THE ALLOWED COST OF CAPITAL FOR DPCR5

A REPORT FOR CENTRICA

September 2009

FOR PUBLICATION

Submitted by:

CEPA LLP

CONTENTS

IMPORTANT NOTICE

This report has been commissioned by Centrica plc. However, the views expressed are those of CEPA alone. CEPA accepts no liability for use of this report, or of any information contained therein, by any third party.

EXECUTIVE SUMMARY

This report considers the appropriate values of the components of the allowed Weighted Average Cost of Capital (WACC) before concluding with a recommended range for the allowed WACC for DPCR5. This report has been written assuming that Ofgem will not adopt a trigger mechanism for the cost of debt for DPCR5. CEPA has consistently argued that were Ofgem to adopt such a mechanism, the allowed cost of debt and WACC could be set lower. This report has been commissioned by Centrica plc, but sets out CEPA's independent views.

Critique of alternative approaches (Section 2)

In Section 2 we outline our concerns with certain methodological aspects of the reports by PWC and NERA that have been commissioned by Ofgem and the ENA respectively:

- We concur with the Competition Commission (CC) that Index Linked Gilts (ILGs) provide the best available evidence on risk-free rates and are to be preferred to the use of swap rates, although account should also be taken of swap rates.
- Recent evidence on ILGs and nominal gilts as well as longer term averages should be used to inform the judgment about the WACC. However, to rely wholly on 10 year trailing averages when establishing the lower bound for the real risk-free rate is to ignore the underlying structural adjustments in debt markets in recent times.
- We have fundamental concerns about placing reliance on the Dividend Growth Model (DGM) and over the reliability of results produced using that approach, particularly at the present time. The DGM approach is highly sensitive to the assumed long-run growth in dividends and hence in earnings per share. At the present time there is unusual uncertainty about GDP and earnings over the short and longer term. Estimates of the Equity Risk Premium (ERP) based on short term market data are highly volatile on a year-to-year basis since they are a function of stock market performance over the business cycle. It is unlikely that investors adjust their expectations of the ERP on an annual basis when investing in long lived assets and such a view is inconsistent with the academic literature on ERP. Therefore, we consider that Ofgem should not place any weight on values derived using DGM, especially in current market conditions.

Gearing (Section 3)

We continue with the now well-established approach of determining the appropriate gearing for a notional efficient DNO. In doing so, we have reviewed current market data on actual levels of gearing for utilities and observe that levels of gearing of up to 65% remain consistent with an investment grade rating in current market conditions. We note that there has been some evidence of de-levering by more highly geared companies (>70%), such as regulated water companies, but that these companies do not appear to be de-levering below levels consistent with Ofgem's more recent, relatively conservative views of notional gearing.

We, therefore, recommend a range of 60-62.5% for gearing and suggest that there is no strong justification for Ofgem to reduce notional gearing from its most recent decision in GDPCR of 62.5%.

Cost of debt (Section 4)

DPCR5 comes at a time of major change in the state of the debt markets. The period of sustained very low real cost of debt for investment grade borrowers ended with the credit crunch. A brief period of very high cost of debt has now been followed by some normalisation, but the cost of debt remains higher than the medium term trailing averages. Despite the recent falls in rates from a peak in late 2008/ early 2009, the future level of rates is very uncertain and volatility is likely to be higher. What is clear, however, is that the significant government monetary interventions have pushed down risk free rates to very low levels, whilst debt premia for investment grade borrowers have increased as risk is re-priced.

The issue is whether these countervailing effects will result in a significantly different cost of debt for new debt of a notional DNO. We, therefore, consider the cost of embedded debt and new debt separately and recommend that Ofgem takes a similar approach.

For new debt, we consider recent market evidence on the risk-free rate (from shorter-dated ILGs and from deflated nominal gilts), the debt premium and evidence from recent corporate debt issuances:

- Risk-free rates are extremely low and are expected to stay low over the period in view of the very relaxed global monetary conditions and weak economic growth. We recommend a range for the risk free rate of 175 – 200 bps. We note that a 2% risk-free rate is in line with recent views from the CC and Ofwat.
- Debt premia have risen from the lows of the early 2000s as risk is re-priced, and there is reason to consider that on average they will remain higher than in the past five years. We consider that a reasonable range is 150 – 200 bps for investment grade utilities.
- We thus consider that a reasonable **range for the cost of new debt is 3.5 – 4.0%**.
- We note that there have been a limited number of corporate index-linked issues in 2009, and recommend that Ofgem review the likely use of these instruments in DPCR5 to inform the position in the range.

For embedded debt, we consider that the appropriate rate is the expected historic cost of debt for a notional efficient DNO rather than the actual cost of debt locked in by DNOs. The actual cost of debt over the period is now observable but it is the expected cost at the time that is relevant. To use actual cost would have an adverse impact on incentives. The cost of corporate debt was very low until 2007 and we note that up until mid to late 2007 there was significant headroom between the observed cost of debt and Ofgem's determination for the period (4.1%). We do, however, acknowledge that an efficient DNO would have had to fix some debt at higher rates over end 2007 and 2008, before rates started to reduce again after an apparent peak at end 2008/ early 2009. **We, therefore, consider that a reasonable range for the real cost of embedded debt is 3.25% to 3.4%,** 25 to 60 bps lower than the cost of new debt.

Weighting new debt (30%) and embedded debt (70%) according to our estimates for DPCR5 gives **a range of the cost of embedded and new debt of 3.325 – 3.58%.**

Cost of equity (Section 5)

We continue to consider the allowed cost of equity by relying on long-term data for the CAPM parameters, cross-checked to market evidence. We have noted above that risk-free rates have fallen and recommend a range of 1.75-2.0%. For the ERP, we continue to believe that it is best considered as broadly stable over time and there is no new academic evidence to refute this view.

There is clear evidence from equity markets that utilities continue to exhibit low equity beta characteristics – falling less rapidly than the market during the crash in equity markets and equally rising less quickly in the current market 'bounce'. This is classic share price behaviour of a sector with low covariance on the market and accords with the conclusion of Smithers & Co that the equity beta is less than 1.

There is limited evidence available from Market Asset Ratios due to the lack of transactions, but it is interesting to note that City analysts expect water utilities to earn a positive spread vs Ofwat's Draft Determination for PR09 (Ofwat put forward a cost of equity of 7.1%).

Given that risk-free rates have fallen, that there is no clear evidence that the ERP has increased above 5% at the top end, and that there is clear evidence that the equity beta is no more than 1, we recommend a range of 6.5 – 7.1% for the cost of equity with the evidence indicating a value towards the lower end of this range.

Relative risk (Section 6)

Before concluding on the allowed WACC, we have reviewed the relative risk of the proposed regulatory settlement for DPCR5 with that of DPCR4 and Ofwat's PR09. We conclude that DPCR5 is, *prima facie,* less risky than the current DPCR4, and is likely to be of similar or potentially lower risk compared to Ofwat's PR09 (based on the draft determination).

Conclusion (Section 7)

Our estimate of the Vanilla WACC based on the analysis in the report is a range of 4.6% - 4.9%.

1. INTRODUCTION

This report has been prepared by CEPA on behalf of Centrica and presents our assessment of the appropriate allowed cost of capital for DPCR5, absent a trigger mechanism on the cost of debt. The views expressed here are those of the authors and may not reflect those of Centrica.

In order to define the allowed revenues that relate to the cost of the capital, the regulator needs to determine for the next review period:

- the cost of debt[1];
- the cost of equity;
- the appropriate gearing (measured as net debt: RAB);
- an approach to allowing for taxation costs; and
- the appropriate regulatory asset base against which the WACC should be applied to calculate the allowed revenues.

It is important to note that for each element of this framework the regulator is seeking to set the parameters on a forward looking basis – i.e. to an appropriate level for the forthcoming price review period.

CEPA's approach is to use well established economic theory, cross-checked to actual market data. As we consider the cost of embedded debt and the cost of new debt separately, recent market evidence on the cost of investment grade debt is especially relevant. In terms of the cost of equity, it is well understood that a purely mechanical application of the Capital Asset Pricing Model (CAPM) approach typically generates a very wide range of values, and with mid-points that are often implausibly low. CEPA's approach is therefore to take account of all relevant evidence, including CAPM, but to give particular weight to the available market evidence on the cost of equity.

In the rest of this report we outline the market evidence on gearing, cost of debt and cost of equity, and then discuss alternative approaches and views used previously by regulators or recommended by consultants, and give CEPA's view on the appropriate range of values for the components of the WACC. We then, as a cross check, assess the relative riskiness of the potential regulatory settlement for DPCR5, both compared to prior Ofgem decisions and to that of comparable regulated networks. We use this to inform our recommended narrow range for the allowed WACC.

This rest of this report is structured as follows:

- Section 2 - Overview and critique of approaches to setting the allowed WACC.
- Section 3 - Notional gearing.
- Section 4 - The cost of debt, considering embedded debt and new debt separately.
- Section 5 - Cost of equity.

[1] All of these parameters are in real terms.

- Section 6 - Relative risk.
- Section 7 - Conclusion: CEPA assessment of the appropriate WACC.

Annex A: Ofwat's interim determination.

Annex B: Overview of approaches to setting the allowed WACC.

2. CRITIQUE OF CURRENT APPROACHES

PWC[2] and NERA[3] have been commissioned by Ofgem and the DNOs respectively to provide estimates of the allowed WACC for DPCR5. In this section we briefly outline our concerns with certain methodological aspects of these reports. Specifically:

- use of interest rate swaps market to infer the real risk-free rate;
- mean reversion and the use of long term versus short term historical averages; and
- using the dividend growth model (DGM) to derive a forward looking equity risk premium (ERP).

In Annex B, we set out a fuller summary of the approaches that the consultants have adopted.

2.1. Using nominal swap rates to infer real risk-free rate

NERA argue that there is an underlying problem with the current regulatory approach of using yields on index linked gilts (ILGs) as a measure for the real risk-free rate. They argue that the demand for ILGs is affected by the minimum financing requirement (MFR) leading to liquidity issues in the market for ILGs. In support of this, they present evidence of an inverted yield curve and international comparative data showing yields in the UK to be lower than US and Germany.

2.1.1. Swap rates as an alternative

NERA propose using information contained within swap rates to estimate the real risk-free rate. They decompose swaps into the following:

$$\text{Swap rate} = \text{risk-free rate} + \text{credit default premium}$$

where the credit default premium can be proxied using Credit Default Swap (CDS) data.

This gives a *nominal* risk-free rate, which is then converted into a real figure through use of an estimate for inflation expectations. NERA use Oxford Economic Forecasting (OEF)'s inflation projections for this purpose.

We have two high level concerns with using the swaps market as an alternative for traditional measures of the risk-free rate:

- We are not convinced that distortions in the long end of the ILG yield curve due to MFR automatically leads to distortions in the short end. The long dated liabilities of pension funds suggests that it is the long end of the market that is distorted leaving the short end unaffected. As such the CC's approach of focussing on rates at the shorter end seems acceptable.[4]

[2] PricewaterhouseCoopers (2009) 'Advice on the cost of capital analysis for DPCr5 – final report for the Office of Gas and Electricity Markets'.
[3] NERA (2009) 'Distribution Network Operators' cost of capital for DPCR5 – a report for the DNOs'.
[4] Competition Commission (2008) 'Stansted Airport Ltd – Q5 price control review', p. L12.

- As argued by the CC,[5] the interest rate swap curve shape is similar to the ILG yield curve suggesting that the two markets are linked – a relationship explained by arbitrage in risk markets. Hence, distortions in one market (e.g. ILGs) are likely to be reflected, at least in part, in other markets (e.g. swaps).

2.1.2. Criticisms of NERA's approach

Putting concerns around market distortions to one side, we do agree that, in theory, the swap market can provide some useful information on the real risk-free rate. Having said that, there are number of issues with NERA's methodology that we believe contribute to making real risk-free rates derived from nominal swap rates unreliable and unstable as a primary source of information. These include:

- Excessive volatility in the interbank market as a result of the financial crisis, which clearly undermines its usefulness in estimating the risk-free rate.[6]
- No account is made of the inflation risk premium and liquidity premium inherent nominal swaps. These would further reduce derived estimates of the real risk free rate.
- NERA uses a 10-year average of OEF's forecasts as a measure of inflation expectations. If UK inflation expectations have been unchanged for the 10-year period (highly doubtful), then the BoE official target (2.5% in terms of RPI/RPI-X when the Bank was granted independence) may be considered a more robust indicator of long-term UK inflation expectations. If, on the other hand, inflation expectations have indeed changed over time, they are better indicated by market-based measures such as changes in the real yields on zero coupon securities.
- Finally, and perhaps most awkwardly for NERA's analysis, swap rates have fallen dramatically – since January 2009 estimates of the real risk-free rate using the NERA approach have been hovering below 1% and have, at times, been negative. NERA argues that in a post-Lehmann world the data has become "unreliable" and, in fact, has changed its methodology somewhat for its July 2009 paper. This seems a highly partial and argument to us relying on selective use of data.

2.1.3. Conclusion

Of the reasons outlined above we consider the use of swap markets to infer the real risk free-rate as inappropriate given current volatility and the need for multiple parameter estimates. We note with interest that in their most recent submission to Ofgem, NERA do concede that:

"…in the current market environment of high inflation uncertainty, ILGs might be a less imprecise measure than any nominal instrument (swaps or gilts) which necessarily need to rely on an inflation forecast. Deriving real yields from nominal yields produce currently inconclusive wide ranges for the risk free rate."[7]

[5] Ibid, p. L14.
[6] Ibid.
[7] NERA (2009) 'Distribution Network Operators' cost of capital for DPCR5 – a report for the DNOs', p. 7.

2.2. Mean reversion and long term versus short term historical averages

In reaching a range for the real risk-free rate, PWC disregard recent evidence on both ILGs and nominal gilts and prefer instead to use 10 year historical averages. Whilst we recognise the need to not be overly swayed by spot or recent rates in the market when setting the forward looking WACC for the next five years, we equally believe that to rely wholly on 10 year trailing averages when establishing the lower bound for the real risk free rate is to ignore the underlying structural adjustments in debt markets that have occurred due to the financial crisis.

