framework') shows that investors price risks not captured by the CAPM.[52] If the exposure of future cash flows to regulatory risk is priced by investors, there would be an impact on the return they require for investing in regulated networks, and hence on the cost of capital. The BX framework provides a means to think about the impact of regulatory risk on asset pricing. The implication is that regulatory risk suggests an increase in the cost of capital from increasing the duration of the cash flows for regulated utilities.

UK GDNs are particularly exposed to one type of time-inconsistency effect: the possibility that the decarbonisation of heat in the UK may require less use of the

[49] See also Oxera (2010), 'What is the impact of financeability on the cost of capital and gearing capacity?', report prepared for Energy Networks Association, 9 June; 'What is the cost of equity for RIIO-T1 and RIIO-GD1?', report prepared for Energy Networks Association, 4 February.
[50] Oxera (2010), op. cit.
[51] In theory, rules and contractual commitments could be created to remove these sources of uncertainty. In practice, as the course of the last several price controls has shown, this is unlikely—neither Ofgem nor the government would want to bind itself to commitments that it might later be compelled to renege on. Furthermore, given the broad and complex remit of economic regulators, it is a considerable challenge to construct a complete 'regulatory contract' between companies and the regulator that specifies in advance the course of action in every possible state of the world.
[52] The ICAPM 'can be viewed as an extension of the CAPM to a multi-period setting where certain assumptions of the CAPM are relaxed'. Oxera (2011), op. cit., p. ii.

gas network assets in the future and that assets become stranded or under- or unutilised means that investors may not recoup their full investment. Ofgem itself has noted the asset stranding risk:

> The energy system transition, from changing behaviours to advancing technologies, generates uncertainty around the future demand for electricity and gas. This leads to potential stranding risk, whereby the demand for a network asset may fall away but remaining consumers would still need to pay for the original investment. Stranding risk can emerge for both existing and new investments.[53]

In particular, in relation to the risk of asset stranding in the existing investments in the GDNs, Ofgem noted that:

> if a decision is taken to decarbonise by electrifying heat, then gas may serve more as a transition fuel during the 2020s, and there may be a need to reassess the short and long-term investment required in gas distribution.[54]

Indeed, a risk of potential future under-utilisation of gas network infrastructure was one of the drivers of an accelerated depreciation profile for the GDNs, as adopted by Ofgem in RIIO-GD1.[55] Similarly, regarding the risk of asset stranding in new investments, Ofgem has noted that 'anticipatory investment for needs that do not arise can increase costs for consumers'[56] and suggested that GDNs apply 'higher hurdles (enhanced CBA) for future investment in network capacity to mitigate stranding risks, particularly in the gas network'.[57]

As a result of potential asset stranding, there is a concern that investors will not be able to fully recover an appropriate return on their equity investments over time. In the presence of this risk, investors would demand a higher return on equity.

Indicative estimate of the time-inconsistency effect from asset stranding risk on the cost of equity

In this sub-section, we provide indicative estimates of the additional return that investors may require from the risk of asset stranding. These figures are not presented as precise calculations (not least because of the high degree of uncertainty in relation to asset stranding or under-utilisation scenarios), but rather to suggest an order of magnitude of the potential impact.

As an indicative estimate, we assume that, in 2050, there is a risk that the assets would be partially stranded, or under-utilised, and NGN's RAV would have less value (e.g. because decarbonisation of heat is achieved principally through electrification or other technological means, eliminating the need for a proportion of the gas network assets). In NGN's financial model, we can observe the projected value of the RAV in 2050, allowing for net new CAPEX that is undertaken between now and 2050, as well as the proportion of undepreciated value from the existing asset base at that point in time.

