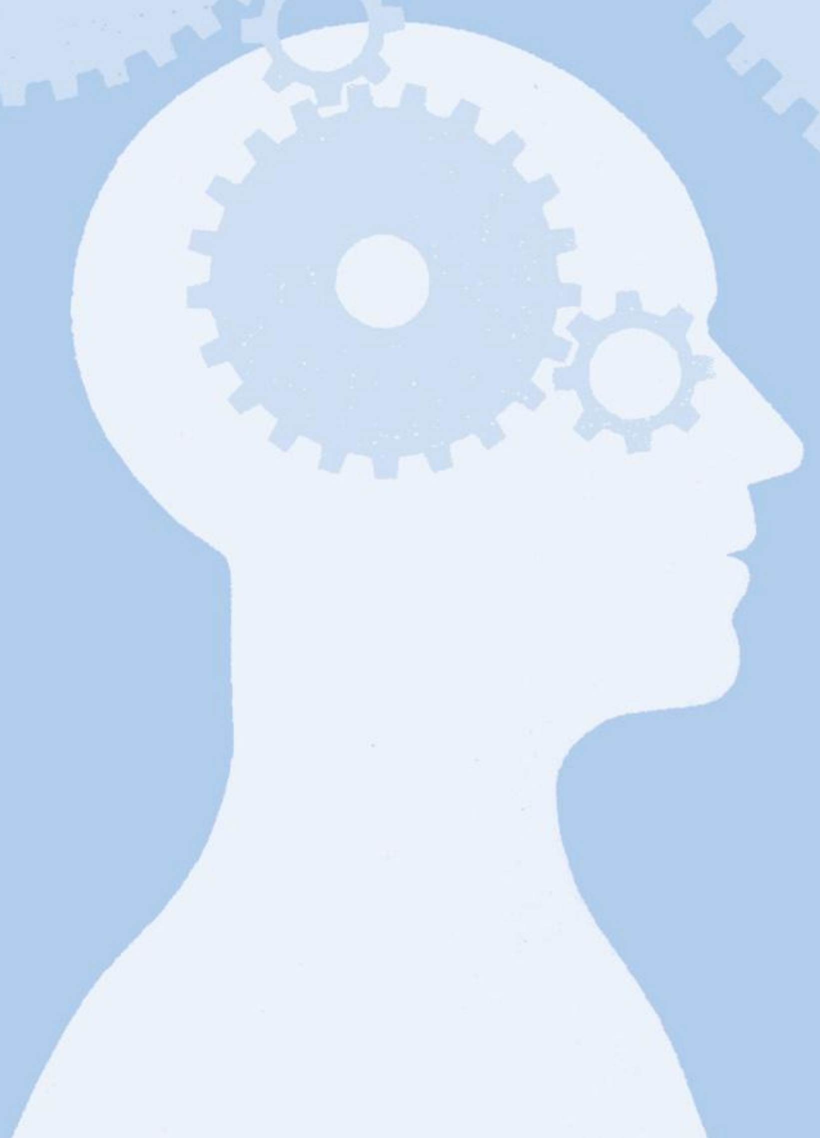
What is the cost of capital for NATS (En Route) plc for RP2?

Prepared for NATS (En Route) plc

July 24th 2013



Executive summary

NATS (En Route) plc (NERL) has commissioned Oxera to estimate the appropriate rate of return allowance for the next regulatory period covering 2015–19 (RP2).

The methodology adopted in this report is consistent with that used by the Civil Aviation Authority (CAA) in previous regulatory periods. However, the methodology is also consistent with the European Commission's Single European Sky (SES) Charging Regulations, which are aimed at harmonising and improving the provision of air traffic navigation services across EU Member States, and which the CAA will need to align with in future regulatory periods.

Recent developments
The process for setting RP2 price control parameters is taking place against the backdrop of a weak macroeconomic outlook, slow pace of traffic recovery and a number of material regulatory changes. It is relevant to consider how to take these developments into account when estimating a reasonable rate of return for RP2.

– Current capital market conditions remain unusual in the aftermath of the financial crisis and global recession.

– Traffic volumes previously forecast for the end of the current regulatory period are now expected only towards the end of RP2, affecting the profitability of air navigation service providers (ANSPs).

– The implementation of RP2 is likely to see tougher efficiency and performance targets being set for individual ANSPs, including NERL.

– Given the timing of the RP2 implementation process, the effectiveness and availability of the current appeal mechanisms under the Transport Act 2000 are less clear than before.

These developments highlight the importance of ensuring that NERL is allowed to earn an appropriate return that compensates it adequately for its risk profile and allows it to manage shocks appropriately. These developments are important context for estimating the individual parameter values and for recommending an appropriate point estimate of the allowed rate of return.

Cost of debt
In light of the CAA currently considering the possibility of debt indexation as part of the Q6 price review for designated airports, the relative merits of debt indexation have been evaluated in this report. Debt indexation, at least in the form in which it is implemented by other regulators (eg, Ofgem), is unlikely to be a suitable mechanism for setting financing costs, given NERL's size and financing structure.

Therefore, the cost of debt for NERL is estimated on the assumption that a fixed cost of debt allowance will be set for RP2. The estimates have been derived from the following evidence.

– The real cost of NERL's embedded debt is estimated at 2.4%. This figure has been cross-checked against suitable comparator evidence.

– NERL's refinancing requirements are low over the next price control period (less than 20% based on bond debt) and new debt is not expected to be issued until the end of RP2. On this basis, and taking into account the evidence from forward markets, the cost of new debt is estimated with reference to longer-term averages of debt costs rather than spot values, which produces an estimate of 2.4–3.0%.

– Weighting the cost of existing and new debt according to the refinancing requirements, and adding an allowance for transaction costs of 10–20bp, produces an estimate for the total cost of debt of **2.5–2.7%**.

Asset beta

For a company listed in the market, equity, and subsequently, asset beta can be estimated with reference to direct market evidence. However, for a company such as NERL, which is not listed, and in the absence of other air traffic service providers that are listed, risk assessment needs to rely on other sources of evidence.

To estimate the asset beta for NERL for RP2 the analysis has focused on the assessment of how the forward-looking exposure to key business risks in RP2 compares with CP3. The evidence considered shows that risk is expected to be at least as high in RP2 as in CP3. Exposure to revenue risk, adjusted for operational leverage, has not decreased. Indeed, some factors, such as the unexpectedly sluggish recovery of traffic volumes and diminishing ability to outperform regulatory cost targets over time, suggest potentially higher forward-looking exposure to revenue risk.

Other factors, such as the increased inflation exposure, and a reversion to five-year price controls, also indicate a potential increase in risk going forward. However, robustly quantifying to what extent these risks have been priced into the CP3 asset beta assessment is challenging. Overall, a comparison with CP3 suggests that, at the very least, it would be appropriate to keep the asset beta assumption unchanged at **0.60**.

Market parameters

Oxera's estimates for the risk-free rate and the equity risk premium (ERP) imply a total equity market return in the range of 6.5% to 7.25%. The lower bound of the proposed range is equal to the mid-point of the CAA's proposed range for Q6 and the upper bound is consistent with the most recent Final Proposals for energy networks by Ofgem. Given the uncertainty in estimating the constituent components of the total market return—that is, the real risk-free rate and the ERP—and the relatively greater stability of total market returns, this range is considered to be appropriate for RP2.

The approach to decomposing the total market return into a risk-free rate and an ERP is consistent with taking a longer-term view of capital markets.

– **Risk-free rate**. In the light of the possibility of mean-reversion in index-linked gilt yields during RP2, it is prudent to allow for considerable headroom above the present market rates. Evidence from forward and corporate bond markets suggest that gilt yields are expected to rise. Regulators have recognised the uncertainty in estimating the risk-free rate based on current index-linked yields in recent determinations and have tended to follow a conservative approach by allowing headroom above market rates. Taking all of the evidence into account, a range of **1.50–1.75%** is proposed.

– **Equity risk premium**. Historical estimates of the ERP suggest a value of no lower than 5.0%. Forward-looking dividend growth models suggest an estimate above 6.0% and survey evidence indicates an ERP of between 5.0% and 6.4%. Given the uncertainty in equity markets, regulatory estimates of the ERP have steadily increased since the start of the financial crisis, with the most recent determination suggesting a range of around 5.0–6.0%. Based on the evidence, and consistent with the overall approach of taking a longer-term view of capital markets and a risk-free rate allowance that is set above spot yields, a range of **5.0–5.5%** is proposed.

WACC estimates for RP2

Bringing together all of the evidence, a range of 4.8–5.3% for the real vanilla weighted average cost of capital (WACC) is estimated. The breakdown of the underlying parameters is shown in Table 1. This compares with a vanilla WACC of 5.7% in CP3. The main driver for the reduction in the cost of capital is the assimilation of some of the decline in government and corporate bond yields observed since the CP3 decision.

Table 1 Estimates of NERL's allowed WACC for RP2 and CP3

Parameter	Low	High	CP3
Real risk-free rate (%)	1.50	1.75	1.75
ERP (%)	5.00	5.50	5.25
Asset beta	0.60	0.60	0.60
Debt beta	0.10	0.10	0.10
Equity beta	1.35	1.35	1.35
Cost of equity (post-tax real, %)	8.3	9.2	8.8
Gearing (%)	60	60	60
Cost of debt (pre-tax real, %)	2.5	2.7	3.6
Vanilla WACC (real, %)	**4.8**	**5.3**	**5.7**
Pre-tax WACC (real, %)	6.7	7.3	7.0

Source: Oxera analysis.

Given the increased forecasting error in individual parameter estimates and the ongoing changes to the regulatory landscape—in particular, the challenging efficiency targets that are likely to restrict NERL's ability to manage shocks—an estimate above the mid-point of the range (5.0% vanilla or 7.0% pre-tax) is considered appropriate.

Allowance for tax

Corporation tax is a normal business cost that needs to be reflected in the revenue requirement of a regulated company. In regulating NERL, the CAA has previously taken into account the actual tax payments projected by NERL in each price control period. The CAA has then converted the tax allowances in pound terms into a percentage of the regulatory asset base in order to allow it to estimate the required pre-tax WACC.

Using the statutory tax rate of 20% expected for RP2 and the vanilla WACC assumptions proposed above, NERL has estimated its actual tax bill for RP2. Taking into account the projected tax payments, the appropriate pre-tax WACC range for RP2 is 6.7–7.3%.

Contents

List of tables

List of figures

List of boxes

1 Introduction

The Civil Aviation Authority's (CAA) future economic regulation of UK air navigation services has to fulfil the regulator's duties under the Transport Act 2000 and the UK's obligations under the Single European Sky (SES) Performance Scheme.

The CAA is currently in the process of preparing the joint UK–Ireland National Performance Plan for the relevant Functional Airspace Block (FAB) for SES Reference Period Two (RP2), which will cover a five-year period from January 2015 to December 2019. The National Performance Plan will include projections of determined costs for the national air traffic service providers for the en route services. The determined costs will need to be determined on a forward-looking basis and be consistent with the latest SES Charging Regulations. A component of determined costs is the cost of capital:[1]

> The costs referred to in paragraph 1 shall be broken down into staff costs, other operating costs, depreciation costs, **cost of capital** and exceptional items including non-recoverable taxes and customs duties paid, and all other related costs. [emphasis added]

NATS (En Route) plc (NERL) has commissioned Oxera to estimate what reasonable rate of return NERL should be allowed over the RP2 period. The methodology adopted in this report is consistent with the CAA's methodology for estimating the allowed rate of return in previous regulatory periods. This methodology, however, is also consistent with the SES Charging Regulations. Oxera has prepared a separate report for NERL illustrating this.[2] The rest of this report is structured as follows:

– section 2 discusses recent developments, which set the scene for the RP2 review;
– section 3 assesses the appropriate cost of debt allowance and gearing;
– section 4 examines the asset beta for NERL;
– section 5 assesses the appropriate market parameters (the risk-free rate and the equity risk premium);
– section 6 presents the WACC estimates for NERL and discusses the appropriate allowance for tax.

[1] European Commission (2013), 'Charging Regulations [Draft]', Article 7, para 2.

[2] Oxera (2013), 'What is the appropriate cost of capital for NATS (En Route) plc in the context of the next European reference period (2015–19)?, July.

2 Setting the scene

This section examines important developments, since the CAA's last regulatory determination in December 2010, for the current price control period (CP3) spanning 2011–15. The challenging macroeconomic outlook, slow pace of traffic recovery and ongoing regulatory and policy changes could introduce challenges into the determination of what constitutes a reasonable rate of return (ie, cost of capital) for NERL for RP2.

– Current capital market conditions remain unusual in the aftermath of the financial crisis and global recession.

– Traffic volumes previously forecast for the end of CP3 are now expected only towards the end of RP2, affecting the profitability of ANSPs.

– The implementation of RP2 is likely to see tougher efficiency and performance targets being set for individual air navigation service providers (ANSPs), including NERL.

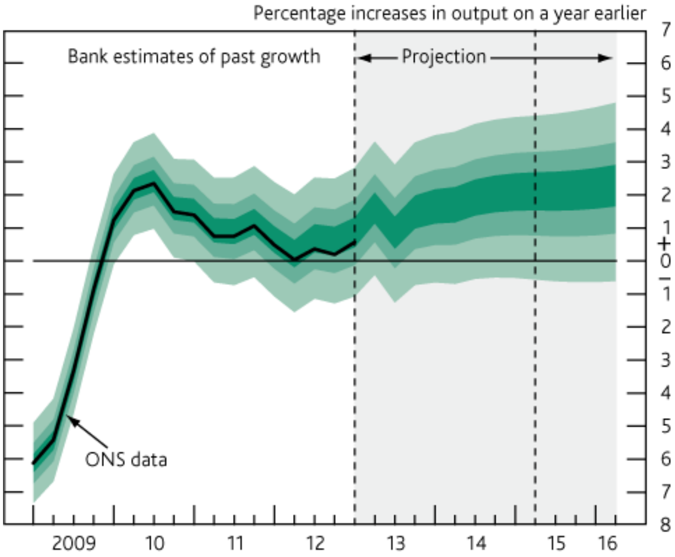
– Given the timing of the RP2 implementation process, the effectiveness and availability of the current appeal mechanisms under the Transport Act 2000 are less clear than before.

These developments highlight the importance of ensuring that NERL is allowed to earn an appropriate return that compensates it adequately for its risk profile and allows it to manage shocks appropriately. These developments are given consideration in estimating the individual parameter values and in recommending an appropriate point estimate of the allowed rate of return in the rest of this report.

2.1 Macroeconomic developments

The CP3 decision was taken in the aftermath of the most severe financial crisis in recent decades. The 2008–09 period saw a sharp contraction in UK GDP and large falls in the equity market. More than three years on, the outlook for economic growth remains weak and uncertain, with the pace of recovery continuing to be slow (Figure 2.1).

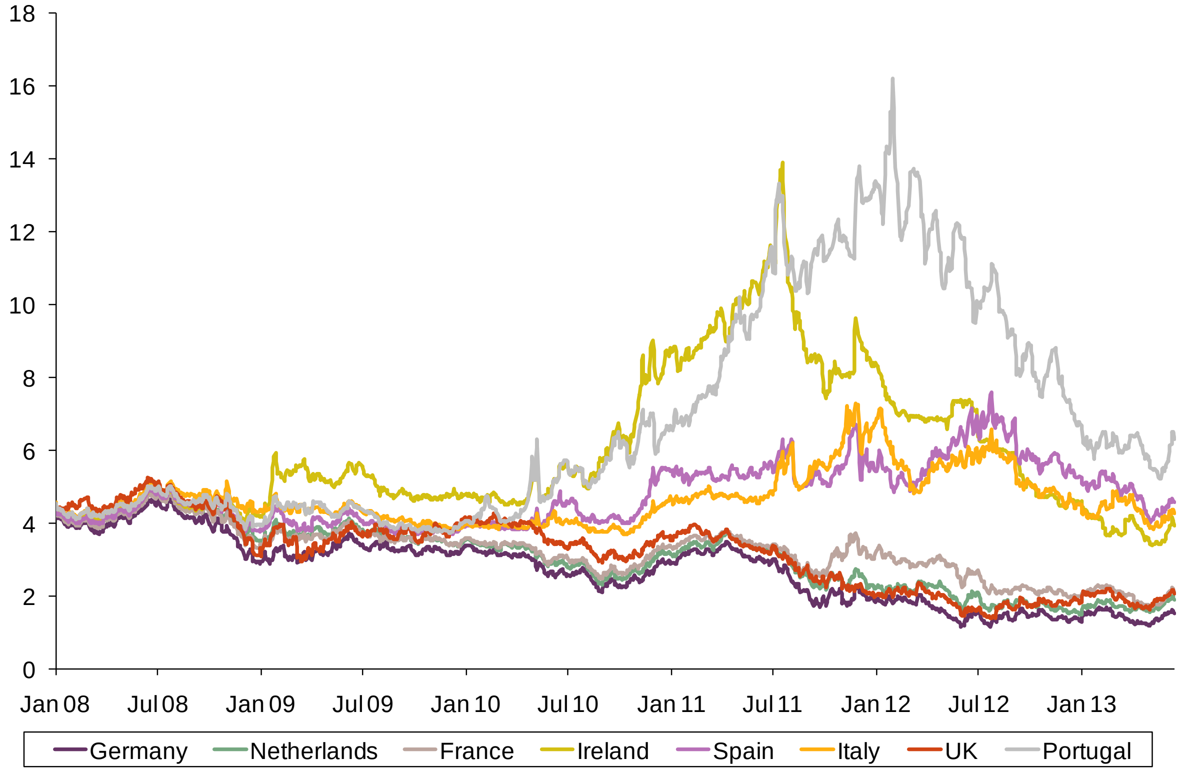
Figure 2.1 Outturn and forecast GDP growth (%), Bank of England



Source: Bank of England (2013), 'Inflation Report', May, p. 6.

In response to the financial crisis, a number of key monetary authorities around the world have adopted extraordinary monetary policy measures to stimulate economic growth, leading to government interest rates reaching all-time lows in the UK, the USA, Germany, and a number of other countries. At the same time, several European nations with weak fiscal positions have seen the costs of sovereign borrowing rise significantly (Figure 2.2).