At the very least it seems inappropriate to us to not include rates currently being observed in the market in the recommended range.

2.3. Use of the DGM to derive a forward looking ERP

A key element of NERA's estimate of the ERP (and to a much lesser extent that of PWC) is a forward looking estimate of the DGM derived total market return from which an estimate of the real risk-free rate is subtracted to give a measure of the ERP.

There is, however, an important difference in the methodologies employed by NERA and PWC in reaching their DGM based estimates of the ERP. PWC use a one step model under which the required dividend growth rate is held constant, whereas NERA employ a two step model where the dividend growth rate is allowed to fluctuate. That is, PWC use only a long term dividend growth rate, whilst NERA use a shorter term and long term dividend growth rate.

Both use very similar estimates of the long term dividend growth rate: 2.4% for PWC and 2.3% for NERA. These are consistent with most measures of long term GDP growth for the UK.

NERA's estimate of a shorter term dividend growth is, however, somewhat surprising. NERA cite unsupported "analysts' medium-term projections" and use a dividend growth rate of 4.5%. Given that, according to HM Treasury's 'Forecasts for the UK Economy' publication,[8] analysts' latest GDP growth estimates for 2010 range between -0.5-2.0% and that the National Institute of Social and Economic Research forecasts 1.0% GDP growth in 2010,[9] 4.5% dividend growth appears extremely bullish.

2.3.1. Conclusion

More generally, estimates of the ERP based on DGM are highly volatile on a year-on-year basis since they are a function of the stock market performance. We also believe it is unlikely that that investors adjust their expectations of the ERP on an annual basis when investing in long lived asset, and this is consistent with the academic literature on ERP. As such we do not place any weight on DGM.

[8] HM Treasury (2009) 'Forecasts for the UK economy – a comparison of independent forecasts', August 2009.

[9] National Institute of Economic and Social Research (2009) 'The UK Economy', *National Institute Economic Review*, vol. 209 (1).

3. GEARING

3.1. Introduction

In setting the allowed WACC for the DNOs, Ofgem is required to estimate an appropriate level gearing (net debt: RAB) to be used to in determining the allowed WACC. The values of the cost of equity and cost of debt must of course be consistent with the selected level of gearing, since the cost of equity and the debt premium are both, to an extent, functions of the assumed financial leverage.

In recent reviews, including the Initial Proposals for DPCR5, Ofgem has adopted an 'optimal' gearing approach in assessing gearing for WACC calculation purposes, that is the proportions of debt and equity that an 'efficiently financed' DNO would employ.

The use of optimal gearing has become recognised best practise amongst regulators as they seek to avoid making consumers pay for the particular financing arranging arrangements put in place by a regulated business' owners. We believe this is the correct approach and agree that is the basis on which Ofgem should set the gearing level for WACC purposes.

In a regulated business where the costs of equity and debt are correctly set, the management will choose a gearing level for the regulated business that equates the marginal interest tax shield benefit and the marginal default risk cost. Optimal gearing is therefore a function of:

- the tax position of the regulated business; and
- the diversifiable and non-diversifiable business and regulatory risks facing the business.

Businesses with more volatile cash flows will have higher default risk at any given level of gearing. The higher the cash flow volatility, the lower will be the optimal financial leveraging, other things being equal.

3.2. Regulatory precedent

Table 3.1 below shows recent relevant gearing assumptions adopted by the CC and European energy regulators to calculate the WACC.

Table 3.1: Recent regulatory precedent on gearing

Regulator	Decision	Gearing assumption
Ofwat	Draft Determination (July 2009)	57.5%
CC/ CAA	Stansted (2008/ 2009)	50%
CC/ CAA	Heathrow / Gatwick (2008)	60%
CER	Gas Transmission & Distribution (2007)	55%
Ofgem	Gas Distribution (2007)	62.5%
NMa	Electricity (2006)	60%
Ofgem	Electricity & Gas Transmission (2006)	60%
CER	Electricity Transmission & Distribution (2005)	50%
Ofgem	Electricity Distribution (2004)	57.5%

Sources: Ofwat, Competition Commission, Civil Aviation Authority, Commission for Energy Regulation, Ofgem, Nederlandse Mededingingsautoriteit.

Regulators have chosen gearing levels in the range 50% - 62.5% with 60% being the most common gearing level employed.

3.3. Market evidence

In order to inform a judgment about an appropriate assumed gearing for the DNOs, Table 3.2 shows the level of gearing for a range of comparable investment grade UK and European companies.

Table 3.2: Market evidence of electricity utility gearing assumptions

Company	Gearing	Credit rating
AES Corp	72%	BB-
Centrica	44%	A
EDF (Group)	62.5%	A+
Endesa	48%	A
International Power	64%	BB-
EON	52%	A
Scottish Power	42%	A-
Scottish & Southern Energy	65%	A

Source: Company Annual Reports, Bloomberg and CEPA analysis.

The points to note from Table 3.2 are as follows:

- Electricity utilities in the UK and Europe have sustained gearing levels broadly in the range 45 – 70%.
- The 40 - 65% range for a utility asset gearing ratio is broadly consistent with an investment grade credit rating.

We note that there has been significant corporate de-levering post 2007, but that this has only been followed in small part by regulated utilities/ their parents (Iberdrola and SSE are examples,

where we understand the change to group gearing post equity/ quasi-equity issues is of the order of 2 - 3%). This is not surprising, given the stable nature of regulated utility cash flows.

3.4. Conclusion on gearing

Identifying an appropriate gearing assumption for an efficiently financed DNO is inevitably a judgment. The fact that DNOs are part of wider groups means there is little direct evidence and the appropriate comparators must be considered in reaching a judgement.

In our view, international evidence and regulatory precedent for companies similar to the DNOs suggests that gearing levels in the range of 60% - 70% are achievable whilst maintaining an investment grade rating for an efficiently financed and operated regulated business.

However, this must be viewed as being at the more aggressive end of the leveraging spectrum. Taking into account the current financial market and macro economic conditions, **we believe an optimal gearing level in the range of 60% - 62.5% is appropriate for determining the DNO's WACC. Furthermore, we believe that Ofgem's most recent decision on gearing (62.5% for GDPCR) remains an appropriate benchmark.**

4. COST OF DEBT

4.1. Introduction

The cost of debt that a regulator should allow a regulated business is the cost of borrowing that an efficiently operated and financed company with comparable systematic risks would incur over the forthcoming regulatory period. As such, the cost of debt is a function of:

- debt market conditions, both prior to and during the forthcoming period;
- the business and regulatory risks facing the regulated business;
- its gearing (net debt / RAB); and
- its credit rating as adjudged by one of the main ratings agencies (which will in part reflect business risks and gearing as well as other factors).

DPCR5 comes at a time of major change in state of the debt markets. The financial crisis has meant that one might very reasonably expect a very different cost of debt for embedded and new debt of a notional DNO. **How to allow for embedded debt creates some interesting issues - should it be the actual cost of debt locked in by DNOs that is accounted for, or the expected cost of debt for a notionally efficient DNO at the time of previous price controls? We believe it to be the latter, as to lock in the actual cost of debt ex post would have a significant impact on the incentives to minimise financing costs.**

The cost of debt for the DNOs should thus be determined by assessing the risk-free rate and the debt premium expected to be payable over the forthcoming price control period by a notional, efficiently financed DNO facing comparable regulatory and business risks. This will be a function of:

- the cost of 'embedded' debt, by which we mean debt which has been incurred by the notional DNO prior to the forthcoming review period and whose cost will remain fixed for the duration of the forthcoming period; and
- the cost of 'new' debt, by which we mean debt whose efficient cost will be determined during the forthcoming review period, i.e. newly incurred fixed rate debt, re-financed fixed rate debt and floating rate debt.

In estimating the appropriate cost of embedded debt we have drawn upon regulatory precedent and then sought to cross check this against market data from the time of previous price controls.

We also note again that the cost of debt should be estimated assuming that the business had adopted an 'optimal' gearing (see Section 3 for further explanation and assessment of this) and holds an investment grade credit rating.

In the rest of this section we consider the cost of new debt, the cost of embedded debt and then the overall cost of debt.

4.2. Cost of new debt

In this sub-section we consider separately:

- the risk-free rate;
- the debt premium; and
- recent market evidence on actual issuances.

As we are attempting to assess the cost of new debt for the period 2010-2015, we not only need to consider the most recent evidence, including the most recent paths of the costs of new debt, but also make assumptions about the future path of new debt costs.

4.2.1. Risk-free rate

The risk-free rate is a measure of the return an investor can expect to earn from the least risky asset available to invest in. It can be expressed as being in either nominal terms, whereby it is a function of the underlying real rate of interest[10] and expected inflation, or in real terms where it reflects only the real rate of interest.

In this section we consider the risk-free rate as it relates to new debt through:

- regulatory precedent;
- the evidence on real risk-free rate from the market for UK government backed Index Linked Gilts (ILGs); and
- a cross check against nominal gilts deflated for inflation expectations.

4.2.2. Regulatory precedent

Table 4.1 shows recent regulatory decisions on the risk-free rate. It shows that the assumed risk-free rate has been reducing, in line with market evidence (which is discussed below) and that the most recent assumption by both the CC and Ofwat is of a 2.0% risk-free rate.

Table 4.1: Risk-free rate: regulatory precedents

Regulator	Decision	RfR (%)
Ofwat	Water & Sewerage (2009) – Draft Determination	2.00%
CC/ CAA	Stansted (2008/ 2009)	2.00%
CAA	Heathrow/ Gatwick (2008)	2.50%
Ofgem	GDPCR (2007)	2.50%
Ofgem	TPCR (2006)	2.50%
Ofwat	Water & sewerage (2004)	2.50-3.00%
Ofgem	DPCR4 (2004)	2.25-3.00%

Sources: Ofwat, Competition Commission, Civil Aviation Authority, Ofgem.

[10]This is generally taken to be the return on government backed securities as these are viewed as minimising the likelihood of default.

4.2.3. Index linked gilts

Figure 4.1 shows that, having spiked briefly at the height of financial turmoil, current yields on long dated ILGs continue to remain at historically low levels.

Figure 4.1: Yields on UK index linked gilts of 10 and 20 year maturity

Sources: Bloomberg and CEPA analysis.

Table 4.2 confirms that this is true across all maturities with spot rates for five through to 20 year debt all within the range 0.8% - 1.2%.

Table 4.2: Summary averages for ILG yields

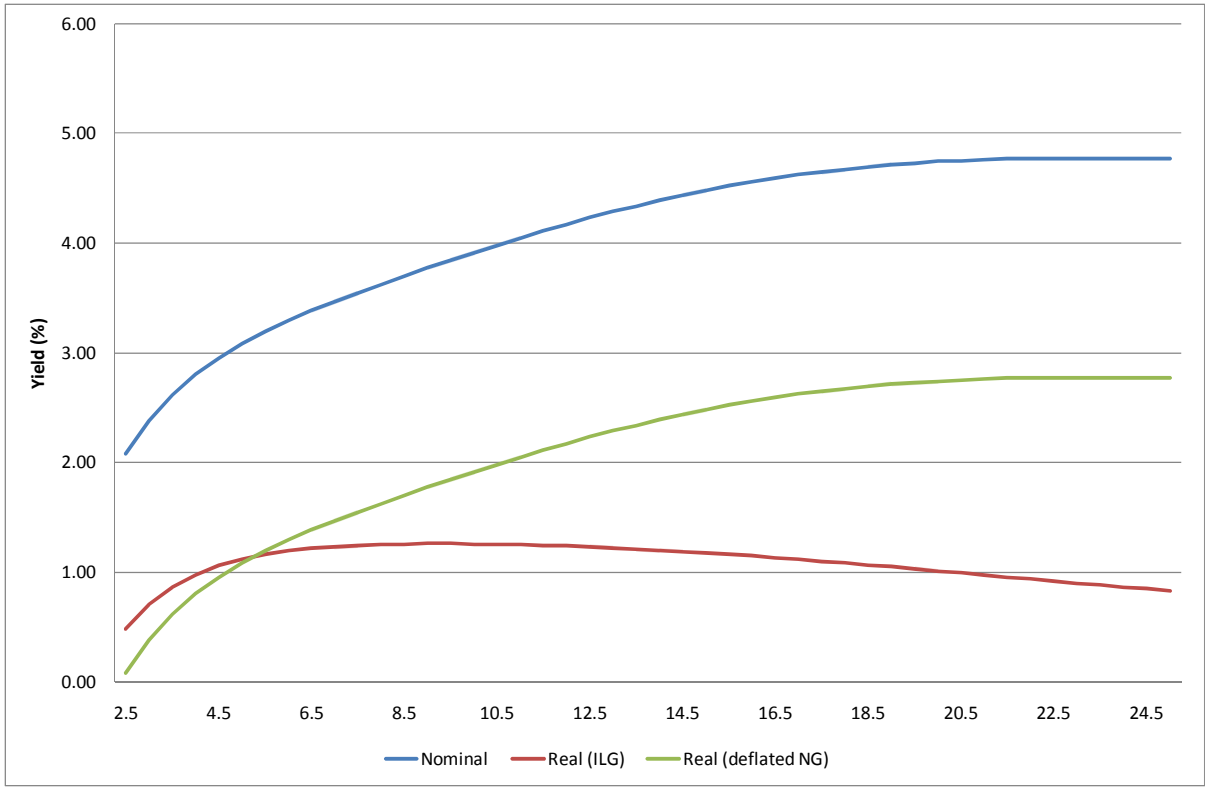
ILG:	5 year	10 year	20 year	30 year
Spot	1.0	1.1	1.2	0.8
1 year average	1.8	1.5	1.2	0.9
5 year average	1.7	1.6	1.4	1.1
10 year average	2.0	1.9	1.7	1.5

Sources: Bloomberg and CEPA analysis.