For this exercise, we assume that the probability-weighted impact of under-utilisation, or asset stranding, is that there would be a 5–20% reduction in the projected value of the RAV that is financed by equity as at 2050, relative to the base case in NGN's financial model. We estimate the expected value of the equity proportion of NGN's RAV in 2050, factoring in a risk of a 5–20% reduction

[53] Ofgem (2018), 'RIIO-2 Sector Specific Methodology', 18 December, para. 7.15.
[54] Ibid., para. 7.19.
[55] Ofgem (2012), 'RIIO-GD1: Final Proposals - Finance and uncertainty supporting document', 17 December, para. 2.4.
[56] Ofgem (2018), 'RIIO-2 Sector Specific Methodology', 18 December, para. 7.26.
[57] Ibid. para. 7.29.

in value, and discount it back to the present using Ofgem's guidance for the cost of equity in RIIO-GD2 (i.e. 4%) ('calculation A'). The second calculation ('calculation B') takes the present value of the equity proportion of NGN's RAV assuming no asset stranding, and discounts this to the present at the cost of equity plus an additional margin, such that the present value of the regulatory asset value (RAV) is equal to the present value in calculation A. The additional margin represents an indicative risk-neutral uplift on the cost of equity that investors may require in order to be indifferent between scenarios with and without a risk of asset stranding, where the stranding scenarios are a 5–20% reduction in the value of equity financing within NGN's RAV. The results of the analysis are summarised in Table 3.1.

Table 3.1 Indicative estimate of cost of equity uplift due to asset stranding risk in 2050

Asset stranding risk	Notional equity-financed RAV (£m)	Present value (£m)	Cost of equity uplift (bp)
0% (baseline)	793.9	235.3	0
5%	754.3	223.6	17
10%	714.6	211.8	35
15%	674.9	200.1	55
20%	635.2	188.3	75

Note: Notional equity-financed RAV is calculated as the RAV × (1 – notional gearing) × (1 – asset stranding risk). Notional gearing level is assumed to be 60%. The real cost of equity is assumed to be 4.0%.

Source: Oxera analysis.

Table 3.1 shows that, for an asset stranding risk level varying between 5% and 20%, the uplift on the cost of equity could be in the order of around 17–75bp. A dividend holiday increases the time-inconsistency problem and the uncertainty from asset stranding by pushing dividend cash flows further out—i.e. extending the duration of cash flows.[58]

However, increasing the duration of cash flows is likely to increase the cost of equity through two other channels: (i) a term premium effect—the impact of duration on the sensitivity of expected returns to changes in the interest rate; and (ii) a beta effect—the impact of duration on the sensitivity of expected returns to the Sharpe ratio. These effects are discussed in turn below, and are consistent with our previous reports on the impact of duration on the cost of capital for utility companies.[59]

3.4 The term premium effect

The term premium effect derives from the result that the NPV of a longer-duration stream of cash flows is more sensitive to changes in interest rates. This is because the compounding of the annual interest rate for more distant cash flows will also compound any changes in the interest rate. This sensitivity constitutes a non-diversifiable risk for investors in long-duration assets, as it is related to changes in the real economy. Risk-averse investors will require a premium to compensate for non-diversifiable changes in interest rates. Such a premium will apply even for a stream of cash flows with low exposure to systematic risk. Indeed, in the limiting case of a risk-free bond, the premium for

[58] Cash flow duration refers to the weighted average time to receipt of each cash flow. See Oxera (2010), op. cit., p. i.
[59] See Oxera (2010), op. cit. and Oxera (2011), op. cit.

interest rate risk would still apply. This is the term premium that leads to an upward-sloping yield curve in theories of the term structure of interest rates.

However, at any point in time, there may be an upward- or downward-sloping yield curve. Theories of the term structure of interest rates suggest that other factors, such as the expected path of short-term interest rates and the demand and supply of long- and short-term bonds, are also significant in determining the shape of the yield curve. The impact of factors other than the term premium on the shape of the yield curve may be expected to reduce as the slope of the yield curve is averaged over a longer time period. For the UK, using a proxy for the slope of the yield curve based on historic long-term data on the arithmetic average of the difference in realised returns on long-maturity government bonds (i.e. with maturities of an average of around 20 years[60]) compared with short-maturity bonds (i.e. with maturities less than one year) over the period 1900–2017,[61] gives an estimate of 1.4% for the term premium.