Figure 2.2 Yields on ten-year government bonds in selected European countries (%)



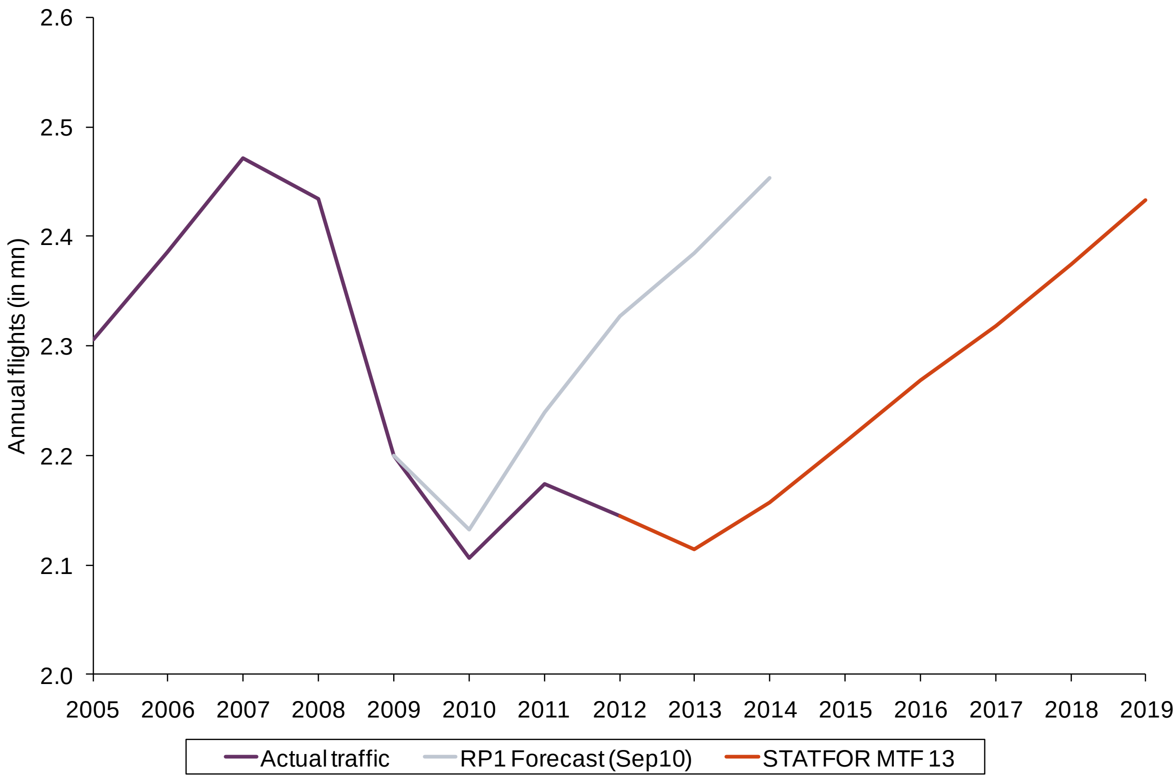
Note: Cut-off date is June 14th 2013.
Source: Oxera analysis, based on data from Datastream.

These developments make it more difficult to interpret current market data, and suggest that forecasting error in some key capital market variables could be higher than usual.

2.2 Industry developments

Given the weak macroeconomic conditions, outturn traffic volumes in CP3 have consistently been lower than forecast at the time of the CP3 determination. Most recent projections expect traffic to reach levels initially forecast for the end of CP3 only towards the end of RP2 (see Figure 2.3). The sluggish pace of traffic recovery has affected the profitability of ANSPs over the period.

Figure 2.3 Changes in traffic forecasts



Source: Oxera analysis, based on data from Eurocontrol and regulatory documents.

Some of these developments may have an impact on industry risk, and so the relevance of these factors to the cost of capital assessment will be considered.

2.3 Regulatory developments

RP2 will be the first price control period when SES II Charging Regulations will be fully implemented, with the Performance Review Body (PRB) having a much greater role in the assessment of National Performance Plans.

Compared with Reference Period One (RP1)—equivalent to CP3 in CAA's nomenclature—the role of the PRB has been made explicit in SES Regulations (whereas previously it was only part of the implementing regulations), giving the European Commission greater ability to assess FAB-level targets and impose sanctions.

The revised Performance Regulations also allow the PRB to undertake greater scrutiny of ANSPs' capital expenditure, with Article 3(3i) outlining its role in:

> monitoring, benchmarking and review of the performance of air navigation services including investment and capital expenditure, at local and Union levels.[3]

Under the current proposed timetable for RP2 implementation, the National Performance Plans will need to be approved by the UK government and the European Commission before the CAA consults on appropriate licence modifications for NERL. This raises questions about the availability and the effectiveness of a potential appeal to the Competition Commission—a well-established appeal mechanism in UK regulation—in case there is a material disagreement between NERL and the CAA around the proposed licence modifications.

[3] European Commission (2013), 'Commission Implementing Regulation (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions', May 9th, article 3(3i).

Any period of material regulatory change, if not implemented in a transparent and predictable manner, could affect investor perceptions of regulatory risk and their required returns. This is an especially important consideration for NERL, as it is the only commercially owned ANSP in Europe.

Initial scenarios of the range of expected reductions in determined unit cost (DUC) across the EU suggest that ANSPs, including NERL, will be expected to meet challenging cost efficiency targets, which could reduce the flexibility of ANSPs to manage downside risks.

Despite having approved the UK National Performance Plan for RP1, the European Commission expressed concern about its efficiency targets. Further, for the start of RP2, NERL would be expected to rebase DUC to levels consistent with the Commission's view of appropriate efficiency targets for the current period rather than those agreed as part of the CP3 determination.

3 Cost of debt and gearing

In previous price reviews, the CAA has estimated a fixed cost of debt allowance for the duration of the price control period. It is assumed that the same approach will be followed at RP2. This approach also appears to be consistent with the SES Charging Regulations.

However, the CAA is currently considering the possibility of debt indexation as part of the Q6 price review for designated airports.[4] In principle, the SES Charging Regulations permit a within-period adjustment to determined costs in response to 'significant changes in interest rates on loans, which finance costs arising from the provision of air navigation services,' provided that changes in these costs are outside the ANSP's control or the ANSP has taken reasonable steps to manage the risk.[5]

The relative merits of debt indexation are considered separately in Appendix A1. It is shown that debt indexation, at least in the form in which it is implemented by other regulators (eg, Ofgem), is unlikely to be a suitable mechanism for setting financing costs given NERL's size and financing structure. This is because NERL's financing costs are largely fixed over the next price control period. Introducing a variable cost of debt allowance would increase, rather than reduce, cash-flow volatility over the period. Debt indexation is also typically better suited to companies that access bond markets on a frequent basis, which is not the case for a company the size of NERL.

Therefore, the cost of debt for NERL is estimated on the assumption that a fixed cost of debt allowance will be set for RP2. The cost of debt is estimated as a weighted average of the costs of existing and new debt, consistent with the approach taken in CP3 (section 3.1).

– The real cost of NERL's embedded debt is 2.4%. This figure has been cross-checked against suitable comparator bonds as well as evidence from A-rated corporate bond indices (section 3.2).

– NERL's refinancing requirements are low over the next price control period (less than 20% based on bond debt) and new debt is not expected to be issued until the end of RP2. On this basis, and taking into account the evidence from forward markets, the cost of new debt is estimated with reference to longer-term averages of debt costs rather than spot values, which produces an estimate of 2.4–3.0% (section 3.3).

– Weighting the cost of existing and new debt according to the refinancing requirements, and adding an allowance for transaction costs of 10–20bp, produces an estimate for the total cost of debt of **2.5–2.7%**. This range is found to be in line with recent regulatory precedent (section 3.4).

3.1 Methodology for estimating the cost of debt

The CAA, along with a number of other UK regulators, has an explicit financing duty with respect to NERL, as codified in the Transport Act 2000:[6]

> The CAA must exercise its functions in the manner it thinks best calculated to secure that licence holders will not find it unduly difficult to finance activities authorised by their licences.

[4] Civil Aviation Authority (2013), 'Economic regulation at Heathrow from April 2014: initial proposals'.

[5] European Commission (2013), op. cit., Article 13.

[6] Transport Act (2000), sections 1(2)(c), 2(2)(2) and 17(2)(c).

To ensure financeability of the regulated company, the CAA has judged in previous reviews that it is appropriate to allow the company to recover the cost of efficiently incurred embedded debt—ie, the cost of existing debt prior to the start of the new price control period.

An explicit financing test is not included in the Commission's performance scheme assessment criteria and, as a general principle, EU legislation will take precedence over domestic legislation.[7] However, the Charging Regulations state that '[t]he interest rate on debts [to be included in the WACC calculation] shall be equal to the weighted average interest rate on debts of the air navigation service provider'.[8] This suggests that having regard to the company's existing costs of debt, provided they have been efficiently incurred, is a principle that is consistent with the Charging Regulations.

Therefore, the approach adopted in this section estimates the cost of debt for NERL by considering the appropriate costs of both existing debt and any new debt to be issued in RP2. As discussed above, this approach is consistent with the way in which the CAA has assessed debt costs in CP3. In particular, the CAA adopted the concept of a notional debt portfolio:[9]

> Against this background, the CAA sees merit in the concept of a notional debt portfolio and – in the absence of any evidence of inefficient financing – using for this review NERL's actual debt portfolio as the basis for this approach which, if applied consistently across control periods, should both recognising the realities of treasury management at NERL, while ensuring that NERL has the incentive to make efficient financing decisions in future.

3.2 Cost of existing debt

NERL's existing financing structure consists of a mixture of nominal fixed-rate bond debt, partially hedged against RPI movements through an inflation-linked swap, and bank facilities.

The bond debt represents around 80% of total debt outstanding, and therefore the cost of bond debt is the main driver of the cost of NERL's existing debt. For the purposes of estimating debt costs of a notionally efficient company, it is appropriate, and indeed common among regulators, to focus on bond debt only.

NERL's secured amortising bond (with a current credit rating of AA–/A2) was issued in August 2003 at a nominal issuance yield of 5.4% (Table 3.1). In estimating the cost of existing debt, it is relevant to consider whether 'fixed-rate debt has been incurred prudently and efficiently.'[10]

One method of benchmarking the efficiency of NERL's bond costs is to compare its bond with others issued by suitable comparators (Table 3.1). The three most important characteristics when choosing comparators are the credit rating at issuance, timing of issuance and maturity. All the bonds in Table 3.1 have been issued at slightly higher yields. For the bonds issued by South East Water and Southern Water this is likely to be explained by their longer tenor. For the remaining bonds, this is likely to be explained by their lower credit rating at issuance. In addition, all of the comparator bonds have been issued by mature regulated utilities, which may explain the slightly lower spreads at issuance for some of the bonds. Overall, there is no evidence that NERL's bond debt costs were not efficiently incurred.

[7] Civil Aviation Authority (2012), 'A consultation on the CAA's process for developing economic regulation for Reference Period Two under the Single European Sky', July, paras 4.3–4.

[8] European Commission (2013), op. cit., Article 7.

[9] Civil Aviation Authority (2010), 'NATS (En Route) plc CAA price control proposals (2011-2014)', May, para 12.82.

[10] Competition Commission (2007), 'BAA Ltd: A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd)', presented to the CAA, September, Appendix F, para 42.

Table 3.1 Comparison of NERL bond issue with suitable comparators

Issuer	Pricing date	Maturity date	Tranche face value (£m)	Yield to maturity (launch, %)	Coupon (launch, %)	Spread to benchmark at issuance (bp)	S&P bond rating (launch)	S&P issuer rating (launch)
NATS (En Route) plc1	Aug 2003	Mar 2026	600	5.4	5.3	70	AAA	A–
Southern Water Services (Finance) Ltd1	Jul 2003	Mar 2029	350	5.2	6.2	56	AAA	A–
South East Water Ltd	Jul 2004	Mar 2029	166	5.6	5.6	68	AAA	n/a
Southern Water Services (Finance) Ltd	Jul 2003	Mar 2026	350	5.5	6.6	89	A–	A–
Seeboard Power Networks plc	May 2003	Jun 2026	300	5.9	5.5	103	A	n/a
United Utilities Water plc	Dec 2003	Dec 2027	100	5.7	5.6	n/a	A–	A–

Note: [1] Bonds guaranteed on a financial guaranty insurance policy by MBIA Assurance. The securitisation of the bonds explains the difference between the bond rating and the underlying issuer rating.
Source: Oxera analysis, based on data from Dealogic.

As another cross-check, the cost of NERL's existing debt is compared with the average historical yields on the general A-rated non-financials corporate bond index. Although NERL's current credit rating is AA–/A2, this reflects a credit rating uplift due to the possibility of NERL receiving extraordinary government support in case of financial distress, given its strategic importance and partial government ownership. However, the fundamentals-based stand-alone credit rating for NERL is A/A3. A single 'A' credit rating is also consistent with the target credit rating used by the CAA to assess the cost of debt and financeability at CP3 (specifically, the CAA has targeted an 'A–' rating).

Nominal yields on A-rated corporate debt have averaged 5.5% over the last ten years, which is broadly comparable with NERL's actual cost of existing debt. Therefore, this provides further support that an estimate of 5.4% for the nominal cost of existing debt is appropriate.

The average implied inflation—calculated as the break-even inflation rate from nominal and real ten-year gilt yields—for the period between NERL's pricing date in August 2003 and June 14th 2013 was 2.9%.[11] The 2.9% figure is comparable with long-term average outturn RPI inflation and assumed to be representative of expected inflation over the RP2 period.[12] Deflating the nominal cost of NERL's existing debt (5.4%) by the inflation rate of 2.9% translates into an estimate of 2.4% for the real cost of existing debt for NERL.[13]

3.5 Cost of new debt

NERL's current business plan projects a decline in the regulatory asset base (RAB) over the price control period, suggesting that there will be no requirements for significant new debt issues over the period to fund capital expenditure.

[11] The break-even inflation is calculated using the Fisher equation: $inflation\ rate = \frac{1+nominal\ rate}{1+real\ rate} - 1$. June 14th 2013 is the cut-off date for all the analysis presented in this report.
[12] Outturn RPI has averaged 3.0% since 1997.
[13] Using the Fisher equation.

NERL has advised Oxera that, to meet its funding requirements, the current business plan projects the issue of another fixed-rate nominal bond towards the end of RP2 of a notional value of c. £100m. This suggests that the overall re-financing requirements are relatively small and represent less than 20% of net debt that will be outstanding at the start of RP2.[14]

Figure 3.1 shows the evolution of nominal yields on long-term A-rated and BBB-rated non-financial corporate bond indices.

Figure 3.1 Nominal yields on long-term A-rated and BBB-rated non-financial corporate bond indices (%)

Note: Cut-off date is June 14th 2013.
Source: Oxera analysis, based on data from Datastream.

Bond yields are currently low by historical standards, largely as a result of unconventional monetary policy taken by the UK central bank in response to the financial crisis. It is unlikely that such low rates will prevail throughout the RP2 period. This is supported by evidence from the forward markets (section 5) that shows that market participants are currently factoring in an increase in real government bond yields of about 1.0–1.1% towards the end of RP2.

It is therefore expected that the cost of any new debt issued will be closer to longer-term historical averages rather than current yields. The five- and ten-year averages of A-rated and BBB-rated debt yields are about 1.1–1.3% higher than spot yields, which is broadly consistent with the evidence from the forward market (Table 3.2). Therefore, an assumption that new debt will be issued at yields closer to longer-run averages is appropriate.

[14] Based on the net debt profile supplied to Oxera by NERL.

Table 3.2 Real yields on A-rated and BBB-rated debt (%)

	A-rated	BBB-rated	Average
Spot (14/06/2013)	1.3	1.7	1.5
Five-year average	2.4	3.0	2.7
Ten-year average	2.5	3.0	2.8

Note: Based on A- and BBB-rated 10+ iBoxx non-financial indices. Daily nominal yields have been converted into real using ten-year break-even inflation on the day, and then averaged over relevant periods.
Source: Oxera, Datastream.

Taking into account the evidence from Table 3.2 and from the forward markets, a range for the cost of new debt of 2.4–3.0% is proposed. The lower and upper bounds of the range are based on five-year averages of A- and BBB-rated secondary yields, respectively. It is important to note that yields taken from secondary market bond yields do not incorporate any new issue or liquidity premia that NERL might need to pay (the liquidity premium, in particular, is a relevant consideration, given the small expected issuance size). Taking this into account and the continued uncertainty in capital markets, it is considered appropriate to place some weight on both A– and BBB– evidence to ensure the proposed range is robust to a range of future market scenarios.

3.6 Total cost of debt

Taking all of the evidence on the cost of existing and new debt and refinancing requirements, the total cost of debt estimate is in the range of 2.4–2.5% (Table 3.3). In addition, it is appropriate to include an allowance for transaction costs associated with debt issuance. These include ongoing commitment, agency and arrangement fees paid to lenders, rating agencies and arrangers of finance.

In previous decisions for designated airports (including the Q6 Initial Proposals) and NERL, the CAA has included 10–20bp in the cost of debt allowance to reflect these fees.[15] This represents a reasonable range to be included for RP2, and indeed estimates towards the upper end of the 10–20bp range might be more appropriate in the case of NERL. This is because in addition to various debt arrangement fees that would be expected to be covered by these estimates, NERL also pays a guarantee fee of 17.5bp to MBIA Assurance on its existing bond to reflect the higher credit rating of the bond relative to NERL's underlying credit rating.[16]

Adding the allowance of 10–20bp to the total cost of debt results in an all-in cost of debt estimate of **2.5–2.7%**.

[15] Civil Aviation Authority (2008), 'Economic Regulation at Heathrow and Gatwick Airports 2008–2013', March; Civil Aviation Authority (2010), NATS (En Route) plc price control: CAA formal proposals for control period 3 (2011-2014): under Section 11 of Transport Act 2000', October; Civil Aviation Authority (2013), 'Economic Regulation at Heathrow from April 2014: initial proposals', April.
[16] Based on data provided by NERL.

