# Cost of capital for NR23

Prepared for
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# 1 Introduction

NATS (En Route) plc (NERL) has commissioned Oxera to assess the allowed rate of return for the forthcoming NR23 price control review. The allowed rate of return is a key element of NERL's regulatory framework. It is set on the basis of an estimate of the weighted average cost of capital (WACC). NERL's price cap is set such that it should expect to earn the WACC on the value of the regulated asset base (RAB).

NR23 will establish the price cap for the period from 2023 to 2027, and hence the intention of this report is to estimate the cost of capital over that period. In line with the well-established approach to the calculation of the required return for regulated companies, we use the capital asset pricing model (CAPM) to estimate the cost of equity. We have prepared the parameter estimates based on current market evidence, with a cut-off date of 30 September 2021. The levels of each parameter may be subject to change by the time the NR23 review concludes even if the same methodology were to be applied. We therefore expect to update this analysis in 2022 to inform the Civil Aviation Authority's (CAA) review.

In conducting this analysis, we have taken into account the CAA's most recent guidance for setting the cost of capital for NR23.[1] Among other points, the guidance recommended that NERL consider recent relevant precedents in regulated industries in the UK, particularly the price controls that were referred to the Competition and Markets Authority. As recommended by the CAA, we have also considered the role of the traffic risk-sharing mechanism on NERL's beta, we assess NERL's notional gearing, and we demonstrate that NERL's recent debt refinancing can be considered efficient by comparing it to the relevant market benchmarks.

## 1.1 Context for this review

### 1.1.1 RP3 cost of capital

The allowed rate of return is updated at each price review to reflect the latest developments in capital markets. The most recent price determination for NERL by the Civil Aviation Authority (RP3) was set in August 2019 and was anticipated to run from 1 January 2020 to 31 December 2024. At RP3, there was a significant discrepancy between NERL's business plan proposal and the CAA's allowance of 2.68% (RPI-real, vanilla).[2] NERL appealed the RP3 control to the Competition and Markets Authority (CMA) on a number of grounds, and the allowed rate of return was a key area of focus in the CMA's redetermination.

The CMA commented extensively on the methodology for estimating the individual WACC parameters. Having reviewed the evidence submitted by NERL, the CAA and various third parties, the CMA uplifted the (RPI-real, vanilla) WACC allowance to 3.05% on appeal.[3] The movement in the WACC reflected material differences between the CAA and CMA estimates for a number of parameters—most notably the asset beta and gearing.

[1] Civil Aviation Authority (2021), 'Economic Regulation of NATS (En Route) plc: further update on approach to the next price control review ("NR23") – CAP 2160', June, pp. 34–5.
[2] The CAA calculated that the difference in regulatory return between its Final Decision and NERL's Business Plan equated to a revenue differential of £125m. See Civil Aviation Authority (2019), 'UK RP3 CAA Decision Document', August, CAP1830, p. 101.
[3] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 250, para. 13.319.

**Table 1.1 Mid-point estimates of the RP3 cost of capital (RPI-real)**

| | CAA RP3 | CMA RP3 |
|---|---|---|
| Asset beta | 0.46 | 0.57 |
| Gearing | 60% | 30% |
| Debt beta | 0.10 | 0.05 |
| Equity beta | 1.00 | 0.79 |
| Total market return | 5.40% | 5.50% |
| Risk-free rate | -1.70% | -2.25% |
| Equity risk premium | 7.10% | 7.75% |
| Cost of equity, post-tax | 5.40% | 3.89% |
| Cost of debt, pre-tax | 0.86% | 1.12% |
| **WACC, vanilla** | **2.68%** | **3.05%** |

Source: Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July.

While the CMA RP3 determination is of some relevance, we note that in light of the COVID-19 pandemic the CMA did not refine its parameter assessment (with the exception of the weight to place on embedded debt and the conversion from a vanilla to a pre-tax WACC) following the provisional findings.[4] There have been important developments following the conclusion of the CMA process that mean the 3.05% estimate needs to be revisited.

### 1.1.2 Subsequent CMA reviews

Following the CMA's NERL redetermination, four England and Wales water companies (Anglian, Bristol, Northumbrian and Yorkshire Water) appealed Ofwat's PR19 Decision, including on the grounds that Ofwat had set allowed returns at a level that did not accurately reflect the required returns for investors.[5] While many of the issues within the PR19 redetermination were sector-specific, the CMA revised its methodology and made higher allowances for the generic equity market parameters relative to its approach for NERL.

- First, the CMA adopted a higher value for the total market return (TMR, 5.85% RPI-real) than in its Decision for NERL.[6]
- Second, the CMA changed its approach to estimating the risk-free rate (RfR), basing it on both government bond and corporate bond yields.[7]

The CMA is currently undertaking a further review of cost of capital issues in light of GB energy networks' appeals of Ofgem's RIIO-2 determinations. In contrast to the air traffic control and water processes, which involve a full redetermination of the price control, the energy appeals are conducted under a different legal basis in which the CMA's role is limited to determining whether the regulator's Decision was wrong. At the Provisional Findings stage, the CMA has concluded that the evidence provided by appellants does not prove that Ofgem's approach was wrong, even where its methodology differs from

[4] The CMA stated that: 'given the ongoing uncertainties affecting the aviation sector we have not refined our assessment in detail following our provisional findings, or made specific adjustments to take account of the impact of the COVID-19 pandemic, as this would not allow us to reach figures that accurately reflect the effects of the pandemic on determined costs'. Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 250, para. 13.2.
[5] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Final Report', 17 March.
[6] Ibid., p. 1099, Table 9-38.
[7] Ibid., pp. 795–6, para. 9.264.

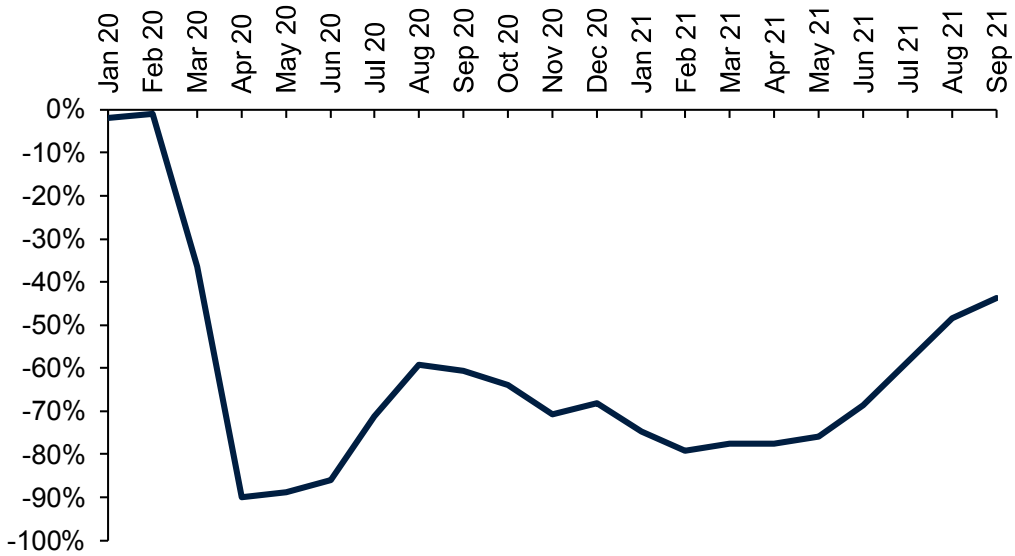
that used by the CMA in the PR19 case.[8] Consequently, it has provisionally not sought to align the RIIO-2 parameters with those used for PR19.

Any further changes in approach (particularly to cross-sector parameters, such as TMR and RfR) may also need to be reflected in the NR23 assessment.

### 1.1.3 Developments in the aviation sector

During the course of the CMA's RP3 redetermination process, COVID-19 was declared a global health emergency and many countries around the world began to impose restrictions on domestic and international travel. The impact on air travel has been unprecedented in terms of the year-on-year reduction in flights in UK airspace. In April 2020, flights fell by 90% relative to the same month a year earlier. By August 2020, the decline in flights had narrowed to c. 60% relative to 2019 levels, but the gap has since widened again as travel restrictions have been reimposed. It was only from June 2021 that traffic started to show some recovery, reaching 56% of 2019 levels by September

**Figure 1.1 UK air traffic volumes as a percentage reduction on 2019 levels**




Source: NATS (En Route) Plc (2021), 'Financial statements, Year ended 31 March 2021', p. 4.

UK en route charges collected by NERL were £162m compared to the price control assumption of £676m as a result of travel restrictions and the reduction in demand due to Covid-19. As a result, NERL took a number of measures to reduce its cost base to preserve liquidity and position the business for a sustainable future. These measures included freezing recruitment, deferring bonuses and pay awards, use of the government furlough scheme, and a voluntary redundancy scheme. This allowed NERL to cut costs in the financial year ending 31 March 2021 by 5.6% (or 14.6% if redundancy costs are excluded).[9]

As the outcome of the CAA's reconciliation of UK en route revenue and costs for 2020 to 2022 will not be known until 2022, NERL recognised regulatory allowances under-recovered to the extent that it is highly probable that a

[8] Competition and Markets Authority (2021), 'RIIO-2 Energy Licence Modification Appeals, Summary of provisional determination', 11 August, pp. 4–5.
[9] NATS (En Route) plc (2021), 'Financial statements, Year ended 31 March 2021', p. 44. Operating costs exclude goodwill impairment and changes in expected credit losses.

significant reversal will not subsequently occur. This approach is in line with applicable accounting standards. This reduction in UK en route revenue together with the impact of the significant shortfall in North Atlantic en route revenue, for which NERL bears the full traffic risk, resulted in a pre-tax, real loss on RAB of 2.53% for the calendar year 2020, compared with the allowed pre-tax return on capital of 3.48%

The impact of COVID-19 was explicitly not factored into the CMA's determination of the allowed return or any other price control parameters given the high level of uncertainty at the time. There remains considerable uncertainty around the ongoing impact of the COVID-19 pandemic and the implications for the aviation industry in the short, medium and longer term.

However, there is evidence that investors perceive there being higher levels of volume, cost and price risk for companies in the aviation sector as a result of the pandemic. A key unknown is the speed of recovery of traffic given uncertainty around vaccination programmes, travel restrictions and macroeconomic conditions (e.g. GDP). Investors and credit rating agencies have noted that the range of possible outcomes in terms of traffic is very wide, such that there is a significant difference between projected high and low traffic scenarios.[10] The impact of COVID-19 on the cost of equity is a critical issue in the NR23 assessment.

#### 1.1.4 NERL refinancing

The traffic downturn has negatively affected NERL's cash and liquidity positions. Consequently, NERL recently completed a debt raise of £1.6bn to refinance its existing loans and provide additional liquidity.[11] This has a significant impact on the estimation of the cost of debt for NR23. We cover this in section 4.

### 1.2 Key assumptions

The estimates presented in the report have been prepared on the following basis.

- **Cut-off date.** We have used a cut-off date of 30 September 2021 for all analysis underpinning the parameter estimates provided in this report.
- **Inflation assumptions.** In setting price controls, regulators have to control for inflation in several areas. Different regulators take different approaches, and the approach chosen can affect prices and revenues. Given the CAA's framework for setting NERL's charges, all estimates in this report are presented in RPI-real terms (unless stated otherwise).
- **Tax.** In this report, we present real, vanilla WACC estimates. We understand that the tax allowance will then be estimated using the NERL financial model (to convert to pre-tax numbers).

### 1.3 Structure of the report

The remainder of report is structured as follows.

- In section 2, we derive an estimate of the NR23 asset beta for NERL taking account of the latest market evidence and the impact of COVID-19 on the aviation sector.

[10] Moody's (2020), 'European Airports and Airlines: Recovery Prospects', 19 November, p. 5 (slide titled 'A wide range of outcomes still possible').
[11] NATS (En Route) Plc (2021), 'Financial statements, Year ended 31 March 2021', p. 13.

- Section 3 discusses the estimation of the equity market parameters, considering the current evidence on the risk-free rate (RfR), total market return (TMR) and equity risk premium (ERP).
- Section 4 presents the cost of debt.
- Section 5 considers the appropriate gearing assumption for the purposes of estimating the NR23 WACC.
- Section 6 concludes.

# 2 Asset beta

## 2.1 Background

In the CAPM framework, equity investors require compensation for systematic risk only (risk that cannot be diversified away by holding a portfolio of assets). This exposure to systematic risk is measured by the equity beta. The higher the equity beta, the more responsive the expected value of the company's stock to movements in the overall market, as shown in Table 2.1.

**Table 2.1 Illustrative equity betas**

| Equity beta | Increase in stock market index | Expected increase in company X's stock |
|---|---|---|
| 1 | 5% | 5% |
| 0.5 | 5% | 2.5% |
| 2 | 5% | 10% |
| -1 | 5% | -5% |

Source: Oxera.

The equity beta is a function of operational risk and financial risk. That is, a company can have a higher beta than another if it operates in a more cyclical industry, or if it has more debt in its capital structure, because:

- the cash flows of a more cyclical company will vary more with changes in the economy, and so will be more correlated with changes in the overall stock market value;
- the more debt a company has, the higher the probability of default, and, therefore, the more risky the cash flows are to equity.

When comparing the relative risk of different sectors, or different companies within a sector, it is important to isolate the impact of capital structure. This is done by considering the asset beta, which is the weighted average of the equity and debt betas of the firm.

## 2.2 Key methodological issues in beta estimation

### 2.2.1 Comparator set

For companies that are publicly listed, the beta can be directly observed by regressing the company's share price against a stock market index. Given that NATS Holdings Limited is privately owned and financed, it is not possible to directly observe a beta for NATS or for the narrower NERL entity. As such, NERL and its UK regulatory bodies (the CAA and CMA) have estimated the beta with reference to the observed betas of publicly listed companies that are considered to be close comparators.[12]

NERL is the monopoly provider of en route services in the UK, such that there are no direct comparators in the UK. This means that it is necessary to look at comparators in other sectors and/or regions. In the context of the RP3 redetermination, the CMA highlighted the difficulty in identifying good

[12] In conducting its redetermination, the CMA noted that: 'All the submissions to this reference were based on the approach used in regulatory precedent of identifying suitable comparators, measuring their betas, and then estimating the beta of NERL using those comparator betas. We agreed that using comparator companies was the correct approach to estimating the beta of NERL, and we broadly followed the approach proposed by all parties'. See Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, p. 178, para. 13.46.

comparators for NERL.[13] It ultimately analysed betas for ENAV, the only publicly listed European air navigation service provider, and three large European airport operators (Fraport, Aena, AdP).

The CMA determined that no weight should be placed on UK water and energy companies with respect to the asset beta.[14] Moreover, the CMA considered whether to include a wider set of comparators from the aviation sector, including smaller European airports (Copenhagen, Vienna and Zürich), non-European airports (e.g. Auckland and Sydney) and airlines. It decided against including these comparators with the following rationale.

- For the smaller European airports, the CMA was concerned that company-specific issues and lack of liquidity could distort betas.[15]
- Sydney and Auckland were excluded as the CMA 'did not feel confident that investors in these very geographically distinct markets could be assumed to be comparable investors with a comparable view on systematic risk'.[16]
- The CMA noted that airlines are higher risk than airports and ANSPs, and were not seen (by any parties) as direct comparators for NERL.[17]

In the context of the H7 review, the CAA has outlined that it is considering the merits of using wider comparator sets given concerns 'that a small sample size could bias our estimate of the equity beta'.[18] It has shortlisted eight airport operators as potential comparators for Heathrow (Table 2.2). These are the same airports considered by the CMA in relation to NERL.

**Table 2.2 CAA's shortlist of comparators for H7**

| | | | |
|---|---|---|---|
| Aéroports de Paris | Flughafen Zürich | Fraport | Aena |
| Copenhagen Airports | Flughafen Wien | Sydney Airport Holdings | Auckland International Airport Limited |

Source: CAA (2021), 'Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward', CAP 2139A, April, p. 70.

Consequently, we have considered the appropriate comparator set for the NR23 review and, in particular, whether there are strong grounds to expand the comparator set beyond that favoured by the CMA in its RP3 redetermination.

In line with the approach adopted by the CMA, we assess the suitability of comparators using two main criteria.

- First, **comparator firms should have a similar asset risk to NERL**. It is therefore important to choose companies that are similar in their exposure to systematic risk. Ideally, the sample would be formed of pure-play comparators—i.e. companies that are exclusively involved in the provision

[13] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 173, para. 13.27.
[14] Ibid., p. 192, para. 13.96.
[15] Ibid., p. 186, para. 13.74.
[16] Ibid., p. 186, para. 13.75.
[17] Ibid., p. 180, para. 13.51.
[18] CAA (2021), 'Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward', CAP 2139A, April, p. 68.

of en route air navigation services. However, given the lack of pure-play comparators in this case, it is necessary to develop a comparator set that faces sufficiently similar risks to NERL to provide meaningful comparison. The most important characteristics are the type of assets (sector), the company's business risk profile, and hence the sensitivity of profits to movements in the market. This includes the scale of and exposure to cost/revenue risk and the regulatory framework under which the company operates.

- Second, **the data should provide a reliable estimate of the comparator's 'true' beta**. In particular, it is necessary to screen out illiquid firms because illiquidity creates estimation problems when calculating beta.

We have applied these two criteria in order to filter the potential comparators down to a final comparator set. Below, we consider potential comparators involved in aviation (i.e. airport operators and air navigation service providers) and non-aviation activities (e.g. system operators).

**Aviation**

Table 2.3 provides an overview of the potential aviation comparators in terms of the size of the asset base, ownership structure and regulatory framework. It shows that the airport operators generally have considerably larger asset bases and, in many cases, have revenue streams that lie outside the scope of regulation.

**Table 2.3 Overview of potential aviation comparators**

| Potential comparator | Size of assets (£m, 2020) | % of revenue from aeronautical activities (2019) | Ownership | Regulatory framework |
|---|---|---|---|---|
| Aena | 13,300 | 64% | Partially privatised | Regulator-set price cap. Aena bears all volume risk. |
| AdP | 15,780 | 64% | Partially privatised | Regulator-set price cap. Traffic risk share mechanism has been in place for multiple price control periods. |
| Auckland | 4,700 | 42% | Partially privatised | Price monitoring regime with pricing flexibility to deal with changes in traffic |
| Copenhagen | 1,190 | 56% | Partially privatised | Multi-year price cap determined through commercial negotiations with airlines. Once price cap is agreed, Copenhagen bears volume risk. |
| Fraport | 11,950 | 45% | Partially privatised | Frankfurt Airport proposes its own charges, subject to regulatory approval. Significant amount of operator discretion around timing of consultation on charges. |
| Sydney | 6,830 | 51% | Private | Price monitoring regime with pricing flexibility to deal with changes in traffic |
| Vienna | 1,845 | 73% | Partially privatised | Regulator-set price cap |
| Zürich | 3,890 | 55% | Partially privatised | Price caps determined through user consultation and subject to regulatory approval |
| NERL | 1,836 | 100% | Partially privatised | Regulator-set price cap. NERL has some protection from volume risk through the traffic risk-sharing mechanism. |

Note: we have reported the share of aeronautical revenues for the sample of airports for the year 2019, rather than 2020, as aviation revenues contracted relatively more due to COVID-19 than non-aviation revenues. As such, the share of aviation revenues in 2020 may not be fully representative of the situation going forward.