The additional premium over a shorter-maturity cost of capital represents compensation for interest rate risk, not equity market risk. Therefore, extending the duration of cash flows suggests that it is appropriate to use a higher risk-free rate in estimating the cost of equity. However, to maintain consistency between the parameters used to estimate the cost of equity, the increase in the term premium on the risk-free rate would have to be matched by an equal decrease in the market equity risk premium. The net effect on the cost of equity of an increase in the maturity of cash flows therefore depends on the equity beta.

As both the cost of equity and the cost of debt would be expected to be affected by the term premium, an approximation of the net impact on the cost of capital could be given by considering the impact for a company that is 100% equity-financed. On this basis, the impact on the cost of capital would be to increase the risk-free rate by the term premium and decrease the risk premium by the product of the term premium and the asset beta. As an illustration, using the midpoint of Ofgem's RIIO-2 asset beta guidance of 0.355 (without prejudice to the ongoing discussion on the appropriate asset beta estimate for RIIO-2), an indicative estimate of the magnitude of the term premium effect on the cost of capital is 90bp. This is calculated as 1.4% × (1 – 0.355), where 1.4% is the historic long-term data on the term premium, as calculated above, and 0.355 is the average of the guidance on the asset beta provided by Ofgem for RIIO-GD2.[62] We note that this indicative estimate of the term premium effect does not disaggregate the difference in yields on long- and short-term bonds into various drivers including the expected path of short-term interest rates and, behavioural factors (i.e. demand and supply of long- and short-term bonds), and liquidity preferences.[63]

3.5 The cash-flow beta effect

The second effect on the cost of equity of extending duration is the impact on beta. The BX framework (see section 3.3) indicates that extending duration increases the sensitivity of the asset value to the interest rate, as well as the

[60] Since 1955, the average maturity of the long-maturity government bonds, as reported by the authors, has been 20 years; prior to 1955, the data series comprised yields on perpetual government bonds, i.e. consols. Source: Dimson, E., Marsh, P. and Staunton, M. (2017), 'Credit Suisse Global Investment Returns Yearbook 2017', p. 211–212.

[61] Returns in UK long-term bonds minus short-term bills between 1900 and 2017 are sourced from Dimson, E., Marsh, P. and Staunton, M. (2018), 'Credit Suisse Global Investment Returns Yearbook 2018'.

[62] Ofgem (2018), 'RIIO-2 Sector Specific Methodology Annex: Finance', 18 December, p. 40.

[63] For a discussion of what drives the term premium, see BIS (2018), 'Term premia: models and some stylised facts', 23 September.

sensitivity of the asset to the market price of risk.[64] Brennan and Xia (2006) state that expected returns are more likely to increase with duration for assets where the systematic risk of the cash flows (the 'cash-flow beta') is lower. In particular, the BX framework implies that expected excess returns increase with duration for cash-flow betas of less than 0.5. For regulated energy networks, cash flows in any given year would be expected to be relatively insensitive to returns on the market portfolio in that year. Moreover, empirical estimates indicate cash-flow betas substantially below 0.5 for utilities, and hence that expected excess returns will increase with duration for utilities.[65]

The next section considers the empirical evidence that duration affects the cost of capital.

3.6 Empirical evidence of the effect of duration on the cost of capital

The empirical literature suggests that the impact of duration is significant. Bernardo, Chowdhry and Goyal (2007) use a dataset spanning the period 1977–2004 taking NASDAQ stocks in 37 industries to decompose asset betas into betas of assets in place and betas of growth opportunities:[66]

> Since firms with more growth opportunities have cash flows with longer duration, their values are more sensitive to changes in interest rates and thus should have higher betas.