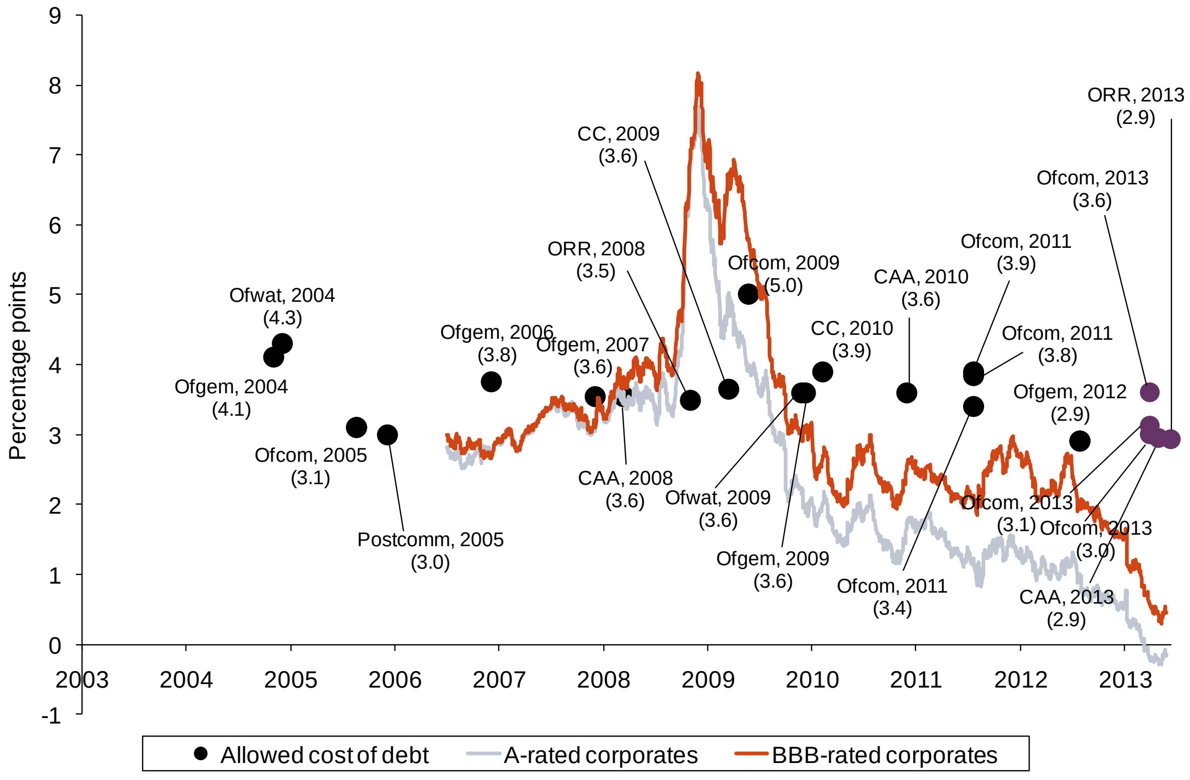
Table 3.3 Estimate of NERL's real cost of debt

Parameter	Estimate (low)	Estimate (high)
Cost of existing debt (%)	2.4	2.4
Cost of new debt (%)	2.4	3.0
Proportion of refinanced and new debt (%)	20	20
Weighted average cost of debt (%)	2.4	2.5
Transaction costs (%)	0.1	0.2
Total cost of debt (%)	**2.5**	**2.7**

Source: Oxera.

As a cross-check on this estimate, Figure 3.2 shows recent regulatory precedent on the allowed cost of debt in the UK. The range proposed for NERL is in line with recent regulatory determinations.

Figure 3.2 Regulatory precedents on the allowed real cost of debt



Note: Cut-off date is June 14th 2013. Purple dots denote initial decisions that are not final.
Source: Oxera analysis, based on various regulatory documents and data from Datastream. The A-rated and BBB-rated indices shown in the chart are the deflated versions of the indices shown in Figure 3.1.

3.7 Gearing

In previous price reviews, the CAA has typically taken the actual forecast gearing for NERL in the business plan as the appropriate gearing assumption for the cost of capital assessment.

In CP3, the CAA introduced an explicit gearing target and cap of 60% and 65%, respectively. These measures were brought in to address the CAA's concerns that there was an implicit expectation by market participants of a government bailout in case of financial distress, and that this could create incentives on NERL to adopt an excessively risky capital structure.

The gearing target of 60% was also adopted for the purposes of calculating the WACC. It is understood that the RP2 business plan was drawn up on the assumption that the gearing target and cap values would remain unchanged. NERL's actual gearing over the current regulatory period has, on average, been slightly below the target.

Changes to notional gearing assumptions in price control decisions are typically triggered by changes in the business risk profile, by actual changes in the capital structure of the regulated companies, and/or changes in the target credit rating.

As discussed in greater depth in section 4, first, business risk is expected to be at least as high in RP2 as in CP3, suggesting that it is appropriate to adopt a gearing assumption no higher than 60%. Second, NERL's actual gearing over the current regulatory period has, on average, been slightly below the target, but not by a significant amount. Finally, a gearing level of 60% is also consistent with the guidance from credit rating agencies on target credit metrics for an A–/A3 credit rating.[17]

Therefore, a notional gearing assumption of **60%** appears to remain appropriate for RP2.

[17] See, for example, Moody's (2012), 'Credit opinion: NATS (En Route) plc', September 18th.

4 Risk assessment and the asset beta

In the capital asset pricing model (CAPM) framework—the framework adopted widely by regulators, including the CAA, to estimate the cost of equity—investors require compensation only for systematic risk (risk that cannot be diversified away by holding a portfolio of assets). This exposure to systematic risk is measured by the equity beta.

For a company listed in the market, equity, and subsequently, asset beta (which isolates the impact of financial leverage) can be estimated using information on actual share returns, market returns and capital structure. However, for a company such as NERL that is not listed and in the absence of other air traffic service providers that are listed, risk assessment needs to rely on other sources of evidence, including qualitative evidence and judgement. This is consistent with the CAA's views on risk assessment in CP3.[18]

> The CAA believes that, in the absence of publicly traded NERL shares, the estimate of NERL's beta is a largely qualitative and subjective exercise in identifying and assessing appropriate proxy companies. It is possible to justify using a variety of companies as proxies for the risks faced by NERL. Given this inherent subjectivity, the CAA has sought an over-arching sense check to the beta estimate.

To estimate the asset beta for NERL for RP2 the analysis has focused on the assessment of how the forward-looking exposure to key business risks in RP2 compares with CP3 (section 5.1). The evidence considered shows that risk is expected to be at least as high in RP2 as in CP3.

– Exposure to revenue risk, adjusted for operational leverage, has not decreased. Indeed, some factors, such as the unexpectedly sluggish recovery of traffic volumes and diminishing ability to outperform regulatory cost targets over time, suggest potentially higher forward-looking exposure to revenue risk.

– Other factors, such as the increased inflation exposure and a reversion to five-year price controls, also indicate a potential increase in risk going forward. However, robustly quantifying to what extent these risks have been priced into the CP3 asset beta assessment is challenging.

– The asset beta assumption is also cross-checked with recent regulatory precedent on asset beta and with equity and asset betas for listed comparators (section 5.2). The assumption of 0.60 is broadly consistent with this additional evidence.

Overall, taking all of the evidence together, at the very least, an asset beta of **0.60** is considered appropriate for RP2.

4.1 Comparison to CP3

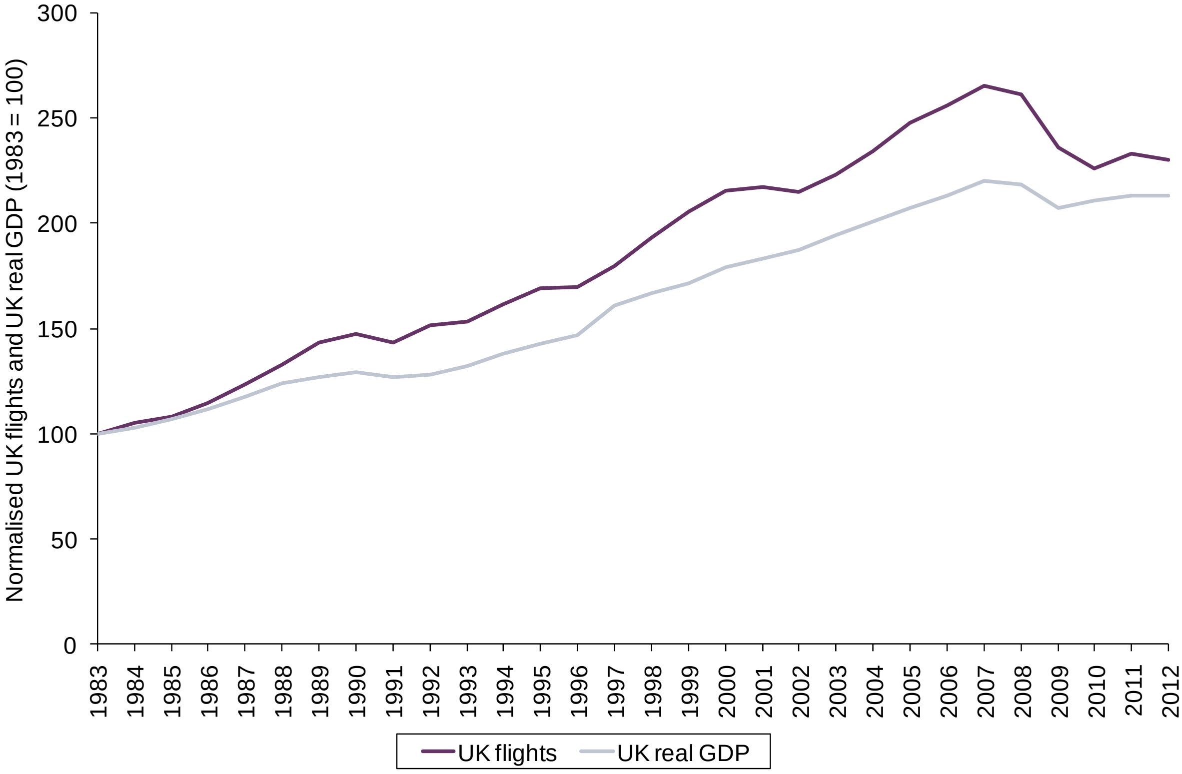
To assess if asset risk has changed since CP3, the relevant question to consider is whether profit volatility on a forward-looking basis is higher or lower than was expected at the time of the CP3 determination. This requires assessing if there have been unexpected changes in the forward-looking exposure to key business risks since the CP3 determination.

The main risk factors affecting systematic risk are revenue risk due to demand (traffic) volatility and operational leverage. Changes in air traffic have a systematic component as it is

[18] Civil Aviation Authority (2010), 'NATS (En Route) plc CAA price control proposals (2011-2014)', May, para 12.70.

correlated with the macroeconomic cycle (Figure 4.1). Therefore, a firm exposed to higher traffic volatility would be expected to have a higher asset beta. Similarly, a firm with higher operational leverage—higher relative proportion of fixed costs—would also typically be expected to have a higher asset beta. This is because, for a given demand shock, the impact on profits will be higher for a company with higher operational leverage as it has less scope to flex costs in response to the volume shock. In summary, the asset risk of a business can be decomposed into the beta of its revenues, adjusted for operational leverage.[19]

Figure 4.1 Evolution of UK flights and UK GDP



Note: The chart depicts total flights in the UK airspace and real GDP, both normalised to 1983 = 100.
Source: Oxera analysis, based on data from Eurocontrol and the Office for National Statistics.

There are other, secondary, operational and financial risks that affect cash-flow volatility, and potentially the asset beta. For a business like NERL, these include:

– bad debt risk—bad debt costs resulting from customer non-payment is typically linked to the macroeconomic cycle;
– pension cost risk—changes in pension costs are linked to market interest rates;
– inflation—any residual exposure to inflation after taking into account the way inflation is treated within the regulatory model.

In addition, any business is exposed to one-off event risks. These are typically low-probability events that are not necessarily systematic, but may nevertheless have significant financial and reputational implications—importantly, these risks are frequently downside risks only. Some examples of these for NERL include risk of aircraft collision, terrorism, extreme weather events (eg, volcanic ash), and industrial action.

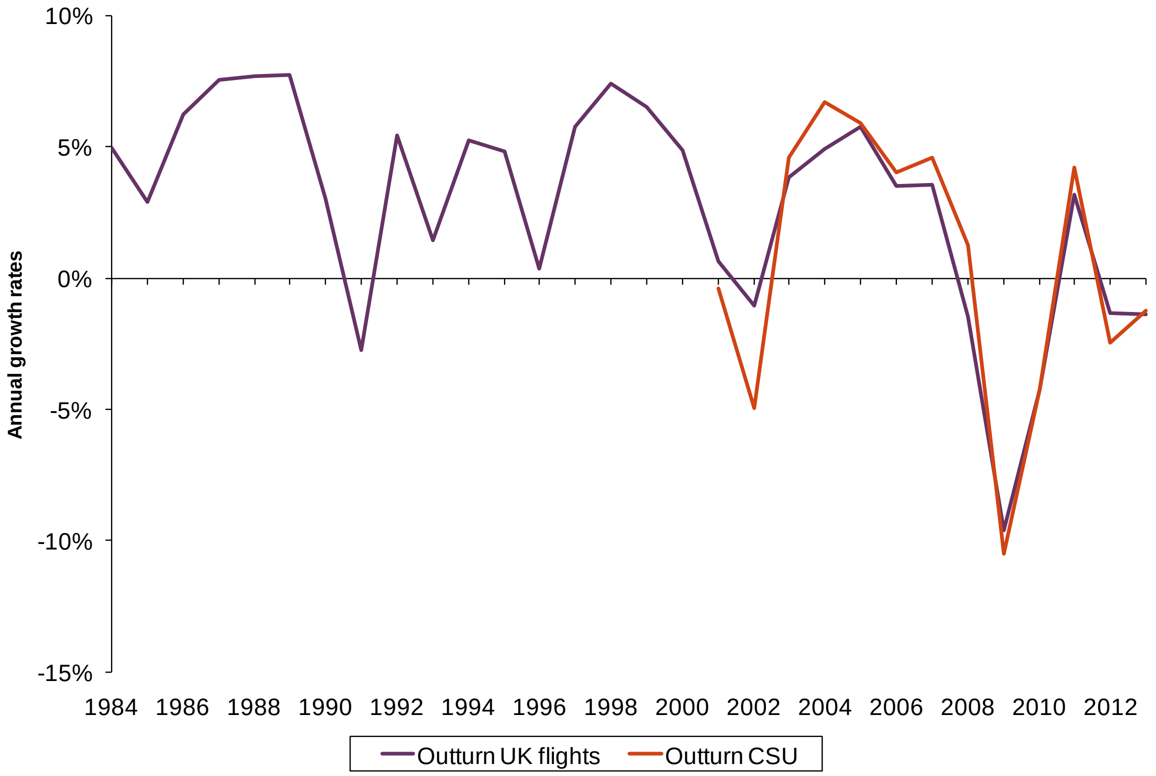
Finally, for a regulated business, stability and predictability of the regulatory framework is an important consideration for investors. Significant changes in the regulatory/policy landscape can have material implications for investor risk perceptions.

[19] Allen, F., Myers, S. and Brealey, R. (2008), *Principles of corporate finance*, McGraw-Hill, International Edition, Chapter 10.

4.1.1 Traffic risk

Traffic volumes have exhibited considerable volatility in the last few years, in particular as a result of the financial crisis (which coincided with the end of the previous regulatory period CP2), and at the start of CP3 (Figure 4.1).

Figure 4.2 Annual growth rates of UK flights and chargeable service units (CSUs)



Source: Oxera analysis, based on STATFOR data from Eurocontrol.

Over the previous price control period (CP2), covering 2006–10, and the first two years of CP3, for which outturn data is available, volatility in annual growth rates of flights and CSUs has averaged 4.9% and 5.6%, respectively, compared with 2.9% and 4.9% pre-CP2 (Table 4.1).

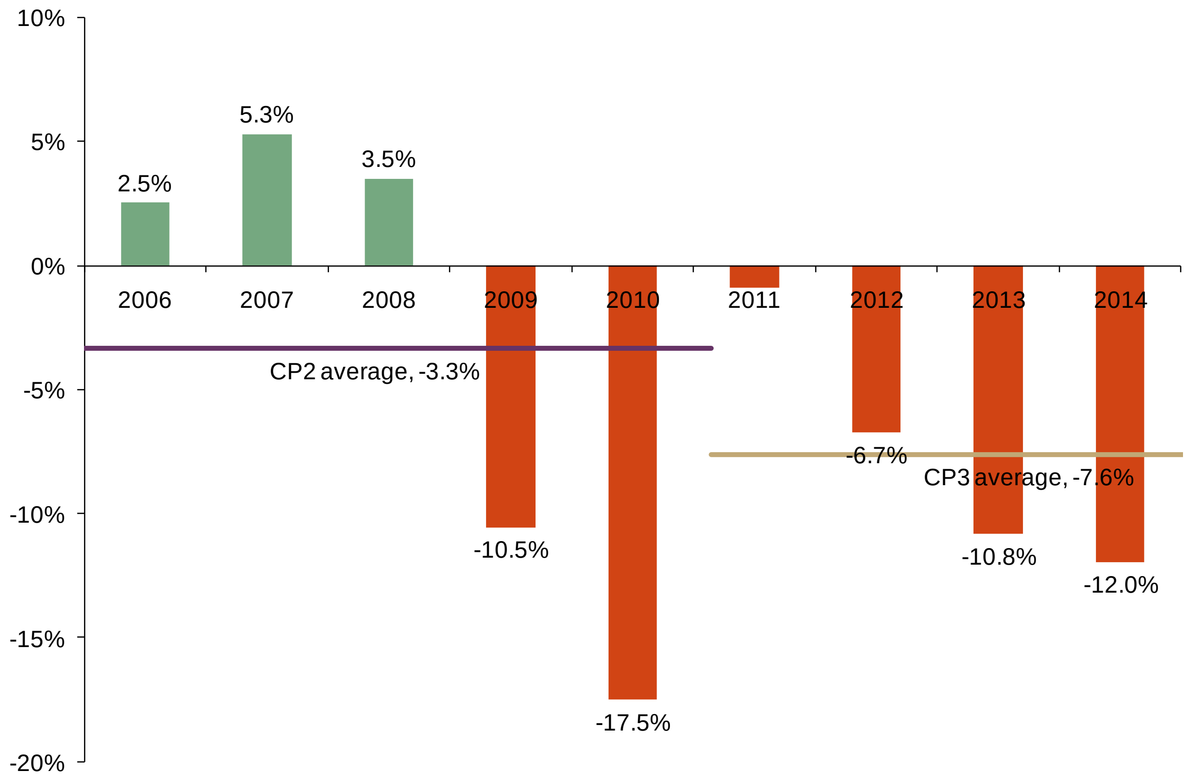
Table 4.1 Standard deviation of annual growth rates of flights and CSUs (%)

	UK flights	CSUs
Pre-CP2[1]	2.9	4.9
CP2 + CP3	4.9	5.6

Note: [1] The Pre-CP2 period covers annual growth rates over 2001–05.
Source: Oxera analysis, based on STATFOR data provided by NERL.

Following the crisis and the global recession, traffic volumes have not recovered as quickly as was anticipated at the CP3 decision. As shown in Figure 4.3 below, traffic has been lower than forecast in both 2011 and 2012. Latest forecasts also indicate that traffic will be lower than forecast throughout CP3 and that deviations from forecasts will continue to increase.