Source: Oxera research based on company financial statements.

We note three areas of difference that are particularly relevant to the assessment of beta comparators.

- **Business mix.** The majority of NERL's revenue comes from regulated activities relating to the provision of en route air navigation services. It earns a small amount of non-regulated income (c. 10% of total revenue). ENAV's business model is largely similar—however, around 27% of its regulated

revenues are from terminal services (as opposed to en route).[19] Airport operators, by contrast, typically have more diversified business models with a more significant proportion of income earned from non-aeronautical activities (e.g. retail, car parking and property). A number of airports (e.g. Aena and AdP) operate under 'dual' or 'hybrid' till regulatory models in which the income from certain business segments is unregulated. For retail activities, income is often based on minimum annual guarantees, which provide a lower bound on income and reduce the variability of revenue. However, the long-term drivers of this revenue are likely to be similar to those for aeronautical activities (i.e. passenger traffic). An important difference between airports and ANSPs is that the former have some capacity to influence traffic by adapting airport charge levels and tariff structures (within the constraints of the overall price cap), while ANSPs are restricted in their ability to affect demand conditions.

- **Market dynamics.** For the purposes of assessing the suitability of comparators, we note there are potentially differences in market dynamics between:

  1. en route and terminal air navigation services;

  2. air navigation services and airports—for example, airports may be subject to greater levels of competition than ANSPs, which are national monopolies.

  3. ANSPs/airports operating in different geographic markets—for example, there may be differences between the UK market and other national markets, and/or differences between the European and non-European markets.

- **Regulatory framework.** The airports broadly fall into three categories: (i) those subject to regulator-determined ex ante price caps (AdP, Aena, Vienna); (ii) those subject to multi-annual price caps agreed through consultation with users and subject to ex ante regulatory approval (e.g. Copenhagen, Frankfurt and Zürich); and (iii) those that have flexibility to set their own prices subject to ex post monitoring by a regulator (Auckland and Sydney). Therefore, the regulatory arrangements in Australia and New Zealand differ from the European airports, as they do not operate under ex ante price caps and instead have the commercial flexibility to set and revise their own charges from year to year. There is regulatory oversight in the form of price monitoring.

Overall, we consider that the underlying driver of revenue for airports and air navigation service providers is demand for air travel and, hence, despite the differences in business mix, airports are sufficiently similar to be included in the beta comparator set.

However, in line with the conclusions of the CMA, we consider that there are strong grounds to conclude that Sydney and Auckland are not good comparators for NERL.

- First, they operate in an entirely separate geographic market that is subject to different market dynamics.

- Second, they operate under different regulatory regimes, characterised by light-touch regulation based on commercial agreements between airports

[19] ENAV (2021), 'Investor Presentation – July 2021', last accessed on 19 August 2021 at https://www.enav.it/sites/public/it/Servizi/Documenti/presentazione-03-08-2021.pdf.

and airlines. This provides considerably higher commercial flexibility compared to regimes based on multi-year regulatory price caps. In particular, it provides greater scope to flex prices in response to cost or traffic shocks.

- Third, the impact of the pandemic has also been quite different from European airports. Australia and New Zealand have enforced severe restrictions on international travel, but domestic flights have been less badly affected. For example, Moody's considered that Australian and New Zealand airlines were less vulnerable to coronavirus than their global peers due to the strength of the domestic market.[20]

On this basis, we exclude Auckland and Sydney from the comparator set.

In order to evaluate the sample of potential European airport comparators, we have analysed the liquidity of airport stocks to assess whether their equity betas may be biased due to low stock trading volumes. We look at two measures.

- **Bid–ask spread as a percentage of closing price**—the difference between the lowest price at which an asset is offered for sale in a market and the highest price that is offered for the purchase of the asset. The lower the bid–ask spread, the more liquid the stock. A relatively narrow bid–ask spread could be a sign that there are a large number of buyers and sellers in the market.
- **Free float**—the proportion of shares that can be publicly traded. A small proportion of shares floated would create an impediment to active trading. Stocks with a low free float could therefore be considered less liquid.

Table 2.4 presents these two measures for the European airport operators. The table shows that Copenhagen and Vienna airports have significantly lower free float and higher bid–ask spreads than the other operators. This issue is particularly acute for Copenhagen Airport, which has a very small proportion of shares floated (1.5% of the total stock). This evidence suggests that these stocks are considerably less liquid than the remainder of the comparator set, which may lead to asset beta estimates that are biased downwards.

**Table 2.4 Assessment of comparators using liquidity filters**

| Potential comparator | Free float | Bid–ask spread |
|---|---|---|
| Aena | 45.4% | 0.08% |
| AdP | 33.4% | 0.15% |
| Fraport | 39.8% | 0.09% |
| Zürich | 61.5% | 0.16% |
| ENAV | 46.7% | 0.15% |
| **Vienna** | **10.2%** | **0.66%** |
| **Copenhagen** | **1.5%** | **1.33%** |

Source: Oxera based on Bloomberg data.

Based on the above, we establish the following conclusions.

[20] Moody's (2020), 'Australian and New Zealand airlines less vulnerable than many global peers to coronavirus outbreak', 6 February.

- The large European airport operators (AdP, Aena and Fraport) are suitable comparators, in addition to ENAV, the only publicly listed ANSP.
- For non-European airports, differences in market dynamics, legal and regulatory frameworks lead us to exclude the asset betas of these airport operators from our comparator set.
- Copenhagen and Vienna airports present liquidity issues, whether in terms of a lower free float, or a higher bid–ask spread than the other airports selected in the sample. We therefore exclude these from our comparator set.
- Zürich Airport, which was not included by the CMA as a comparator, appears to be more similar to the sample of large European airport groups based on its stock liquidity. As such, we also consider it to be a suitable comparator.

While we have excluded Auckland, Copenhagen, Sydney and Vienna airports from our core analysis, we have included them as sensitivities in some tables and diagrams for completeness.

**Non-aviation comparators**

Finally, it is also important to consider whether there are any companies operating outside the aviation sector that would be relevant comparators for NERL. In this context, we note the core characteristics of NERL's business:

- high revenue risk, subject to regulatory protections;
- high operational leverage;
- NERL operates an open network—it has limited control over the volume of flights that it serves;
- low capital intensity and short asset lives (relative to other infrastructure networks).

As noted above, the CMA found that NERL's business risk was sufficiently different from utility companies (i.e. water and energy networks), such that these should be excluded from the beta comparator set. In particular, the CMA concluded that (i) NERL's volumes were likely to be significantly more variable than for water or energy companies and (ii) NERL's thin operating profit margins and equity value relative to OPEX and CAPEX mean that shareholders are vulnerable to relatively small changes in the macroeconomic environment.[21]

The subsequent, disproportionate impact of COVID-19 on the aviation sector relative to other regulated sectors reinforces the CMA's conclusion that utilities are an inappropriate reference point for NERL. Consequently, we exclude utility companies from our comparator sample.

In its Statement of Case to the CMA, NERL noted that its business could be regarded as closer to that of a system operator found in other sectors, such as the National Grid ESO (Great Britain) or SONI (Northern Ireland). In particular, these businesses are relatively asset light, have high operating leverage, are exposed to cash flow risk, and are subject to economic regulation. However, there are also important differences—in particular, the system operators are

[21] 'Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 180, para. 13.53.

not exposed to volume risk in the same way as NERL, and have not faced the same COVID-19 impact.

Moreover, it is not possible to estimate a beta for these businesses directly, and therefore the only reference point would be the regulatory determinations for these companies (shown in Table 2.5).

**Table 2.5 System operator betas**

| Company | Regulator | Year | Asset beta |
|---|---|---|---|
| SONI (NIAUR/CMA) | NIAUR/CMA | 2017 | 0.60 |
| National Grid ESO | Ofgem | 2020 | 0.55 |

Source: Competition and Markets Authority (2017), 'SONI Limited v Northern Ireland Authority for Utility Regulation: Final Determination', 10 November; Ofgem (2021), 'RIIO-2 Final Determinations – Electricity System Operator (REVISED)', 3 February, p. 68.

We note that in developing the beta estimate for the National Grid ESO, Ofgem's consultants used the CMA's beta determination for NERL as a key input, and that therefore placing any weight on this value when estimating NERL's beta would give rise to a circularity issue. Moreover, Ofgem notes the source of its final asset beta estimate of 0.55 as 'Ofgem judgement'.[22] As a result, we consider there to be limited read-across to NERL.

### 2.2.2 Estimation approach

Equity and asset betas can be calculated over different time periods (e.g. one-year, two-year and five-year estimation windows) and on the basis of daily, weekly or monthly data. There are often material differences in beta estimates for different estimation windows and sampling frequencies.

Moreover, there is a question of which stock market index to use as the comparator index in the beta regression. This could be the relevant domestic index for the country in which the stock is listed, or a broader market index covering a more diversified range of stocks.

In the RP3 redetermination, the CMA's approach involved:[23]

- using daily and weekly data to estimate betas;
- assessing two-year and five-year betas;
- analysing both spot betas and rolling betas over a one-year, two-year and five-year period to check the stability of the betas over time;
- using a Europe-wide equity index (the Eurostoxx 600) as the market index for the beta regression.

We follow the CMA's approach by calculating two-year and five-year betas, regressed on the Eurostoxx 600 index, using both daily and weekly data. We also estimate one-year betas with a view to understanding whether there has been any reversion in betas towards pre-COVID-19 levels in recent months.

However, we have chosen not to include rolling average betas in the beta assessment. We note that the three-year rolling average of the two-year beta will effectively cover the same total estimation period as a five-year beta.

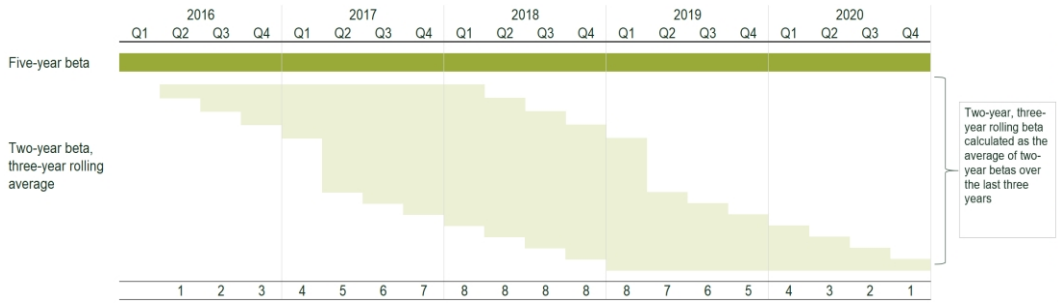
[22] Ofgem (2021), 'RIIO-2 Final Determinations – Electricity System Operator (REVISED)', 3 February, p. 68, Table 11.
[23] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, pp. 192–3.

However, a critical issue with rolling average betas is that they place unequal weight on data points across this time period. The rolling average beta places more weight on data points within the middle of the period, while the five-year beta places equal weight on each data point within the five-year period.

Figure 2.1 below provides a simplified example of the effect of rolling averages using quarterly data. In this example, we compare (i) a three-year rolling average of the two-year beta with (ii) the five-year beta. Although these cover the same estimation period (2016–20), data points in 2018 receive eight times the weight of the first and last data points in the estimation period under the rolling average approach.

As a result, significantly more weight is placed on 2018 data than on 2020 data in the calculation of rolling average betas. By assigning such a low weight to the most recent data, when betas have increased, the use of rolling average betas are likely to result in an underestimate of the beta for the next regulatory period.

**Figure 2.1 Rolling average illustration**




Source: Oxera analysis.

### 2.2.3 Weight to place on spot estimates compared to past data

The impact of COVID-19 on the aviation sector is unprecedented and unlike any previous traffic shock. The scale and nature of the shock will inevitably affect how investors view the sector and assess its riskiness relative to other sectors and asset classes. It is therefore paramount that the beta assessment does not seek to exclude the impact of COVID-19 in its entirety. However, there is a legitimate question as to whether the increase in asset betas will be temporary or whether it will sustain in the medium to long term.

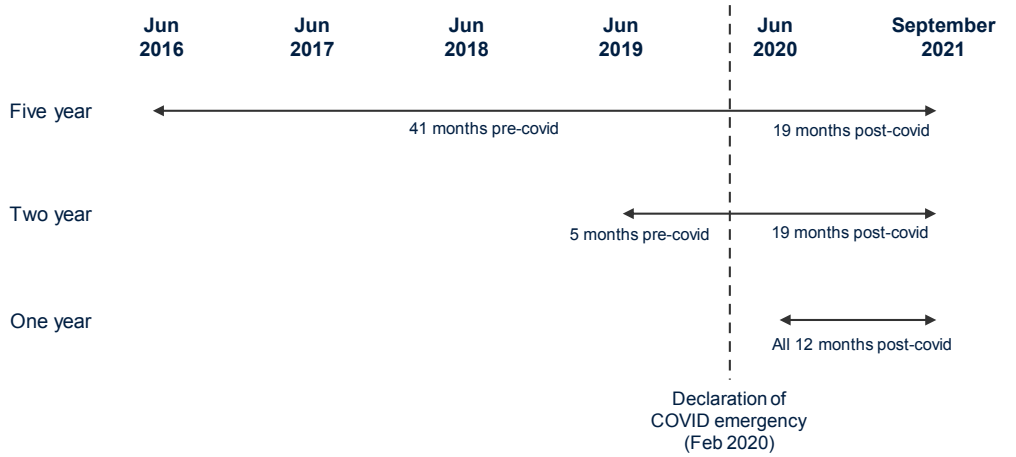
In its consultation on the way forward in regulating Heathrow Airport, the CAA has set out its view that current beta estimates need to be interpreted carefully:[24]

> We consider that data on airport share prices and movements in stock market indices are important and relevant to the assessment. It is plausible that their evolution since 2020 could signal a shift in investors' perceptions of the systematic risk exposure of airports. At the same time, this data must be cautiously interpreted:
>
> - we are concerned that beta estimates may be subject to certain biases during periods of market turmoil; and
> - there is a risk that data during the period of the pandemic is over represented in recent market evidence for the purposes of determining HAL's forward looking risk exposure.

[24] Civil Aviation Authority (2021), 'Appendices to Economic regulation of Heathrow Airport Limited: Consultation on the Way Forward', CAP2139A, April, p. 67, para. 38.

As we note above, we have considered one-year, two-year and five-year betas in our assessment. Figure 2.2 shows the number of months of data that can be considered to be pre- and post-COVID-19 for each of these beta estimation periods. The figure shows that for five-year betas, around two-thirds of the data points precede the declaration of the COVID-19 emergency. By contrast, one-year betas purely capture market evidence after the outbreak of the pandemic.

**Figure 2.2 Beta estimation windows**




Source: Oxera analysis.

There are a number of potential ways in which the current market evidence could be interpreted for the purposes of the NR23 assessment. One approach would be to rely on spot estimates as the best indicator of future betas, as these estimates reflect the most updated information and opinions of investors about the systematic risk of a company. An alternative would be to assume that spot asset betas, which have been driven up by the impact of the pandemic, will eventually revert back to their pre-pandemic levels, provided that investors perceive this as a one-off event that does not permanently alter the risk profile of the sector. A third outcome is also possible—that betas will reduce from spot levels but remain above pre-pandemic levels. We discuss our approach to this issue further in section 2.5.

### 2.2.4 Weight to place on different comparators

A further question when estimating asset betas is whether all comparators should be given an equal weight in the calculation. In the case of NERL and the air traffic management industry, this question is very relevant due to the limited number of publicly listed ANSPs (only ENAV is listed), and the need to widen the comparator set by looking at other sectors, such as airports.

As we have set out above, there is no perfect single comparator for NERL, and even small differences in relative risks between comparators (including regulatory, revenue, volume and cost risk) may assume a greater importance in the minds of investors in moments of greater uncertainty. The closest comparator in operational terms is ENAV, as the only ANSP in the sample. However, even though ENAV operates under a very similar regulatory model with a comparable traffic risk-sharing mechanism,[25] there are also differences that may mean that NERL is considered to face higher risk exposure, as the CMA concluded in its Decision.

[25] We note that, since the UK's official departure from the EU on 31 January 2020, the CAA has the ability to diverge from European rules, and thus adopt a different TRSM for NERL.

There are number of potential ways in which the comparator betas could be interpreted in order to arrive at an estimate of NERL's asset beta. A simple average could be used, whereby all comparators receive similar weights; or specific weights can be assigned to each company depending on their similarity to NERL. Additionally, qualitative adjustments can be made to reflect the relative riskiness of NERL as perceived by investors, compared to the sample of companies analysed.

### 2.2.5 Debt beta

The debt beta measures the systematic risk of debt returns. Historically, UK regulators tended to assume a debt beta of zero when estimating the cost of capital for price reviews. More recently, the CAA and other regulators—including Ofcom, Ofgem, Ofwat and the CMA—have assumed a non-zero debt beta.

There are a number of potential approaches to estimating the debt beta:[26]

- **direct method**—regressing bond returns directly on equity market returns to obtain an estimate of a debt beta;
- **indirect method**—a staged approach, where the first step consists of regressing the returns of a company's bond against the returns on an index of government bonds of similar duration, and on the returns on the company's shares. The second step is to multiply the coefficient on equity returns by the company's equity beta;
- **structural methods**—based on theoretical option pricing models. The debt beta can be estimated given assumptions on gearing, equity volatility and the equity beta;
- **decomposition method**—decomposing the debt spread (i.e. spread between corporate bond yields and government bond yields) into three components—a default premium, a default risk premium and a liquidity premium. This was the main method proposed by the CAA in RP3.

The methodology for calculating the debt beta was considered as part of the CMA process. The CMA chose not to place any weight on the decomposition approach given its view that the estimates carried significant uncertainties:[27]

> NERL's evidence, in our view, illustrated that there was significant uncertainty over the ability to measure debt betas using the CAA's approach. Whilst we were cautious about the extent to which interpretation of the traded bond data is possible, on balance we agreed with NERL that, consistent with the traded bond data, it was likely that the actual beta of NERL's debt would be lower than 0.1. We took account of the low risk of NERL's debt, and our decision to set a lower gearing, and decided to use a lower debt beta of 0.05.