In their model, growth opportunities represent a proxy for cash-flow duration. The empirical findings suggest that the beta of growth opportunities is greater than the beta of assets in place for virtually all industries in the sample. Moreover, the asset betas of firms with above-average growth opportunities (i.e. those with longer-duration cash flows) are higher than for firms with below-average growth opportunities within the same industry. This evidence supports the intuition that duration affects risk and the cost of capital, and, moreover, that longer duration is associated with higher asset and equity betas. The effect persists even once industry sector is controlled for.

In addition, Bernardo, Chowdhry and Goyal (2007) note that:[67]

> the failure to account for [the impact of duration] can lead to misestimating the cost of equity by as much as 3% depending on the industry.

Further evidence in support of a positive relationship between betas and the duration of cash flows is presented by others. Dechow, Sloan and Soliman (2004) show that stock price volatility and stock beta are both positively correlated with equity duration.[68] Using the decomposition of returns into cash-flow and discount-rate components proposed by Campbell and Mei in 1993,[69] Cornell (1999) undertakes a case study of Amgen, a US biotechnology company, and finds that, despite operational performance having low correlation with the market, the company had a high beta. This is consistent with the duration of cash flow being an important determinant of beta. Cornell notes that not only does this imply that longer-term projects will have a high cost of capital,

[64] Brennan, M. and Xia, Y. (2006), 'Risk and Valuation under an Intertemporal Capital Asset Pricing Model', *Journal of Business*, **79**:1, p. 18, equation 33.
[65] See Oxera (2011), op. cit., section 5.2.
[66] Bernardo, A. E., Chowdhry, B. and Goyal A. (2007), 'Growth options, beta, and the cost of capital,' *Financial Management*, summer, p. 6.
[67] Ibid, p. 2.
[68] Dechow, P.M., Sloan, R.G. and Soliman, M.T. (2004), 'Implied Equity Duration: A New Measure of Equity Risk', *Review of Accounting Studies*, **9**:2–3, pp. 197–228.
[69] Campbell, J.Y. and Mei, J. (1993), 'Where do Betas Come From? Asset Price Dynamics and the Sources of Systematic Risk', *The Review of Financial Studies*, **6**:3, pp. 567–592.

but that, where it is not possible to measure beta directly and accurately, it will be important to allow for the impact of duration when using indirect methods such as cash flow and accounting betas. Cornell (1999) argues that 'longer-term projects should typically be discounted at higher rates.'[70] Others, such as Berk, Green, and Naik (2004)[71], and Campbell and Vuolteenaho (2004)[72] also find a positive relationship between cash-flow duration and beta.

The literature suggests that firms in a relatively high growth phase will tend to experience longer-duration cash flows. Therefore, while not directly analogous to the context for RIIO-GD2 (e.g. the scale of expected network growth has not yet been determined), we have also considered whether there are any regulatory precedents that address the extent to which regulated returns face upward pressure in periods of high growth. We note the following precedents:

- In RIIO-T1, Ofgem assumed a lower level of notional gearing for SPTL and SHETL (55%)[73] than for NGET (i.e. 60%).[74] Ofgem noted that this was due to the relative pace of network growth: 'We regard the scale of investment as the most significant differentiator of risk affecting both the asset beta (and, therefore, the cost of equity) and the appropriate level of notional gearing.' All else being equal,[75] the lower notional gearing assumption implied that the asset beta was higher by 0.05 for SPTL/SHETL than for NGET, and that the cost of capital (vanilla, RPI-deflated) was higher by approximately 20 bps.
- In GD17 (i.e. 2017–22), the Northern Ireland regulator allowed a greenfield gas distribution network (i.e. SGN Gas to the West) to continue to earn a pre-determined allowed rate of return of 6.2% (pre-tax, RPI-deflated) relative to allowances of around 4.3% (pre-tax, RPI-deflated) for the other GDNs in Northern Ireland. The fixed rate of return for SGN Gas to the West had been determined as part of a licence competition.[76] The pre-determined allowance for the greenfield SGN Gas to the West network, for the period 2017-22, therefore turned out to be around 2% higher than for the other regulated GDNs in Northern Ireland.
- In the Competition Commission's recommendation to the Civil Aviation Authority in relation to the Q4 review for BAA, the Commission recommended a 0.25% uplift to the cost of capital in relation to the construction of Terminal 5.[77]