Figure 4.3 Deviation of outturn CSUs from regulatory assumptions



Note: The chart represents the deviations of outturn CSU traffic data from forecasts in percentages. If the outturn traffic is greater than the forecast traffic, the deviation is positive and the bar is green. The red bars, on the other hand, represent lower outturn traffic than forecast. Data for 2013 and 2014 is based on forecasts.
Source: Oxera analysis, based on NERL's regulatory accounts and data from NERL.

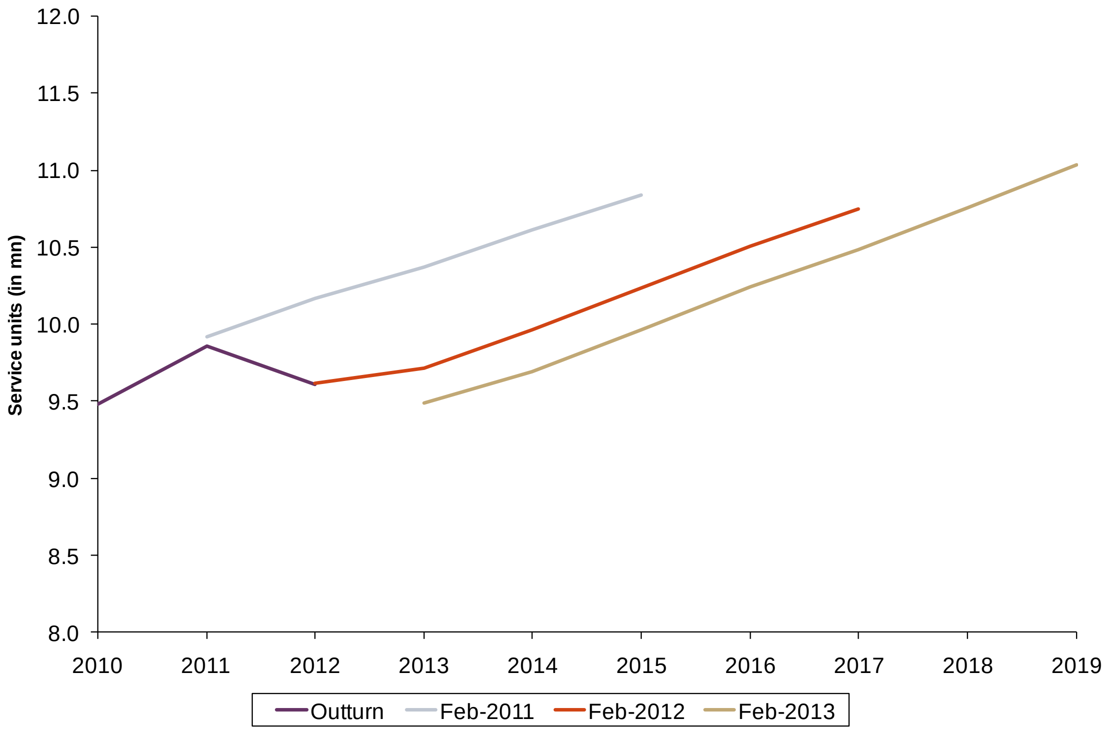
Although NERL is partially protected from traffic risk by the existing traffic risk-sharing mechanism, the downturn in traffic to date and forecast for the remainder of CP3 is expected to result in a traffic-related loss of £72m.[20] This compares with a £57m traffic-related loss in CP2. As a proportion of the allowed profit, changes in traffic reduced returns by 17% in CP2 but are expected to reduce returns by 22% in CP3.

Figure 4.4 also suggests that traffic forecasts have consistently proven too optimistic in the last few years, with traffic forecasts continuously being revised downwards over the period. Traffic levels previously expected by end CP3 are now expected towards the end of RP2.

There is also some limited evidence that forecasting uncertainty on the downside has increased slightly, as reflected in the widening of the difference between the STATFOR 'Base' and 'Low' scenarios (see Figure 4.5).

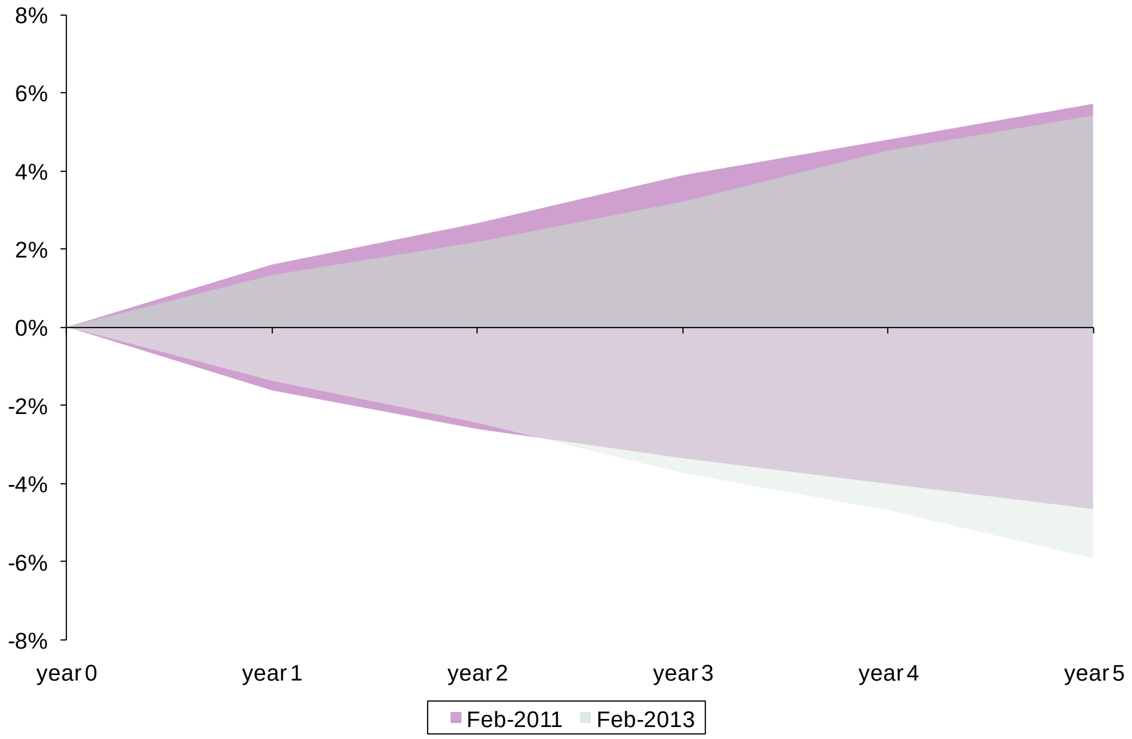
[20] Based on internal analysis produced by NERL (in 2008/09 prices). The impact of profit takes into account the impact of the traffic risk-sharing mechanism and the impact of changes in traffic on costs.

Figure 4.4 Comparison of Eurocontrol medium-term forecast of service units



Note: The chart compares the Eurocontrol Medium-Term Forecast of Service Units, published in February 2011, 2012 and 2013.
Source: Oxera analysis, based on data from Eurocontrol.

Figure 4.5 Percentage deviation of outturn CSUs from forecasts



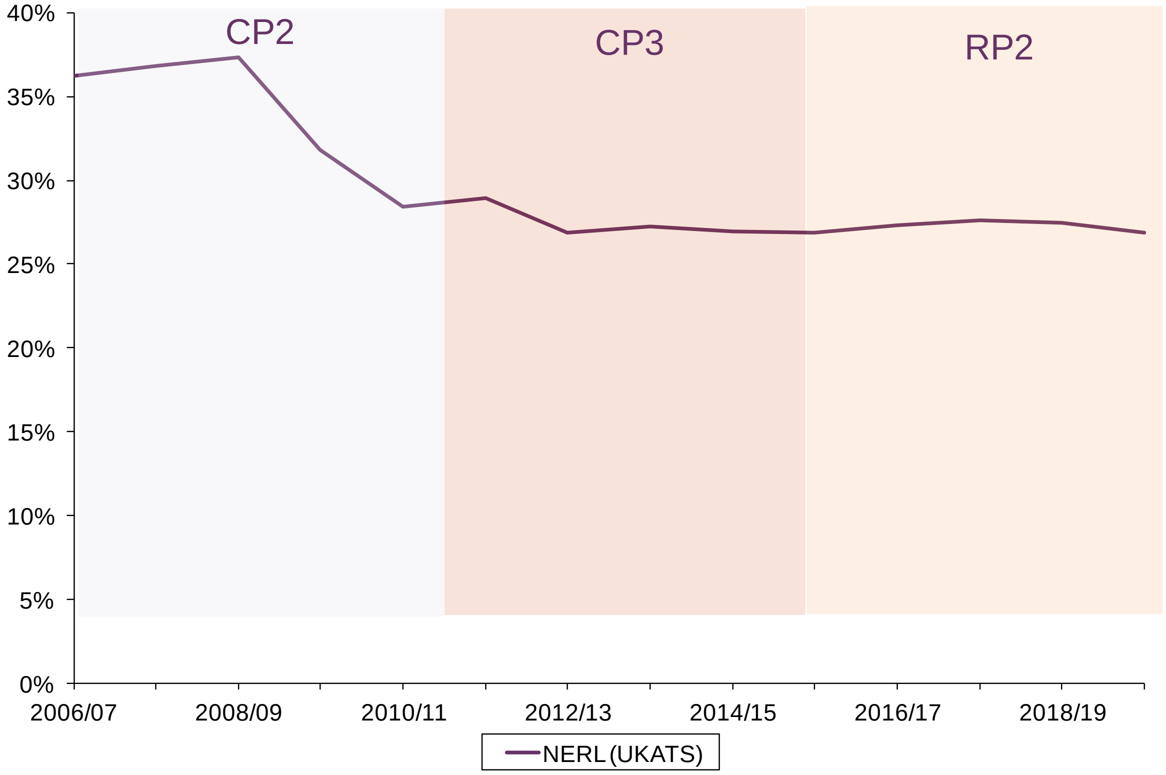
Note: The chart represents the fans generated by the difference between the high and low forecasts. Forecasts are normalised to start in year zero, and the three scenarios, high, base and low forecasts, are represented by their percentage deviation from the base forecast.
Source: Oxera analysis, based on STATFOR data from Eurocontrol.

In summary, more than three years on from the CP3 decision, the evidence generally suggests that the current traffic outlook remains relatively uncertain, and that traffic volumes have generally surprised on the downside. This is expected to lead to greater traffic-related profit volatility in the current price control than in CP2. The impact on the asset beta depends on whether this greater profit volatility was fully expected and reflected in the CP3 determination. At the very least, forward-looking exposure to traffic risk is likely to be as high as was expected at the time of the CP3 decision.

4.1.2 Operational leverage

There are different ways to measure operational leverage. In CP3, the CAA considered the ratio of OPEX (excluding pension costs) to RAB as a reasonably proxy. Based on this measure, Figure 4.6 below shows that NERL's operational leverage for RP2 is broadly similar to CP3.

Figure 4.6 NERL's OPEX to RAB ratio



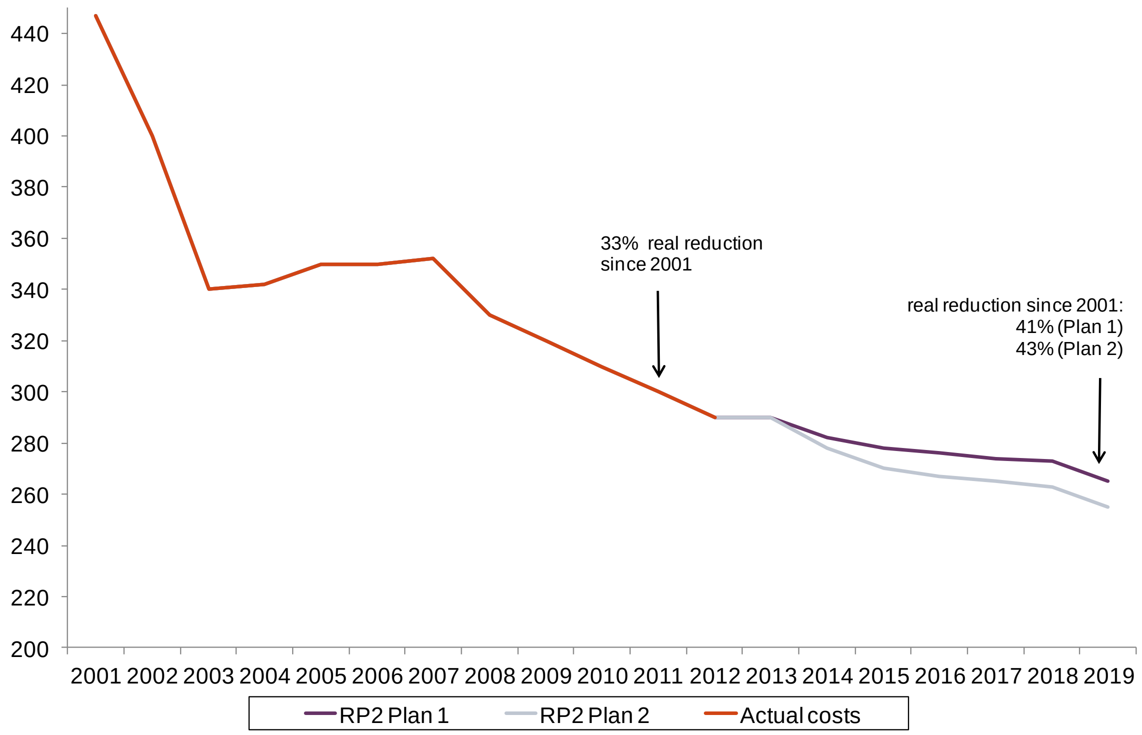
Source: NATS (2013), 'RP2 consultation plan – appendices'.

NERL has estimated that a 1% change in traffic leads to a 0.15–0.30% change in costs. In other words, more than 70% of NERL's cost base is fixed, at least in the short to medium term. This is because about a third of costs represent sunk costs relating to historical investment, and another third represent infrastructure and compliance costs that do not vary with traffic. It is only the remaining third that include labour and other operational costs where NERL may have some flexibility to change costs in response to volume fluctuations.

As the industry matures and the cost base becomes more efficient, the ability to offset traffic-related revenue losses with reductions in costs becomes more limited. NERL has achieved significant improvements in cost efficiency since the start of the first regulatory period in 2001 (Figure 4.7); going forward, the potential for further significant cost reductions is lower. For example, in CP2 NERL outperformed the regulatory cost allowances by £170m, which allowed NERL to outperform the regulatory return assumption despite the downturn in traffic. For CP3, the expected cost outperformance is significantly lower at £85m, which, along with other factors, is still expected to allow NERL to achieve its regulatory return target; however, it illustrates the diminishing ability over time to reduce the cost base beyond what was expected by the regulator.[21]

For RP2, NERL is planning on achieving ambitious efficiency targets, including a significant reduction in headcount. When set against efficiency improvements achieved to date, the ability to flex costs relative to regulatory assumptions in response to demand shocks is expected to be more limited. In other words, forward-looking operational leverage will be at least as high as in CP3.

Figure 4.7 NERL's real operating costs (£m)



Note: Costs are in 2008/09 prices.
Source: NATS En Route plc (2013), 'RP2 Business Plan (2015–2019) for Customer Consultation'.

4.1.3 Inflation

In accordance with the SES Charging Regulations, determined costs will be uplifted with CPI, with the ANSPs being allowed to recover the difference between forecast and outturn CPI. Prior to the introduction of SES, the regulatory regime for NERL was based on all of the components of allowed revenues being uplifted with RPI. RPI is also the index that has been used to date to uplift the RAB and to estimate the real cost of capital.

Going forward, the RAB will continue to be indexed with RPI. This means that the real cost of capital and depreciation will continue to be linked to RPI, while other components of determined costs will be linked to CPI. In practice, to deal with this issue the CAA is likely to make an assumption about the difference between RPI and CPI and use a set of RPI assumptions consistent with its CPI forecasts. Since under SES there will be no true-up for the difference between forecast and outturn RPI, this exposes NERL to any deviations in the outturn gap between RPI and CPI relative to forecast.

In CP3, the CAA acknowledged this risk and provided NERL with a hedging allowance to help mitigate the risk; however, no such allowance is expected in RP2. This means that exposure to inflation risk is likely to increase in RP2 relative to CP3.

[21] Based on internal analysis produced by NERL (in 2008/09 prices).

The potential impact on business risk is also noted by the credit rating agency Moody's.[22]

> A move to CPI indexation may create a mismatch with the company's current funding structure, which includes an inflation-linked hedging agreement based on RPI indexation on a proportion of its debt. This may in turn have an impact on how Moody's assesses NATS's financial risk profile.

There is also some evidence that the gap between RPI and CPI has been more volatile in recent years than historically.[23]

4.1.4 Other business risks

On bad debt and pension cost risk, there does not appear to be any evidence of a change in risk exposure in RP2. There is some risk that within-period cash-flow volatility will be higher as a result of the timing of the deficit pension valuations; however, NERL will be allowed to recover any changes in pension costs in future regulatory periods.

One final key factor that could affect the asset beta is the length of the price control. CP3 is a four-year price control, to align with the European timetable. RP2 will be a five-year price control, consistent with the pre-CP3 periods. A longer price control increases the risk that outturn costs will differ from regulatory allowances, increasing profitability risk.

4.1.5 Event risks

The probability and impact of significant one-off event risks is by definition difficult to forecast, given the unique nature of these risks. These risks would not normally be expected to be priced in the cost of capital, but can nevertheless have a material impact on cash flows and financeability within the period. As an example, unusual weather events, such as volcanic ash, would fall into the category of event risks. In 2010/11, the impact of the Iceland volcano eruption and subsequent disruptions to air traffic resulted in a £5m loss for NERL.[24]

One specific risk to highlight for RP2 is the risk of industrial action. NERL is proposing challenging cost efficiency targets for RP2, which go hand in hand with significant reductions in headcount. This could potentially strain the relationship with the highly unionised workforce and increase the risk of industrial action. Industrial action would lead to disruptions in services provided to customers, imposing extra costs on users and on NERL (eg, in the form of lost revenue, poorer performance and delay metrics, and, in the extreme case, closure of UK air space).

4.1.6 Regulatory risks

The full transition of regulation to be consistent with SES Charging Regulations inevitably introduces a period of uncertainty, as new regulatory arrangements come into play and NERL prepares its business plan for the first time for ex ante assessment, not only by the CAA but also the European Commission.

As discussed in section 2, there are a number of issues that could create additional regulatory uncertainty and undermine investor confidence in RP2. These include the lack of clarity on the availability of an effective appeal mechanism for NERL, challenging efficiency target expectations for RP2; and the need to rebase DURs at the start of RP2 to levels that would have been consistent with the Commission's view of appropriate efficiency savings in the current regulatory period, rather than those agreed as part of the CP3 determination.