In line with the CMA's Decision, we maintain the assumption of a 0.05 debt beta for NR23, which we believe is an appropriate estimate for a highly rated issuer like NERL.[28]

## 2.3 Market evidence

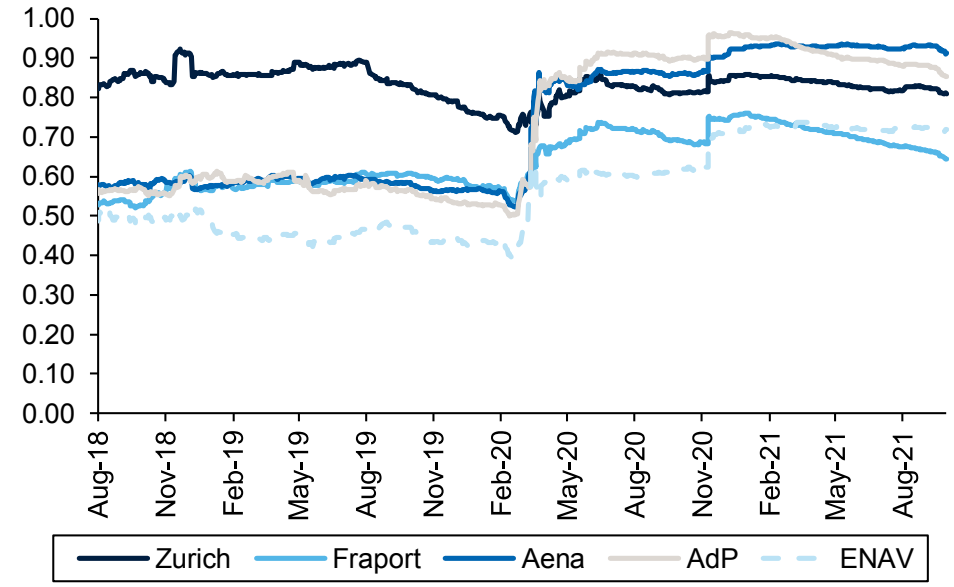
As of February 2020, before the onset of the COVID-19 pandemic, two-year asset betas for the three main European airport groups (i.e. Aena, AdP and

[26] Oxera (2020), 'Estimating debt beta for regulated entities', 8 June.
[27] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, paras. 13.121–13.122.
[28] This is consistent with our estimate of debt betas for regulated energy and water networks in the UK.

Fraport) remained stable in the range of 0.50–0.60. The contraction in traffic and the uncertainty around the short-, medium- and long-run operating climate for the aviation sector are reflected in sharp increases in asset betas for these airport operators.

As shown in Figure 2.3, there has been a clear increase in betas from February/March 2020 onwards. There appears to be a second spike in betas in early November 2020 coinciding with Pfizer and BioNTech's announcement of successful vaccine trials,[29] which led to a stronger reaction from aviation stocks than the wider market due to the importance of vaccine development for the industry's recovery. At the cut-off date of our analysis (30 September 2021), asset betas remained significantly above their pre-COVID-19 levels.

**Figure 2.3 two-year daily asset betas**




Source: Oxera based on Bloomberg data.

The average increase in two-year daily asset betas across the five comparators from February 2020 to September 2021 was 21bp, with asset betas for Aena and AdP both increasing by more than 29bp. The increase in ENAV's asset beta (29bp) was also very significant, which suggests that the existence of an identical TRSM to NERL's has not fully prevented a repricing of risk by investors, particularly in an environment of uncertainty regarding to what extent, and how quickly, revenue allowances for the period 2020/21 will be recovered. Fraport and Zürich (which was excluded from the CMA sample) have seen the smallest increase in two-year betas.

[29] Pfizer (2020), 'Pfizer and BioNTech Announce Vaccine Candidate Against COVID-19 Achieved Success in First Interim Analysis from Phase 3 Study', press release, 9 November.

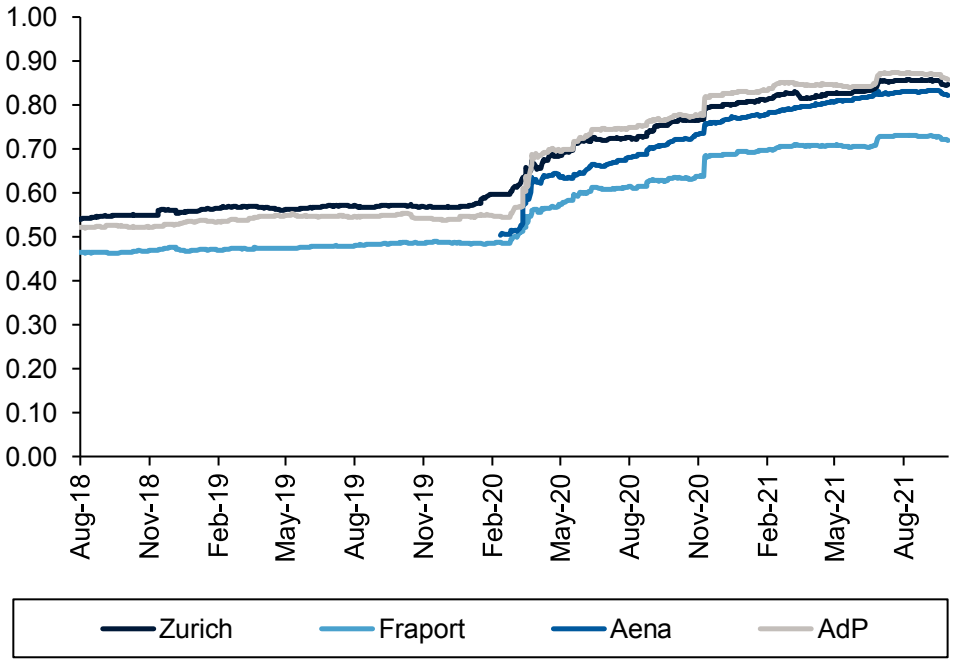
**Table 2.6 Change in two-year daily asset betas since February 2020**

| Comparators | 28 Feb 2020 | 30 September 2021 | Change |
|---|---|---|---|
| ENAV | 0.434 | 0.719 | **29bp** |
| Aena | 0.551 | 0.912 | **36bp** |
| AdP | 0.558 | 0.852 | **29bp** |
| Fraport | 0.582 | 0.644 | **6bp** |
| Zürich | 0.749 | 0.810 | **6bp** |
| **Average** | **0.575** | **0.787** | **21bp** |

Source: Oxera analysis based on Bloomberg data.

As Figure 2.2 shows, two-year asset betas are more affected than longer term betas by COVID-19, as more than half of the observations of a spot two-year beta will now fall within the pandemic period. Therefore, looking at five-year asset betas is also informative. As we can see from Figure 2.4, although less pronounced than for the two-year betas, the trend for five-year betas has been of a noticeable and steady increase since February 2020.

**Figure 2.4 five-year daily asset betas**




Source: Oxera based on Bloomberg data.

The average increase in betas across the four comparators from February 2020 to September 2021 was 23bp, with Aena and AdP being the most affected. Although the increase in five-year asset betas has been more gradual since the start of the pandemic than for two-year betas, the magnitude of the total increase between February 2020 and September 2021 has been almost identical.

**Table 2.7 Change in five-year daily asset betas since February 2020**

| Comparators | 28 Feb 2020 | 30 September 2021 | Change |
|---|---|---|---|
| ENAV | n.a. | 0.642 | - |
| Aena | 0.511 | 0.823 | **31bp** |
| AdP | 0.558 | 0.858 | **30bp** |
| Fraport | 0.500 | 0.720 | **22bp** |
| Zürich | 0.610 | 0.846 | **24bp** |
| **Average** | **0.545** | **0.778** | **23bp** |

Note: Five-year asset betas were unavailable for ENAV for 28 February 2020 as ENAV was only listed on the Italian stock market on 26 July 2016.

Source: Oxera analysis based on Bloomberg data.

In Table 2.8 below, we show the asset betas using a number of different specifications for our preferred sample, as well as for listed European airports (Copenhagen and Vienna) and non-European airports (Sydney and Auckland). Using our preferred sample (ENAV, Aena, AdP, Fraport and Zürich), the average asset beta ranges from 0.72 for one-year weekly betas to 0.87 for the one-year daily specification. In comparison, the asset beta range in the CMA Decision was 0.52–0.62. As a sensitivity, if we include the smaller European airports, Sydney and Auckland in our sample, the estimated range is 0.70–0.82, almost 20bp higher than the CMA's estimates in 2020.

**Table 2.8 Spot betas for the comparator set**

| | | One-year daily | One-year weekly | Two-year daily | Two-year weekly | Five-year daily | Five-year weekly |
|---|---|---|---|---|---|---|---|
| 1 | ENAV | 0.97 | 0.81 | 0.72 | 0.95 | 0.64 | 0.80 |
| 2 | Aena | 0.93 | 0.78 | 0.91 | 0.82 | 0.82 | 0.78 |
| 3 | AdP | 0.78 | 0.60 | 0.85 | 0.89 | 0.86 | 0.94 |
| 4 | Fraport | 0.78 | 0.67 | 0.64 | 0.69 | 0.72 | 0.77 |
| 5 | Zürich | 0.89 | 0.75 | 0.81 | 0.91 | 0.85 | 0.94 |
| | **Average (1–5)** | **0.87** | **0.72** | **0.79** | **0.85** | **0.78** | **0.85** |
| 6 | Copenhagen | 0.44 | 0.41 | 0.32 | 0.45 | 0.30 | 0.46 |
| 7 | Vienna | 1.02 | 0.89 | 0.86 | 0.86 | 0.70 | 0.74 |
| | **Average (1–7)** | **0.83** | **0.70** | **0.73** | **0.80** | **0.70** | **0.78** |
| 8 | Sydney | 0.59 | 0.64 | 0.57 | 0.74 | 0.55 | 0.67 |
| 9 | Auckland | 0.87 | 0.73 | 1.08 | 1.01 | 1.01 | 0.93 |
| | **Average (1–9)** | **0.81** | **0.70** | **0.75** | **0.82** | **0.72** | **0.78** |

Note: Cut-off date of 30 September 2021.

Source: Oxera based on Bloomberg data.

## 2.4 NERL's risk profile relative to comparators

In assessing relative risk, it is relevant to analyse:

- levels of underlying asset risk, in terms of both cost and revenue risk;
- the impact of the regulatory framework in increasing or decreasing exposure to these risks;
- the sensitivity of profits to changes in costs and revenues.

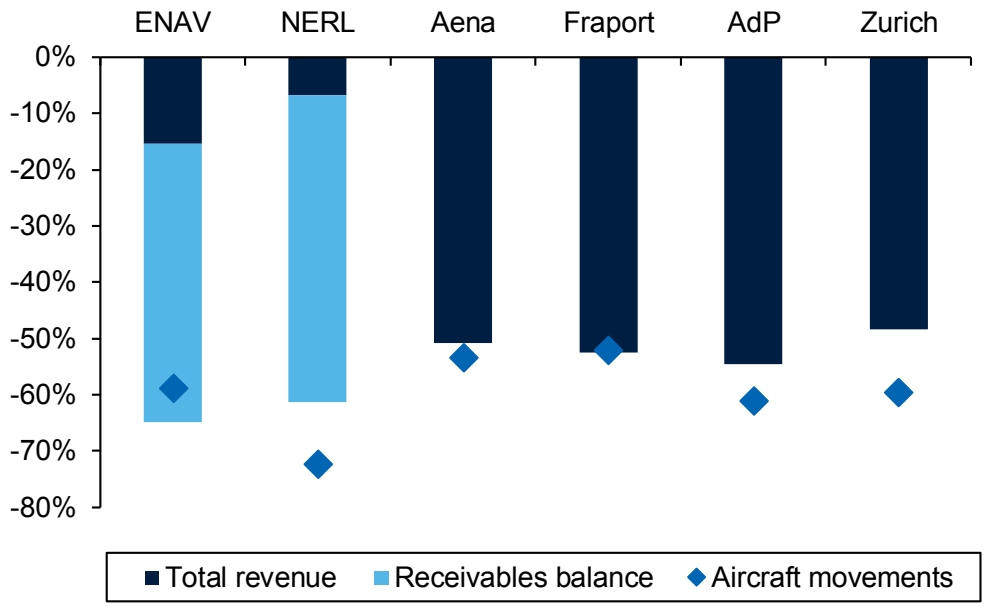
### 2.4.1 Underlying asset risk

**Revenue risk**

'Revenue risk' refers to uncertainty about the amount of revenue that a company will earn depending on the economic and business conditions in which it is operating. For regulated ANSPs and airports operating under price caps, revenues are primarily driven by passenger volumes and aircraft movements, such that volume risk is the key driver of revenue volatility.

Due to COVID-19, air traffic movements at the four comparator airports and ENAV have fallen by 52–61% relative to 2019, while traffic for NERL fell by 72%.[30] This indicates that the impact on NERL has been greater than for the other comparators, but all have been very significantly affected.

**Figure 2.5 Traffic and revenue impact of COVID-19**



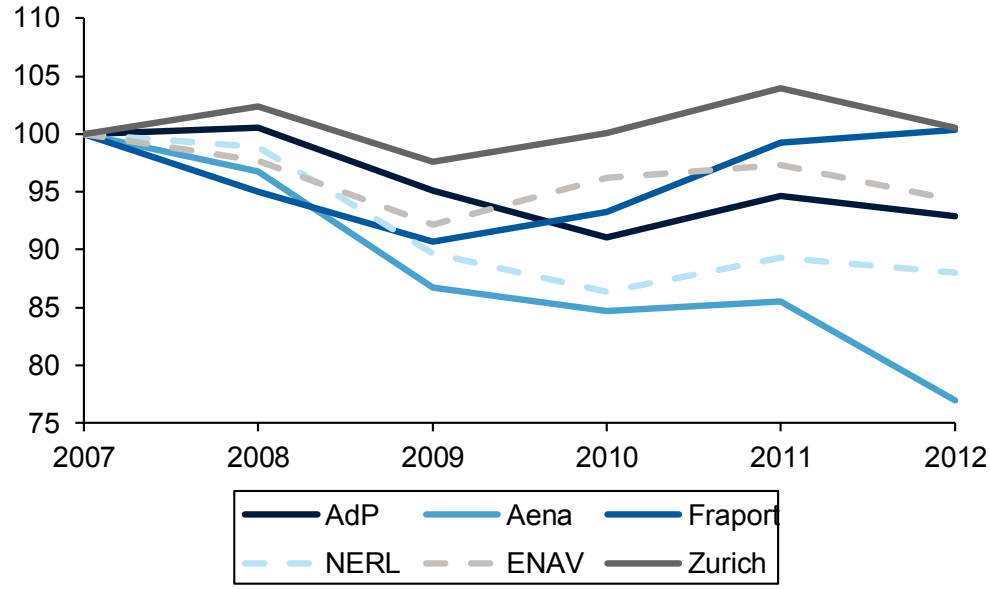

Note: 'Receivables balance' refers to the under-recovered revenue allowances for ENAV and NERL based on their traffic risk share mechanism. Traffic is measured in aircraft movements.

Source: Oxera analysis based on company annual accounts.

In addition to the similar traffic shocks faced by the comparators during the pandemic, the recovery from the crisis is also likely to be similarly challenging for all. As we can see in Figure 2.6, with the exception of Zürich Airport, all other operators took at least four years to recover to pre-crisis levels following the 2008 financial crisis, with a more severe contraction for Aena due to the economic crisis that followed in Spain. The figure shows that NERL was the second most affected by the financial crisis, with a more severe reduction in traffic than ENAV.

[30] Traffic figures for the four airports and ENAV refer to calendar years, while NERL figures are for the 2020/21 financial year (i.e. 1 April 2020 until 31 March 2021). Aena traffic figures only include its Spanish airports.

**Figure 2.6 Recovery of aircraft movements post-financial crisis**



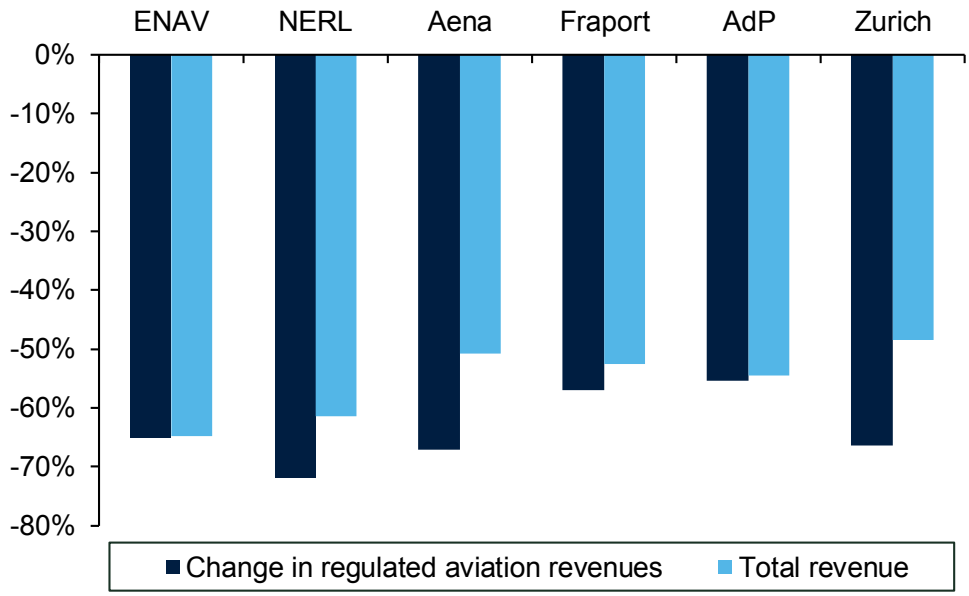

Source: Oxera analysis based on airport/ANSP data.

Looking ahead to NR23, traffic risk is likely to remain a serious concern for investors in airports and ANSPs, due to the restrictions imposed by the pandemic itself, the changes in travelling habits sparked by the pandemic (particularly business travel), and the potential macroeconomic side-effects that may lead to more protracted recessions. The unprecedented scale of the decline in traffic as a result of COVID-19 means that investors are likely to factor in the potential for traffic shocks that would previously have been considered highly unlikely or even infeasible (i.e. 25%+ year-on-year).

Revenue risk can also be impacted by the specific activity mix and diversification of a company. In the context of the aviation sector, this refers to the differences across airports in the share of their regulated aviation revenues, as some have a larger portfolio of real estate assets or bigger commercial activities. Additionally, all the airports in the comparator sample have important international operations in regions with different revenue drivers, such as South America, the Middle East, India and China.

Additionally, as we can see in Figure 2.7, airports have been able to cushion the impact of COVID-19 on their regulated revenues through their other business segments. The importance of real estate for Zürich and commercial revenue for Aena (which is currently subject to minimum annual guarantees, and therefore less sensitive to volumes) have reduced the impact of the traffic shock on revenues in the short term.

**Figure 2.7 Impact of COVID-19 on total revenue regulated revenue**




Note: Based on each company's annual accounts, regulated aviation revenues for ENAV are estimated as 'Revenue from Operations' minus 'Non-regulated market'. For Aena, they consist of 'Aviation Services' revenues; for Fraport they consist of 'Aviation' revenues; for AdP they consist of 'Aviation revenues'; and for Zürich, it is 'Total revenue, of which aviation revenue'.

Source: Oxera analysis based on company annual accounts.

### Cost risk

'Cost risk' refers to the ability of a company to reduce its costs as a response to large revenue shocks in order to mitigate the negative impact on its earnings. A higher degree of fixed costs (also referred to as operating leverage) is usually associated with greater challenges in reducing costs during downturns, which means that the impact on earnings will be greater for a company with higher operating leverage. Companies with largely fixed cost structures will have to increase their leverage more (either by issuing more debt or using retained cash) or raise additional equity in order to plug an earnings gap.