These precedents relate to higher allowed network returns, in relatively high growth phases—where there would be an expectation of higher risk and longer-duration cash flows. The precedents, excluding the SGN Gas to the West

[70] Cornell, B. (1999), 'Risk, Duration, and Capital Budgeting: New Evidence on Some Old Questions', *The Journal of Business*, **72**:2, pp. 183–200.
[71] Berk, J.B., Green, R.C. and Naik, V. (2004), 'Valuation and Return Dynamics of New Ventures', *The Review of Financial Studies*, **17**:1, pp. 1–35.
[72] Campbell, J.Y. and Vuolteenaho, T. (2004), 'Bad Beta, Good Beta', *The American Economic Review*, **94**:5, pp. 1249–1275.
[73] Ofgem (2012), 'RIIO-T1: Final Proposals for SP Transmission Ltd and Scottish Hydro Electric Transmission Ltd', Final decision - Supporting document, April, p. 33
[74] Ofgem (2012), 'RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas', Finance Supporting document, December, p. 11.
[75] I.e. controlling for small changes in the inflation, taxation and indexed cost of debt allowances between the decisions for NGET and SHETL/SPTL. Source: Oxera analysis.
[76] Utility Regulator (2016), 'Price Control for Northern Ireland's Gas Distribution Networks GD17', Final Determination, 15 September, pp. 282, 289, 290.
[77] Competition Commission (2007), 'BAA Ltd, A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd)', Presented to the Civil Aviation Authority, 28 September 2007, paragraph 4.112.

greenfield network, suggest an indicative range of a 20-25 bps impact on the cost of capital.

These findings are consistent with our conclusions from the Oxera 2010 and 2011 reports, on the impact of duration on the cost of capital. Such empirical literature suggests that the impact of duration on the cost of capital is significant.

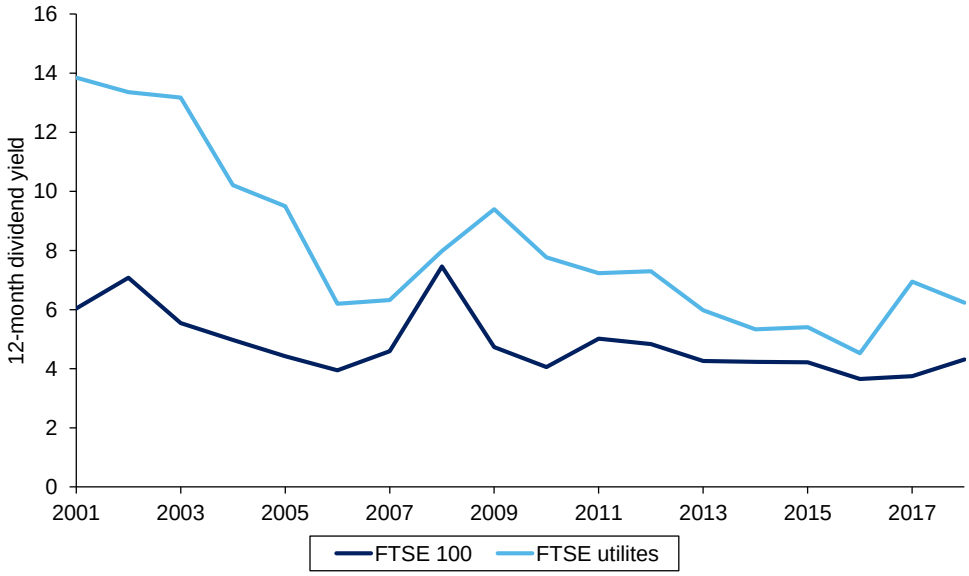
A number of other empirical observations suggest that investors do care about the timing of dividends. This is discussed in the next section.