So far, some market participants, such as the credit rating agencies, have not expressed huge concern about these regulatory changes, at least from a credit perspective.[25]

[22] Moody's (2012), 'DFS Deutsche Flugsicherung GmbH and NATS (En Route) Limited – Peer Comparison', July.

[23] The standard deviation of the gap has averaged 1.5% in the last 5 years compared to 1.2% over the last 15 years.

[24] Source: NATS (En Route) plc.

[25] Moody's (2012), op. cit.

> Overall, Moody's believes that the implementation of SES II is a credit positive for European air traffic controllers because it creates a common framework based on well established principles for incentive-based charging regimes, thus underpinning stable and predictable cash flow generation that supports the overall low business risk profile of the sector.
>
> For NATS, on the other hand, the development is largely neutral, as the company has been subject to an incentive-based regime of similar features for nearly a decade.

However, this statement highlights the value attached to the current regulatory framework in place, and that any unpredictable or unsubstantiated changes to the regulatory landscape could affect investor risk perceptions. This is why it is important to continue with the well-understood and transparent principles used to set NERL's allowed revenues in previous regulatory periods, including a reasonable return on capital.

4.1.7 Summary

Table 4.2 summarises how the exposure to key business risks is likely to differ in RP2 relative to CP3. The evidence shows no indication of a decrease in risk in RP2. Indeed, there are a number of factors or developments that suggest risk could be higher going forward. These include:

– unexpectedly sluggish recovery of traffic volumes;
– diminishing ability to outperform regulatory cost targets over time;
– removal of the hedging allowance for the difference between RPI and CPI;
– reversion to five-year price controls;
– various changes to the regulatory environment, mainly due to the implementation of SES.

However, robustly quantifying to what extent these risks have been priced into the CP3 asset beta assessment is challenging. Overall, a comparison with CP3 suggests that, at the very least, it would be prudent to keep the asset beta assumption unchanged at 0.60.

Table 4.2 Relative risk to CP3

	Key risks within each category	Likely change in risk in RP2
Operational risks	traffic risk	slightly higher
	operational gearing	slightly higher
	bad debt risk	similar
	pension cost risk	similar
	length of the price control	slightly higher
Financial risks	Inflation	slightly higher
Event risks	aircraft collision	similar
	industrial action	similar
	extreme weather events (eg, volcanoes)	similar
Regulatory risk	regulatory environment	slightly higher

Source: Oxera.

4.2 Other cross-checks

The asset beta estimate of 0.60 is sense-checked against regulatory precedent and market evidence.

4.2.1 Regulatory precedent

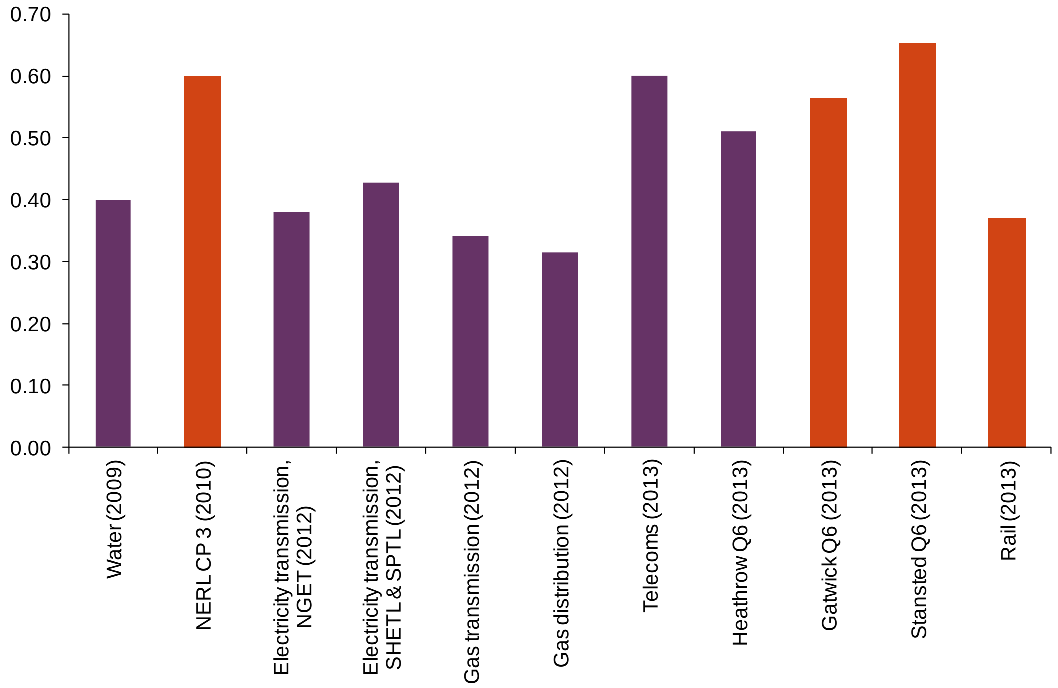
There is only a very limited number of price control decisions for air traffic control providers available to allow cross-checks with the asset beta used by the CAA for NERL.

The ATNS South Africa appears to be regulated under a similar incentive-based framework, including a determination of a regulatory rate of return. However, price control decisions do not appear to be publicly available.

The process of approving prices of Airservices Australia also includes a determination of the appropriate WACC by the Australian Competition & Consumer Commission (ACCC). In its most recent decision (in 2011) the ACCC used an asset beta assumption of 0.55.[26]

Figure 4.8 shows selected UK regulatory precedent on the asset beta. It shows that air transport-related industries (NERL and designated airports) tend to have higher asset betas than regulated water and energy networks (the range is 0.51–0.65 relative to 0.32–0.43). This is consistent with air transport having a higher elasticity of demand than traditional utility services.[27]

Figure 4.8 Regulatory precedent for the asset beta



Note: The chart depicts the ranges and point estimates of the asset beta from recent regulatory precedents.
Source: Oxera analysis, based on various regulatory documents.

Table A2.1 in Appendix A2 provides additional precedent from other international (primarily European) regulators. The evidence from international precedent shows an average asset beta for air-transport related industries of 0.59, broadly consistent with the UK evidence shown. The international precedent is also supportive of the observed differential between allowed betas of regulated utility networks and air-transport related industries, with the latter being materially higher than the former.

[26] The breakdown of the WACC parameters is contained in the draft decision: ACCC (2011), 'Airservices Australia draft price notification', Preliminary view, July.

[27] The UK Department for Transport estimates the overall income elasticity of demand for air travel (weighted across business, leisure, foreign and domestic passengers) to be 1.3. By comparison, Worthington and Hoffman (2008) report that for the (residential) water sector 'estimates of income elasticity in the literature are almost universally income inelastic (less than one). Department for Transport (2013), 'UK aviation forecasts', January, p. 17. Worthington, A.C. and Hoffman, M. (2008), 'An Empirical Survey of Residential Water Demand Modelling', *Journal of Economic Surveys*, **22**:5, p. 862.

4.2.2 Market evidence

Since neither NERL nor any other international air traffic control companies are listed, comparators have to be drawn from other industries. Since a key revenue risk for airports is air traffic volatility, they could serve as a sense-check on the asset beta assumption. Ideally, the chosen comparators would be subject to a comparable regulatory framework; however, most listed airports do not fully satisfy this criterion.

A list of major international airports was chosen for this cross-checking exercise. A sample of ten airports with listed equity and available operational data has been identified to form an initial estimate of the beta.

To obtain a comparable equity beta estimate for NERL, it is necessary to de-gear the equity betas estimated for comparators, and form estimates of the asset betas. Table 4.3 presents these estimates. The analysis of comparators suggests a range of 0.52–0.62. The asset beta proposed for NERL is within this range.

Table 4.3 Asset beta estimates for comparator companies

	1-year daily	5-year daily	5-year monthly
Flughafen Zürich	0.38	0.48	0.76
Københavns Lufthavne	0.29	0.32	0.67
Flughafen Wien	0.42	0.39	0.50
Fraport	0.49	0.55	0.60
Aéroports de Paris	0.66	0.61	0.58
Auckland Airport	0.83	0.76	0.71
Sydney Airport	0.56	0.52	0.52
Range	0.29–0.83	0.32–0.76	0.5–0.76
Average	0.52	0.52	0.62

Note: A debt beta of 0.10 was used to de-gear the equity betas.
Source: Bloomberg, Datastream and Oxera analysis.

4.3 Summary

In summary, the evidence shows that risk is expected to be as high in RP2 as in CP3. Indeed, some factors—such as the unexpectedly sluggish recovery of traffic volumes, stretching efficiency targets, and increased inflation exposure—indicate a potential increase in risk going forward.

However, robustly quantifying to what extent these risks have been priced into the CP3 asset beta assessment is challenging. Overall, a comparison with CP3 suggests that, at the very least, it would be appropriate to keep the asset beta assumption unchanged at **0.60**.

This assumption has been cross-checked against evidence from other sources, including regulatory precedent and market data, and has been found to be consistent with the additional evidence.

Combining with the gearing assumption of 60% and a debt beta assumption of 0.10,[28] this is equivalent to an equity beta assumption of **1.35**.

[28] A debt beta of 0.10 was used by the CAA in CP3. Since it is concluded that there is no indication of a material change in risk since CP3, and the gearing assumption is also the same as in CP3, it is appropriate to retain the same equity beta assumption for RP2 as CP3. Therefore, to ensure the same equity beta for RP2, it is appropriate to re-lever the asset beta of 0.60 using the same debt beta as in CP3 (0.10).

5 Market parameters

This section reviews evidence on the market parameters that are used to estimate the cost of equity—that is, the real risk-free rate and the equity risk premium (ERP).

– **Risk-free rate**. In light of the possibility of mean-reversion during RP2, it is prudent to allow for considerable headroom above the present market rates. Evidence from forward and corporate bond markets suggests that gilt yields are expected to rise. Regulators have recognised the uncertainty in estimating the risk-free rate based on current index-linked yields in recent determinations, and have tended to follow a conservative approach by allowing headroom above market rates. Taking all the evidence together, a range of **1.50–1.75%** is proposed.

– **Equity risk premium**. Historical estimates of the ERP suggest a value of no lower than 5.0% based on arithmetic averages. Forward-looking dividend growth models suggest an estimate above 6.0% and survey evidence indicates an ERP between 5.0% and 6.4%. Given the uncertainty in equity markets, regulatory estimates of the ERP have steadily increased since the start of the financial crisis, with the most recent determination suggesting a range of around 5.0–6.0%. Taking all the evidence presented, and consistent with the overall approach of taking a longer-term view and a risk-free rate allowance that is set above spot yields, a range of 5.0–5.5% is proposed.

Oxera's estimates for the risk-free rate and the ERP imply a total equity market return in the range of 6.5% to 7.25%. This is in line with regulatory precedent. The lower bound of the proposed range is equal to the mid-point of the CAA's proposed range for Q6, and the upper bound is consistent with the most recent Final Proposals for energy networks by Ofgem.

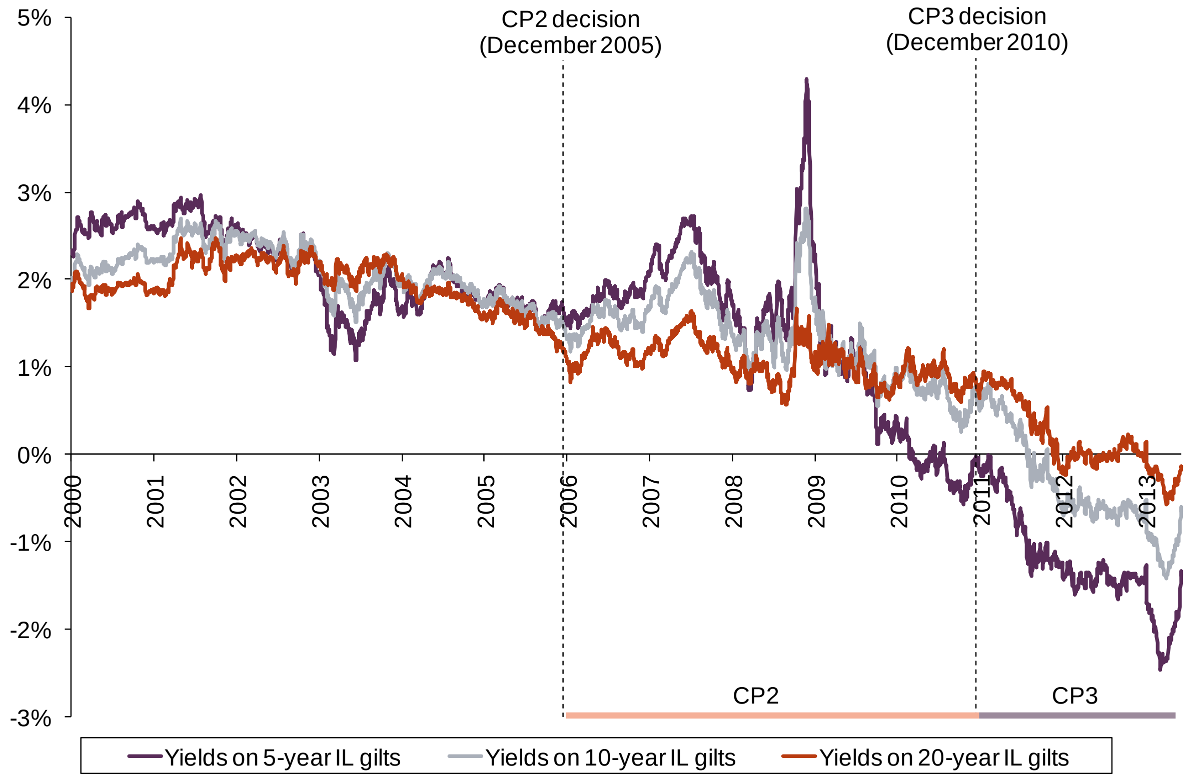
The rest of this section is structured as follows:

– section 5.1 examines market evidence and regulatory precedents for the real risk-free rate;
– section 5.2 assesses historical, forward-looking and survey-based evidence and regulatory precedent for the ERP;
– section 5.3 provides a cross-check by considering total market returns.

5.1 Risk-free rate

Since the start of CP3, UK government bond yields have followed a declining trend, with spot yields for five-, ten- and 20-year index-linked gilts trading at –1.5%, –0.7% and –0.2% respectively (see Figure 5.1).

Figure 5.1 Evolution of index-linked gilt yields since 2000



Note: Cut-off date is June 14th 2013.
Source: Oxera analysis, based on data from the Bank of England.

A number of factors have contributed to the reduction in yields on UK gilts.

– Interventions by monetary authorities in financial markets, in particular the reduction in the base rate and the quantitative easing (QE) programme of the Bank of England which has put downward pressure on gilt yields. Recent research from the Bank of England estimates that QE alone has decreased gilt yields by as much as 100–150bp.[29]

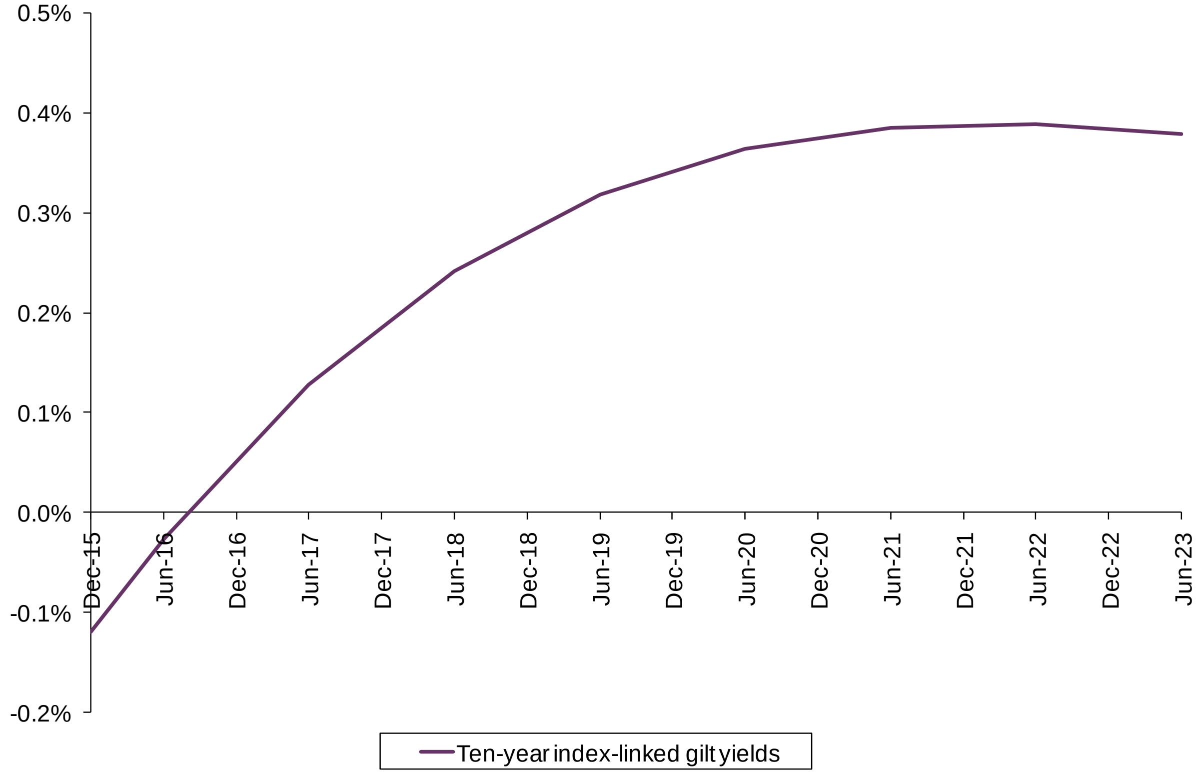
– Flight-to-quality towards safer assets as a result of the EU sovereign debt crisis, which has increased demand for UK gilts.

It is unlikely that current negative real yields will persist throughout the price control period. Indeed, ten-year real gilt yields have risen by 40bp in the last month alone, reflecting the uncertainty around the continuation of loose monetary policy, which illustrates that gilt markets are currently displaying considerable volatility.

Yields are also expected to rise based on the evidence from forward markets. Figure 5.2 shows that, on average, market participants are expecting real government bond yields to increase by more than 100bp from current levels by the second half of RP2.

[29] Joyce, M., Tong, M. and Woods, R. (2011), 'The United Kingdom's Quantitative Easing Policy: Design, Operation and Impact', September 19th, *Bank of England Quarterly Bulletin* Q3 2011, p. 209; and Bridges, J. and Thomas, R. (2012), 'The impact of QE on the UK economy – some supportive monetarist arithmetic', Bank of England Working Paper no. 442, January, p. 4.