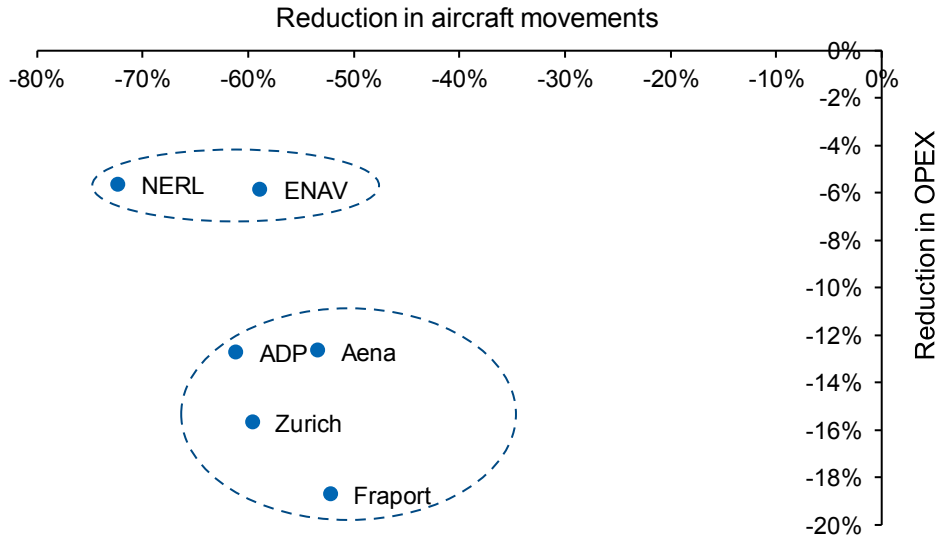
While airports are usually considered to have high operating leverage, ANSPs such as NERL have specific characteristics that mean that their share of fixed costs may be greater than airports. In particular, NERL has:

- high operating leverage. This is driven primarily by staff costs, which are less variable than in other industries due to the challenges in recruiting qualified air traffic controllers (ATCOs);
- a highly unionised labour force, which increases the fixity of costs;
- a large Defined Benefits (DB) pension scheme. Unlike Defined Contribution (DC) pension schemes where the employer contributions are known ex ante and consist of a defined amount every month, a DB scheme may require top-ups depending on the performance of the pension funds' investments.

The higher operating leverage of NERL and ENAV is illustrated by Figure 2.8, where the ability of ANSPs to cut costs during 2020 was lower than that of airports. As part of its Business Plan for RP3, NERL stated that it only

expected 7–15% of its costs to be variable in the medium term.[31] This is likely to be an over-estimate of NERL's ability to reduce costs in NR23, considering the cost-cutting measures and the VR programme launched in 2020. A higher operating leverage should result in a higher asset beta, all else being equal, as it will render the returns to shareholders more volatile due to the inability to cut costs quickly.

**Figure 2.8 Reduction in costs for ANSPs and airports during 2020**




Source: Oxera analysis based on company annual accounts.

[31] Nats (En Route) plc (2018), 'RP3 Business Plan 2020–2024 – Appendices', 26 October, p. 64.

### 2.4.2 Impact of regulation on risk exposure

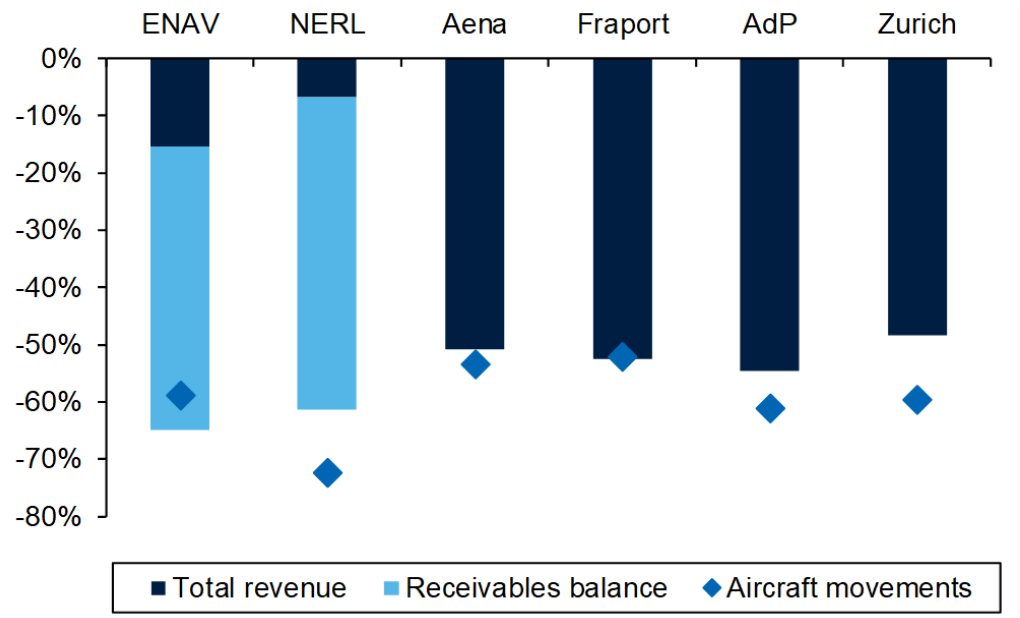
**Revenue risk**

Regulation can also have an important effect in limiting a company's revenue risk by providing protection against fluctuations in volume. In some sectors, such as water, the companies are provided with protection against fluctuations in demand through the use of revenue (rather than price) caps, thereby allowing for prices to rise where volumes are lower than anticipated.

Similarly, traffic risk-sharing mechanisms (TRSMs), such as those that apply to NERL and ENAV, seek to ensure that only a portion of the fluctuations in volume translate to changes in revenue, thus limiting exposure to volume risk. The result of the TRSM is to decouple volume risk and revenue risk. As we can see in Figure 2.9, the reduction in traffic as a result of COVID--19 has been larger than the change in revenues.

The regulatory protections for NERL and ENAV are reflected in the 'Receivables balance' bar, which shows that the extent of the revenue loss caused by COVID-19 is conditional on the TRSM. On an actual revenue basis, the revenue shock in 2020 was 60–65%. If we consider the recovery of revenue allowances in the future, NERL's current projections indicate the revenue shock will instead be 7–15% (although the actual revenue loss will be determined by the CAA's revenue reconciliation process at the NR23 review). We note that the estimates of the size, speed and profile of the revenue recovery are subject to judgement on the part of management.

**Figure 2.9 Traffic and revenue impact of COVID-19**




Note: 'Receivables balance' refers to the under-recovered revenue allowances for ENAV and NERL based on their traffic risk share mechanism, Traffic is measured in aircraft movements.

Source: Oxera analysis based on company annual accounts.

Importantly, risk-sharing mechanisms are more common for ANSPs than for airports, reflecting the fact that ANSPs have a very limited ability to influence demand for their services and are more sensitive to volume fluctuations due to their higher operational leverage. Airports, on the other hand, have a range of commercial tools that they can use to stimulate or manage demand.

Given that the beta assessment is intended to be forward-looking, it is important to consider the risk of significant regulatory changes following the COVID-19 pandemic, and the likely impact of these changes on relative risk exposures when compared to NERL.

For ANSPs, the main regulatory risk relates to how the TRSM is updated following the COVID-19 shock. The mechanism limits the risk which the ANSP bears for given deviations in traffic from a central forecast set for the price control. This mechanism functions by adjusting the charges that airlines (and ultimately passengers) pay for en route services. Under the current scheme, when traffic falls short of forecasts in year n, user charges for year n+2 are increased to make up for the shortfall in actual revenues, thus allowing the ANSP to achieve its revenue allowance set for the price control. The reverse happens when traffic exceeds forecasts significantly, leading to lower charges in the future.

As the adjustment to user charges that is needed to cover the revenue shortfall caused by the pandemic is very substantial, and the aviation industry is currently facing significant liquidity challenges, the mechanism has been temporarily altered by the European Commission to allow for a longer period for the recovery of charges, while the CAA is planning on making similar changes. This will avoid a sudden increase in charges at a time when the industry is still recovering.

Therefore, prior to the start of NR23 and a Final Decision from the CAA on the details of the temporary adjustment to the TRSM, there is considerable uncertainty about when these revenue shortfalls will be recovered. NERL has developed its own internal management assumption about the speed of the recovery of revenue allowances for its own planning and financial modelling having regard to general policy guidance published so far by the CAA and the European Commission as well as industry traffic projections.

At this stage, it is unclear what the impact of prolonging the revenue recovery will be on an NPV basis. If the TRSM debtor is capitalised at a rate that is lower than the cost of capital, extending recovery of the allowed revenues out over a longer period will have a negative impact on the enterprise value of the company today. In addition, it is also unclear whether the TRSM will be altered for NR23 and beyond (i.e. to deal with future traffic shocks, and not with the revenues for the period 2020–22), in light of the aviation industry's reaction to COVID-19. As the amount that remains to be recovered during NR23 is very substantial relative to NERL's allowed revenues—under-recoveries in the twelve months to 31 March 2021 were £417.2m, relative to average determined costs over RP3 of £692m (in 2020 prices)—any slight modification to the mechanism will have a noticeable impact on NERL's financial position.

The same considerations apply to ENAV due to the similar traffic shock suffered and the application of its own TRSM for en route revenues. As we can see from Table 2.9, the size of the revenue under-recoveries relative to RAB since the start of COVID-19 are comparable for NERL and ENAV, suggesting that their relative risk exposures to different treatments of the 2020–22 TRSM debtor are similar.

**Table 2.9 Revenue under-recovery relative to RAB, 2020/21**

| | NERL | ENAV |
|---|---|---|
| Revenue under-recovery | £417.2m | €376.8m |
| Regulated asset base (RAB) | £1,167.6m | €1,200.0m |
| **Under-recovery relative to RAB** | **35.7%** | **31.4%** |

Note: Data for NERL and ENAV refer to the period 1 April 2020 to 31 March 2021, in order to match NERL's financial year. Under-recoveries for ENAV refer specifically to its en route segment (i.e. we exclude terminal revenue under-recoveries).

Source: NERL under-recovery and RAB estimates were retrieved from NATS (en route) plc (2021), 'Financial statements – Year ended 31 March 2021'. Revenue under-recoveries for ENAV were sourced from ENAV (2021), 'Interim Financial Report at 31 March 2021' and ENAV (2021), 'Annual Financial Report 2020'. RAB estimates for ENAV were retrieved from Credit Suisse (2021), 'ENAV SpA – Priced-in cost efficiency gains look challenging following EC efficiency targets', 7 June, Figure 3.

What is clear from the RP3 experience is that a traffic risk share mechanism cannot guarantee recovery in any given year when faced with the scale of traffic shock caused by COVID-19. Where there is a considerable decline in air traffic, the implied increase in en route charges inevitably becomes unaffordable for airlines that are likely to have themselves been financially affected by the fall in demand.

In relation to airport regulation, there is also uncertainty about the implications that the pandemic will have for volume risk protections, although there are initial suggestions that regulators may introduce some protections going forward. For example, based on the CAA's Way Forward Consultation for Heathrow, the early indications are that there may be greater volume protections in the future, potentially in the form of a TRSM for Heathrow. AdP already has a traffic rebalancing mechanism in place, and it is possible that regulation of other airports moves in a similar direction.

We also note that Aena has asked for a reassessment of its current price control, DORA I. The regulation document states that volume risk is fully borne by Aena in 'non-exceptional circumstances', and that the price control can be revised in 'exceptional circumstances'. This is defined as a situation where Aena's financial viability is impacted in a substantial way due to a contraction in annual passengers of more than 10%, due to natural disasters or terrorist attacks. The outcome of the reassessment will give investors a clearer indication of the level of volume risk that Aena bears in extreme scenarios.

To summarise, our assessment is that risk for ANSPs is currently higher than before the pandemic, due to the amount of unearned revenue linked to the TRSM, at a period of uncertainty about the precise functioning of the mechanism. However, we consider that revenue protections remain stronger than for airports, despite initial indications of new regulatory protections for airports, and their greater ability to influence demand and diversify their revenues compared to ANSPs. Hence, we consider ENAV to be the closest comparator to NERL in terms of revenue risk at this point in time.

**Cost risk**

Similar to the situation described for the revenue risk assessment, the specific elements of the regulatory model of ANSPs can change their relative cost risk. NERL's regulatory model allows it to 'pass through' onto user charges any DB pension costs that are reasonable, efficiently incurred and reflective of actual financial market conditions. Similarly, NERL can recover the full costs of its actual capital expenditures, provided these pass efficiency tests.

Moreover, the CAA has committed to undertaking a revenue reconciliation exercise for the period 2020–22 as part of the NR23 process, which might be expected to mitigate some of the risk related to COVID-19 relative to airport comparators, which have not had the same level of cost recovery assurances for these years. We note, however, that the uncertainty about the costs that may be deemed inefficient by the CAA during the reconciliation process creates some regulatory risk for NERL. Nevertheless, for the airports in our comparator set, cost pass-throughs are not common and are not as material, the main example being AdP's ability to pass-on security costs.

### 2.4.3 Sensitivity of profits to movements in cost and revenue

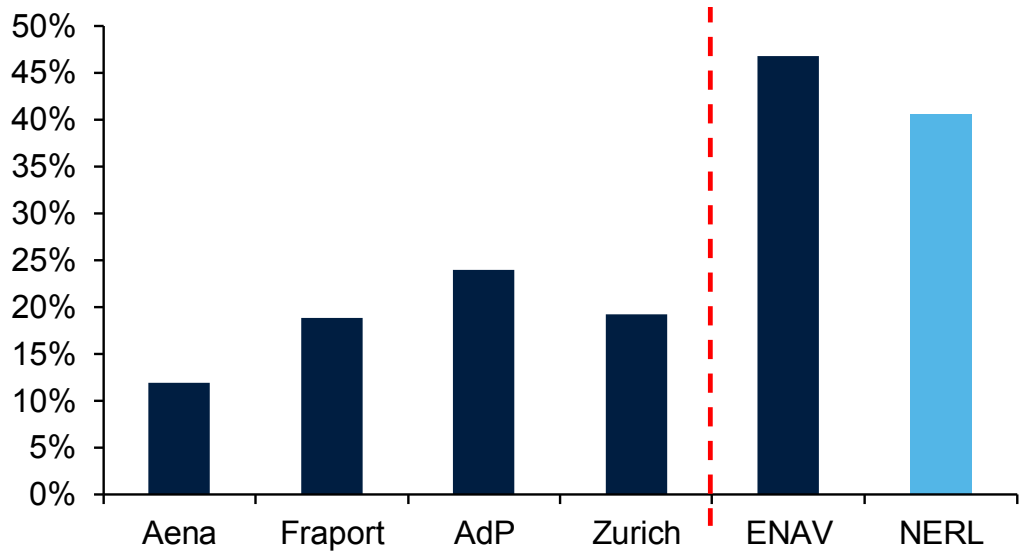
A key determinant of risk is the company's capital intensity and operating margins as this dictates how sensitive the company's profitability is to changes in cost and revenues. NERL's operations depend primarily on its staff and on the software it uses to manage traffic. Consequently, it is relatively asset-light relative to airports, which typically have large asset bases.

Asset-light companies can present a greater risk to shareholders, in the form of higher profit variability, as they have a smaller operating margin as a proportion of costs. This was noted, for example, by the CMA in its RP3 redetermination, as follows.[32]

> NERL's operating profit margins and equity capital are small relative to both opex and capex levels, leaving shareholders in particular vulnerable to relatively small changes in the macroeconomic environment.

This can be assessed by looking at metrics such as OPEX/assets, as presented in Figure 2.10. A higher ratio indicates that a company is more asset-light. Where this is the case, shareholders may suffer losses from a much smaller deviation in cost or revenue than would be the case for a more capital intensive business. As the beta relates to the risk assessment of equity holders, this asset-light structure means that there is a greater risk to shareholders associated with the cost structure of ANSPs than airports.

**Figure 2.10 Operational expenditures/assets, average 2017–19**




Note: the dashed red line separates the four airport comparators from the two ANSPs.

Source: Oxera analysis.

[32] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 138, para 12.46(b).

### 2.4.4 Summary of NERL's relative riskiness

Based on the findings of the previous sub-sections, we consider the following.

- The airports and ANSPs in our sample appear to have similar levels of underlying traffic volatility . However, it is notable that NERL has seen a slightly larger fall in air traffic movements than the other comparators as a result of COVID-19.
- The way in which traffic volatility affects revenues appears to differ across the comparator set. The revenues of large airport groups are more geographically diversified, and their unregulated businesses have provided a buffer to the aviation shock. Airports also have more capacity to influence their revenues as they can stimulate traffic (to a certain extent) by negotiating charges and agreements with airlines and tenants. This suggests that underlying revenue risk for airports may be lower in some regards than ANSPs. However, we also note that there is greater inter-airport competition than there is in the ANSP market.
- ANSPs have a higher degree of operational leverage and cost fixity. ANSPs are OPEX-heavy businesses that depend primarily on highly trained and specialised air traffic controllers, which makes it hard for them to react to demand shocks by adjusting their headcount.
- Regulatory mechanisms impact how underlying revenue and cost risks feed into profits. The CAA has taken some steps to mitigate NERL's exposure to risk—for instance, the traffic risk-sharing mechanism, CAPEX cost pass-through, and protections against pension cost risk. Airports generally have fewer regulatory protections than ENAV and NERL. There are some examples of traffic risk-sharing in airport regulatory frameworks (e.g. for AdP) but other airports are fully exposed to traffic risk (e.g. Aena),[33] and do not benefit from significant cost recovery guarantees.
- ENAV and NERL are currently exposed to similar regulatory uncertainty regarding the recovery of the unearned revenues during the period 2020–22. The size of the TRSM debtor in relation to RAB is very similar for both ANSPs.
- The lower operating margins of ANSPs means that their profitability is more sensitive to changes in costs and revenues. Indeed, it would take a much smaller cost or revenue shock to significantly reduce the equity return of NERL than any of the airport comparators.

Taking these points into consideration, we consider that the closest comparator to NERL is ENAV and, hence, that ENAV should be given greater weight than the airports for the purposes of defining a range for the asset beta. Despite some differences in the revenue mix of ENAV and NERL (with the former having a larger terminal segment), the combination of revenue, cost and particularly regulatory risk around the TRSM debtor is more similar than the current risk exposures of airports for the NR23 period. We note, however, that the differences between the two ANSPs which led the CMA to conclude that

[33] Airport regulation is evolving in response to the pandemic, and some of the likely changes to airport volume risk protections (such as a potential TRSM for Heathrow, or a reassessment of DORA I in Spain) could already be incorporated in investor expectations and 'priced in' for airport stocks. The ANSP regulatory model is also changing, particularly the TRSM under extreme shocks and the speed of the recovery of revenue shortfalls.

the NERL was riskier than ENAV, remain relevant, although challenging to quantify in a precise manner.

In terms of the relative risk of ANSPs and airports, we note that there are contrasting effects. On the one hand, NERL and ENAV appear to have greater regulatory protections than the airport comparators. On the other hand, the impact of a given change in revenue or cost on profitability will be significantly greater for the ANSPs due to their lower operating margins.

Therefore, we place greatest weight on ENAV's asset beta estimates under different specifications as our reference points for the lower and upper bounds of the range. Although this represents a slight departure from previous regulatory determinations where airport betas were included in the assessment for NERL, we believe that a greater focus on ENAV for this particular regulatory period better reflects the current risk exposures that most affect NERL's equity investors heading into NR23. In particular, the size of NERL's TRSM debtor relative to allowed revenues are only comparable to ENAV.