There have been concerns, however, expressed as to whether the ILG market provides an accurate proxy for the real risk-free rate due to market distorting factors such the minimum financing requirement (MFR) for pensions creating excessive demand for ILGs and driving down the yield on long term ILGs.

Figure 4.1 below shows the yield curve for both nominal and index linked gilts.

Figure 4.2: Yield curves for both nominal and index linked gilts on 31 July 2009.



Sources: Bank of England and CEPA analysis

Assuming that over the long term inflation assumptions converge on the Bank of England target rate,[11] the much flatter slope of the curve for ILGs relative to conventional bonds suggest that there are factors influencing the market for long dated ILGs that are not present in the market for conventional bonds.

In its recent recommendations on the London airports, the CC acknowledges this and focuses on yields at the short end for ILGs (3 – 5 years) suggesting that the market for these is less distorted due to pension funds requirements that are typically for long dated ILGs so to match their long term liabilities. We agree that the full range of evidence should be considered, and that there should not be an overreliance on very long dated ILGs.

One important factor in assessing the cost of debt is the assumed use of the index linked bond market by the notional DNO. In previous papers,[12] we had assumed that an efficient entity would use a significant proportion of index linked debt. Following the onset of the credit crunch, there was a period when the index linked market was effectively closed, although we do note that there have been several issues in 2008 and 2009 and therefore some limited use of this market for new debt could be assumed.

An alternative to relying on ILGs is to consider the evidence from conventional gilts deflated for inflation expectations, as we do below.

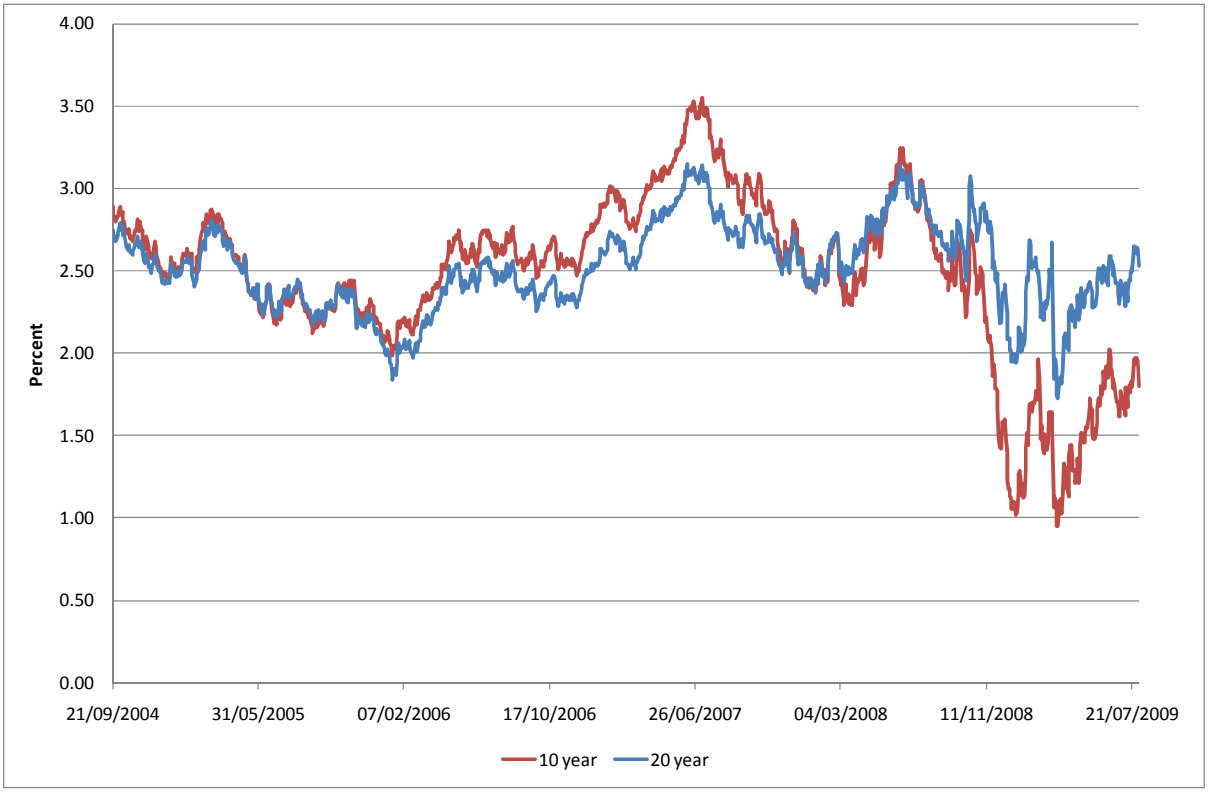
[11] For simplicity, we have deflated nominal gilts by the Bank of England target, whereas near-term (< 2 years) inflation forecasts are currently below this target.

[12] For example, CEPA (2007) 'Risk adjusted cost of capital for Network Rail – final report for the Office of Rail Regulation', July 2007.

4.2.4. Conventional gilts

Figure 4.3 shows yields on conventional gilts deflated, using the Fisher equation, by the Bank of England target inflation rate of 2.0%. In our view the Bank's inflation target is the appropriate long term inflation expectation to deflate by, as alternative indicators, such as the market for inflation swaps, suffer from a distorting lack of liquidity over longer maturities (i.e. beyond 5 years). Furthermore, inflation expectations at the moment are highly uncertain and volatile. It is not clear whether the market genuinely does have inflations expectation of 2.0% when pricing bonds but given current uncertainty it is the most robust indicator available.

Figure 4.3: Deflated yields on UK conventional gilts of 10 and 20 year maturity



Sources: Bloomberg and CEPA analysis.

Table 4.3 suggests that using deflated nominal bonds gives estimates greater, by around 50 – 100 bps, than those derived purely from the ILG market. We recognise that the deflated yields are highly sensitive to the estimate of expected inflation employed but note that it requires long and very long term inflation expectations of around 3.0% for nominal yields to be consistent with yields on ILGs. This is a full 100bps greater than the Bank of England's target rate and would suggest either a lack of faith of by the market in the Bank's inflation targeting policies or concerns as to whether the current 'quantitative easing' combined with government deficits raises long term inflation expectation to closer to 3%, whereas the short term expectation is lower than 2%.

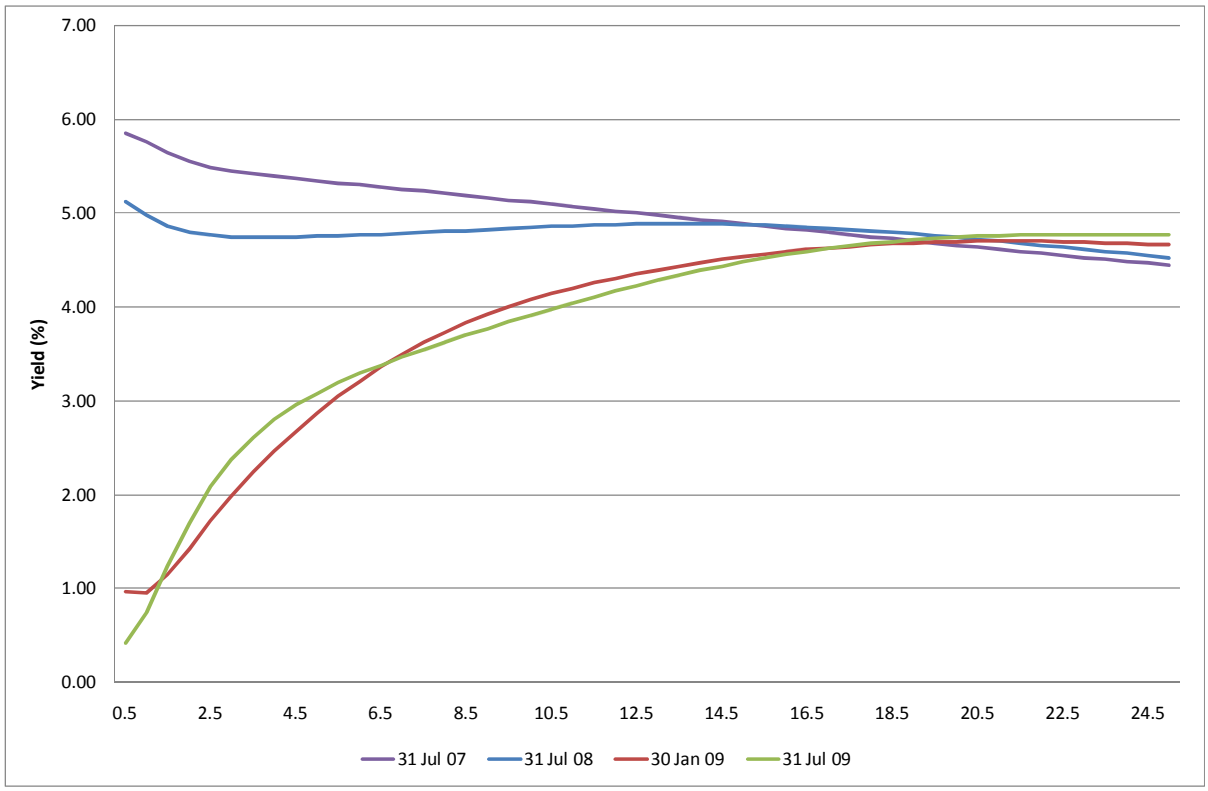
Table 4.3: Summary averages for deflated nominal yields

Gilt:	5 year	10 year	20 year	30 year
Spot	0.9	1.8	2.5	2.5
1 year average	1.1	1.8	2.4	2.3
5 year average	2.3	2.4	2.5	2.3
10 year average	2.7	2.7	2.6	2.5

Sources: Bloomberg and CEPA analysis.

Figure 4.4 below tracks the evolution of the UK yield curve over the last twenty four months.

Figure 4.4: UK nominal yield curve



Source: Bank of England.

The figure shows a significant move from a downward sloping curve pre-credit crunch, to a flattening of the curve and now a more conventional steepening in the curve. This has been driven by sharply declining yields at the short end rather by increasing yields on longer dated debt.

This is a factor for efficiently financed DNOs who, given the long lived nature of their asset base, can be expected to attempt to issue debt of varying maturities and should seek to have average debt maturity in excess of ten years. Whilst an efficiently financed DNO may wish to take advantage of the upward sloping yield curve by shortening the maturity of its debt portfolio, this would need to be balanced against the increased exposure to refinancing risk given the need to finance the assets over a longer maturity.

4.2.5. Conclusion on the risk-free rate

It is not surprising that, given the impact of quantitative easing and a flight to lower-risk assets, the risk-free rate is currently extremely low, and we expect it to remain low for DPCR5.

We place most reliance on ILGs, noting the distortions at the very long end, to inform our narrow range for the risk-free rate. **Therefore, in our view the relevant range for the real risk-free rate based on government securities is 1.75% - 2.00%.** The lower bound of the range reflects yields on ILGs and an upper bound reflecting longer term trailing averages on deflated conventional bonds. The upper bound is also in line with recent regulatory precedent.

4.3. Debt premium

4.3.1. Regulatory precedent

Table 4.4 below sets out the regulatory precedent on debt premium decisions. It shows that more recent decisions have been in the range of 1.4% to 1.9%, an increase from pre-credit crunch levels of a little over 1%.

Table 4.4: Debt premium – regulatory precedents

Regulator	Decision	Debt Premium (%)
Ofwat*	Water & sewerage (2009) – Draft Determination	1.6
CAA	Stansted (2009)	1.7-1.9
CC	Stansted (2008)	1.4-1.7
CAA	Heathrow/ Gatwick (2008)	1.1
Ofgem	GDPCR (2007)	1.1 (implied)
Ofgem	TPCR (2006)	1.3

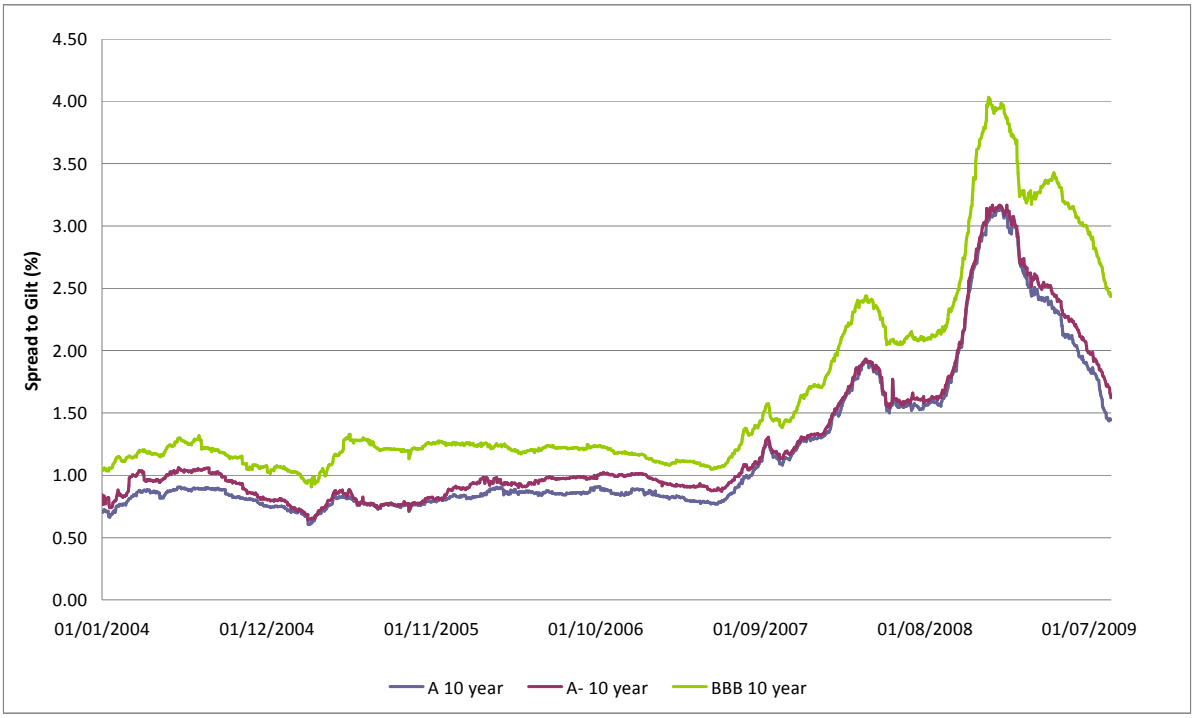
Sources: Ofwat, Civil Aviation Authority, Competition Commission, Ofgem.