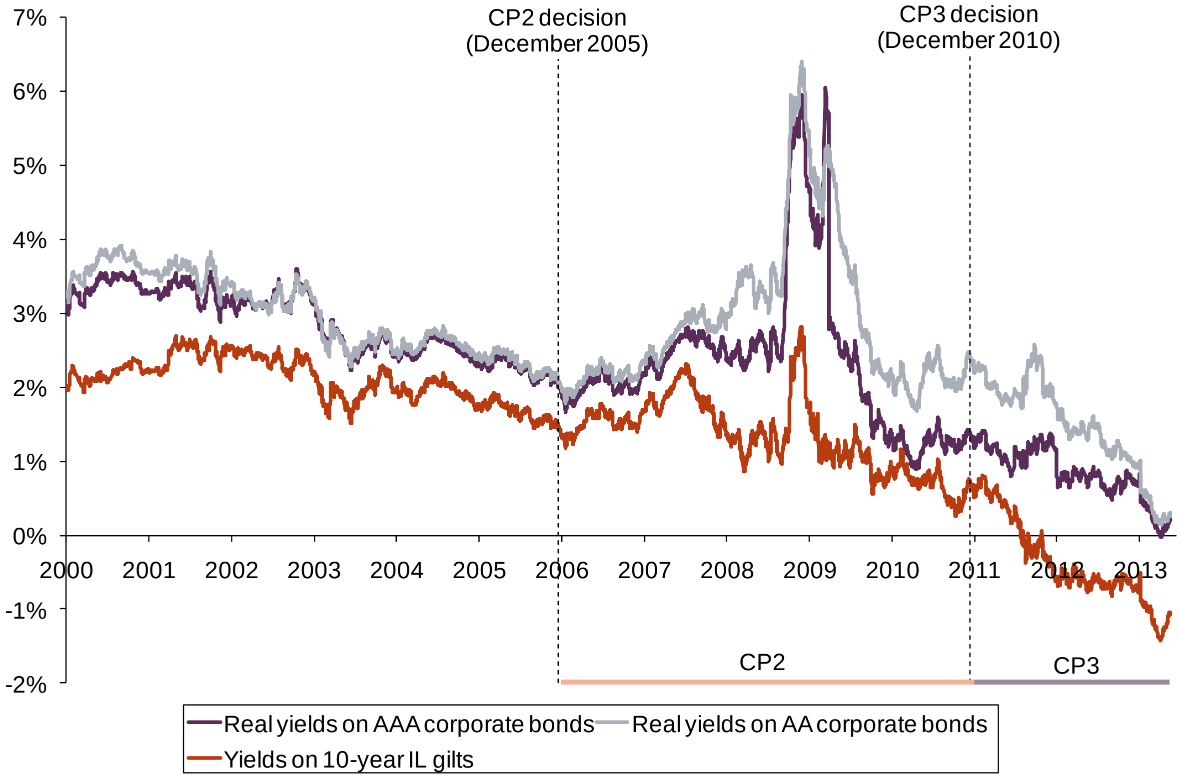
Figure 5.2 Implied forward yield on ten-year index-linked gilts



Note: The forward yields have been calculated as at June 14th 2013.
Source: Oxera analysis, based on data from the Bank of England.

Another cross-check on current market data is provided by evidence on deflated nominal yields on AAA and AA corporate bonds. These bonds carry only a small risk of default, and therefore their yields indices may provide a realistic proxy for the risk-free rate. Spot yields on AAA and AA bonds are trading at around 0.5% and 0.7%, respectively, noticeably higher than the corresponding gilt yields. In addition, the spread between the yields on AAA and AA rated bonds and gilt yields has widened in recent years. This is consistent with the evidence that gilt yields have been lowered by factors such as QE (see Figure 5.3).

Figure 5.3 Evolution of real yields on iBoxx AAA and AA corporate bond indices since 2000 compared to ten-year index-linked gilt yields

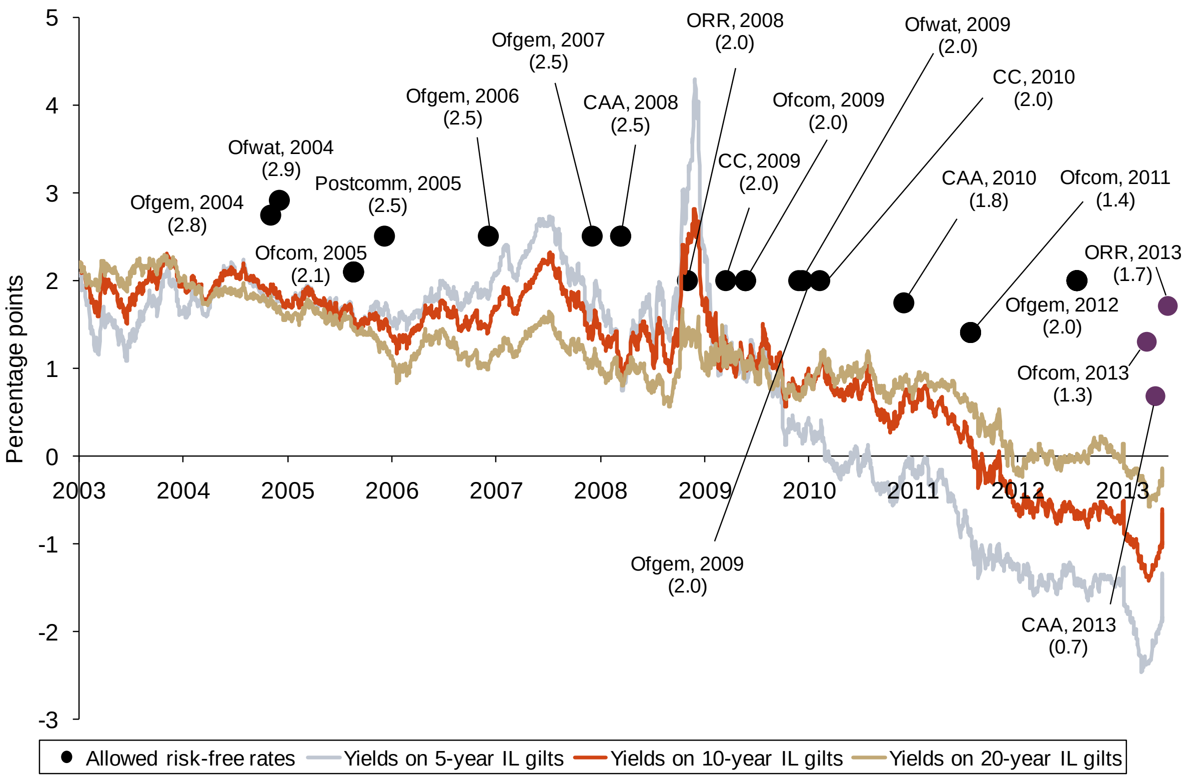


Note: Cut-off date is June 14th 2013. Nominal yields have been deflated using the break-even inflation rate as implied by ten-year nominal and real gilts.
Source: Oxera analysis, based on data from Datastream and the Bank of England.

Evidence from regulatory precedent suggests that UK regulators have taken into account the decline in yields by gradually reducing risk-free rate allowances, but have also consistently allowed for headroom over market rates (Figure 5.4).

The CAA is the only regulator to show a marked departure in approach from other regulators by proposing a much larger reduction in the risk-free rate than other regulators in the Q6 Initial Proposals. However, the CAA has also proposed a materially higher ERP estimate (section 5.2), mitigating the decrease in the overall equity market return (section 5.3).

Figure 5.4 Regulatory precedents on the real risk-free rate



Note: Cut-off date is June 14th 2013. CC, Competition Commission. To facilitate comparability of regulatory precedents across parameters, in determinations where a nominal rate of return is applied, as in telecoms, a real risk-free rate has been estimated using inflation assumptions reported by the regulator. Purple dots denote initial decisions that are not final.
Source: Oxera analysis, based on various regulatory documents and data from Datastream.

In the regulatory context, it is appropriate to set the regulatory allowance for the risk-free rate higher than the spot yield to reflect the uncertainty over future levels of the risk-free rate, and hence the required return on equity.

– This can be viewed as the ‘insurance premium’ that a company requires for bearing the risk of a variable cost of equity relative to a fixed allowance. Given the length of a typical regulatory price control (5–8 years), it is appropriate not to set a risk-free rate based on current market levels in view of the possibility of a mean reversion in gilt yields.

– Additionally, setting the regulatory allowance above the spot yield takes into account the commonly accepted view among regulators that the costs of overestimating the risk-free rate (overcharging consumers) are smaller than the costs of underestimation (creating an underinvestment problem). This is especially important when regulators have an explicit financing duty.

The approach of placing limited weight on current market evidence adopted in recent regulatory determinations is also appropriate for RP2, and suggests that weight should be given to the possibility of mean-reversion in gilt yields, supported by additional sources of evidence presented above. On this basis, a real risk-free rate range of **1.5–1.75%** is proposed.

5.2 Equity risk premium

The ERP is not directly observable from market data. Therefore, this section analyses various sources of evidence in order to arrive at an appropriate estimate of the ERP for RP2. The following sources are considered:

– section 5.2.1 presents historical evidence;
– section 5.2.2 evaluates forward-looking evidence using the dividend growth model;
– section 5.2.3 considers survey-based evidence;
– section 5.2.4 examines evidence from regulatory precedents.

5.2.1 Historical evidence

The most widely cited source of historical evidence on the ERP is the annual publication by Dimson, Marsh and Staunton (DMS), which estimates the historical ERP for 19 countries using a comprehensive dataset on annual excess equity returns since 1900.

Table 5.1 presents the latest historical ERP estimates from DMS for the UK. Based on arithmetic averages, DMS estimates of the ERP in the UK lie between 5.0% and 5.4%. For geometric averages, the range is 3.6–4.0%.

Table 5.1 Dimson, Marsh and Staunton's ERP estimates for the UK (%)

	Geometric	Arithmetic
1900–2012	3.7	5.0
1900–2011	3.6	5.0
1900–2010	3.9	5.2
1900–2009	3.9	5.2
1900–2008	3.6	5.0
1900–2007	4.0	5.4

Note: The ERP is estimated relative to bonds.
Source: Oxera analysis, based on Dimson, Marsh and Staunton.

The historical ERP can be calculated as a geometric or an arithmetic average of past excess returns. Geometric averages are, by construction, lower than arithmetic averages as they do not take into account the volatility of annual excess returns over the averaging period. While there is debate around which is the most appropriate averaging method in any given context, the weight of opinion is supportive of using arithmetic averages for selecting the ERP to use when estimating required equity returns. Indeed, DMS themselves recommend the arithmetic average 'for use in asset allocation, stock valuation, and corporate budgeting applications'.[30] This is consistent with a number of analytical studies that suggest that greater weight should be placed on arithmetic than on geometric estimates of returns.[31]

The long-term historical evidence on UK equity returns suggests an ERP estimate for RP2 of around 5.0%.

However, although historical estimates represent the best source of data available for the realised ERP, this approach is inherently backward-looking, and can lead to counterintuitive results in times of economic uncertainty. As an example, 2008 was one of the worst years for equity markets on record. Including the strongly negative equity return in the calculation of historical ERP lowers the premium significantly. Between 2008 and 2009, the DMS ERP

[30] Dimson, Marsh and Staunton (2010), p. 34.
[31] For further details, see Cooper, I. (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, **2**:2, p. 157.

estimate based on arithmetic averages for the UK decreased from 5.4% to 5.0%.[32] As noted by Damodaran (2010), this result is counterintuitive:[33]

> In effect, the historical risk premium approach would lead investors to conclude, after one of worst stock market crisis in several decades, that stocks were less risky than they were before the crisis and that investors should therefore demand lower premiums.

Forward-looking models can therefore provide a useful cross-check on the historical estimates. Using current, rather than historical, market data may provide estimates that are more representative of the forward-looking ERP.

Forward-looking evidence on the ERP can be derived from a forward-looking dividend growth model (section 5.2.2) and from surveys of market practitioners regarding their expectations for required returns on equity (section 5.2.3).

5.2.2 Forward-looking evidence

The basic concept behind forward-looking models is the assumption that the current market price of an asset represents the expected discounted value of all future cash flows to this asset. The general multi-period dividend growth model (DGM) is formulated as follows:

$$P_o = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \cdots + \frac{D_t}{(1+r)^t} + \frac{D_t}{(r-g) \times (1+r)^t}$$

where P_0 is the current market price; D_n is the n-year ahead dividend forecast; r is the cost of equity; and g is the long-term dividend growth rate.

To estimate the ERP, this equation is calculated for a broadly diversified market index ('the market portfolio') and is solved for r—ie, the expected market return. As inputs, the model requires the current index value, dividend forecasts for the index, and a long-term growth rate assumption. The ERP is then calculated by subtracting a measure of the risk-free rate from the estimate of the expected market return.

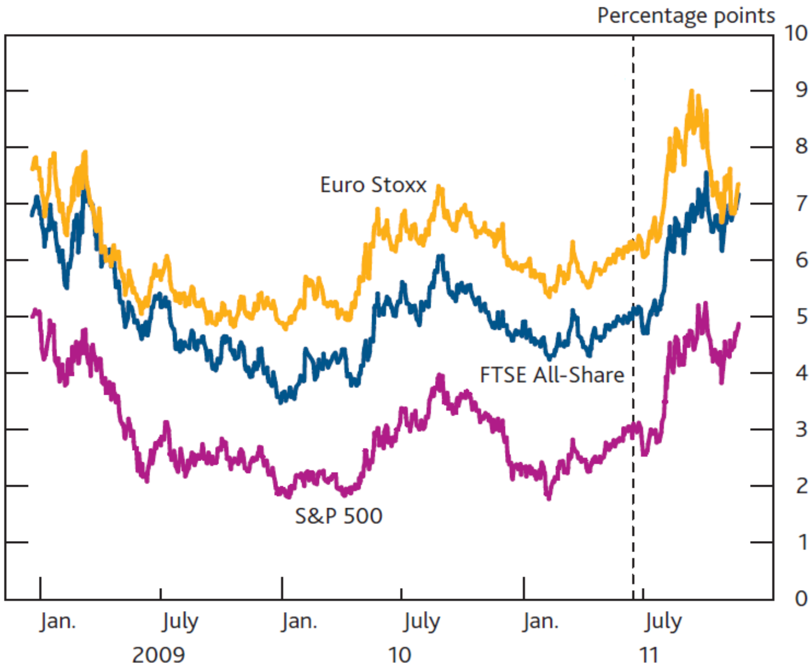
For example, Figure 5.5 shows the forward-looking estimates of ERP from a multi-stage DGM produced by the Bank of England.[34]

[32] Dimson, E., Marsh, P. and Staunton, M. (2008), 'London Business School / ABN AMRO Global Investment Returns Yearbook 2008', February. Dimson, E., Marsh, P. and Staunton, M. (2009), 'Credit Suisse Global Investment Returns Sourcebook 2009', February.

[33] Damodaran, A. (2010), 'Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2010 Edition', February, p. 26, New York University – Stern School of Business.

[34] The Bank of England has not published an updated analysis of the ERP in 2012–13.

Figure 5.5 Bank of England estimates of the ERP



Source: Bank of England (2011), 'Financial Stability Report', December; reproduced with permission of the Bank of England.

The estimates of the ERP produced by the Bank of England have:

– trended upwards since 2007;
– risen above 7% on three occasions in the 2009–11 period.

Although this evidence is now outdated,[35] it shows the possible discrepancy between historical and forward-looking estimates of the ERP at times of heightened equity market volatility.

Table 5.2 shows estimates of the ERP based on a simple, one-stage DGM, which reduces to this expression:

$$r = \frac{D_1}{P_0} + g$$

In effect, the expected market return is equal to the sum of the expected dividend yield on the market index and the long-term dividend growth rate. The long-term growth rate is proxied by the long-term average expected GDP growth rate.

[35] The Bank of England has not published an updated analysis of the ERP since the December 2011 report prior to the analysis cut-off date used in this report (June 14th 2013).

Table 5.2 Forward-looking ERP estimates based on a one-step DGM

	ERP
June 14th 2013	6.2%
Six-month average to June 14th 2013	6.4%

Note: The ERP is calculated using a long-term dividend growth assumption of 1.8%. This is based on the average forecasts of GDP growth for the UK over the 2013–17 period provided by the HM Treasury survey of independent forecasters.
Source: Datastream; HM Treasury (2013), 'Forecasts for the UK Treasury: a comparison of independent forecasts', May; and Oxera calculations.

The results of the one-step DGM suggest an ERP of 6.2–6.4% using the most recent six months of data. These estimates are also higher than the historical DMS estimates. However, these estimates are derived using spot gilt yields which are much lower relative to historical data that underpins the historical estimates of the ERP.

Using current market data may provide estimates that are more representative of the forward-looking ERP. However, this technique can produce volatile results that are sensitive to assumptions about the risk-free rate and long-run growth rates of dividends or earnings. Also, the resulting estimates of the ERP from such models should be interpreted with caution, due to the reliance on long-term forecasts, but they provide a useful cross-check of historical estimates.

5.2.3 Survey evidence

This section considers forward-looking evidence on the ERP as derived from surveys of market practitioners regarding their expectations for required returns on equity. However, survey evidence needs to be interpreted with caution, for a number of reasons:

– respondents' answers may be influenced by the way the questions are phrased—for example, whether the question asks about required returns to equity or expected returns on a specified stock market index;

– there is a tendency for respondents to extrapolate from recent realised returns, making the estimates not entirely forward-looking;

– the results are based purely on judgement and are less reliable than estimates based on direct market evidence on pricing.

Nonetheless, survey evidence provides an indication of investors' and market practitioners' average expectations of required returns to equity. The evidence from recent surveys summarised in Table 5.3 below suggests that, over the past few years, the ERP has ranged from 5.0% to 6.4%.