## 2.5 Are spot betas a good estimate of the beta for the NR23 period?

The question of whether spot betas are the appropriate risk measure to use for NR23 depends on assumptions about the nature of the COVID-19 shock, its impact on the aviation industry, and the level of uncertainty concerning the recovery. As we set out below, we believe that the impact of COVID-19 on equity markets is representative of a systematic risk that cannot be diversified by investors. As the uncertainty regarding the evolution of the pandemic and the recovery of the aviation industry remain very high, and the long-term outlook for the aviation industry appears riskier than before, pre-COVID-19 betas may not be good benchmarks for the perceived riskiness of NERL in the medium term. Therefore, we place weight on asset beta evidence that captures the impact of the pandemic.

### 2.5.1 COVID-19 has resulted in a reassessment of the relative risk of different sectors

Equity betas are a measure of exposure to systematic risk, which in turn is the risk that an investor faces by holding a perfectly diversified portfolio. According to the CAPM, investors will not receive compensation for holding idiosyncratic, company-specific risk. Beta is therefore a measure of how a stock's performance covaries with the returns of the wider equity market, which is the reference for the perfectly diversified portfolio. An event that affects the market portfolio is therefore an event or risk that investors cannot diversify away from. However, certain stocks may be more or less correlated with these market movements.

Considering the disruptive, unprecedented and unpredictable impact that COVID-19 had on the economy and on equity markets, it has been regarded as an example of a systematic shock.[34] The pandemic has affected the way in which many sectors function and how they interact with customers, leading to changes in their cost and revenue drivers.

Some stocks are more sensitive to systematic risks than others, as measured by their equity beta. This sensitivity can change over time. As investors realised that the earnings of companies in the aviation sector are very sensitive

[34] For example, the CMA referred to the pandemic as 'a systematic event' in its PR19 Final Determination. CMA (2021), op cit., para. 9.493, p. 870.

to a global pandemic with the characteristics of COVID-19, this was priced in to aviation stocks.

By definition, the average equity beta across all stocks in the market has to be one, as these are the stocks that make up the market index, and the market index's exposure relative to itself has to be unitary. Therefore, a relative increase in betas for a given sector is matched by an equivalent decrease in betas for other sectors. Put differently, a systematic shock to a market will likely lead to a reassessment and rebalancing of the relative risks between industries, based on the specific characteristics of the shock.

### 2.5.2 Level of uncertainty regarding the recovery remains very high

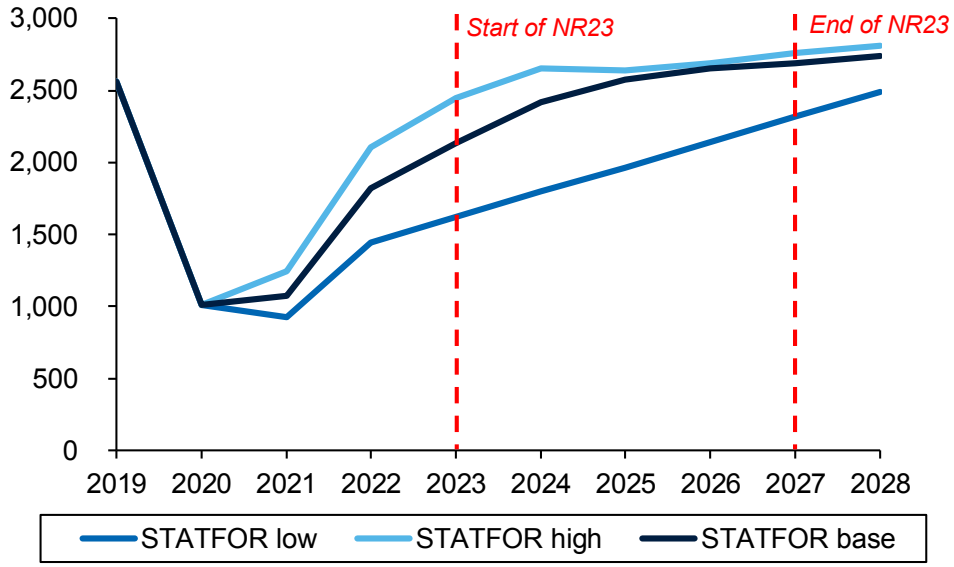
Establishing that the COVID-19 pandemic represents a systematic, non-diversifiable risk is not enough, by itself, to justify setting a higher asset beta for aviation stocks, if this risk was likely to subside and disappear during NR23. If investors expected the pandemic to be fully controlled in the near future, and the restrictions that it had on our personal lives totally removed, then we could expect to see a reduction in asset betas as the likelihood of a repetition of this event diminished.

This is unlikely to be the case, as uncertainty regarding the recovery remains very high despite recent progress in developing multiple vaccines and in administering them to a large share of the population in Europe and North America. Uncertainty remains in a lot of important aspects concerning the aviation industry.

- **Uncertainty about traffic recovery**: the difference between the STATFOR high and STATFOR low forecasts, which are being used to develop NERL's business plan and traffic forecasts, are large enough to breach the 10% limit of the TRSM.[35] In 2023, the first year of the price control, the STATFOR high flight forecast for UK traffic is 51% larger than STATFOR low, as can be seen from Figure 2.11. By contrast, as we can see in Figure 2.12, STATFOR's high and low forecasts for RP3 were much more aligned than for NR23, although these were published slightly closer to the starting date of the price control. In addition, IATA's most recent forecasts for European traffic show an even wider range than STATFOR, with flight volumes in the pessimistic scenario approximately half of the optimistic scenario.[36] This exemplifies the difficulty in reaching any form of industry consensus regarding the recovery.

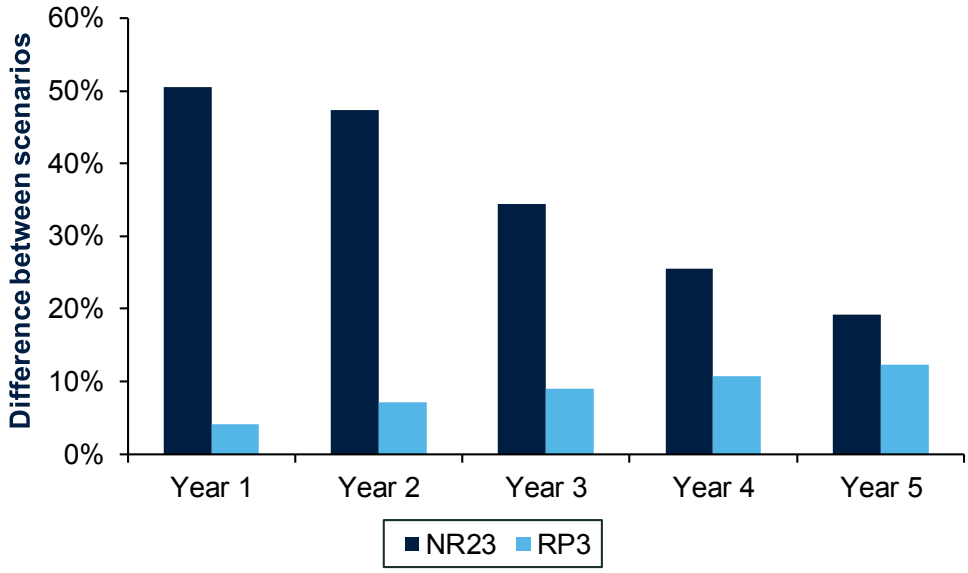
[35] This refers to the STATFOR forecasts issued May 2021. This report was completed before the issue of STATFOR's October 2021 forecast.
[36] IATA (2021), 'Air Traffic Movement Outlook – Europe, August 2021', last accessed on 20 August 2021 at https://www.iata.org/en/iata-repository/publications/economic-reports/air-traffic-movement-outlook---europe---august-2021/.

**Figure 2.11 Comparison of STATFOR extended forecasts**




Source: STATFOR extended forecasts were provided to Oxera by NERL.

**Figure 2.12 Comparison of the range between high and low STATFOR forecasts for RP3 and NR23**




Source: Oxera analysis based on Eurocontrol data. STATFOR forecasts for years 3, 4 and 5 of NR23 are based on NERL's modelling of the extended STATFOR scenarios.

- **Risk of new variants**: new variants such as Delta are leading to surges in cases in countries with already high vaccination rates (e.g. UK and USA), and in countries that dealt successfully with the first 12 months of the pandemic (e.g. Australia). If vaccination rates outside Europe and North America remain low, the risk of new variants developing is greater, which raises the possibility of new restrictions and lockdowns.
- **Health risks associated with long-term impacts of COVID-19**: there is still considerable uncertainty and lack of information about the long-term health impacts of contracting COVID-19. The risks of long-term illnesses, as well as of virus mutations that are more resistant to vaccination, mean that there is a lingering risk of restrictions being reimposed to control public health impacts.

- **Macroeconomic impact of COVID-19**: governments and central banks have provided extensive support to various sectors of the real economy and financial markets to alleviate the impacts of the crisis. This additional spending, which has led to rising debt-to-GDP burdens across all major economies, will likely need to be repaid through higher taxation in the future. Combined with a progressive reduction of other measures such as loan moratoria and furlough schemes, the process of repaying the 'COVID-19 bill' may have a significant and unpredictable impact on GDP and disposable income.
- **Uncertainty about the 'new normal'**: there is also little consensus regarding the long-term changes to our social and professional habits caused by the pandemic. A 'new normal' where home working is common and international business travel is less frequent, will be more challenging for the aviation industry. Additionally, significant progress has been made on climate change goals since the start of 2020, and a greater environmental consciousness may lead to different travel habits forming post-pandemic.

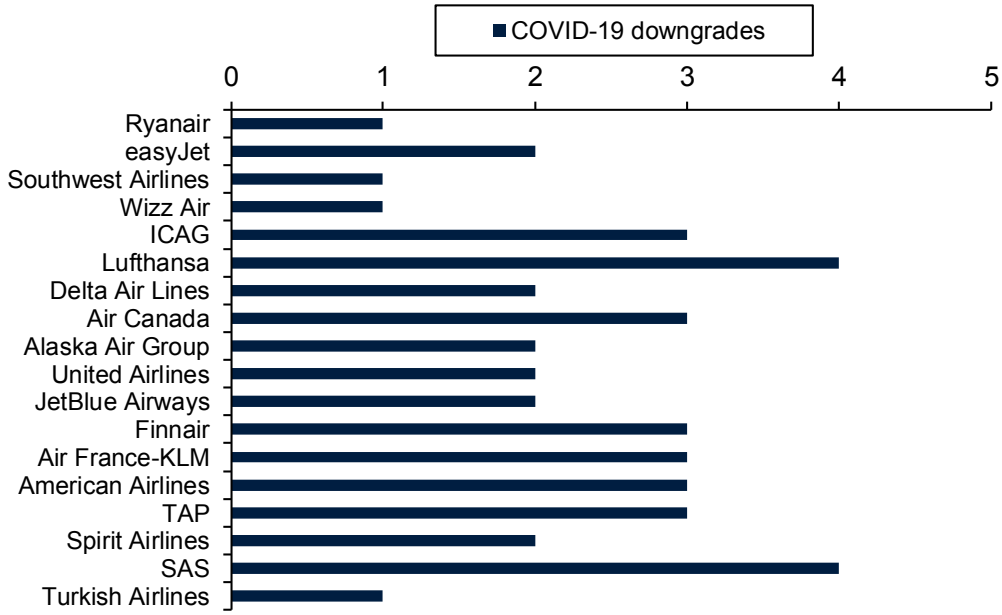
### 2.5.3 The 'new normal' for the aviation industry will likely be riskier

Another important point concerns the state of the aviation industry in the medium to long term, once recovery to 2019 levels of traffic has been achieved. The aviation industry and its revenue and cost drivers may look very different in the future, which would mean that the perceived riskiness of aviation stocks will have changed even if there was absolute certainty about traffic recovery.

A topic that is frequently discussed is whether business travel will return to pre-pandemic levels. This is an important consideration for airports and airlines, as business travel demand has traditionally been (i) less income and price elastic, and (ii) higher margin, as business travellers tend to spend more money. Additionally, the visa requirements that have been imposed due to the Brexit agreement are also likely to have an impact on UK–EU business travel. Therefore, if this travel segment is permanently reduced and leisure demand starts to account for a larger share of passengers, demand for airport services would become more elastic and volatile, making airport cashflows riskier. This will have a direct impact on NERL's revenues from the business-focused UK–North America flights.

Another important aspect during and after the recovery is the counterparty and operational risk of airports and ANSPs in regards to their airline customers. Airlines' financial position has suffered the most during COVID-19, as evidenced by the amount of credit rating downgrades that major airlines have suffered since the start of COVID-19 (see Figure 2.13), and by the extensive government support measures granted both in Europe and in North America. Counterparty risk would be manifested in airline solvency difficulties leading to non-payment of fees to airports and ANSPs. Operational risk would also increase for airports if they lose a major client and important slots are left unfilled for a while, while for ANSPs this may get manifested in more uncertain staffing requirements at the airspace sector level.

**Figure 2.13 Airline credit rating downgrades during COVID-19**




Note: The scale denotes the number of credit rating downgrades that each airline suffered since the start of the COVID-19 pandemic. One credit rating downgrade denotes a fall from, for example, BBB+ to BBB. All credit assessments are from S&P, with the exception of Wizz Air (Fitch), Air France–KLM (Egan-Jones) and Finnair (Egan-Jones). Airlines are ordered in descending order of credit rating pre-COVID-19 (i.e. Ryanair had the strongest credit rating, on part with easyJet and Southwest, and Turkish Airlines and SAS the weakest ratings pre-pandemic).

Source: Thomson Reuters Eikon.

## 2.6 Summary

Considering the arguments set out above, we conclude the following.

- COVID-19 should be viewed as systematic risk to the economy because it affects many, if not all, sectors of the economy and will be factored into assessments of required returns and risk premiums on the market.
- The economic effects of COVID-19 vary across sectors and have changed investor expectations about how different sectors will perform when future systematic shocks occur.
- There is likely to have been an enduring reappraisal of the risk of aviation relative to the economy as a result of the COVID-19 pandemic and the high levels of future uncertainty. Risks that were not previously priced in to betas are likely to now be reflected.

This suggests that aviation betas are likely to remain higher than pre-pandemic levels into the future. We do not believe that a full reversion of aviation betas back to their pre-pandemic level is consistent with the trends that analysts, commentators and regulators have identified. As such, it is our view that it is appropriate to look at evidence on spot beta levels when estimating the NR23 cost of equity, as these reflect the most up-to-date investor views on the prospects for the industry.

In arriving at a range for the NR23 asset beta, our approach is as follows.

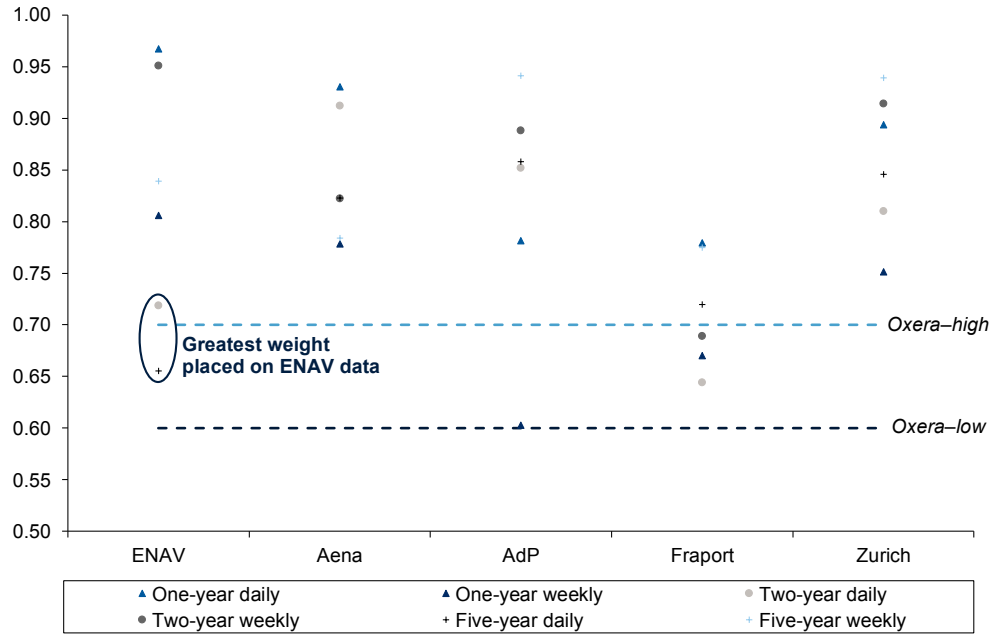
- We have calculated betas using multiple estimation windows (one-, two- and five-years) and data frequencies (daily and weekly). This results in a

wide range of data points, with beta estimates ranging from around 0.65 to 0.95.

- Among the spot estimates, we place greater weight on five-year betas as these are less driven by the COVID-19 data than one-year and two-year betas.
- We view ENAV as the closest comparator for NERL in NR23 given the comparable size of the TRS debtor and similarity of the regulatory protections that are in place. We therefore place most weight on estimates of ENAV's beta and less weight on the betas of airport operators.
- We adopt a conservative approach and estimate an asset beta range that is slightly lower than ENAV's two-year daily (0.72) and five-year daily (0.64) asset betas as of 31 September 2021. Our approach therefore allows for a possible reduction in ENAV betas ahead of NR23. However, we note that should the current beta levels remain unchanged between now and the NR23 decision, this range may need to be revised upwards.

Based on this approach, we adopt an asset beta range of **0.60–0.70**. We note that the majority of the beta data points in our sample sit above this range, as shown in Figure 2.14, reflecting the slightly different risk exposures of airports and the conservative nature of our approach. A higher beta range may be warranted for NR23 if the current beta levels persist over the remaining 12–15 months preceding the CAA's final determination.

**Figure 2.14 Summary of beta estimates and Oxera's proposed range**




Note: Cut-off date is 30 September 2021.

Source: Oxera analysis based on Bloomberg data.

# 3 Equity market parameters

In this section, we outline our approach for estimating the generic equity market parameters for the cost of equity: the risk-free rate, the total market return (TMR), and the equity risk premium (ERP).

## 3.1 Total Market Return

### 3.1.1 Key methodological issues

**'Stable' vs 'fixed' TMR**

The TMR reflects the total returns that an investor expects to receive by investing in the equity market. It can be decomposed into the RfR and ERP parameters—i.e. TMR = RfR + ERP.

We adopt a 'stable TMR' approach, meaning that the total returns that investors can expect remain relatively constant over time, with movements in the RfR being largely offset by opposing changes in the ERP. This approach is different from a 'stable ERP' approach, in which the ERP is assumed to remain relatively constant and the TMR (estimated as a sum of the RfR and ERP) is highly sensitive to the movements in the RfR. In periods of decreasing RfR, the latter approach underestimates the TMR and the ERP.

The theoretical underpinning for a 'stable TMR' approach is in the link between required returns and economic uncertainty. When risk perceptions change, the pricing of both the risk-free and the risky assets should change simultaneously. When uncertainty increases, there is a 'flight to safety' which raises the demand for the risk-free asset, and consequentially lowers the return that investors expect by holding it. Simultaneously, this decreases the demand for risky assets and increases the premium required to hold them. For example, see research undertaken by the Bank of England.[37]

There is further academic evidence suggesting that the TMR is less volatile than the ERP and RfR, and that there is a negative relationship between the RfR and ERP on the basis of long-term historical market data.