**Note:* Ofwat assess a total cost of debt for existing debt of 3.4% and new debt of 4.1%-4.3%, and assumes a ratio of existing to new of 75:25.

4.3.2. Recent market evidence

Figure 4.5 shows the evolution of spreads (against UK benchmark government bonds) for Sterling denominated corporate debt with BBB, A- and A credit ratings (from Standard & Poor's) with a maturity of 10 years.

Figure 4.5: Spreads on UK corporate debt of 10 year maturity



Sources: Bloomberg and CEPA analysis.

The figure shows that premia have been reducing rapidly since spiking at the peak of the financial crisis, although with spreads not yet at levels comparable to those observed prior to the crisis. It is not yet clear whether mean reversion (to recent long term averages) will occur and if so over what time period.

It seems likely that the extremely low margins observed in DPCR4, up until the financial crisis, will not be seen again for some time at least. The dotcom bubble of 2001 provides some precedent on how long debt markets take to 'normalise' and we present spreads on British Telecom and National Grid in Figure 4.6 below.

Figure 4.6: Spreads on British Telecom and National Grid pre and post dotcom bubble

Sources: Bloomberg and CEPA analysis.

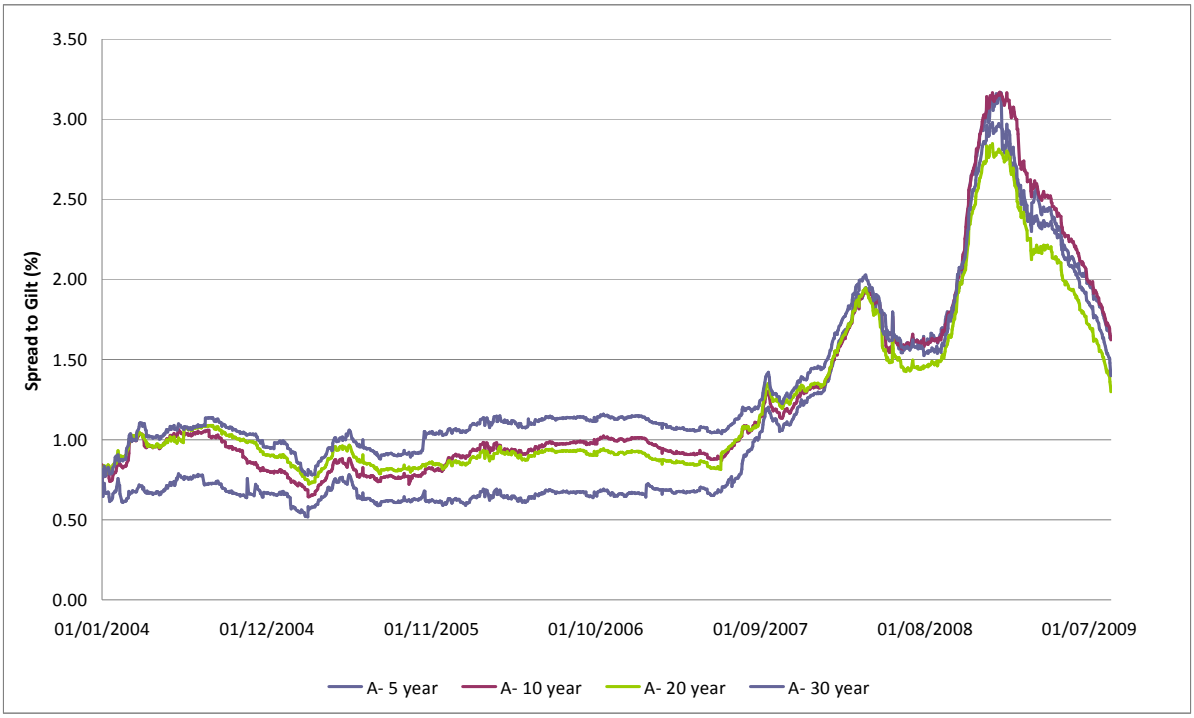
What is clear is that there is evidence of a 'flight to a quality' hypothesis with better rated debt returning to pre-crisis levels much more rapidly than lower rated debt. Additionally, from Figure 4.7 below, there appears to be a discount for utility debt when compared to general corporate debt of similar rating.

Figure 4.7: Spreads on UK corporate debt and utilities debt, 10-15 year maturity

Sources: iBoxx and CEPA analysis.

As noted above, an efficiently financed DNO will seek to issue debt at a variety of maturities in an effort to match the asset lives of its investments, to minimise exposure to refinancing risk and to take advantage of rates available on differing tenor. Figure 4.8 presents premia on A- rated Sterling denominated corporate debt of different maturities.

Figure 4.8: A- rated utility Sterling debt of differing maturities



Sources: Bloomberg and CEPA analysis.

Table 4.5: Summary averages for A- rated utility Sterling debt of differing maturities

Bond:	5 year	10 year	20 year	30 year
Spot	1.8	1.8	1.5	1.6
1 year average	2.3	2.4	2.1	2.2
5 year average	1.1	1.3	1.2	1.4

Sources: Bloomberg and CEPA analysis.
Note: 10 year average not available.

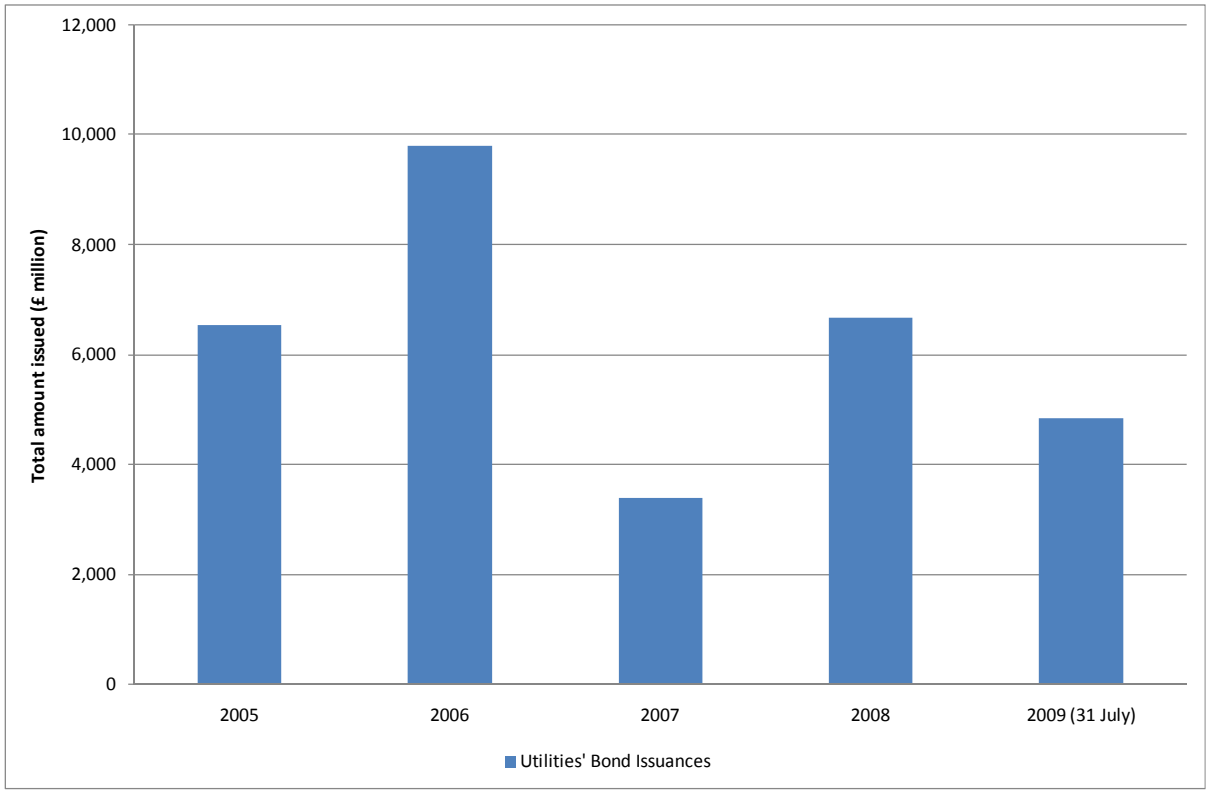
The figure shows that short dated debt is marginally more expensive than longer debt but that there appears to be no material discount for debt based on maturity.

There has been some suggestion of liquidity issues in debt markets requiring a new issue premium in order to place debt in the current climate. Our analysis, presented in

Figure 4.9, suggests that whilst there may be some wider market concerns the relatively low risk utilities appear to have had few problems placing. In June of this year, for example, National Grid stated that it had already ready raised 75% of its £2.5bn financing requirement for 2009/10 (of which £1.4bn was refinancing and £1.1bn was new investment).[13]

[13] National Grid, investor relations *European Roadshow* presentation, June 2009

Figure 4.9: Utility bond issuance by value 2005 – 2009



Sources: Bloomberg and CEPA analysis.

This apparent lack of liquidity constraint for utility bonds seems to be due to combination of rebalancing debt portfolios away from bank debt toward bond markets as the market for bank debt became closed (in any event, UK utilities have typically made much greater use of bank financing than in the US and Asia) and an appetite on the part of investors to buy debt perceived as being low risk or that, at least, faces lower demand risk than banks and industrials.

4.3.3. Conclusion on the debt premium

- **Evidence from the UK bond market suggests a debt premium for solid investment grade rated utilities of c.150 – 200 bps for new debt.**
- The upper end of the range is for the lower investment grade entities and assumes the return to stable levels of debt premia costs is slow and that these costs settle at above pre-credit crunch levels.
- The lower end of the range for new debt assumes that both the recent decline in premia stabilises and is maintained, but that, even for A rated entities, debt premia remain slightly (c.25 to 50 bps) above pre crisis levels during the forthcoming price control period.

4.4. Other evidence on the cost of debt

4.4.1. Recent debt issues by utilities

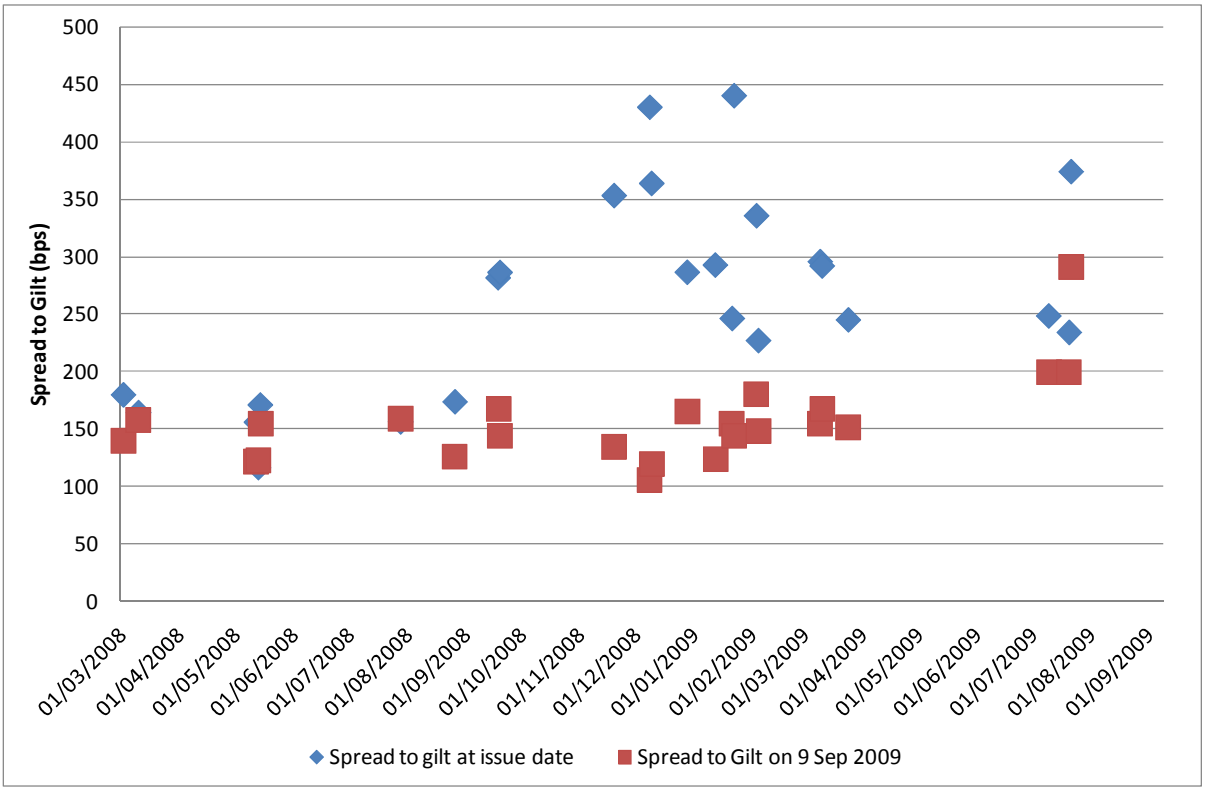
Table 4.6 and Figure 4.10 below shows evidence from recent issues, together with comments from City analysts. It shows that *nominal* debt costs were over 7% even for high quality issuers, but are now well below 6%.