3.7 Investors in utilities have a preference for dividends

There are behavioural factors that suggest that utilities should maintain a high dividend payment, in line with a catering theory of dividend policy.

Historically, dividend yields for UK utilities have been higher and more consistent than the market average, as is illustrated in the figures below.

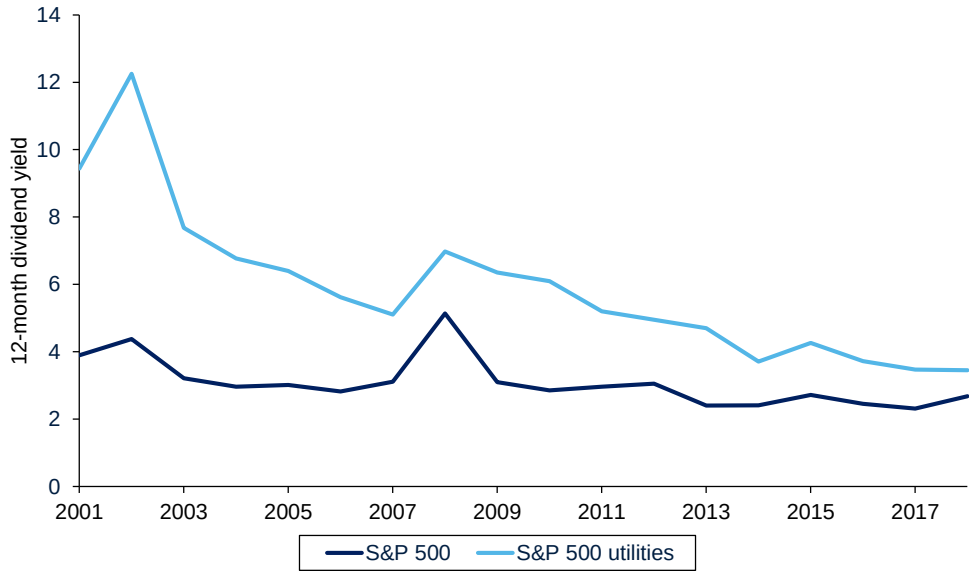
Figure 3.1 Average dividend yields for all FTSE 100 constituents relative to FTSE 100 utilities



Note: FTSE utilities comprise the following utility companies: Drax, Centrica, National Grid, United Utilities, SSE, Severn Trent, and Pennon Group. ContourGlobal, a FTSE 100 utility, is excluded due to no reported UK operations.

Source: Oxera analysis based on Bloomberg and ContourGlobal (2018), 'Annual Report 2017', pp. 6–7.

Figure 3.2 Average dividend yields for all S&P 500 constituents relative to S&P 500 utilities



Note: S&P 500 utilities are companies in the utilities sector as reported by Bloomberg.

Source: Oxera analysis based on Bloomberg.

Figures 3.1 and 3.2 show that utilities listed in the UK and the USA had higher dividend yields than the market as a whole between 2001 and 2018, although there has since been some convergence in the yields between utilities and the rest of the market.

Similarly, by analysing dividend pay-out ratios, we find that the FTSE 100 utilities[78] did not forgo dividends between 2001 and 2018, while about 15% of the remaining FTSE 100 companies did forgo dividends in this period.[79] The average dividend holiday duration for those companies was approximately three years. Similarly, none of the S&P 500 utilities has forgone dividends between 2001 and 2018, while 6% of the remaining S&P 500 companies did forgo dividends during this period. The average dividend holiday duration for those companies was approximately four years. While we have not investigated the cause of the dividend holidays, we would expect some to be due to financial distress and/or adjustment of capital structures. This analysis demonstrates that utilities' dividend distributions have been highly consistent both in absolute terms and when compared with the market as a whole.