- A research paper from the San Francisco Federal Reserve finds that the components of the TMR—the RfR and the ERP—are significantly more volatile than the TMR. These findings were based on historical annual returns from 1870 to 2015 for 16 advanced economies.[38]
- Similar conclusions were reached by Harris and Marston (2013), based on evidence for the US market.[39]
- Mason, Miles and Wright (2003) proposed a methodology whereby the TMR should be assumed to be constant over time, on the basis of long-term realised historical returns of the US, UK and global stock markets as measured by Dimson, Marsh and Staunton (DMS).[40]
- Wright and Smithers (c. 2014–15) reinforced the conclusion of the paper mentioned in the preceding bullet by reviewing similar long-term historical

[37] Vlieghe, G. (2017), 'Real interest rates and risk', Society of Business Economists' Annual Conference, 15 September.
[38] Òscar, J., Knoll, K., Kuvshinov, D., Schularick, M. and Taylor, A. (2017), 'The Rate of Return on Everything, 1870–2015', Federal Reserve Bank of San Francisco Working Paper 2017-25.
[39] Harris, R. and Marston, F. (2013), 'Changes in the Market Risk Premium and the Cost of Capital: Implications for Practice', *Journal of Applied Finance*, **1**.
[40] Wright, S., Mason, R. and Miles, D. (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K., On behalf of Smithers & Co', 13 February.

returns until a later date. This allowed them also to capture the periods of the 'dot-com bubble' and 2008 crisis, and the prolonged downward trend in RfRs, which further strengthened the conclusion that the ERP and the RfR 'must be perfectly negatively correlated'.[41]

It is common practice in cost of capital estimation in regulatory contexts to use long-term historical returns time series, as reported by Dimson, Marsh and Staunton (DMS), as a source of evidence on the TMR. The most recent estimates provided by the authors range from 1899 to 2020.

- Mason, Miles and Wright (2003) proposed a methodology whereby the TMR should be assumed to be constant over time, on the basis of long-term realised historical returns of the US, UK and global stock markets as measured by Dimson, Marsh and Staunton (DMS).[42]
- Wright and Smithers (c. 2014–15) reinforced the conclusion of the paper mentioned in the preceding bullet by reviewing similar long-term historical returns until a later date. This allowed them also to capture the periods of the 'dot-com bubble' and 2008 crisis, and the prolonged downward trend in RfRs, which further strengthened the conclusion that the ERP and the RfR 'must be perfectly negatively correlated'.[43]

In recent price reviews, including in the most recent CMA appeals processes, companies and regulators across sectors have generally agreed that it is appropriate to use evidence on long-run historical averages when estimating the TMR. However, there have been a number of areas of debate regarding how this evidence should be interpreted. The key conceptual issues can be summarised as:

- the approach to averaging historical returns;
- the appropriate inflation series for converting nominal returns to real values;
- the weight to place on historical returns relative to forward-looking evidence.

We briefly discuss each of these issues below.

**Inflation series**

The first issue that has been extensively discussed in recent price reviews is the appropriate inflation series to use when converting nominal historical equity returns into real returns.

From the 2019 edition of DMS onwards, the authors have deflated the nominal returns with an inflation series that is a hybrid of RPI and CPI inflation.[44] For comparability with how regulators allow for inflation in price controls, one must obtain real returns that are consistent with either RPI or CPI inflation over time. Therefore, the DMS real estimates cannot be directly relied upon for the purposes of setting the regulatory cost of capital.

[41] Wright, S. and Smithers, A. (undated), 'The Cost of Equity Capital for Regulated Companies: A Review for Ofgem', last accessed 18 March 2021 at https://www.ofgem.gov.uk/ofgem-publications/86100/wrightsmithersequitymarketreturnpdf.
[42] Wright, S., Mason, R. and Miles, D. (2003), 'A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K., On behalf of Smithers & Co', 13 February.
[43] Wright, S. and Smithers, A. (undated), 'The Cost of Equity Capital for Regulated Companies: A Review for Ofgem', last accessed 18 March 2021 at https://www.ofgem.gov.uk/ofgem-publications/86100/wrightsmithersequitymarketreturnpdf.
[44] Dimson, E., Marsh, P. and Staunton, M. (2019), 'Credit Suisse Global Investment Returns Yearbook 2018', February.

This poses a number of issues as approaches to estimating inflation, including the RPI series, have changed over time. To deal with this issue, in previous research conducted on behalf of Heathrow Airport, Oxera created an adjusted RPI series that applies the current methodology used for RPI throughout the whole time series.[45] We estimated that this led to an adjustment of at most 30bp compared to the official RPI series published by the ONS.

A number of regulators, including the CAA, Ofwat and Ofgem, have adopted a different approach to estimating real historical returns based on the use of a composite CED/CPI inflation series. A significant weakness of this approach is that the CPI series prior to 1997 has been estimated ex post using a CPI backcast model. The historical estimates of the CPI are essentially based on estimates of what the wedge between RPI and CPI inflation would have been in the past and are subject to a number of estimation biases.[46] The ONS is currently revising the backcast CPI dataset and there continues to be an active debate among members of the Advisory Panel on Consumer Prices—Technical regarding the methodology for correcting this time series.[47]

The historical RPI series is not subject to the estimation error created by using a backcast of CPI and is therefore a more reliable basis for the purpose of calculating historical real returns to inform the estimate of future returns. As such, we focus on RPI-deflated historical returns in estimating the TMR.

**Averaging approach**

A second important decision when using long-term historical returns to estimate the forward-looking TMR is the averaging approach.

One approach is to use a geometric average, which provides an estimate of the total return that an investor would have received if the earnings of each year were to be reinvested and compounded over time. It accounts for the fact that, if you start off with £100 and you lose 10% of your investment in the first year and finish the year with £90, a 10% increase in value will only result in £99, which is less than the starting point. Geometric averages therefore provide the best proxy for realised historical returns.

An arithmetic or simple average treats losses and gains of equal magnitude in the same way. Using the previous example of losing 10% in the first year and then gaining 10% in the second year, the arithmetic average of those returns would simply be 0%. As the arithmetic average treats each historical return as a random draw, it provides a better proxy for returns that an investor would expect to receive in the future, independent of past events. As such, academic evidence suggests that the arithmetic average is the most appropriate in a CAPM setting.[48]

Other types of averaging and adjustments have also been referenced by regulators, including the Jacquier, Kane and Marcus (JKM), Blume, and

[45] Oxera (2020), 'Response to the CMA on estimating RPI-adjusted equity market returns', prepared for Heathrow Airport, 15 April.
[46] These biases are explained in Oxera (2021), 'The cost of equity for RIIO-ED2', Prepared for Energy Networks Association, 4 June, p. 25.
[47] Minutes of the 9 October 2020 meeting of the Advisory Panel on Consumer Prices—technical, section 4, last accessed 11 October 2021 at https://uksa.statisticsauthority.gov.uk/wp-content/uploads/2020/12/APCP-T2015-Minutes-October-2020_v3.pdf.
[48] For example, Cooper (1996) demonstrated that the discount rate investors should use to give an unbiased estimate of the present value of future cash flows will assume a TMR at least as high as the arithmetic average of historical returns. See Cooper, I. (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, **2**:2, 1996, pp. 156–67, last accessed 11 October 2021 at http://faculty.london.edu/icooper/assets/documents/ArithmeticVersusGeometric.pdf.

Cooper (1996) estimators.[49] However, the relationship between these estimators and the unbiased estimate of the regulated allowed rate of return is a complex problem that has not been solved.[50]

The choice of averaging approach can have a material impact on estimates of the TMR. Based on the 2021 edition of DMS, which covers data from 1899 to 2020, the long-run geometric and arithmetic averages of the real UK equity market returns are 5.4% and 7.2% respectively.[51]

In the context of the RIIO-2 energy price controls, Oxera reviewed the existing academic evidence on the most appropriate averaging approach to use for the purposes of estimating the TMR as part of a forward-looking cost of capital assessment. The academic literature supports the use of the arithmetic average, as it converts historical equity returns into an unbiased estimate of the rate used by investors to discount future cashflows. A return lower than the actual arithmetic average observed in the data has the result of embedding a downward bias to the value of the regulated business and undercompensating investors. The CMA agreed with this approach in its PR19 water redetermination:[52]

> We consider that the theoretically correct measure of a return to use in deriving the cost of capital is the arithmetic mean…We consider that it is appropriate to consider returns over a relatively long time-horizon, reflecting both the relatively long holding periods of investors in UK water companies, as well as to ensure consistency with the other elements of the cost of capital, such as the maturities of ILGs used to benchmark the risk-free rate. Therefore, we have considered returns over a 10 to 20 year holding period.

The results of the TMR estimated using arithmetic averages over annual, ten-year and 20-year holding periods (non-overlapping) are summarised below.

**Table 3.1 TMR estimation: non-overlapping returns**

| Holding period | RPI-real |
|---|---|
| One year | 6.6% |
| Ten years | 6.2% |
| 20 years | 6.5% |

Note: Oxera analysis based on DMS data from 1899 to 2020. CPIH numbers are estimated using an inflation wedge of 0.954%.

### Weight to place on other sources of evidence

A final issue in determining the TMR is the weight to place on alternative sources of evidence, including historic ex ante approaches, dividend discount models (DDMs) and survey evidence.

DDMs are used to infer the discount rate applied to future equity cash flows. According to the DDM theory, the expected market return is the discount rate at which the present value of future equity cash flows is equal to the current

[49] Jacquier, E., Kane, A. and Marcus, A. (2005), 'Optimal Estimation of the Risk Premium for the Long Run and Asset Allocation: A Case of Compounded Estimation Risk', *Journal of Financial Econometrics*, **3**:1, pp. 37–55; Blume, M.E. (1974), 'Unbiased Estimators of Long-Run Expected Rates of Return', *Journal of the American Statistical Association*, **69**:347.
[50] Oxera (2021), 'The cost of equity for RIIO-ED2', Prepared for Energy Networks Association, 4 June.
[51] Dimson, E., Marsh, P. and Staunton, M. (2021), 'Credit Suisse Global Investment Returns Yearbook'.
[52] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Final Report', 17 March p. 819, paras 9.329–9.330.

market price. Under the DDM, the expected market return (or TMR) can be estimated with reference to three components:

- a dividend yield, which is observed in the market;
- share buybacks, which are also observed in the market;
- the growth rate of dividends and buybacks, which needs to be assumed.

A key issue with DDMs is that they are typically highly sensitive to the growth rate assumptions, and in particular to the long-term growth rate. As such, we use the estimates derived from DDMs primarily as a cross-check on the TMR implied by long-term equity returns. Oxera has produced a DDM based on the Bank of England model, which considers the historical dividend yield and share buybacks of the FTSE All-Share Index, and different growth rate forecasts.

**Table 3.2 DDM results**

| **Nominal** | **Five-year average** |
|---|---|
| Weighted GDP growth forecast | 10.6% |
| UK GDP growth forecast | 8.8% |
| **Real (RPI)** | |
| Weighted GDP growth forecast | 7.5% |
| UK GDP growth forecast | 5.7% |

Source: Oxera analysis based on Bloomberg, Refinitiv Datastream, and the IMF World Economic Outlook. The cut-off date is 31 March 2021.

The estimate based on UK GDP growth is 5.7% RPI-real, whereas a weighted international return that accounts for the international exposure of UK firms is higher, at 7.5%.

A further source of evidence on the TMR is survey evidence. However, survey results need to be interpreted with a degree of caution for a number of reasons.[53]

- Respondents' answers may be influenced by the way questions are phrased—for example, whether the question asks about required returns to equity or expected returns on a specified stock market index (the '**framing effect**').
- There is a tendency for respondents to extrapolate from recent realised returns, making the estimates less forward-looking and prone to be anchored on recent short-term market performance ('**recency bias**').
- The results are based purely on judgement, which may also be influenced by a respondent's own position or biases, and are less reliable than estimates based more on market evidence on pricing.

We therefore do not place weight on survey evidence in our estimation of the TMR and note that the CMA PR19 redetermination draws a similar conclusion.[54]

[53] Oxera (2021), 'The cost of equity for RIIO-ED2', Prepared for Energy Networks Association, 4 June, p. 30.
[54] Competition and Markets Authority (2021), op. cit., p. 833, para. 9.379.

### 3.1.2 Regulatory determinations of the TMR

Recent UK regulatory Decisions on the TMR are shown in Table 3.3 below. The recent regulatory determinations cover a range of 5.40–5.85% in RPI-real terms. This is materially lower than the TMR precedents observed historically.

**Table 3.3 Recent UK regulatory precedent**

| | Year | TMR (%) |
|---|---|---|
| CAA (RP3) | 2019 | 5.4 |
| Ofwat (PR19) | 2019 | 5.5 |
| CMA (RP3 Provisional Findings) | 2020 | 5.5 |
| Ofgem (RIIO-II) | 2020 | 5.6 |
| Ofcom (Market Review 2021–26) | 2021 | 5.6 |
| CMA (PR19 Appeals) | 2021 | 5.85 |

Note: the TMR figures presented are the mid-point used in each determination.

Source: Oxera analysis based on various regulatory Decisions.

The recent determinations rely heavily on a number of recommendations made in a study conducted on behalf of the UKRN.[55] Consequently, these should not be regarded as independent data points. The most recent determination of the TMR was conducted by the CMA when making the Final Determinations on the water PR19 appeals. After detailed review of the issues, the CMA arrived at a range for the TMR of 5.2–6.5%. The CMA has subsequently considered Ofgem's TMR estimate as part of the RIIO-2 appeals lodged by energy networks and has provisionally concluded that Ofgem was not objectively wrong in its Decision. However, given the legal framework in place, we do not consider that this is an endorsement of Ofgem's estimate and we thus view the CMA's redetermination in the water sector as its best view on this subject.

### 3.1.3 Proposed approach

In estimating the appropriate TMR for NR23, the economic evidence points to a range of 6.0–6.5% RPI-real. This range takes account of an analysis of long-term equity returns in the UK using the arithmetic average and checked against the average of non-overlapping ten- and 20-year holding periods. We convert from nominal to real terms using the long-run average of RPI inflation (as published by the ONS). We have cross-checked this using data from DDMs (see the real TMR estimates presented in the last two rows of Table 3.2), which points to a higher TMR estimate than the historical average equity market returns, but focus our range around the evidence on historical returns. We believe that this is the most robust range for the TMR in NR23 based on market evidence.

We have also reviewed regulatory Decisions by the CMA and various UK sector regulators. The approaches taken by the CAA, Ofcom, Ofwat and Ofgem lead to ranges for the TMR that understate the required equity return largely as a result of the weight placed on non-arithmetic averaging approaches, insufficiently robust historical inflation series, and reliance on disputed sources of evidence. Moreover, the CMA's PR19 redetermination, which we consider to be the best guide of its independent view on the equity market parameters, supersedes these determinations as the pre-eminent UK regulatory precedent (particularly for sectors with an appeals regime based on

[55] UK Regulators Network (2018), 'Estimating the cost of capital for implementation of price controls by UK Regulators'.

a full CMA redetermination). As a result, we place no weight on decisions preceding the PR19 redetermination.[56]

We recognise the importance of the role of the CMA in UK economic regulation as the appellate body for sector regulators and companies. Its PR19 redetermination is the most comprehensive regulatory review on this issue conducted to date and sets a precedent that is likely to be influential in regulators' thinking on the TMR in future. Moreover, we note that our proposed range of 6.0–6.5% lies within the range adopted by the CMA (5.2–6.5% RPI-real), but that the CMA's mid-point lies below the bottom end of our range. As a result, we have considered whether any weight should be placed on the CMA's mid-point estimate in formulating our range.

On this issue, we consider that the market evidence, which currently points to a TMR range of 6.0–6.5%, should be treated as the primary, and best, source of evidence on the TMR. However, given the importance of the CMA's approach in shaping UK regulatory practice, we recognise that it may be relevant to place some weight on this decision in reaching a view on the NR23 cost of capital parameters (and, indeed, we have sought to be consistent with the CMA in other aspects of our analysis).

Consequently, we take the CMA's PR19 mid-point estimate of 5.85% as the lower bound of our range. By doing so, we exclude the bottom half of the CMA's range, which largely relied on 'historic ex ante' evidence that we consider is unreliable for estimating the forward-looking TMR.

Combining the TMR range proposed for the RIIO-2 price control and the CMA PR19 Final Determinations results in a TMR range of 5.85–6.50%.

## 3.2 Risk-free rate

### 3.2.1 CMA's approach for RP3

The CMA estimated the RfR by reference to spot and short-term averages of ten-year, 15-year and 20-year UK gilts. The estimated range was -2.60% to -2.20%, and the CMA used the mid-point of -2.40%, in line with 15-year ILG yields. It also introduced a forward adjustment of 0.15% to account for forecasted movement in yields between the analysis cut-off date and the middle of RP3. This resulted in a (real) RfR estimate of -2.25%.

### 3.2.2 Key methodological issues for NR23

**Estimating a zero-beta RfR**

The CAPM defines the RfR as the return on an asset without risk (i.e. with zero beta), and assumes that investors can undertake risk-free borrowing and lending at this rate. The most conventional approach for estimating the RfR is using government bond yields of highly rated sovereign issuers, such as the UK, for long maturity bonds (usually 10–20 years).

The approach of using government bond yields implicitly assumes that very low-risk borrowers (e.g. highly rated, AAA+ companies) are able to issue debt at the same rates as governments. Empirical evidence shows that this is not the case, due to some particular properties of government bonds that create additional demand for these instruments (therefore lowering their interest rate). In other words, market participants have reasons to hold government bonds that go beyond the rate of return expected on these risk-free investments.

[56] This includes the decisions made by the CAA, Ofcom, Ofwat and Ofgem, presented in Table 3.3.

These factors are collectively known as a 'convenience premium'. These push the returns on a government bond below the true RfR that would apply to a zero-beta asset.

The CMA recognised this issue in its PR19 redetermination and concluded that reliance on ILGs alone would underestimate the RfR:[57]

> We note that evidence provided on both the presence of a convenience yield within ILG yields and on market RFRs with different borrowing and lending rates suggest that the appropriate RFR for our CAPM is likely to sit above the ILG yield. On this basis of this evidence, we consider it unlikely that the yield on ILGs is a perfect representation of a theoretical RFR (or the average market participant rate in the Brennan approach). We consider that, on balance, it is likely that the RFR appropriate for a range of relevant investors sits above the return available from ILGs, but below the level suggested by the return on AAA bonds.

As a result, we consider that it is appropriate to apply a convenience yield on top of ILG yields for the purposes of estimating the RfR.

**Time horizon**

Another important consideration is the time horizon used for the RfR, as this influences the maturity of the bonds and the indices used as benchmarks for both the top-down and the bottom-up approaches. The time horizon used should match the average useful life of the assets owned by the regulated entity. In contrast to energy and water networks, NERL is a relatively asset-light and OPEX-heavy business, with assets that have shorter useful lives than those for energy and water networks.