Table 4.6: Yield and spread on GB utilities' bond issuances in 2008 and 2009

Issuer	Issue Date	Maturity	Amount	S&P rating	YTM at issue (%)	Spread at issue (bps)	Spread at 9/9/09 (bps)
Nat. Grid Gas	03/03/2008	03/03/2020	£484m	A-	6.3	180	139
Severn Trent	11/03/2008	11/03/2016	€700m	A-	5.3	164	158
Nat. Grid Gas	13/05/.2008	13/05/2038	£449m	A-	6.1	156	121
Nat. Grid Gas	14/05/2008	14/05/2013	€800m	A-	5.1	116	123
Southern Gas	15/05/2008	15/05/2040	£225m	BBB	6.3	171	155
SSE	29/07/2008	29/07/2013	€600m	A-	6.0	156	159
SSE	27/08/2008	27/08/2038	£350m	A-	6.1	173	126
SSE	20/11/2008	20/11/2028	£500m	A-	8.1	353	134
Nat. Grid Elec.	10/12/2008	28/01/2014	€600m	A-	6.4	364	119
United Utilities	29/12/2008	29/12/2015	£425m	A-	5.9	286	165
Nat. Grid Elec.	13/01/2009	13/01/2031	£379m	A-	7.1	292	124
Severn Trent	22/01/2009	22/01/2018	£500m	A-	6.0	246	154
Nat. Grid Plc	22/01/2009	22/04/2014	€578m	BBB+	6.7	440	144
Nat. Grid Plc	04/02/2009	15/04/2014	£414m	BBB+	6.3	335	180
SSE	05/02/2009	05/02/2014	£700m	A-	5.1	227	148
United Utilities	25/03/2009	25/03/2022	£375m	A-	5.9	245	152
Wales & West	10/07/2009	30/11/2021	£250m	N/A	6.3	248	200
ENW Capital	21/07/2009	20/06/2015	£300m	BBB	6.8	374	291
ENW Finance	21/07/2009	21/07/2021	£200m	BBB+	6.2	234	199

Sources: Bloomberg and CEPA analysis.

Figure 4.10: Evolution of spread on GB utilities' bond issuances in 2008 and 2009



Sources: Bloomberg and CEPA analysis.

We also note with interest that selected corporates do appear to have been able to issue index-linked debt, as illustrated in Table 4.7. This indicates that Ofgem should consider assuming a share of this traditionally lower cost debt in the efficient new debt portfolio of a DNO (for GDPCR, CEPA recommended 25% for a share of index-linked of total debt, so this represents an upper bound given that the market appears more restricted).

Table 4.7: Index-linked bond issuances by UK utilities

Issuer	Issue Date	Maturity	Amount	S&P Rating
Nat. Grid Gas	05/11/2008	05/11/2018	€163m	A-
Nat. Grid Elec.	23/12/2008	23/12/2058	£9m	A-
Nat. Grid Elec.	12/02/2009	12/02/2019	€100m	A-
Nat. Grid Gas	19/02/2009	19/02/2019	€100m	A-
United Utilities	21/07/2009	21/07/2039	£70m	A-
Nat. Grid Elec.	05/08/2009	05/08/2039	£25m	A-
Wessex Water	07/09/2009	01/06/2039	£50m	BBB+

Sources: Bloomberg and CEPA analysis.

The data above on new issues is supported by City analysts' comments:

- Northumbrian Water: 'the group now has now fixed 75% of its debt at long-term interest rates of 5.8% [nominal], with a further c20% of index linked debt that is fixed at a real rate of 1.85%'.[14]

- '[Grid's] fall in effective interest charges having already started to take effect, with a 60 basis point fall to 5.7% [nominal] in FY09'.[15]

4.5. Conclusion on the cost of new debt

In light of the analysis above, we make the following conclusions about the cost of debt:

- **Evidence on the real risk-free rate points to a narrow range of 1.75% to 2.0%.**
- **Evidence on the debt premium lies in the range of 1.50% to 2.00%.**
- **Conservatively discarding the combined low ends, this provides a narrow range of 3.5 – 4.0%.**
- **Ofgem should review the likely use of new index linked debt by an efficient DNO to inform the choice of position in the range.**

Table 4.8: Summary on new debt

Element	Low	High
Cost of new debt	3.5%	4.0%
Proportion of embedded debt (see below)	70%	70%
Impact on allowed cost of debt	1.05%	1.2%

Source: CEPA analysis.

We note that this range is lower than that proposed by Ofwat in its Draft Determination (4.1 – 4.3%), but believe that our view in line with the market evidence.

4.6. Embedded debt

As noted above, DPCR5 come at a time of major change in the state of the debt markets, and one might very reasonably expect a very different cost of debt for embedded and new debt for a notional DNO. This section considers in further detail whether and how an embedded debt value should be calculated including the regulatory precedent for this.

4.6.1. Overview of regulatory precedent

Ofwat's recent Draft Determination has set out 3.4% as an embedded debt allowance.[16] This is relative to a cost of debt of 4.3% at PR04 (from the range 3.3% to 4.4%) but possibly adjusted for:

[14] Deutsche Bank, Research note dated 3 June 2009.
[15] Citigroup, Global Markets research note dated 14 May 2009.

- greater certainty around inflation; and
- removal of headroom.

For 'total' cost of debt, i.e. embedded and new, Ofgem assumed 3.55% for GDPCR,[17] 4.1% for DPCR4[18] and 4.3% for DPCR3.[19] Again, these decisions would out of necessity have included a 'headroom adjustment', given the absence of a trigger mechanism.

4.6.2. Need for embedded debt cost

In regulated markets the allowed WACC is often expected to play two roles:

- a signal for new investment, since it sets the return available to persuade investors to lend new money to the company to either fund new investment or to refinance existing investments; and
- remuneration of existing investments, since it provides the cash-flow to make payments on existing debt and to pay dividends on equity.

During normal periods, i.e. throughout a standard economic cycle, and when a company/ industry is close to the steady-state level of investment/ replacement of assets there is no real problem with expecting a single WACC to meet both roles – although it is standard practice for the signal for new investment to be the deciding factor. Within a normal economic cycle allowing existing assets to be either over- or under-remunerated (depending on where the current estimate of the WACC is relative to the average over the cycle) should not matter since over the whole cycle the assets are appropriately remunerated, although consumers may of course have different preferences.

This situation will only hold if the amount of investment in any price control period is at a steady state – otherwise the position in the cycle would matter. This is because some of the asset base would be over- or under-remunerated during the economic cycle – if a disproportionate amount of the asset base is funded when interest rates are above the average rate then the company will be unable to fully remunerate the borrowing during the economic cycle. Further, if there is a structural break in the cycle then previously funded investment may be over- or under-remunerated. It appears that during the late 1990s/early 2000s there was a structural break. As with the non-steady state investment this will lead to a part of the asset base being out of sync – if the structural shift was downwards then the previous investment will be under-remunerated and vice versa.

While it is too early to say if the credit crunch of the last 18 months has led to a structural shift, this clearly has to be a concern. There are several ways in which regulators can respond to this type of problem:

- utilise the financeability correction options to ensure that the company is able to finance itself;

---

[16] Ofwat (2009) 'Future water and sewerage charges 2010-15: draft determinations'.
[17] Ofgem (2007) 'Gas Distribution Price Control Review – final proposals'.
[18] Ofgem (2004) 'Electricity Distribution Price Control Review – final proposals'.
[19] Ofgem (2004) 'Electricity Distribution Price Control Review – background information on the cost of capital'.

- take no action; or
- establish a form of differential WACC with either an embedded debt premium or discount.

Clearly the first option is not tenable when the company could be faced with losses, and while it may work for a period when companies could be making additional returns it could create a non-sustainable situation *vis-à-vis* customers, especially when those returns would be earned during a period of heightened price sensitivity. The second option overcomes the disadvantage of the first with respect to losses but may do it in a non-transparent and potentially net present value positive way for the company (at the expense of customers). It suffers the same concerns as the first approach for the situation when additional returns might be earned.

The third option of a differential WACC allows flexibility to respond to both potential under- and over-recovery periods and should be able to do this in a transparent way. So, it seems to be better than the two alternatives, although the issue is raised as to whether a predictable approach can be developed.

4.6.3. How to measure embedded debt

How should embedded debt be measured? In principle it would seem that the right approach is:

- establish the amount of remaining fixed-term debt from each of the last price determinations;
- determine an appropriate allowed cost of debt for each of the tranches of embedded debt; and
- establish a weighted cost of embedded debt to apply to the proportion of embedded debt in the capital structure.

Based on this type of approach there are three questions:

- How far back in terms of price determinations should one go?
- What is the basis for determining an appropriate cost of debt to allow for each tranche?
- What proportion of the capital structure should be treated as embedded?

Each is addressed in turn.

In principle, since regulated utilities tend to have long lived assets you would expect a high degree of liability matching and consequently a proportion of long lived debt. This could be twenty or even thirty-year debt and consequently there could be debt stretching back three or more price control periods that needs to be considered.

It is important that any proposed approach retain the right incentives for companies to fund themselves efficiently. Consequently, any allowed cost of embedded debt should be based on an efficient cost of debt at the time at which the debt was borrowed. However, this should not necessarily be the headline allowed cost of forward looking debt from that price determination, since that will incorporate the uncertainty premium (headroom) for both inflation and underlying interest rates. That premium should be removed since some, if not all, that uncertainty has been

removed. But what is clear is that the allowed cost of embedded debt should not be based on the actual borrowing rates since that would affect incentives.[20]

Finally, as with the allowed cost of embedded debt, the amount of debt included in each tranche should be based on the efficient structure of borrowing and gearing rather than actual. As noted above, companies will utilise a portfolio of different maturity securities – some of which will imply refinancing the funding of an asset. Consequently, only a proportion of debt should be treated as embedded and this would include 10 year and upwards maturity debt, meaning that the proportion that survives to each new price determination will drop at each review.

While this approach is correct it is quite data intensive, and much of that data will not be publicly available. The few examples of embedded debt calculations (discussed below) have adopted much simpler calculations. That does seem appropriate and consequently a realistic position might be to put greatest weight on the last determination and limited weight on the one before that when coming to a decision about what an appropriate allowed rate and amount of embedded debt would be.

4.6.4. Regulatory precedent for embedded debt

In the UK, Ofwat included an allowance for embedded debt in PR99 (see Box 4.1). In their PR09 document for Ofwat,[21] Europe Economics provide analysis of embedded debt adjustments that can be applied to other regulated industries. They proposed three options, which were analysed in terms of their impact on incentives and risk allocation. This is summarised in Table 4.9. Based on incentive considerations, they recommend that Ofwat should not make any adjustments for embedded debt now or in the future.

Box 4.1: Ofwat and embedded debt

In PR99, Ofwat introduced an adjustment to the cost of capital to take account costs of existing fixed rate debt which could not be refinanced except at equivalent cost. Ofwat calculated an embedded debt premium of between 0.0% and 0.4% from the industry average cost of fixed rate debt and the actual value of fixed rate debt on their balance sheets. In PR04 Ofwat removed this allowance except in certain extreme circumstances, arguing that a single rate should be sufficient for a company with an efficient debt portfolio. This was as their allowed cost of debt premium was relatively backward looking, negating the need for a premium. Ofwat rejected the use of an explicit split cost of capital in PR09 as they did not believe that it would be necessary to increase marginal returns to facilitate new investment or low assign a lower rate to sunk investment.

[20] The financeability test is still available to handle any divergence between actual and efficient costs of embedded debt.

[21] Europe Economics (2009) 'Cost of Capital and Financeability at PR09'.

Table 4.9 Europe Economics' options for embedded debt

Option	Proposal	Incentives	Risk
1	Making full allowance for embedded debt on a company-by-company basis	Little incentive for companies to raise finance efficiently	Impact of poor financing decisions is on consumers
2	Applying an embedded debt adjustment based on average embedded debt costs across the industry	Improved incentives as adjustment is based on industry wide financing decisions	Impact of systematic or industry-wide risks such as interest rates or regulatory risk on consumers
3	Making no allowance for embedded debt	Strongest incentives	Companies bear full cost of financing decision. Higher industry asset beta.

Source: Europe Economics.

Europe Economics reject option one in Table 4.9 as it provides dull incentives for companies to finance themselves efficiently, with the impact of these decisions resting on consumers. They reject option two given the allocation of systematic and industry-wide risks with consumers. Consequently given the potential to dull financing incentives and the unattractiveness of transferring risks to consumers they recommend that Ofwat should not consider making any embedded debt adjustments.

This is a relatively strong position on embedded debt adjustments. While it provides a good framework for considering incentives and risks, it is somewhat removed from the reasons why we might want to consider having embedded debt adjustments. When financing costs are rising, not making adjustments means that companies can make a significant margin on their existing debt at the expense of consumer, given the need to set a higher WACC to incentivise new investment. When financing costs are falling, not making adjustments can lead to financeability problems. Embedded debt adjustments closer to option two may be desirable once these impacts are considered alongside financing incentives and risk allocation.

It may be worth considering a blended approach to setting the WACC where historical and current financing costs are given weighting in cost of debt determinations, weighted to take account of industry-wide financing and re-financing requirements. This approach lies between options two and three and may provide a more balanced outcome.

Ofwat did not follow Europe Economics' advice regarding embedded debt adjustments. In their draft determinations for PR09, they refer to two separate rates which input into a blended WACC, designed to take account of both new investment and embedded debt. Ofwat has assumed 3.4% as an embedded debt allowance. This is relative to an allowed cost of debt of 4.3% at PR04 (from the range 3.3% to 4.4%). Choosing a figure closer to the lower end of the range might have been in response to:

- greater certainty around inflation; and/or
- removal of headroom which should be associated with the uncertainty about forward looking debt rather than the certainty of embedded debt.

Overall, Ofwat has now utilised embedded debt premiums and suggested a discount for PR09 the basis on which the adjustments have been made are difficult to establish.

4.6.5. Our estimate of embedded debt

Given the approach to estimating an embedded debt value outlined above, it is now possible to establish a value to be considered as part of the DPCR5 determination. Table 4.10 provides a summary of the allowed cost of debt from the last two distribution determinations. The value employed at DPCR4 was 4.1%.