The catering theory of dividend policy

The observation that utilities pay higher dividend yields and more consistent dividend distributions compared with the market as a whole has been the subject of significant research. The research suggests that a large subset of investors are likely to invest in utilities with an expectation of consistent and relatively high dividend yield policies. For example, Armitage (2012) finds that the persistently high dividends in the UK water sector cannot be explained by leading

[78] FTSE utilities comprise the following utility companies: Drax, Centrica, National Grid, United Utilities, SSE, Severn Trent, and Pennon Group. ContourGlobal, a FTSE 100 utility, is excluded due to it having no reported UK operations.

[79] Oxera analysis using dividend yields from Bloomberg data. We have assumed that a zero dividend yield in a given year is equivalent to a year of forgone dividends. Instances where a company did not pay any dividends throughout the 2001–18 period are not considered dividend holidays.

explanations, such as taxes, agency costs, signalling, or life-cycle considerations. Rather, the author finds that there is an investor demand for dividends due to institutional, clientele and behavioural explanations.[80] For example, some institutional investors, such as endowments, may require steady cash flows, while others, such as pension funds, may require assets whose cash-flow duration matches that of their liabilities.

The catering theory suggests that a reduction in the dividend yield may cause these investors to reduce their holdings in utilities.[81] Previous work carried out by Oxera[82] suggests that the pool of equity available to support the market in utility equity may be more limited if there are changes to the cash-flow profile that systematically increase the duration, consistent with the catering theory. The cessation or a long-term delay of dividend payments could therefore lead to changes in the relative attractiveness of investment in UK GDNs.

3.8 Conclusion

This section has highlighted important considerations for why the cost of equity would be expected to increase if NGN's dividend distributions are forgone or significantly reduced. Increasing the duration of cash flows creates a time inconsistency effect, which, when combined with asset stranding risk, could increase equity investors' required return for GDN assets. On its own, the effect of asset stranding on the cost of equity could be in the order of 17–75bp.

A higher duration of cash flows would also be expected to increase investors' required returns due to the term premium effect from changes in the interest rate, and the beta effect from increased sensitivity to interest rate fluctuations and market risk. An indicative estimate of the magnitude of the term premium effect on the cost of capital is 90bp.

We have also assessed the finance literature in relation to the beta effect from increased sensitivity to interest rate fluctuations and market risk. The literature suggests that firms in a relatively high growth phase will tend to experience longer-duration cash flows. Therefore, while not directly analogous to the context for RIIO-GD2 (e.g. the scale of expected network growth has not yet been determined), we have also considered whether there are any regulatory precedents that address the extent to which regulated returns face upward pressure in periods of high growth. We note that 20-25bp uplifts in allowed network returns have been observed for high growth phases (i.e. in decisions for RIIO-T1 and the Heathrow Q4 review).

We note that these indicative estimates for the three effects discussed (i.e. the time inconsistency effect, term premium effect and beta effect) are not additive; there are inter-dependencies in the underlying drivers and estimation of the effects, in examining the impact of extended duration on cash flows.

It is likely that investors have strong preferences for the dividend characteristics of utilities (i.e. high and consistent dividend yields). According to the catering theory, any change in the dividend characteristics would be likely to have a negative effect on the relative attractiveness of utilities for these investors. A reduction of dividends may reduce the relative attractiveness of UK regulated assets within the international market for capital, particularly if there is an

[80] Armitage, S. (2012), 'Demand for dividends: the case of UK water companies', *Journal of Business Finance & Accounting*, **39**:3–4, pp. 464–499.
[81] See ibid., section 3.7.
[82] Oxera (2010), op. cit., section 4.

industry-wide trend of lower dividend yields by regulated GDNs, and potentially by other energy and water networks.

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