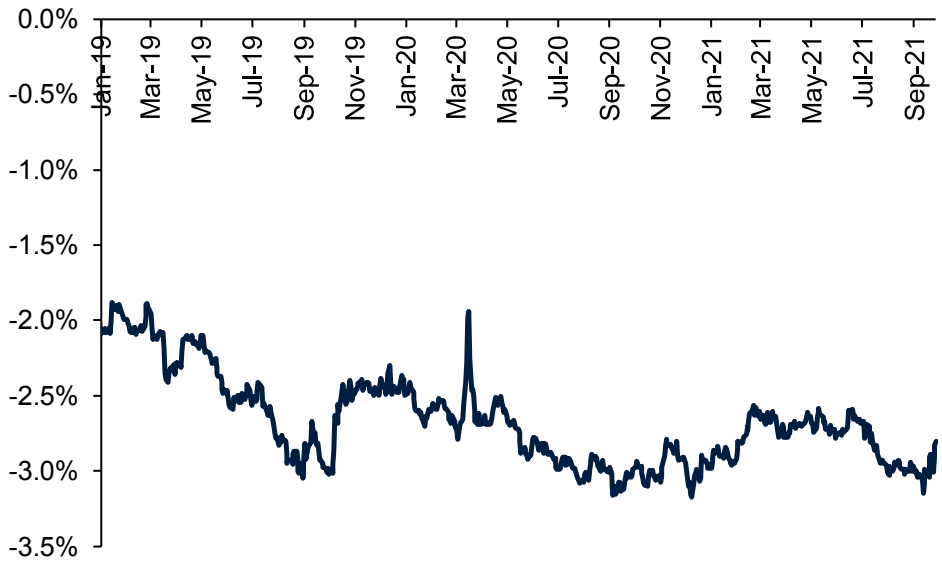
We use a time horizon of ten years due to the average remaining life of NERL's assets,[58] and estimate the RfR using spot yields for ten-year ILG bonds (plus the convenience yield discussed above).

### 3.2.3 Market evidence and proposed approach

As we can see in Figure 3.1, spot yields on ten-year ILGs are currently at -2.80%, slightly below the CMA's estimate for ten-year yields.

[57] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Final Report', 17 March, pp. 795–6, para. 9.264.
[58] Average remaining life of assets can be estimated by dividing net property, plant and equipment assets by the annual depreciation charge. For the financial year 2020/21, the estimated average remaining life is ten years (i.e. £446.1m divided by £45.2m) NATS (En Route) plc (2021), 'Financial statements, year ended 31 March 2021', p. 53, last accessed on 19 August 2021 at https://www.nats.aero/wp-content/uploads/2021/07/NATS-En-Route-Plc-2021-V4a.pdf.

**Figure 3.1 Ten-year ILG bonds**



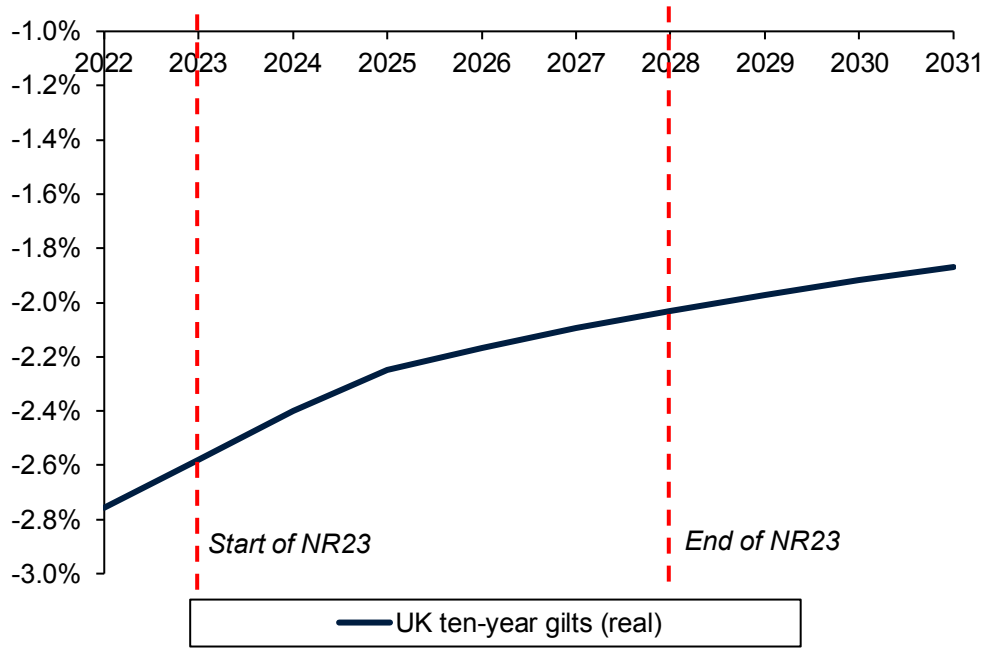

Source: Bank of England.

In previous work for the UK energy sector, we have reviewed the academic and empirical evidence and suggested a convenience yield adjustment of 50bp. This takes into account various academic studies and empirical evidence,[59] and is based on data over a relatively long time horizon. In a context where corporate bond yield spreads have narrowed in part due to central bank bond purchases, it is important to use longer-term estimates that are not as subject to short-term market movements.

Additionally, as a single RfR allowance is set for the entire price control without any adjustments or indexation mechanisms, the spot yields observed in the market today should be adjusted for the expectations of rate movements until the price control. For our lower bound, we estimate a forward adjustment between our cut-off date of 30 September 2021 and the start of NR23. For the upper bound, we calculate the forward adjustment until the end of NR23. This results in a forward adjustment in the range of 22–77 bp. We note that the CMA did not use a range for its forward adjustment, instead using a single estimate between their analysis cut-off date and the mid-point of the price control.

[59] Feldhütter and Lando (2008) found that the magnitude of the convenience yield varies over time and can range between 30bp and 90bp. Similarly, Krishnamurthy and Vissing-Jorgensen (2012) estimated the average of the liquidity component of the convenience yield to be 46bp from 1926 to 2008. Feldhütter, P. and Lando, D. (2008), 'Decomposing swap spreads', *Journal of Financial Economics*, **88**:2, pp. 375–405; Krishnamurthy, A. and Vissing-Jorgensen, A. (2012), 'The Aggregate Demand for Treasury Debt', *Journal of Political Economy*, **120**:2, April, pp. 233–67.

**Figure 3.2 Forward rates for ten-year gilts**




Source: Oxera analysis based on Bank of England data.

Our proposed RfR range is **-2.08% to -1.53%**, as set out in Table 3.4 below.

**Table 3.4 Risk-free rate estimate**

| Parameters | Lower-bound | Upper-bound |
|---|---|---|
| UK government bond yields | -2.80% | -2.80% |
| Convenience yield | 50bp | 50bp |
| Forward adjustment | 22bp | 77bp |
| **Proposed RfR** | **-2.08%** | **-1.53%** |

Source: Oxera analysis.

## 3.3 Equity Risk Premium

As explained in section 3.1, we adopt a 'stable TMR' approach, which implies that the TMR remains relatively stable throughout the economic cycle and over time. Therefore, the ERP then becomes the difference between the RfR and the 'stable TMR'. Based on our proposed TMR and RfR ranges, the estimated ERP range is **7.93–8.03%**.

# 4 Cost of debt

## 4.1 Key methodological issues

The cost of debt allowance should be sufficient to enable NERL to cover its efficiently incurred debt costs and to raise new debt at market rates to meet future investment needs. Consequently, we consider that it is necessary to assess the cost associated with repayment of NERL's existing debt and the expected cost of raising new debt over the duration of the next charges period.

This is consistent with the approach adopted by the CAA and the CMA at the last price review. Indeed, for RP3, the cost of debt allowance included both the actual cost of embedded (existing) debt and an estimate of the cost of new debt that would need to be raised during the RP3 period.

### 4.1.1 Approach to embedded debt

There are two potential approaches to estimating the cost of debt.

1. **Company-specific approach.** The cost of debt allowance may be set to cover the actual cost paid by a company on its borrowings, provided they are in line with market rates and can therefore be considered efficient.
2. **Benchmark index approach.** Alternatively, the allowance can be set with reference to market benchmarks—i.e. the yields on bonds issued by other corporations with similar credit rating.

For RP3, the CAA and CMA both calculated the cost of embedded debt with reference to the yield to maturity at issuance on NATS' bond of 5.40% nominal. Using an RPI adjustment of 2.78%, this was converted to a real cost of embedded debt of 2.55%.

Subsequently, the approach to calculating embedded debt costs was extensively debated in the context of the CMA's water PR19 redeterminations. The CMA considered both approaches and chose to place more weight on the actual costs approach.[60]

> In order to ensure we correctly balance our duties to both companies and consumers, in our Final Determination we begin our assessment of the appropriate cost of embedded debt allowance with reference to actual costs, and use external benchmark data in order to cross check that such an allowance does not over-compensate companies.

We therefore consider that it is appropriate to start by looking at NERL's actual cost of embedded debt, and only deviate from this to the extent that there is evidence that it is inefficient.

### 4.1.2 Approach to the cost of new debt

To estimate the cost of new debt for RP3, the CMA took the average of:

- a top-down estimate—an equally weighted average of Bloomberg bond indices for BBB and A-rated utilities, averaged over six months;
- a bottom-up estimate—the six-month average yield on NATS' existing bond debt, an upwards adjustment to control for target maturity of the new debt

[60] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations', Final report, 17 March, p. 885, para. 9.553.

and a further adjustment to reflect expected increases in the risk-free rate over the RP3 period.

Similarly to the cost of embedded debt, the nominal estimate derived by the CMA, 2.08%, was converted to an RPI-real figure of -0.68%.

#### 4.1.3 The weight that is placed on existing debt vs new debt.

The CMA used its gearing assumption to estimate relative weighting of the cost of embedded debt and the cost of new debt issued during RP3. Using a 30% gearing level, it estimated that the average weight given to embedded debt should be 54%, with an average weight of new debt of 46%.

#### 4.1.4 Allowance for issuance costs

In regulatory cost of capital Decisions, companies are usually allowed to recover costs associated with issuing debt instruments and arranging financing, provided the company has been efficient. The CMA made an allowance for two types of costs:

- issuance costs—these include fees and other costs of raising financing that are not captured in the coupon or interest rate charged;
- liquidity costs—fees associated with maintaining adequate short-term credit facilities to respect debt covenants or the company's liquidity risk management needs.

After calculating a weighted average cost of new and embedded debt, the CMA allowed for an additional 10bp allowance for issuance costs and 5bp for liquidity costs.

### 4.2 NERL's existing debt portfolio

In June 2021, NERL completed a full refinancing of its bank facilities and publicly traded bonds. Since 2003, NERL's financing structure functioned under a Whole Business Securitisation structure, which has now been replaced by a combination of senior unsecured bonds and bank facilities.

NERL's existing debt portfolio consists of:

- a £450m ten-year amortising bond maturing in March 2031, with a weighted average life of seven years, and a yield at issuance of 1.438%;[61]
- a £300m 12.5-year bullet bond maturing in September 2033, with a yield at issuance of 1.786%;
- a £400m three-year variable rate revolving credit facility (RCF), with an interest rate of SONIA plus a margin of 0.45%, in addition to utilisation fees of 0.20–0.40%, depending on the amount drawn by NERL;
- a £450m two-year bridge loan facility which NERL expects to refinance before NR23.

To estimate the cost of debt allowance for NR23, we focus on the two bonds (the ten-year amortising bond and the 12.5-year bullet bond) and on the prospective bond issuance that will replace the two-year bridge loan. In line

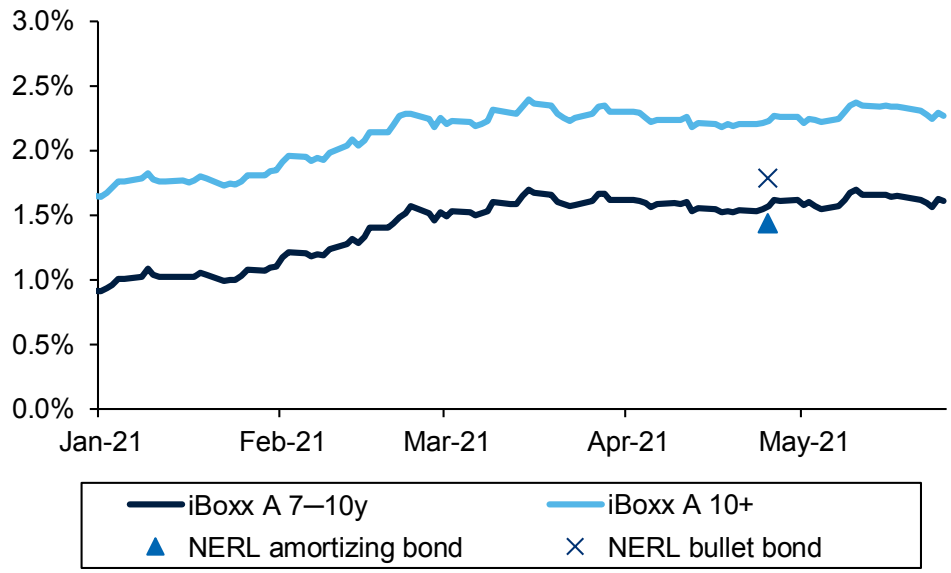
[61] An amortising bond is characterised by regular payments to the lender, which include an interest component as well as part of the principal. This is in contrast with a bullet bond where the principal is paid in one single instalment at the maturity date. A weighted average life estimate gives investors a better sense of how quickly a bond will be paid out, and it is also important for benchmarking the cost of debt (given by the yield at issuance of the amortising bond) with a bond index with an appropriate duration.

with usual regulatory practice, we do not consider the RCF in the weighted cost of debt assessment, as this instrument is intended for liquidity purposes, giving NERL financing flexibility when faced with revenue shortfalls.

As the two bonds issued by NERL were issued and priced in April, the appropriate benchmarks for the bonds are the average yields on iBoxx £-denominated bond indices in April. The yield at issuance of NERL's amortising bond with a weighted average life of seven years can be benchmarked with the iBoxx £-denominated A-rated 7–10-year index, as this index had an average duration of seven years in April 2021. The amortising bond priced at 13bp below average yield of the benchmark index in April.

The 12.5-year bullet bond is more challenging to benchmark with any single iBoxx index, as the iBoxx £-denominated A-rated 10-year+ index has a higher duration (over 14 years) than the bullet bond. However, if we compare the yield at issuance of the 12.5-year bullet bond with the average yields of the 7–10-year and the 10-year+ indexes in April 2021, we find that NERL's bond was priced 11bp lower. This suggests that both bonds were priced competitively and that the refinancing operation should be considered an efficient debt raise.

**Figure 4.1 Benchmarking yield at issuance of NERL bonds using iBoxx £-denominated A-rated indices**




Note: the chart shows yield at issuance for the NERL bonds, while the corresponding indicator for the iBoxx indices is annual yield.

Source: iBoxx data and information provided by NERL.

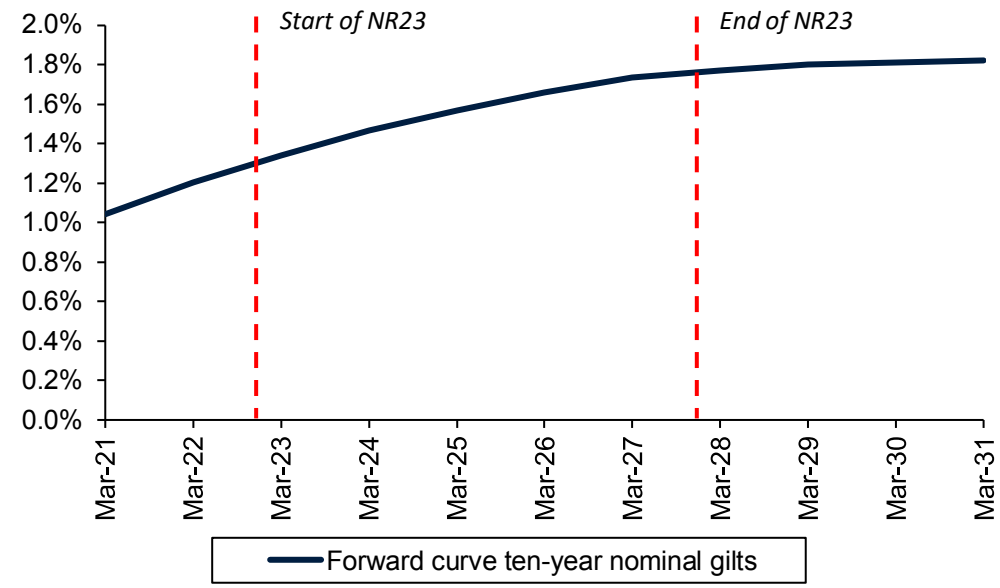
### 4.2.1 Refinancing the two-year bridge loan

NERL has communicated to Oxera that it is highly likely that it will refinance the two-year bridge loan that was part of the refinancing operation, prior to the start of NR23. We assume that the refinancing will take place in March 2022, and that NERL will use a ten-year bullet bond to replace the bridge loan.

We model the pricing of the March 2022 bond in two steps. Firstly, we estimate the forward curve for the risk-free rate of the bond, UK ten-year nominal gilts, in order to obtain an estimate of the yield in March 2022. As shown in Figure 4.2, we estimate that the UK ten-year nominal gilt yield will be 1.12% in March 2022, almost 20bp higher than in March 2021.

The second step consists of adding the premium between the yield at issuance of the April 2021 bullet bond and the relevant UK gilt benchmark, to the forward yield estimate. This assumes that NERL's credit rating remains unchanged between the cut-off date of our analysis (i.e. 30 September 2021) and March 2022. The April 2021 bullet bond priced at 85bp above its Treasury benchmark, and we add this to the 1.12% forward UK ten-year gilt yield estimate to obtain a cost of debt of 1.97%.

**Figure 4.2 Forward adjustment for UK ten-year nominal gilts**




Source: Oxera analysis based on Bank of England UK gilts data.

### 4.2.2 Transaction costs incurred during the refinancing

As mentioned in sub-section 4.1.4, regulatory precedent on cost of capital allows for the recovery of efficient issuance and liquidity costs. In the Final Decision of the CMA Appeal for RP3, a 15bp allowance was awarded. For NR23, we have reviewed NERL's internal data on the costs relating to the new bonds incurred from the refinancing, and have estimated the total issuance costs to be 8bp, with an additional 5bp allowance for liquidity costs related to the RCF, in line with the allowance in RP3. In Table 4.1 below, we present the costs relating to the bond issuances.

**Table 4.1 Issuance costs from refinancing**

| Debt instrument | Amortising bond | Bullet bond | Total |
|---|---|---|---|
| Maturity[1] | Seven years | 12 years | - |
| Issued amount | £450m | £300m | **£750m** |
| Transaction costs | £2.97m | £2.37m | **£5.34m** |
| Per year | £0.42m | £0.20m | **£0.62m** |
| As a share of issued amount | 0.09% | 0.07% | **0.08%** |

Note: [1] Weighted average life in the case of the amortising bond.

Source: Oxera analysis based on data provided by NERL.

### 4.2.3 Overall allowance for embedded debt

Our assessment of NERL's overall cost of embedded debt includes the costs of the 2021 amortising and bullet bonds, and the estimated costs of the bullet

bond to be issued in March 2022 to refinance the bridge loan facility. We also include an issuance cost allowance based on the actual costs incurred by NERL during the refinancing, as well as a liquidity allowance in line with RP3 for maintaining the RCF. The estimates are presented in Table 4.2 below.