Table 4.10 Previous Ofgem cost of debt determinations for electricity distribution companies

Element	DPCR3	DPCR4
Risk free rate	2.25 – 2.75	2.25 – 3.00
Debt premium	1.65 – 1.85	1.00 – 1.80
Cost of debt	3.90 – 4.60	3.25 – 4.80

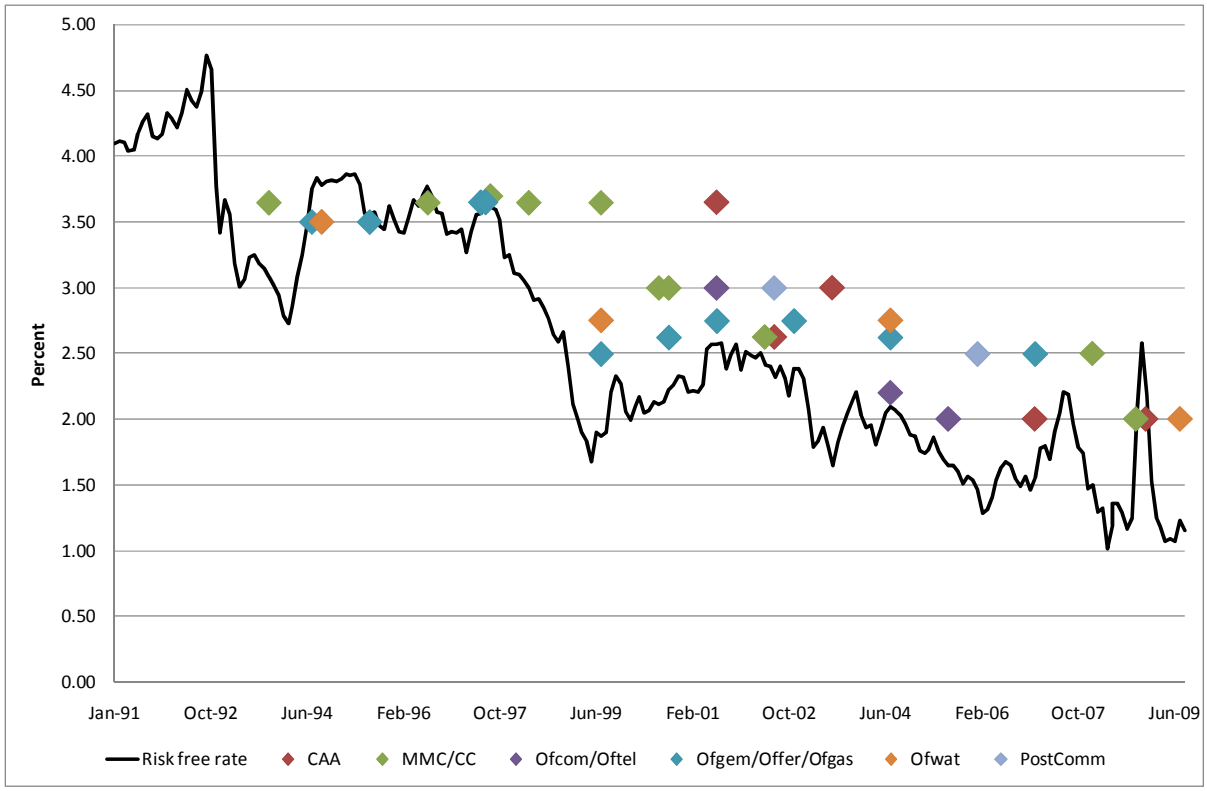
Source: Ofgem.

As noted in the approach, these are forward looking allowances and consequently need to be adjusted for the headroom allowed at that time. It is likely that there is headroom in both the risk-free rate and the debt premium, however, we will just focus on the risk-free rate. Figure 4.11 provides a summary of previous regulatory determinations and the apparent level of headroom. It would appear from the diagram that Ofgem has allowed headroom of between 50 and 100bp at previous determinations, although the actual level throughout the price control period was less during the period 2000-2005 than since 2005. Ofwat's proposed reduction from PR04 for PR09 is 90bp.

This would suggest that a reduction of between 75 and 90bp from the 4.1% allowed for DPCR4 would seem to be appropriate for embedded debt. **That would give rise to a range of between 3.20% and 3.35%. Since we believe that the range should not generally go below the range determined at the last review we would argue for a low end of the range for embedded debt of 3.25%.**

We think it appropriate to give some consideration to the cost of embedded debt taken out during the worst days of the credit crunch, when some DNO debt would have been refinanced at very high cost, although clearly an efficient DNO having to re-finance at higher costs would seek to do so on a floating or shorter term basis. If we allow for a proportion of higher cost embedded debt of this nature of say 10% (bearing in mind we already allow below for 30% of new debt), **we derive an upper end of the range for embedded debt of 3.4%.**

Figure 4.11: Benchmark risk free rate compared with UK authority decisions 1991-2009[22]



Sources: Bank of England and CEPA analysis.

4.6.6. What proportion of the debt should be subject to the embedded debt discount?

In terms of establishing a stock of embedded debt we need to consider the information:[23]

- Forecast RAB 2010: £16.2 billion
- Forecast capex DPCR5: £5.8 billion
- Gearing: 60%
- Assumed depreciation: £4.0 billion

This means we have a forecast RAB of £18 billion at the end of DPCR5 and a debt stock of 60% of this, i.e. £10.8 billion. If we assume that 60% of the capex is funded through debt this means that £3.5 billion of new debt is raised. Consequently embedded debt throughout DPCR5 starts at 100% (this is a simplifying assumption – see next paragraph) and falls to approximately 68% by the end of the period. On a simple straight-line average this would mean embedded debt of 84%.

However, some of the existing debt is likely to be shorter-term and so need refinancing. Exactly how much of the stock of debt this would constitute is unclear, but it would be surprising if more than 10-15% of the existing stock of debt had a mismatch in maturity (accepting that some

[22] Regulatory determinations taken from the regulatory proposals of the respective regulators.
[23] Ofgem (2004) 'Electricity Distribution Price Control Review – background information on the cost of capital'.

will naturally have a shorter life but would be paid down through the depreciation charge). So, a feasible range for the level of embedded debt is between 80% and 70%.

We note that NERA, who should have good access to DNO funding information, assume 70% of debt is embedded,[24] where as PWC apply no special adjustment for embedded debt since the latter is implicitly accounted for by PWC's reliance on long-term averages.

Table 4.11 summarises our embedded debt position.

Table 4.11: Summary on embedded debt

Element	Low	High
Cost of embedded debt	3.25%	3.40%
Proportion of embedded debt	70%	70%
Impact on allowed cost of debt	2.275%	2.38%

Source: CEPA analysis.

We note that the upper end of this range is compatible with that proposed by Ofwat in its Draft Determination (3.4%).

4.7. Fees

We believe that is reasonable for bank and bond issuance fees to be allowed as part of the cost of debt, and note that the CC (Stansted) recently suggesting allowing 10bps for these fees.[25] Based on consultations with the City, we believe that this is relatively generous as an amortised cost over the life of a bond, and as such we do not allow an explicit additional cost for these fees, as we believe that our range is sufficiently broad to capture an allowance for fees.

4.8. Conclusion on the Cost of Debt

Table 4.12 below weights our assumptions on embedded and new debt to produce our recommended range on the allowed cost of debt.

Table 4.12: Weighted CoD

Weighting	Element	Low %	High %
70%	Embedded debt	3.25	3.40
30%	New debt	3.5	4.0
Weighted Average	Cost of debt	3.325	3.58

Source: CEPA analysis.

The appropriate position in the range depends on the weighting between embedded and new debt and Ofgem's view on the path of the future cost of new debt, including the use of index linked debt.

[24] NERA (2009) 'Distribution Network Operators' cost of capital for DPCR5 – a report for the DNOs', p. 33.
[25] Competition Commission (2008) 'Stansted Airport Ltd – Q5 price control review', p. L11.

5. COST OF EQUITY

5.1. Introduction

This section sets out the background to recent decisions on the cost of equity, what can be learned from a purely CAPM-based approach, and evidence from the market on the actual cost of equity.

5.2. Background

Since Ofgem's last decision on WACC in December 2007, and against the background of a banking crisis and severe economic downturn, equity markets have seen significant falls (the FTSE100 index is currently 22% lower than it was in December 2007), withdrawals of capital and volatility. Given this context, regulators have been concerned to know the impact on the cost of equity and whether the traditional CAPM-based approach (and Ofgem's more recent Total Market Return approach) can provide much insight on the actual cost of equity for a notional efficient regulated utility.

As seen in Section 4, risk-free rates are well below their long term averages and any measure of total market return will be negative in recent years, thus implying a negative equity risk premium (ERP) in the short term. Clearly this is nonsensical – investors do not 'require' a negative return – but it does illustrate the risks of relying on short-term equity market data to inform the allowed cost of equity.

Furthermore, more tangible, transaction-driven evidence is, not surprisingly, comparatively lacking: there have been no significant change of control transactions amongst regulated utilities since the sale of Norweb in late 2007, and whilst there have been equity or quasi-equity issues by regulated entities or their parents (SSE, Southern Water and Anglian, amongst others), there is little public data available on these issuances and it is difficult to prescribe a precise market value implied by the issuance to the regulated part of the business (and thus to estimate an implied cost of equity).

Against this background, regulators and commentators have considered more forward-looking estimates of the cost of equity, notably the DGM. But DGM is in itself highly volatile, depending on the timing of the analysis (given stock market volatility) and the assumptions made about expectations of future dividend growth. DGM is especially problematic at present, given the range of expectations over the future path of dividends and whether they will be cut, which in turn is linked to uncertainty over levels of corporate profitability in the depths of a recession. Furthermore, some of the results produced by DGM are simply implausible, bearing no relation to the opportunity cost of capital and relative risk.

Our approach is thus to consider the full range of evidence available from CAPM and the market evidence, comparing this with *a priori* reasoning supported by long-run economic data.

In the rest of this section we, therefore, set out recent regulatory decisions, then current market evidence and then the range of views on the components of CAPM and, finally, provide an a priori cross-check.

5.3. Recent regulatory decisions

Table 5.1 below shows that regulators have considered 7-7.5% as the appropriate range for the cost of equity, although the basic range arising from the building blocks approach is broader than that.

Table 5.1: Recent regulators' assumptions on the cost of equity

Regulator	Case	R_f	ERP	Equity β	CoE Range	CoE Used (post tax)
Ofwat	Draft determination (2009)	2.0	5.4	0.9		7.1
CAA	Stansted (2009)	2.0	3.0 – 5.0	1.0 – 1.2	5.0 – 8.2	
CAA	Heathrow (2008)	2.5	2.5 – 4.5	0.9 – 1.15		7.3
Ofgem	GDPCR (2007)	2.5	4.5	1.0		7.25
Ofgem	TPCR (2006)	2.5	4.5	0.5		7.0
Ofgem	DPCR4 (2004)	2.6	2.5-4.5	0.6-1.0		7.5

Sources: Ofwat, Civil Aviation Authority, Ofgem.

5.4. Market evidence

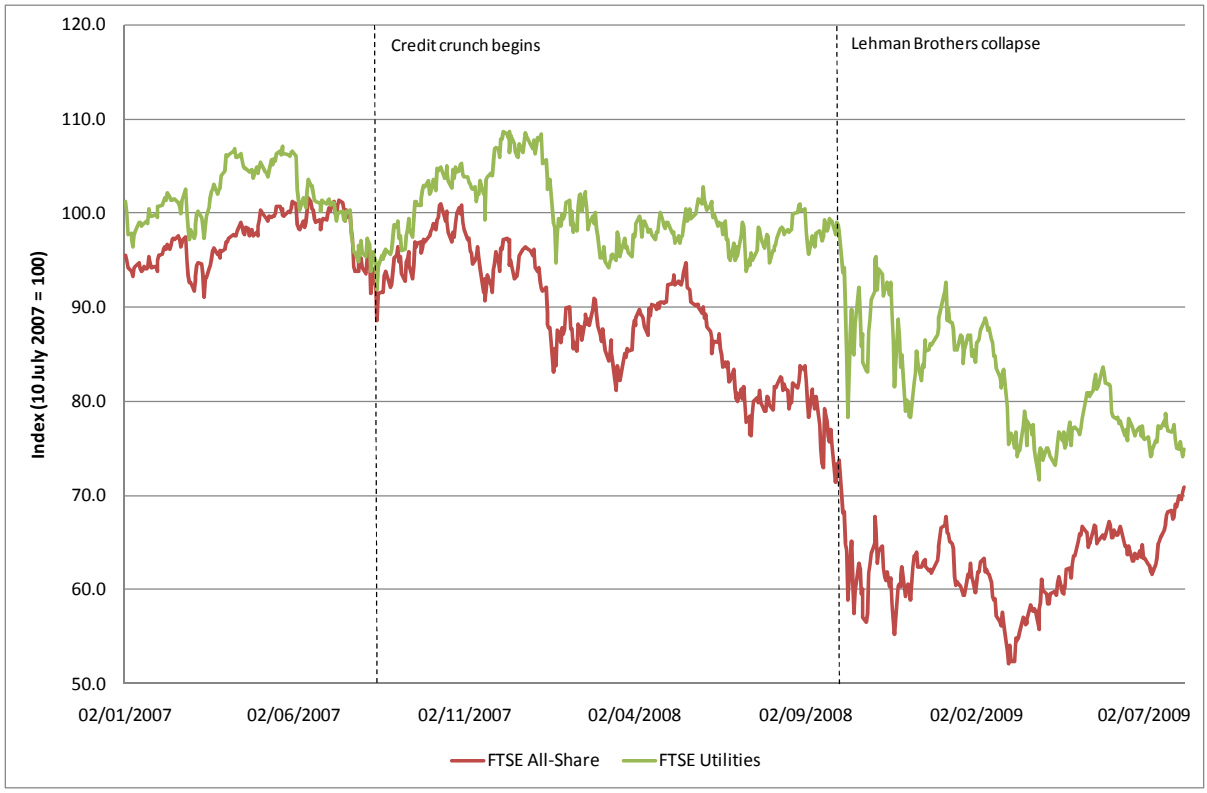
In this section we consider market evidence from:

- relative share price movements;
- analyst comment; and
- market to asset ratio (MAR) analysis.