Table 5.3 Survey evidence on equity risk premium expectations (%)

Study	Description	ERP
Fernandez, Aguirreamalloa and Corres (2013)	Survey of market risk premium used by European finance and economics professors (2012)	5.5
Fernandez, Aguirreamalloa and Corres (2011)	Survey of market risk premium used by European finance and economics professors (2011)	5.3
Fernandez and Aguirreamalloa (2011)	Survey of market risk premium used by European analysts (2011)	5.4
Fernandez and del Campo (2010)	Survey of European analysts (2010)	5.0
Fernandez and del Campo (2010)	Survey of European finance and economics professors (2010)	5.3
Fernández (2009)	Survey of European finance and economics professors (2008)	5.3
Fernández (2009)	Survey of European companies (2008)	6.4
Welch (2009)	Survey of market risk premium by finance or economics professors	5.0–6.0

Sources: Fernandez, P., Aguirreamalloa, J. and Corres, L. (2013), 'Market risk premium used in 82 countries in 2012: a survey with 7,192 answers', May. Fernandez, P., Aguirreamalloa, J. and Corres, L. (2011), 'Market risk premium used in 56 countries in 2011: a survey with 6,014 answers', October. Fernandez, P. and del Campo, J. (2010), 'Market risk premium in 2010 used by Analysts and Companies: a survey with 2,400 answers', May 21st. Fernandez, P. and del Campo, J. (2010), 'Market risk premium in 2010 used by Professors: a survey with 1,500 answers', IESE Business School, May 15th. Fernández, P. (2009), 'Market Risk Premium used in 2008 by Professors: a survey with 1,400 answers', April, pp. 1–21. Welch, I. (2009), 'Views of Financial Economists On The Equity Premium And Other Issues', *The Journal of Business*, **73**:4, October 2000, pp. 501–37.

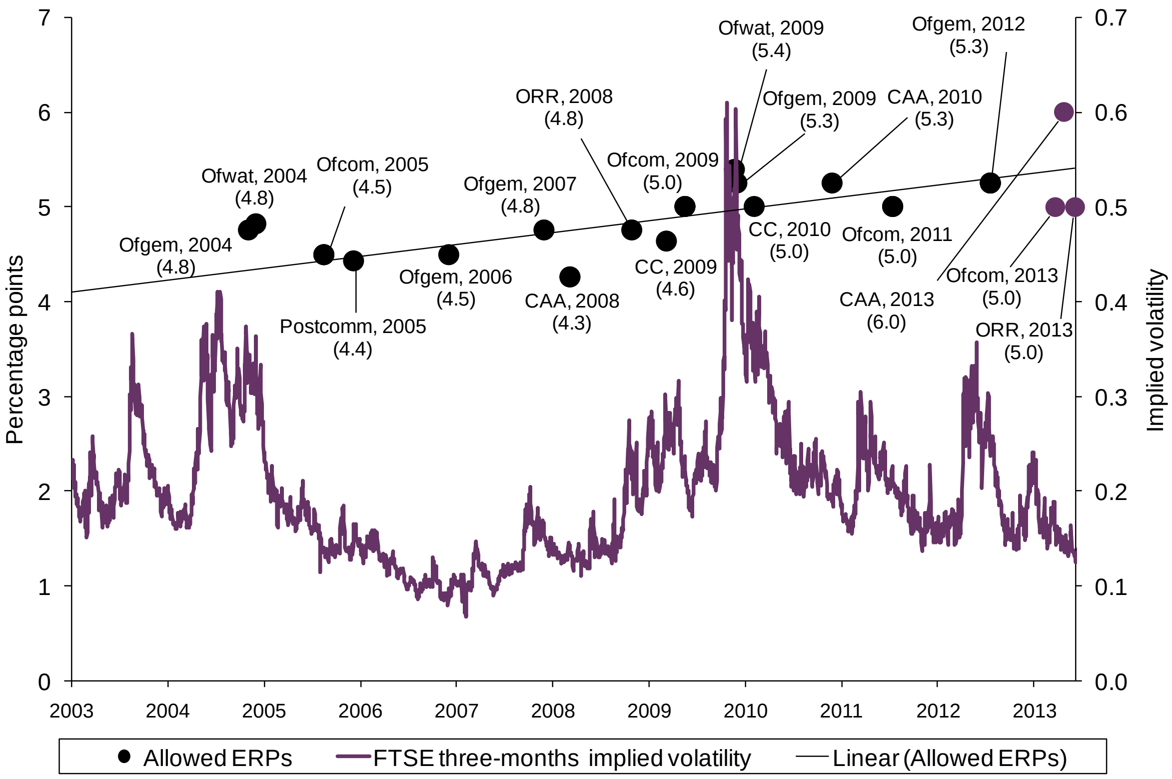
5.2.4 Regulatory precedent

Figure 5.6 shows the ERP allowances from regulatory determinations since 2003. Regulators' estimates of the ERP over time have steadily increased, in acknowledgement of the 'mixed evidence around the current impact of market turbulence'.[36] For example, equity market volatility[37]—which is also in Figure 5.6 and is widely reported to be linked to ERP—has been subject to considerable fluctuations since the onset of the financial crisis. Recent determinations suggest an ERP range of around 5.0–6.0%. The upper end of this range is based on the CAA's Q6 Initial Proposals. However, as highlighted in previous sections, this estimate of the ERP is combined with a materially lower risk-free rate assumption compared to other regulators.

[36] Civil Aviation Authority (2010), 'NATS (En Route) plc price control: Formal proposals for control period 3 (2011-14): under Section 11 Transport Act 2000', October, para 12.47.

[37] Several academic studies have reported a negative relationship between the ERP and equity volatility. See, for example, French, K., Schwert, G.W. and Stambaugh, R.F. (1987), 'Expected Stock Returns and Variance', *Journal of Financial Economics*, **19**, pp. 3–19; Harvey, C. (1989), 'Time-varying Conditional Covariances in Tests of Asset Pricing Models, *Journal of Financial Economics*, **24**, pp. 289–317; Turner, C., Starz, R. and Nelson, C. (1989), 'A Markov Model of Heteroskedasticity, Risk, and Learning in the Stock Market', *Journal of Financial Economics',* **25**, pp. 3–22; and Baillie, R.T. and DeGennaro, R.P. (1990), 'Stock Returns and Volatility', *Journal of Financial and Quantitative Analysis,* **25**, pp. 203–14.

Figure 5.6 Implied volatility and regulatory precedents for the equity risk premium



Note: Cut-off date is June 14th 2013. CC, Competition Commission. Implied volatility estimated from prices on three-month FTSE 100 option contracts. Purple dots denote initial decisions that are not final.
Source: Oxera analysis, based on various regulatory documents and data from Datastream.

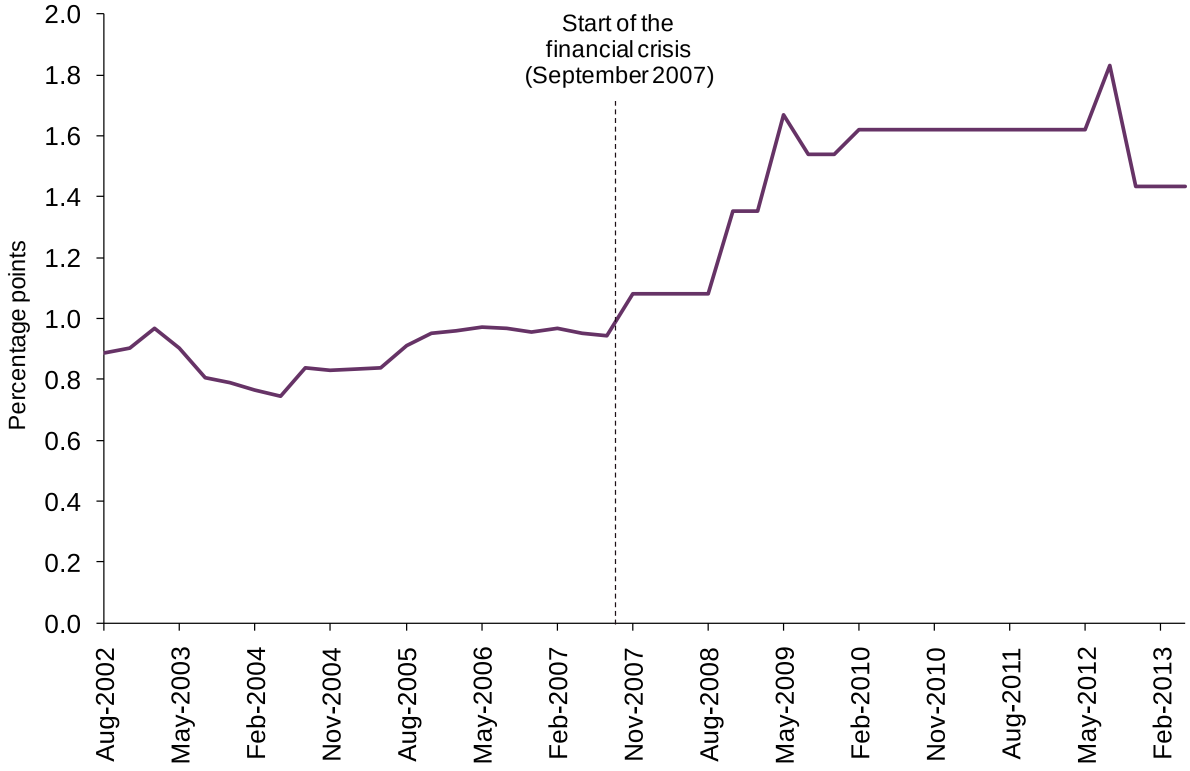
It is also important to consider the heightened GDP volatility to which equity investors will be exposed in RP2, relative to the expected GDP volatility at the time of the CP3 review. Macroeconomic uncertainty has increased considerably since the start of CP3. The estimated GDP volatility at the start of CP3 (calculated as the standard deviation of the quarterly UK GDP growth rate for the period 1998–2005) was 0.6 percentage points.[38] When measured for the period 1998–2012, this estimate increases to 2.2 percentage points.

The significant uncertainty about future macroeconomic conditions in the UK is also acknowledged by the Bank of England.[39] As shown in Figure 5.7, the Bank of England's estimates of the degree of uncertainty around its own forecasts of GDP growth have increased sharply, and despite the slight dip recently, remain significantly higher than prior to the onset of the financial crisis. This uncertainty suggests that investors are likely to require a higher ERP relative to a more benign economic environment.

[38] Oxera analysis, based on Datastream.

[39] Bank of England (2012), 'Inflation Report', August, p. 6.

Figure 5.7 Uncertainty in the Bank of England's GDP forecasts



Note: This figure presents a measure of the dispersion of the Bank of England's quarterly GDP projections. The scale should be interpreted as a relative measure. The start of the financial crisis is represented by Northern Rock's request for liquidity support from the Bank of England.
Source: Oxera analysis, based on data from the Bank of England.

5.2.5 Summary

Overall, historical estimates of the ERP suggest a value no lower than 5.0% based on arithmetic averages. Forward-looking dividend growth models suggest estimates above 6.0%, and survey evidence indicates an ERP between 5.0% and 6.4%. Given the uncertainty in equity markets, regulatory estimates of the ERP have steadily increased since the start of the financial crisis, with the most recent determination suggesting a range of around 5.0–6.0%.

Consistent with the overall approach of taking a longer-term view and a risk-free rate allowance that is set considerably above spot yields, it is appropriate to place more weight on more conservative estimates of the ERP. Overall, a range of **5.0–5.5%** is proposed.

5.3 Cross-check for the total market return

Oxera's estimates for the risk-free rate and the ERP imply a total equity market return in the range of 6.5% to 7.25%.

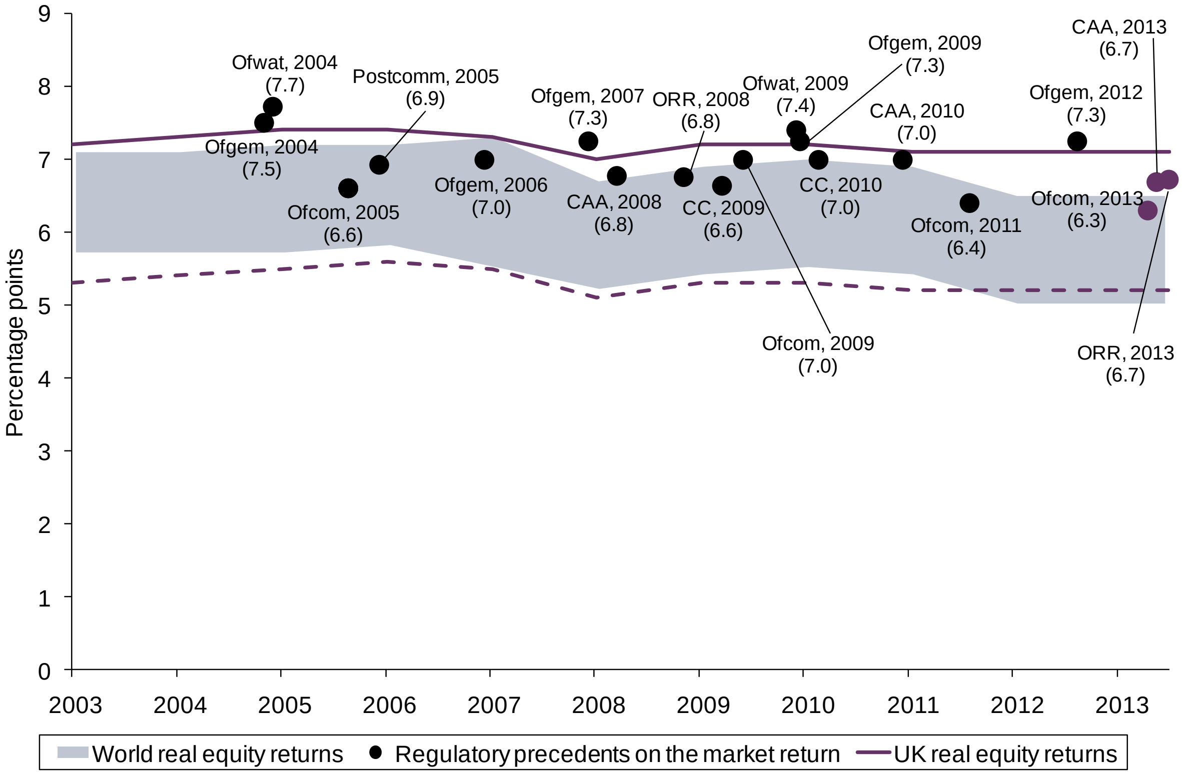
This is in line with regulatory precedent. With the exception of Ofcom (2011), the most recent UK regulatory decisions have allowed a market return of 6.5% or higher.

The lower bound of the proposed range is equal to the mid-point of the CAA's proposed range for Q6, and the upper bound is consistent with the most recent Final Proposals for energy networks by Ofgem.

Comparing the sum of the risk-free rate and the ERP to evidence on the overall market return has become an increasingly important cross-check. This is because of the difficulties in estimating both market parameters in the light of the market turmoil. While the risk-free rate and the ERP can fluctuate considerably over time, the overall market return (risk-free rate plus ERP) tends to be more stable.

This relative stability has led some regulators to attach greater importance to evidence on total equity returns and was recognised, for example, in the Competition Commission's reliance on an estimated range for the total market return of 5–7% to derive the appropriate ERP for Bristol Water during the 2010 appeal,[40] and in the use of this total market return approach in the 2010 NERL price control. In the Q6 Initial Proposals, the CAA noted that: 'consistent with the CC's Q5 recommendations and the CAA's Q5 decision and NATS (En Route) plc (NERL) CP3 (RP1) decision, market return in the region of 6% to 7% appears appropriate.'[41]

Figure 5.8 Regulatory precedents for total equity returns



Note: Cut-off date is June 14th 2013. CC, Competition Commission. DMS estimates of world and UK real market returns are presented, which reflect average returns over the period since 1900. Due to the considerable volatility in equity markets, average market returns are not presented over a shorter period. The lower and upper bounds of the world equity returns and UK real equity returns are derived from the ERP being calculated as a geometric mean and arithmetic mean, respectively. Purple dots denote initial decisions that are not final.
Source: Oxera analysis, based on various regulatory documents and estimates by Dimson, Marsh and Staunton.

Figure 5.8 shows that regulatory decisions for real equity returns have been close to the upper bound of the interval for UK real equity returns, indicating a preference for the arithmetic mean for calculating the ERP. There is also no clear upward or downward trend in the regulatory estimates for total market return over the last decade, illustrating the relative stability of total equity returns compared to its individual components.[42] Overall, the 6.50–7.25% recommended for NERL for RP2 is in line with recent regulatory precedents.

[40] Competition Commission (2010), 'Bristol Water plc', A reference under section 12(3)(a) of the Water Industry Act 1991, February, Appendix N, para 100.
[41] Competition Commission (2013), 'Economic regulation at Gatwick from April 2014: initial proposals', April, para 10.111.
[42] At the same time, regulatory estimates for the risk-free rate have trended downwards, while ERP estimates have trended upwards over the last decade, as illustrated in Figures 5.4 and 5.6.

Table A2.2 in Appendix A2 includes a selection of recent European regulatory precedent on market parameters, as well as the recent decision for Airservices Australia. Given the divergence in capital market conditions across Europe, making direct comparisons with international evidence has recently become more difficult. Nevertheless, for a selection of recent decisions taken by European regulators in countries that have not suffered from the sovereign debt crisis, allowed total market returns have been in the range of 5.8–7.3%. The proposed range for NERL in this report is therefore also broadly consistent with international precedent.

6 Estimate of the cost of capital

Table 6.1 brings the evidence together and shows the estimated WACC range for NERL for RP2. The estimated real vanilla WACC is in the range of 4.8–5.3%. This compares with a vanilla WACC of 5.7% in CP3.

Table 6.1 Estimates of NERL's allowed WACC for RP2 and CP3

Parameter	Low	High	CP3
Real risk-free rate (%)	1.50	1.75	1.75
ERP (%)	5.00	5.50	5.25
Asset beta	0.60	0.60	0.60
Debt beta	0.10	0.10	0.10
Equity beta	1.35	1.35	1.35
Cost of equity (post-tax real, %)	8.3	9.2	8.8
Gearing (%)	60	60	60
Cost of debt (pre-tax real, %)	2.5	2.7	3.6
Vanilla WACC (real, %)	**4.8**	**5.3**	**5.7**
Tax uplift (%)[1]	36	35	27
Pre-tax WACC (real, %)	6.7	7.3	7.0

Note: [1] Equivalent to what the CAA refers to as the 'tax rate' in previous decisions.
Source: Oxera analysis.

Relative to CP3, the lower vanilla WACC range for RP2 reflects:

– a similar cost of equity assumption, reflecting the conclusion that asset risk is expected to be at least as high as in CP3, and the uncertainty in capital markets and observed regulatory responses to recent market conditions;
– a lower cost of debt assumption, reflecting some of the observed decline in corporate bond yields since the CP3 decision.

On a pre-tax basis, the estimated range for RP2 is broadly similar due to the increase in the size of NERL's projected tax payments as a proportion of allowed returns, which in itself is explained largely by a declining RAB (see section 6.1).

Given the increased forecasting error in individual parameter estimates and the ongoing changes to the regulatory landscape—in particular, the challenging efficiency targets that are likely to restrict NERL's ability to manage shocks—an estimate above the mid-point of the range (5.0% vanilla or 7.0% pre-tax) is considered appropriate.