**Table 4.2 Weighted average cost of debt**

| Debt instrument | Amount issued | Interest rate |
|---|---|---|
| Amortising bond | £450m | 1.44% |
| Bullet bond | £300m | 1.79% |
| March 2022 bond | £450m | 1.97% |
| **Weighted average cost of debt** | - | **1.72%** |
| RPI forecast | - | 3.00% |
| Issuance costs | - | 8bp |
| Liquidity costs | - | 5bp |
| **Cost of debt, real** | - | **-1.11%** |

Note: We convert the weighted average cost of debt in nominal terms to RPI-real using the Fisher equation: (1 + nominal rate) = (1 + real rate) x (1 + inflation). We then add issuance and liquidity costs to the RPI-real estimate, in line with the approach adopted by the CMA for RP3.

Source: Oxera analysis based on information provided by NERL. RPI long-term forecast is based OBR forecasts: OBR (2021), 'Economic and Fiscal Outlook – March 2021', para. 2.86, last accessed on 10 August 2021 at https://obr.uk/efo/economic-and-fiscal-outlook-march-2021/.

## 4.3 Allowance for new debt

NERL has communicated to Oxera that its emerging business plan assumptions do not envisage the issuance of new debt during the course of NR23. Therefore, we have not modelled any new debt issuance, although we note that the approach to modelling new debt would be identical to the approach described above for modelling the refinancing of the bridge facility, the only difference being that the forward adjustment should be computed on the basis of the expected issuance date during NR23.

## 4.4 Summary

Following a very similar methodological approach to that of the CMA in RP3, we estimate the cost of debt allowance for NR23 based entirely on a forecast of NERL's embedded cost of debt at the start of the upcoming regulatory period. This results in an RPI-real pre-tax cost of debt allowance of **-1.11%** compared to 1.12% in RP3.

# 5 Gearing

A central principle of most regulatory regimes is that the regulated company's customers should be expected to pay only for costs that are incurred efficiently. This extends to the company's choice of financing structure. Consequently, when estimating the cost of capital, regulators often use a notional level of gearing—as opposed to using historical data on the company's actual gearing—on the basis that the notional gearing reflects the financing structure that an efficient company would adopt. NERL was historically allowed a notional gearing of 60% and has been subject to a gearing cap of 65%.

The CMA found that the difference between the observed gearing of comparators (ENAV and European airports that have an average gearing of 30%) and the RP3 notional gearing value of 60% was significant. It noted that a higher notional gearing would result in a higher cost of capital estimate under the CAA's model (a violation of Modigliani–Miller Theorem) and therefore set the notional gearing at 30% while leaving the actual gearing decision with NERL.

## 5.1 Key methodological issues

### 5.1.1 Notional vs company-specific gearing

The decision to adopt a notional or company-specific approach is central to determining a gearing allowance. The main argument for using a notional gearing approach, informed in part by the gearing of comparators, is that a regulated company is best placed to bear the risks of the financing structure that it chooses. If a fixed estimate of notional gearing is used, then the company and its shareholders bear the risks of deviations in the financing structure and have an incentive to outperform. Customers, however, will be charged based on the efficient cost of debt for a company that is geared at the efficient notional level.

There are also arguments in favour of using a more company-specific approach, particularly during periods of heightened uncertainty. In the case of the aviation industry during the COVID-19 pandemic, gearing has been significantly affected by liquidity shortfalls associated with under-recovery of allowed revenues compared to traffic forecasts, and an inability to reduce mostly fixed costs structures. Analysing the gearing of comparators in such a situation may be less informative, as business-specific and regulatory model-specific factors will have a strong influence on gearing decisions. This will limit the ability to apply these insights to the notional efficient ANSP in the UK.

### 5.1.2 Transition of gearing during the price control

Another aspect to consider in a period of heightened uncertainty like COVID-19, is the additional difficulty of setting a single gearing figure for the entire price control. In the absence of significant industry change or market turmoil, the notional company would be expected to maintain a relatively stable level of gearing. While other cost of capital parameters like the risk-free rate and the cost of debt can sometimes be indexed or updated by regulators during a price control due to their sensitivity to changes in financial markets, notional gearing is usually a stable parameter.

However, the current uncertainty about the recovery of the aviation industry means that there is an additional challenge to setting a notional gearing allowance over a period, which is likely to see significant operational and regulatory changes that will have an effect on gearing decisions.

In NERL's case, its gearing increased by approximately 20pp during the 2020/21 financial year, driven primarily by revenue shortfalls caused by the difference between allowed revenues and actual revenues received.[62] As at 31 March 2021, NERL had £417m of under-recovered revenue allowances, compared to £7m the year before.[63] ENAV faced similar challenges, and its revenue shortfall for the financial year 2020 led its balance of under-recovered allowances to increase by €470m.[64]

Therefore, the main factor determining the evolution of gearing during NR23, provided that traffic recovers in line with forecasts, will be the speed at which NERL is allowed to recover the revenue shortfalls incurred during the years 2020–2022. Although the TRSM is designed to adjust unit rates on an n+2 basis to fully recover or reimburse the difference between actual and allowed revenues, the precise mechanics that will apply for this period will only be decided by the CAA during the consultation process for NR23. In the case of ENAV, the European Commission has proposed a recovery of charges over a 5–7 year period starting in 2023.

Due to the uncertainty about the speed at which revenue shortfalls will be recovered, in addition to higher levels of uncertainty concerning traffic forecasts than in previous price controls, it is likely that gearing will fluctuate noticeably during NR23. This raises the question of whether the gearing allowance should be determined separately for each year of the price control using the baseline traffic forecasts and specific assumptions around recovery of revenue shortfalls, or whether the usual approach of using a single gearing estimate should be preserved.

### 5.2 NERL's forecast gearing

According to NERL's annual report, it's gearing (net debt/RAB) was approximately 50% as at 31 March 2021, approximately 20pp higher than a year before. Based on prices not being re-set until 2023, we understand that NERL expects its gearing to continue to rise over 2021 and 2022.

### 5.3 Market evidence

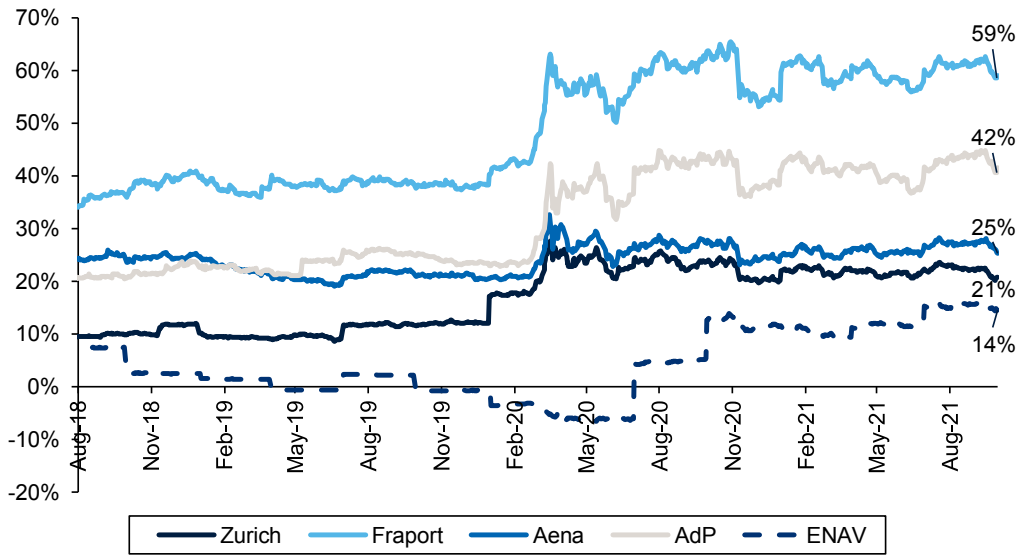
Comparator airports and ENAV have geared up in the intervening period, as can be seen from Figure 5.1. Current (simple) average **gearing is 32%**, or 35% excluding Zürich Airport, which is higher than CMA's 30% assumption (which did not include Zürich). Since the start of the COVID-19 pandemic in February 2020, gearing has increased by 12pp, from 20%. Two of the largest comparators, AdP and Fraport, have increased their gearing by almost 20pp since the start of 2020. For all comparators, this is driven by both an increase in net debt (i.e. higher debt and/or lower cash reserves) and a reduction in equity (i.e. lower stock market capitalisation).

The only other ANSP in the sample, ENAV, has significantly increased its gearing from a relatively low starting point. Its gearing ratio using enterprise value as the denominator increased by 15pp to 12.1%. Its gearing in relation to RAB (i.e. net debt/RAB) is slightly higher, at 31%, and increased by 39pp since the start of the pandemic.

[62] NATS (En Route) plc (2021), 'Financial statements, year ended 31 March 2021', p. 1, last accessed on 19 August 2021 at https://www.nats.aero/wp-content/uploads/2021/07/NATS-En-Route-Plc-2021-V4a.pdf.
[63] Ibid., p. 44.
[64] ENAV (2021), '2020 Annual Financial Report', p. 30, last accessed on 19 August 2021 at https://www.enav.it/sites/public/it/Servizi/Documenti/annual-financial-report-2020-bis.pdf.

It is important to note that estimating gearing for comparators relative to their enterprise value, while assessing NERL's gearing relative to its RAB, can lead to comparability issues. As we can see from ENAV, gearing measured relative to RAB is noticeably higher than relative to enterprise value. As such, caution is needed when using the gearing point estimates of airports as they do not translate directly to the notional gearing assumption used for NERL's WACC. Nevertheless, the main difference between the RP3 Appeal and now is the increase in gearing of all comparators, which applies regardless of the gearing approach used.

**Figure 5.1 Gearing of comparators**




Source: Oxera analysis based on Bloomberg data.

## 5.4 Impact of gearing on cost of capital in NR23

A main concern of the CMA when considering whether to set a gearing allowance in line with previous CAA price controls (60%) was the positive impact that it had on the overall WACC, resulting in higher charges for customers than when using a gearing of 30%. The CMA argued that a more expensive outcome for customers was inconsistent with the view 60% was a notionally efficient outcome.

However, NERL's recent debt refinancing and the negative impact of COVID-19 on government bond yields, have significantly lowered the cost of debt allowance for NR23. Compared to the RP3 allowance of 1.12% RPI-real, we estimate that NERL's allowance should be -1.11%, based on the actual costs of debt raised in the recent refinancing. As we can see in Table 5.1, the impact on the WACC of raising gearing to 50% (consistent with a 20pp increase across a range of comparators since the onset of COVID-19) or to the level seen in earlier price controls (60%), is negligible compared to the impact it had in RP3. Therefore, increasing notional gearing in line with market evidence should not raise similar concerns around the impact on the WACC as in RP3.

**Table 5.1 Impact of gearing assumptions on cost of equity and WACC**

| WACC parameters | Oxera—low | Oxera—high | CMA RP3 | CAA RP3 | NERL RP3 |
|---|---|---|---|---|---|
| Risk-free rate | -2.08% | -1.53% | -1.70% | -1.70% | -1.40% |
| TMR | 5.85% | 6.50% | 5.40% | 5.40% | 6.25% |
| Asset beta | 0.60 | 0.70 | 0.57 | 0.46 | 0.57 |
| Debt beta | 0.05 | 0.05 | 0.05 | 0.10 | 0.05 |
| Cost of debt | -1.11% | -1.11% | 1.12% | 0.86% | 1.07% |
| **60% gearing** | | | | | |
| Cost of equity | 9.22% | 11.92% | 7.89% | 5.40% | 8.93% |
| WACC | 3.02% | 4.10% | 3.83% | 2.68% | 4.21% |
| **50% gearing** | | | | | |
| Cost of equity | 7.04% | 9.31% | 6.04% | 4.12% | 6.94% |
| WACC | 2.97% | 4.10% | 3.58% | 2.49% | 4.00% |
| **30% gearing** | | | | | |
| Cost of equity | 4.55% | 6.33% | 3.93% | 2.66% | 4.67% |
| WACC | 2.85% | 4.10% | 3.09% | 2.12% | 3.59% |
| **Δ 30–60% gearing** | **17bp** | **0bp** | **74bp** | **56bp** | **63bp** |
| **Δ 30–50% gearing** | **12bp** | **0bp** | **49bp** | **37bp** | **42bp** |

Note: the equity beta is estimated using the Harris-Pringle formula, which takes into account the asset beta, debt beta and gearing.

Source: Oxera analysis. Figures for the CMA, CAA and NERL WACC estimates were sourced from Table 13-17 of the CMA's Final Decision, last accessed 11 October 2021 at: https://assets.publishing.service.gov.uk/media/5f350e17e90e0732e0f31c2a/NATS_-_CAA_final_report_for_publication_August_2020_-----.pdf.

This impact is primarily driven by the cost of debt, and does not depend as much on the other parameters that form our WACC assessment. If, for illustrative purposes, we were to use the most recent estimate of the cost of debt alongside the CMA RP3 WACC parameters, the marginal impact of a move from 30% to 60% gearing would be identical to the one we estimate under the Oxera scenarios. Therefore, the argument that gearing should not be set at a level significantly above 30% loses importance in the context of NR23 due to the lower cost of debt for NERL.

## 5.5 Summary

In assessing the gearing allowance for NR23, two main factors should be taken into account. Firstly, NERL's gearing and that of its comparators has increased substantially in response to the liquidity challenges caused by the COVID-19 pandemic. Secondly, the level of uncertainty affecting the main drivers of gearing—regulatory changes concerning recovery of determined revenues, and operational challenges caused by low traffic and uncertain recovery—makes estimating a notional gearing allowance for NR23 unusually challenging.

In particular, it is difficult to make an assumption about how much the notional company will have to increase gearing before January 2023 in response to persistently low traffic; at what point the gearing level will stop increasing and will start to plateau; and how quickly the notional company will be able to reduce its leverage once traffic returns to pre-pandemic levels.

Although we have limited visibility on the gearing path ahead for the notional company, we can see that AdP, Fraport and NERL itself have reacted to the crisis by increasing gearing by around 20pp. Therefore, we believe that a

**gearing allowance of 50%**, which results from uplifting the CMA's gearing allowance of 30% by 20pp, is a reasonable estimate of the current capital structure of a notional ANSP. This is also in line with NERL's current gearing levels of 49.6% (on a net debt/RAB basis).[65]

Considering the limited impact that gearing has on the WACC following the reduction in NERL's cost of debt, we also see a limited risk of an increase in charges to consumers due to a higher notional gearing assumption, a concern raised by the CMA in RP3.

[65] NATS (En Route) plc (2021), 'Financial statements, year ended 31 March 2021', p. 1, last accessed on 20 August 2021 at https://www.nats.aero/wp-content/uploads/2021/07/NATS-En-Route-Plc-2021-V4a.pdf.

# 6 Selecting a point estimate

For each of the parameter estimates discussed above, Oxera has developed an estimated range. This reflects the fact that there is inevitably an element of uncertainty when estimating cost of capital parameters. However, the price-setting approach requires a single point estimate for the cost of capital. There is therefore a question of where in this range the point estimate should be taken from. There is precedent of 'aiming up' when setting the regulatory cost of capital in the UK, by picking a point estimate from the top half of the estimated range.

The CMA considered the question of whether to 'aim up' in the course of its RP3 determination, and again for the four PR19 appellants in the water sector. The CMA considered three main grounds for 'aiming up':[66]

1. To promote investment and address the risk of an exit of capital if the cost of equity is set too low.
2. To reflect asymmetries in the overall price settlement (e.g. due to asymmetric incentive payments) that may skew the potential distribution of returns.
3. To address financeability concerns.

The CMA has been clear that the merits of these grounds can vary from sector-to-sector (and over time) and that there is no requirement for regulators to aim up.[67]

At this stage in the price review process, it is not possible to comment on the second and third of these reasons, as the price control package is insufficiently defined.

With regard to the 'investment rationale', the CMA has been clear that concluded in its PR19 redeterminations that there were sufficiently strong grounds to 'aim up' in order to promote efficient long-run investment. By contrast, in the context of the NERL RP3 redetermination, it provisionally concluded that no such uplift was warranted given the specific governance arrangements, regulatory measures and incentives in the air traffic control sector.

> In the air traffic sector we do not see any evidence that such a premium is necessary. NERL has a clear incentive to identify and deliver the capital programme associated with AMS, both through the regulatory framework and also through the broader governance of the relevant initiatives. The decision to implement AMS follows a consultation across the sector, and has relevant support from government, both in policy terms and as a shareholder in NERL. More generally, NERL's ownership and the structure of the PPP should mitigate any risks that it might not have incentives to identify and implement a capital programme which would have benefits for its direct customers and for broader

[66] Competition and Markets Authority (2021), 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations, Final Report', 17 March, p. 1057, para 9.1240.
[67] The CMA's provisional conclusion in the RIIO-2 appeals is that 'the appellants offered no compelling evidence that regulators are required to aim up. In our view, therefore, the decision whether to aim up (or not) was an exercise of GEMA's regulatory judgement that lay within its margin of appreciation, and we have provisionally concluded that GEMA's decision not to aim up on the cost of equity was not wrong.' Competition and Markets Authority (2021), 'RIIO-2 Energy Licence Modification Appeals: Summary of provisional determination', 11 August, p. 5, para 19.

airspace users. We therefore have concluded that no uplift to the cost of capital is necessary in RP3.[68]

In line with the CMA's provisional view at the time of the RP3 redetermination, we do not see strong grounds for applying an uplift to the cost of capital in order to promote investment. A final view on the merits of aiming up may need to be undertaken once the proposed price control package has been defined in greater detail.

[68] Competition and Markets Authority (2020), 'NATS (En Route) Plc / CAA Regulatory Appeal', Final Report, 23 July, p. 204, para 12.290.

# 7 NR23 WACC estimate

**Table 7.1 Oxera proposed WACC range for NR23**

| Parameters | Formula | Oxera—low | Oxera—high | CMA—mid |
|---|---|---|---|---|
| Asset beta | A | 0.60 | 0.70 | 0.57 |
| Debt beta | B | 0.05 | 0.05 | 0.05 |
| Gearing | C | 50% | 50% | 30% |
| Equity beta | D = (A – B x C) / (1 – C) | 1.15 | 1.35 | 0.79 |
| Risk-free rate | E | -2.08% | -1.53% | -2.25% |
| TMR | F | 5.85% | 6.50% | 5.50% |
| ERP | G = F – E | 7.93% | 8.03% | 7.75% |
| **Cost of Equity, post-tax** | **H = E + D x G** | **7.04%** | **9.31%** | **3.89%** |
| Cost of embedded debt | I | -1.24% | -1.24% | 2.55% |
| Cost of new debt[1] | J | n/a | n/a | -0.68% |
| Proportion of new debt | K | 0% | 0% | 49% |
| Transaction and liquidity costs | L | 13bp | 13bp | 15bp |
| **Cost of Debt, pre-tax** | **M = (J x K) + ((1 – K) x I) + L** | **-1.11%** | **-1.11%** | **1.12%** |
| **WACC, vanilla** | **L = (C x K) + ((1 – C) x H)** | **2.97%** | **4.10%** | **3.06%** |

Note: [1] NERL has informed Oxera that it does not plan to issue any new debt during NR23 following the refinancing of its previous debt liabilities.

Source: Oxera analysis.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