5.4.1. Relative share price movements

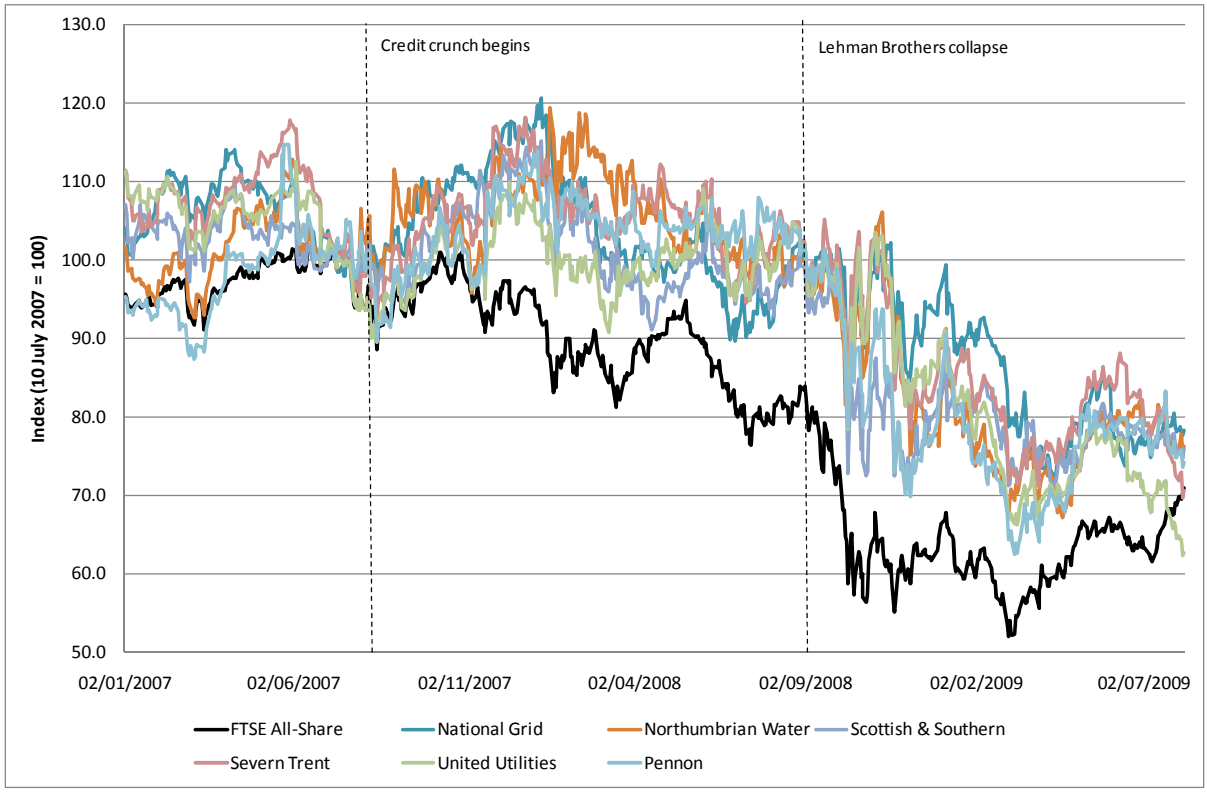
Regulated utility share prices have been considerably less adversely affected by the financial crisis than other types of stocks. The low covariance of regulated utility shares relative to the equity market as a whole is the evidence of the low beta of regulated utility equity. This is unsurprising given the fact that the RAB approach underwrites future cash flows and reduces the downside risks associated with falling demand evident in many other sectors. Figures 5.1 and 5.2 below show this relative performance.

Figure 5.1: Share price movement – FTSE All-Share vs FTSE Utilities Index



Sources: Bloomberg and CEPA analysis.

Figure 5.2: FTSE All-Share vs individual utilities



Sources: Bloomberg and CEPA analysis.

The figures above show that utilities are exhibiting characteristic low beta performance: when the equity market fell sharply, utilities fell proportionately less, when the market recently rose rapidly utilities did not. This evidence points to an equity beta less than 1, although it is worth noting that Ofgem has been relatively conservative (assuming an equity beta of 1) in its implied beta assumption in recent decisions.

5.4.2. Analyst comment

It is interesting to note that even at Ofwat's post tax WACC (Draft Determination) of 4.5% (equivalent to a Vanilla WACC of 5.1%), City analysts still consider that water companies will make a positive spread of c50bps on the WACC.[26] This would imply that Ofwat's draft allowed cost of equity of 7.1% is not reasonable and may, if anything, represent a prudent upper limit for the cost of equity for DNOs, given that they have a similar or lower risk profile (see Section 6 below).

5.4.3. MAR analysis

We believe that the MAR can provide a useful cross-check on the cost of equity. The MAR of a listed regulated business is the ratio of its market capitalisation to its RAB. Whilst it can provide useful additional information about a company's 'true' WACC, care needs to be taken to adjust for factors other than a differential between the actual and allowed WACC, such as outperformance on incentives and efficiency measures.

The premise on which MAR analysis is that, if the market expects a regulated company to achieve operating and capital performance in line with the regulator's assumptions, and if the allowed WACC equals the 'true' WACC, then the MAR will be equal to 1.0. This is because the net present value (NPV) of expected net cash flows should, if the regulator's assumptions hold, equal the value of the RAB. Similarly, if the allowed WACC is higher or lower than the 'true' WACC, and the market expects the regulated company to perform in line with the regulatory assumptions, then the MAR will be greater or less than 1.0, respectively.

The ratio is set out below:

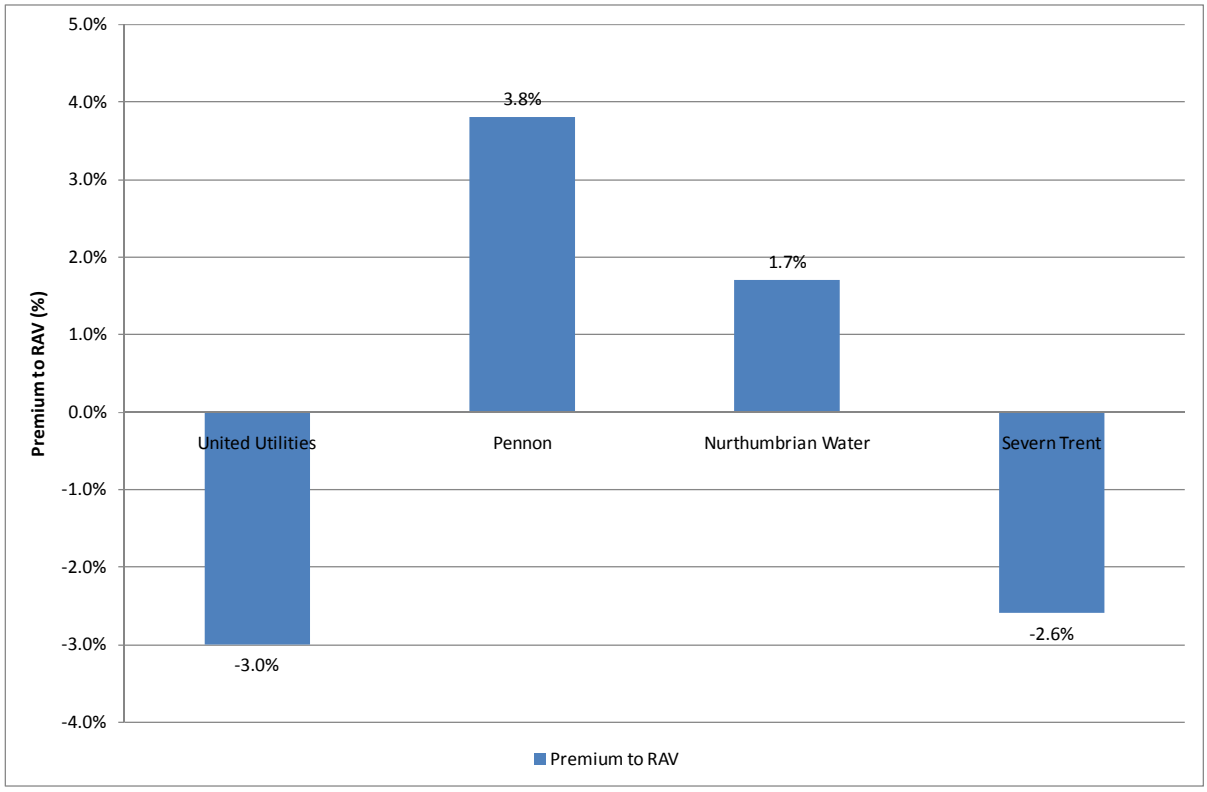
$$\text{MAR} = \frac{\text{Enterprise Value of regulated entity}}{\text{Regulatory Asset Base}}$$

Once an MAR is calculated, an implied cost of equity can be derived, given an assumption about the cost of debt, efficiencies and outperformance on incentives. Figure 5.3 shows Morgan Stanley's estimated premium of share valuation relative to the RAB for regulated water companies.[27]

[26] 'We assume the regulator sets allowed WACC at 4.7% post-tax real – a level that will allow the companies to make a small (80-85bps) premium return during 2010-15' J P Morgan 30 June 2009.

[27] Morgan Stanley (2009) 'UK water companies – balance sheets in focus', research note dated 4 August 2009.

Figure 5.3: Premium to RAB

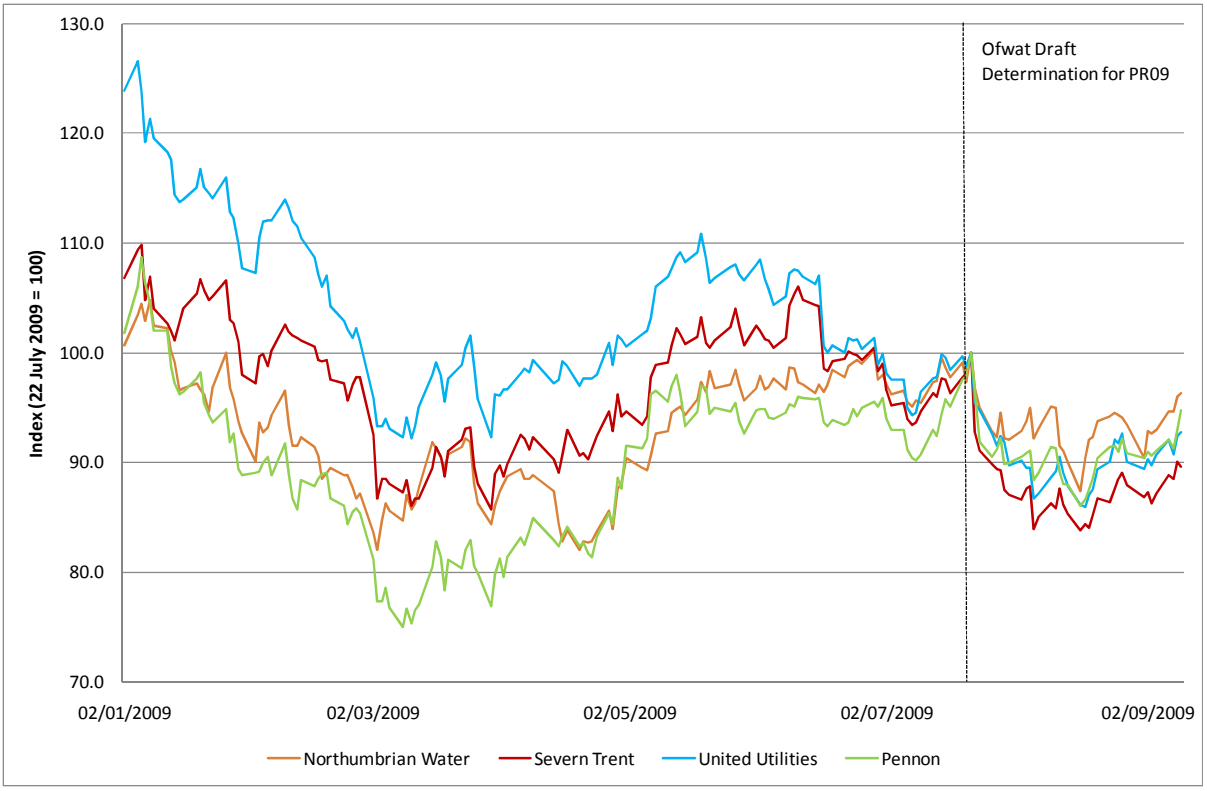


Source: Morgan Stanley.

The data from MARs needs to be treated with caution as it is dependent on quoted share prices as an indicator of equity value, and those prices have been highly volatile of late. Nonetheless, Figure 5.3 (where the premiums were calculated after Ofwat draft determinations were published) does not appear to point to dramatic increases in the cost of equity over and above that allowed (or expected to be allowed) by Ofwat.

We have also looked at the share price of quoted water companies in the run up to and post the publication of Ofwat's Draft Determination. The share prices show a dip of c.10% immediately post publication, but with a recovery to a c.5% drop thereafter. Given the fluctuations in share prices over 2009 to date, this movement does not appear too significant.

Figure 5.4: Equity price indices for water companies around Ofwat's draft determination for PR09.



Sources: Bloomberg and CEPA analysis.

5.5. Share issues

We have also considered what might be learnt from recent equity issues by regulated companies:

- Pennon has raised £125m of convertible debt at parent level, mainly for non-regulated business.[28]
- '[SSE's] placement of £500m of new share capital at 1140p'.[29] CEPA's analysis shows that this implied a c5% discount to RAB.
- 'According to the Sunday Times, Anglian Water has received an equity injection of £115m (2.2% of RAB), Southern Water £85m (2.3% of 2009E RAV), and South East Water £15m (2.8% of RAB)… on our estimates the UK Water companies are trading on an average discount to March 2010 RAB of 1.9%'.[30]

Once again, there are issues with the transparency and robustness of the data from share issues. On balance, the share issues seem to support analyst comments that many utilities have been trading at a slight discount to RAB. Most analysts do, however, consider 'fair value' to be a slight premium to RAB, indicating that the allowed cost of equity set by Ofwat (7.1%) is unlikely to be below the actual cost of equity.