6.1 Allowance for tax

Corporation tax is a normal business cost that needs to be reflected in the revenue requirement of a regulated company. There are two approaches to including tax in allowed revenues (see also Box 6.1). As explained below, the CAA's approach used for NERL is a hybrid of the two approaches.

– Approach #1. Adjust the estimated cost of capital upwards so that returns available to providers of capital after the company pays corporation tax are still commensurate with their required rates of return for investing in the business.

– Approach #2. Include tax as a separate component of allowed revenue—similar to operating expenditure (OPEX)—and do not make any adjustments to the cost of capital.

Box 6.1 Regulatory approaches to tax

1. Including tax in the return component

Under this approach, the estimated cost of equity is uplifted by a 'tax wedge'. The pre-tax WACC used to determine allowed returns, and the annual revenue requirement, are then defined as:

$$WACC_{pre-tax} = r_d g + r_e \frac{1}{(1-t)} (1-g)$$

$$Revenue\ requirement = OPEX + depreciation + WACC_{pre-tax} RAB$$

where r_d is the pre-tax cost of debt, r_e is the post-tax cost of equity, g is gearing, t is the tax rate, and $\frac{1}{(1-t)}$ is the tax wedge (note that the tax wedge is greater than 1).

2. Including tax as a separate allowance

Under this approach, the estimated cost of equity is **not** uplifted by a tax wedge, the allowed returns are based on a vanilla WACC, and tax is included separately in the revenue requirement:

$$WACC_{vanilla} = r_d g + r_e (1-g)$$

$$Revenue\ requirement = OPEX + depreciation + WACC_{vanilla} RAB + tax$$

Note: The calculations should be performed in nominal terms to ensure that the tax compensation is correct under both methods.

The two approaches could, in principle, result in the same revenue requirement, provided that the tax rate used to calculate the tax wedge under approach 1 is equal to the effective tax rate assumed by the regulator in calculating the tax allowance under approach 2. Most regulators use the statutory tax rate to calculate the tax wedge under approach 1. This means that, in any given price control period, discrepancies between the two approaches could arise, especially if there are material differences between the effective and statutory tax rates in the given period.

Both approaches are used by regulators. For example, Ofgem and Ofwat use approach 2, whereas the CAA (in regulating airports) and Ofcom use approach 1.

In regulating NERL, the CAA has effectively used approach 2 in the past, by taking into account the actual tax payments projected by NERL in each price control period. However, the CAA has chosen to convert the tax allowances in pound terms first into a percentage of the RAB and then into an implied tax uplift, which, presentationally, makes the CAA approach appear similar to approach 1:[43]

> More generally, the tax uplift required has been calculated by, first, estimating the return required excluding tax (the vanilla WACC multiplied by the RAB), and then adding to this the required tax allowance. This gives a monetary amount for the allowed pre-tax return. Using this value relative to the RAB, an implicit pre-tax WACC can be calculated, and the tax uplift, expressed as a percentage, can also be extracted. These calculations are performed in discounted cashflow terms to take into account the timing of the flows.

[43] Civil Aviation Authority (2010), op. cit., para 12.90.

For example, the tax uplifts calculated by the CAA in CP2 and CP3 were 11% and 27% respectively, against the corresponding statutory tax rates of 30% and 28% for each period.[44]

For RP2 the statutory tax rate is going to be 20%. However, the actual tax payments that NERL is expected to make based on this statutory rate are equivalent to a 35–36% tax uplift using the vanilla WACC range shown in Table 6.1 and using the CAA's methodology for calculating the uplift. These tax payments imply a pre-tax WACC range of 6.7–7.3%.

Discrepancies between the statutory tax rate and the actual tax uplift can, in practice, arise for a number of reasons, as noted by the Competition Commission:[45]

> The financial modelling underlying the recommendations for the price control takes place in pre-tax terms, so it is necessary to convert post-tax estimates of the cost of capital to a pre-tax basis. The conversion can be made either using the standard rate of corporate taxation (currently 30 per cent) or by using estimates of the tax that will actually be paid by BAA. There are a number of reasons why actual tax payments can differ from the effect of applying the standard rate of tax within the CAPM. They include the effect of capital allowances, other timing differences, delay in the payment of tax and the receipt of relief for tax on interest at a nominal rather than a real rate.

For RP2, a key driver of the increase in the implied tax uplift relative to CP3 is the declining RAB. In pound terms, NERL's tax payments are also declining, but not at the same rate as the RAB, leading to an increase in the tax allowance when expressed as a percentage of the RAB, and subsequently introducing a larger wedge between the post-tax and pre-tax rates of return.

As any regulated company, NERL should be able to make sufficient profit to satisfy the return requirements of its investors as well as to pay all the relevant taxes. The tax uplift is simply a method to present the tax allowance that NERL is required to recover. Consistent with the approach in previous reviews, it remains appropriate to estimate a pre-tax WACC allowance for NERL using the actual projected tax payments for the period.

[44] The CAA estimates the tax uplift using values for the individual WACC parameters in real terms. Therefore, the tax uplift is not exactly equal to the true effective tax rate in nominal terms.

[45] Competition Commission (2002), 'BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd)', p. 177, para 4.65.

A1 Debt indexation

In the Q6 Initial Proposals, the CAA has provisionally concluded that 'the arguments for debt indexation are finely balanced'.[46] It appears that the main reason for considering debt indexation is the interest rate uncertainty over the next price control period, given current unusual market conditions.

Debt indexation is a means of sharing interest rate risk with customers. Assuming that interest rate risk is largely outside NERL's control, such a mechanism could be a reasonable alternative to a fixed cost of capital. Further, the uncertainty around estimating and forecasting the cost of debt for the duration of the price control period might justify adjusting the cost of debt during the period.

However, the allocation of risk under indexation and the impact on company incentives depends crucially on the practical design of the indexation mechanism. The less correlated companies' actual financing costs are to the benchmark financing costs used to index the cost of debt, the more interest rate risk remains with the company.

Given the existing financing structure of NERL and the future funding requirements of NERL, it is unlikely that debt indexation would indeed reduce exposure to interest rate risk over the price control period. This is because NERL's financing costs are largely fixed over the next price control period. Introducing a variable cost of debt allowance would increase, rather than reduce, cash-flow volatility over the period. Debt indexation is also typically better suited to companies that access bond markets on a frequent basis, which is not the case for a company the size of NERL.

The rest of this appendix is structured as follows:

– section A1.1 reviews regulatory precedent on debt indexation;
– section A1.2 discusses the rationale for adopting debt indexation;
– section A1.3 considers the practical implementation issues;
– section A1.4 examines the implications for risk, including specifically in the case of NERL.

A1.1 Precedent

Most UK regulators, including the CAA, have in the past used a fixed cost of debt for the duration of the price control period. Such an approach confers a strong efficiency incentive on regulated companies to profit by achieving actual financing costs that are below allowed costs.

In Great Britain, Ofgem is the only regulator to have deviated from setting a fixed cost of debt allowance and introduced cost of debt indexation. However, Ofgem is not the first regulator to formally consider alternatives to a fixed cost of debt allowance. The Competition Commission, the Office of Rail Regulation (ORR) and Ofwat have all considered indexation in recent price reviews, but in the end decided against it.[47]

[46] Civil Aviation Authority (2013), op. cit., para 9.29.

[47] Competition Commission (2007), 'BAA Ltd: A Report on the Economic Regulation of the London Airports Companies (Heathrow Airport Ltd and Gatwick Airport Ltd)', Appendix F, F4–F5, September 28th. Office of Rail Regulation (2008), 'Update on the framework for setting outputs and access charges and strategic business plan assessment', February. Ofwat (2007), 'PR09/03: Risk allocation, investment incentives and the financing of regulated businesses', October 18th.

Box A1.1 Competition Commission review of indexation in the airports sector

In the Q5 price review for Heathrow and Gatwick Airports, the Competition Commission considered the possibility of cost of debt indexation. It noted the following arguments in favour of indexation advanced by interested parties:

– the risk-free rate and cost of debt would not need to be set above prevailing market rates;
– investors should be insulated from movements in interest rates, as they are beyond their control.

However, the Competition Commission also noted the following problems with indexation:

– imperfect observability of the risk-free rate and the cost of debt;
– how to account for fixed-rate embedded debt;
– the extent to which any automatic adjustment had already taken place via the RPI indexation of price limits.

Finally, the Competition Commission concluded that indexation should not be introduced, since it:[1]

> would start to erode one of the core foundations of RPI–X regulation—ie, that shareholders are asked to manage cost risk for periods of five years at a time—without offering sufficient benefits to justify the apparently sub-optimal allocation of risk.

Source: [1] Competition Commission (2007), op. cit., Appendix F, F4–F5.

A1.2 Rationale for debt indexation

A fixed cost of debt allowance provides a regulated company with a strong incentive to outperform regulatory allowances, which is consistent with the fundamental principles of incentive-based regulation. However, it also exposes the company to interest rate risk for the duration of the price control period. Therefore, a fixed cost of debt can be seen as a high-risk/high-reward scenario from the company's perspective.

An alternative approach is to index the cost of debt allowance. In practice, this means that the cost of debt allowance is adjusted periodically (eg, annually) according to movement in some pre-defined benchmark. Depending on how the benchmark is defined, such an approach has the potential to transfer some of the interest risk from the regulated company to customers.

If market rates increase, the allowed cost of debt under indexation is adjusted to pick up some (or all) of this increase, providing greater protection to the company against adverse market movements than a fixed allowance. If market rates decrease, the benefits of a lower cost of debt are shared with customers faster than under a fixed allowance, reducing the scope for the company to profit from outperformance on financing costs. Therefore, in principle, indexation can be seen as a lower-risk/lower-reward scenario from the company's perspective.

The appropriateness of indexation depends on whether companies or customers are better placed to manage this risk. In the case of NERL, the question would be whether NERL or airlines are better placed to manage interest rate risk.

One of the key considerations regarding whether indexation may be more appropriate than a fixed allowance is how it might affect the price that customers pay for compensating the company to manage interest rate risk.

The cost of capital is inherently uncertain, and it is likely to change over the price control period. Regulators typically consider the costs of under-investment to be greater than the costs of over-investment. The under-investment problem can arise if the cost of capital rises above the cost of capital allowed by the regulator during the price control period. To mitigate the risk of under-investment, regulators typically allow headroom in the cost of capital allowance, including the cost of debt components, by setting the cost of capital above the level that might be justified purely on the basis of available market evidence.

Regulators, including the CAA and Ofgem, have typically assumed that debt indexation would reduce the risk of error in the estimate of the efficient cost of debt over the price control period, and, hence, lessen the likelihood of setting the 'wrong' cost of capital. This in turn would reduce the need for headroom in the cost of debt allowance:[48]

> Our approach, under the RIIO model, is to extend the concept of regulatory commitment to the estimation of the cost of debt...We...believe that such an approach will mean a higher likelihood of getting the WACC 'right' thus leading to better investment decisions by companies.

However, in practice, the scope for reducing the risk of error will depend on whether the benchmark chosen to index the cost of debt is a good proxy for a typical debt portfolio of the regulated industry/company in question.

Therefore, to ensure the indexation mechanism works as intended and, indeed, leads to a reduction in the company's exposure to interest rate risk, the practical design of the indexation mechanism is critical.

A1.3 Choosing the benchmark

There are various practical issues that need to be addressed when choosing the right benchmark to index the cost of debt:

- which bond index should be used—ie, which credit rating, maturity and composition?
- which measure of inflation expectations should be used to obtain the real cost of debt?
- is the cost of debt to be adjusted based on movements in spot rates or a longer-term average?
- should there be an allowance for issuance costs?

Box A1.2 Ofgem's derivation of the real cost of debt

Arriving at a nominal cost of debt

Use an average of yields on iBoxx A and BBB 10+ GBP non-financials indices. Criteria used in the decision included coverage, transparency of methodology, representativeness of the networks, objectivity, transparency, predictability, user familiarity, and risk of discontinuation.

Arriving at a real cost of debt

Use ten-year breakeven inflation index published by the Bank of England to deflate the nominal cost of debt. Although average maturity of bonds in the iBoxx indices is longer than ten years, Ofgem determined that ten-year breakeven inflation should be sufficiently representative of longer-term inflation expectations.

Arriving at the allowed cost of debt

Use a simple ten-year trailing average of the real cost of debt.

- A ten-year window is consistent with the methodology used to set the cost of debt in previous price reviews, and implicitly provides an allowance for efficiently incurred embedded debt.
- While a simple, rather than a weighted, average will not accurately reflect the debt profiles of individual companies, a simple average is easy to implement and, according to Ofgem's analysis, is still the best option to protect against changes in the cost of debt for most companies. However, companies can propose a weighted average mechanism with a transition to a simple ten-year average, if they can show in their business plans why a simple ten-year average is not appropriate.

Issuance costs

[48] Ofgem (2010), 'Handbook for implementing the RIIO model', October 4th, p. 108.

No explicit allowance for issuance costs. In Ofgem's view, utilities have typically issued debt at lower rates compared to yields on the chosen index. The gap between the index and utilities is meant to be sufficient to cover any additional costs associated with accessing debt markets.

Source: Ofgem (2011), op. cit.

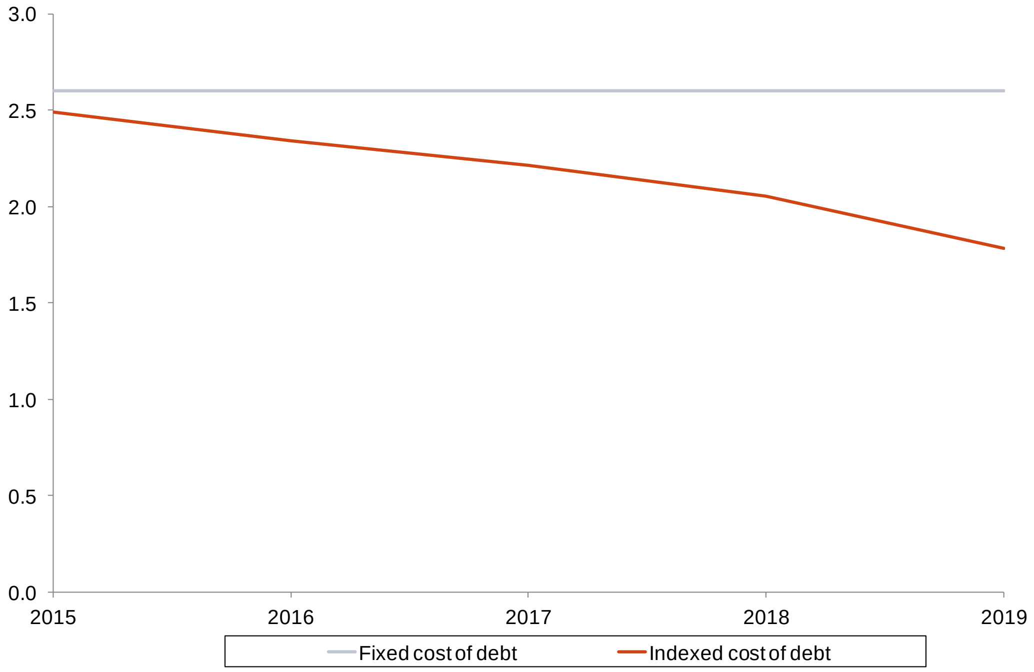
Although regulators face similar questions when estimating the fixed cost of debt allowance, they can exercise a greater degree of judgement in their decisions when setting a fixed allowance. In contrast, to ensure indexation can be implemented in practice, the calculation of the cost of debt under indexation needs to be objective, transparent and easy to update on an annual basis.

A1.4 Implications for risk

As discussed earlier, the scope for reducing the company's exposure to interest rate risk depends on how a good a proxy the chosen benchmark is for the company's actual cost of debt. How closely the chosen benchmark tracks the actual cost of debt of the regulated company will depend on a number of factors, including size and profile of capital expenditure, structure of existing debt portfolio, and frequency of debt issuance.

For example, Figure A1.1 shows the allowed cost of debt for NERL for RP2 under two scenarios—a fixed cost of debt allowance of 2.6% (the mid-point of the range estimated in section 3) and an allowance updated annually using Ofgem's index and assuming market interest rates will stay at current levels throughout the price control period.

Figure A1.1 Fixed versus an indexed cost of debt allowance (%)



Note: The indexed cost of debt allowance is based on an assumption of no change in interest rates over the price control period.
Source; Oxera, Datastream.

This shows that it is unlikely that debt indexation would indeed reduce the risk of error in the cost of debt estimate over the price control period. This is because NERL's financing costs are largely fixed over the next price control period. Introducing a variable cost of debt allowance would increase, rather than reduce, cash-flow volatility over the period. Debt indexation is also typically better suited to companies that access bond markets on a frequent basis which is not the case for a company of the size of NERL.

A2 International regulatory precedent

Table A2.1 International regulatory precedent for the asset beta

Regulator	Country	Year	Asset beta
Electricity and gas			
CER	Ireland	2010	0.40
Nma[1]	Netherlands	2010	0.43
CRE	France	2009	0.33
BNetzA	Germany	2008	0.39
Average			**0.39**
Air transport-related			
Norwegian CAA (airports)	Norway	2012	0.58
Airservices Australia	Australia	2012	0.55
CAR (airports)	Ireland	2011	0.65
Average			**0.65**
Fixed-line telecommunications			
ARCEP	France	2011	0.48
CMT	Spain	2011	0.43
PTS	Sweden	2011	0.54
Average			**0.48**

Note: [1] The values reported are based on the mid-point of the regulator’s range.
Source: Various regulatory determinations.

Table A2.2 International regulatory precedent for the market parameters

Regulator	Country	Year	Real risk-free rate (%)	ERP (%)	Total market return (%)
'Lower risk' European countries					
Norwegian CAA (airports)	Norway	2012	0.3	6.0	6.3
PTS (telecoms)	Sweden	2011	1.7	5.0	6.7
ARCEP (telecoms)	France	2011	1.2	5.0	6.2
NMa (energy)[1]	Netherlands	2010	2.3	5.0	7.3
CRE (energy)	France	2009	1.3	4.5	5.8
BNetzA (energy)	Germany	2008	2.7	4.6	7.3
Average			**1.6**	**5.0**	**6.6**
'Higher risk' European countries					
CAR (airports)	Ireland	2011	1.5	5.0	6.5
CMT (telecoms)	Spain	2011	2.9	6.9	9.8
CER (energy)	Ireland	2010	2.2	4.5	6.7
Average			**2.2**	**5.5**	**7.7**
Australia					
Airservices Australia (air traffic control)	Australia	2012	2.4	5.5	7.9
Average			**2.4**	**5.5**	**7.9**

Note: [1] The values reported are based on the mid-point of the regulator's range.
Source: Various regulatory determinations.

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