[28] Ibid.
[29] Nomura, Equity research note dated 7 May 2009.
[30] Cazenove, Utility research note dated 27 April 2009.

5.6. Precedents on CAPM parameters

5.6.1. Equity risk premium

The ERP is the extra return over the risk-free rate which investors require if they are to hold a portfolio of equities rather than risk-free securities alone. Estimation of the ERP is fraught with difficulties – it is a variable whose value cannot be directly observed and hence is one of the more contentious parameters estimated when determining a company's WACC. Complicating matters further is that few studies concur on what the true value of the ERP is, or even the correct method for estimating it with, for example, reams of academic literature given over to debating the relative merits of geometric means versus arithmetic means.

Generally speaking, however, the ERP is estimated by determining the *ex post* 'excess returns' of a market portfolio over the historic risk-free rate. The value of the ERP measured in this way is highly sensitive to the period over which the average is measured, to whether the arithmetic or geometric mean is used and to whether the market portfolio is made up of a portfolio of regional or global equities. This estimation method assumes that *ex post* excess returns are a fair reflection of the *ex ante* expected excess returns.

Table 5.2 below summarises a broad range of academic studies on total market returns and the ERP implied by these. These estimates were reported and commented upon by the Competition Commission in its analysis of the cost of capital during the 2008 review of Stansted Airport, and have been updated by CEPA.

Table 5.2: UK market return/equity-risk premium estimates

	Rm	**Rf**	**Rm-Rf = ERP**
Ex post estimates, long –term historical data			
Dimson, Marsh, Staunton (2009) geometric averages			3.6
Dimson, Marsh, Staunton (2009) arithmetic averages			5.0
Smithers and co (2004; 2006)		2 – 2.5	
Ex ante estimates, long –term historical data			
Dimson, Marsh, Staunton (2009) arithmetic averages			4.5-5.0
Gregory (2007) geometric averages	5.4-6.8	2.2-3.0	3.3-3.8
Gregory (2007) arithmetic averages	5.9-7.8	2.3-2.9	4.4-5.3
Forward-looking residual income model recent historical data			
Claus and Thomas (2001)			3.4
Ex ante estimates using latest market data			
Gregory (2007) geometric averages	3.8-5.6	2.3	1.7-3.3
Gregory (2007) arithmetic averages	4.3-6.2	2.3	2.0-3.9
CC (2007), dividend growth model	4.6-5.8	2.5	2.1-3.3
CC 12 September 2008, dividend growth model	5.8-7.0	2.0	3.8-5.0

Sources: Competition Commission and CEPA.

The table indicates that academic studies give a wide range for the UK ERP of 1.7% – 5.3%.

It is particularly noteworthy that Dimson, Marsh and Staunton (DMS) 2009, whose data analysis is perhaps the most respected in this field, say "After adjusting for non-repeatable factors, we infer that investors expect an annualised [arithmetic mean] equity premium of 4.5-5.0%". It is also important to note that DMS' 2009 work points to an *ex post* (arithmetic) ERP of 5.0%.

We also note that the CC (Stansted 2008) used 3-5% ERP, noting that there is no consensus on whether the use of arithmetic mean or geometric mean is more correct.

There is, therefore, little academic evidence that the ERP has increased above 5% and until Ofwat's draft PR09 determination no recent regulatory precedent for going above 5%.

5.6.2. Equity Beta

A company's equity beta is a measure of the non-diversifiable risk attached to its equity. That is, the systematic risk faced by the company that cannot be diversified away from as part of an investor's balanced portfolio of assets. For companies with listed stock, it is measured as the covariance between returns on the stock and returns on the market portfolio, over the variance of returns on the market portfolio. By definition, the market has a beta of 1.0.

Broadly speaking there are two approaches to determining a business' equity beta:

- rely on actual observed equity betas seen in the market; or
- estimate a de-levered asset beta, that is, the operational risk of the underlying business assets, and apply a particular gearing level to take account of financing risk and calculate its equity beta.

The issue with the former is that, in the case of regulated assets, there are few standalone listed companies meaning the observed equity betas reflect wider risks faced by the company than just the risks faced by the regulated asset. Furthermore, as we are using a notional gearing level it would be inappropriate to rely wholly on observed equity betas as they reflect individual financing decisions. For these reasons we place more weight on the second approach outlined above.

Most commentators reach a similar conclusion on asset beta. We present in Table 5.3 the asset beta data presented by PwC in its most recent analysis for Ofgem.

Table 5.3: PwC's analysis of asset betas

	5 year monthly (assuming zero debt beta)	5 year monthly (assuming 0.1 debt beta)	3 year weekly (assuming zero debt beta)	3 year weekly (assuming 0.1 debt beta)	2 year daily (assuming zero debt beta)	2 year daily (assuming 0.1 debt beta)
National Grid	0.30	0.36	0.37	0.40	0.33	0.37
Scottish and Southern Energy	0.57	0.59	0.61	0.62	0.55	0.56
Scottish Power	0.47	0.47	0.56	0.57	0.55	0.56
United Utilities	0.32	0.36	0.38	0.47	0.35	0.43
Severn Trent	0.29	0.33	0.38	0.53	0.34	0.48
Pennon	0.37	0.44	0.41	0.43	0.34	0.36
Kelda	0.35	0.38	0.42	0.54	0.40	0.51

Source: PricewaterhouseCoopers[31]

We note that most of the evidence points to an asset beta for utilities of 0.3-0.4%. Re-levering this for a 60 – 62.5% notional gearing level[32] gives an implied equity beta in the range of 0.75-1.07. This fits with the conclusion of the Smithers report, which stated that "It seems safe to conclude that there is only a quite low probability that any of the companies examined (and especially those subject to regulation) have [an equity] beta greater than or equal to one."[33] We concur with this view.

5.7. *A priori* cross-check

The world-wide economic recession has coincided with massive deleveraging in the debt markets and a huge increase in savings (Figure 5.4 shows that households' saving ratio in the UK has risen rapidly since hitting its lowest level for more than 50 years at the start of 2008). Savers can put their money into cash, debt or equity. Returns on cash are extremely low (sometimes negative in real terms), opportunities to invest in debt are reduced as borrowers pay down debt and de-leverage. Where will all the savings go? Presumably a lot of it will go to equities, and we currently see 'dead-cat bounces' in the equity market because better that than a zero or negative return on cash.This is confirmed by City strategists[34].

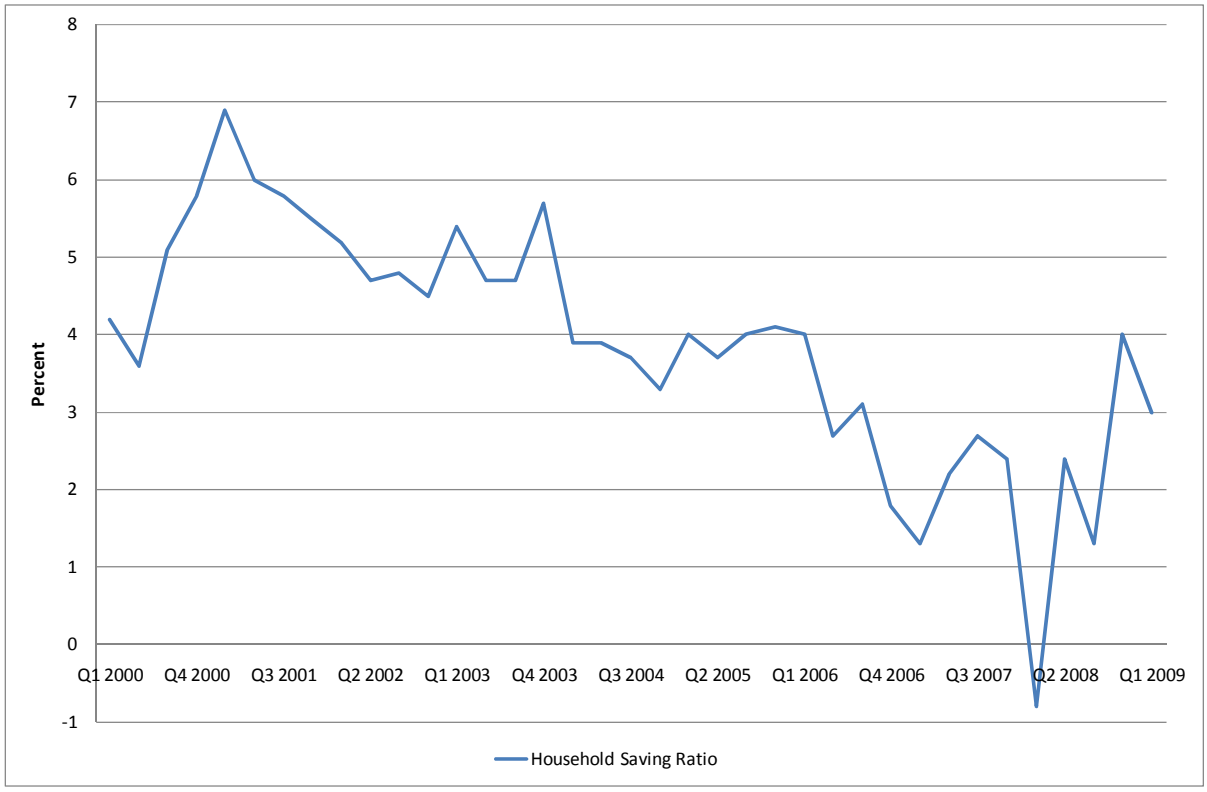
[31] PricewaterhouseCoopers (2009) 'Advice on the cost of capital analysis for DPCr5 – final report for the Office of Gas and Electricity Markets', p. 40, Table 17.

[32] The formula for this is $\beta_E = \beta_A/(1-g)$

[33] Smithers & Co. (2006) 'Report on the cost of capital'.

[34] 'However, the main reason to think the rally will continue is monetary and fiscal policy. "Whether it is quantitative easing trying to force money out of risk-free assets or low policy rates making it very expensive to hold cash, the goal is the same. Get the cash out from under the mattress," says Mr Cattley [Citigroup strategist]. Central banks have also injected a lot of liquidity into the system and that cash has to find somewhere to go. And equities, which are still not expensive on many measures, are a good option, especially when the yields on government bonds are so low and interest rates are almost at zero' Financial Times, 12/09/09.

Figure 5.5: UK households' saving ratio



Source: ONS.

There is *a priori* reason to consider that the required real return on equity should reduce in current market conditions, because the opportunity cost of savings is very low in cash and expected growth in company earnings is expected to be low. This suggests that there is no case for an increase in ERP.

5.8. Conclusion on the Cost of Equity

Given our above analysis, we conclude that:

- The regulatory precedent for the cost of equity is 7-7.5%
- City analysts seem to support lower end of this range, with analysts seeming confident that water utilities will still achieve a positive spread against the allowed WACC in Ofwat's Draft Determination value (cost of equity of 7.1%).
- Relative share price movements confirm the defensive and low equity beta characteristics of regulated utilities.
- Components analysis of CAPM points to:
    - Risk-free rate of 1.75 – 2.0%
    - ERP of no more than 5%
    - Equity beta of no more than 1 and given the evidence closer to 0.9.

This would point to a range for the cost of equity as per the table below:

Table 5.4: CAPM-derived cost of equity

	Low	**High**
Risk-free rate	1.75	2.0
ERP	5.0	5.0
Equity beta	0.9	1
Cost of equity	6.25	7.0

Source: CEPA analysis.

Given the uncertainty over equity markets, and taking account of Ofwat's Draft Determination, we consider it prudent to refine this CAPM derived range of 6.25 – 7% to **6.5 – 7.1%, which is our recommended range for the allowed cost of equity.**

6. RELATIVE RISK

This section considers the relative riskiness of the regulatory framework proposed for DPCR5[35] as compared to other UK regulated industries. Investigation of relative risk exposure on regulated cash flows can help to inform judgements on the allowed WACC generally and, in particular, the cost of equity and gearing.

Our main conclusion is that we find DPCR5 to be, *prima facie,* less risky than the current DPCR4, Ofwat's PR09 (based on the draft determination) and CAA's Q5 determination for Heathrow. It appears to be similarly risky to GDPCR, but slightly more risky than Ofgem's regulation of transmission networks.

6.1. Approach

Relative risk analysis is a useful instrument for framing regulatory decisions against each other. It can provide guidance as to where decisions have placed the industry within the risk spectrum as suggested by other regulatory decisions. Whilst some studies have taken an empirical approach to relative analysis, in our view methodological issues make it difficult to generate robust results from such an approach.

This section takes a qualitative approach, based on ranking of risks in each regime relative to DPCR5. Judgements are based on CEPA's knowledge of each regime and judgements are not intended to be definitive but, rather, to provide an indication of where DPCR5 sits in the risk spectrum so as to guide estimation of WACC parameters such as the asset beta.

Comparisons are made between DPCR5 and DPCR4, GDPCR, TPCR, Ofwat's PR09 regime and CAA's Q5 determination for Heathrow. Judgements are made across five risk categories: volume, opex, capex, incentive, and regulatory risk.[36] This bottom-up approach does not directly account for covariance between impacts in each category with offsetting effects instead incorporated into the overall judgements when weighing the significance of each factor.

6.2. Risk categories

This section considers each risk category in greater detail, outlining how each may be affected by the regulatory regime, and relating them to the DPCR5 proposals.

Volume and margin risk

Demand risk can be considered as two separate elements:

- volume risk – largely determined by whether the regime is a price or revenue cap, although in the case of Heathrow airport, it may also be affected by competitive pressures; and
- margin risk – based on the level of allowed cost pass through and whether (any) volume drivers match operational gearing levels.

[35] As set out in Ofgem's Initial Proposals, August 2009.

[36] The choice of categories is consistent with previous analyses. The inclusion of an 'incentives' category is a response to the increased significance of incentives granted outside of the direct price control.

The move to a full revenue cap for DPCR5 (from a hybrid revenue / price cap) will further transfer volume risk away from companies. However, some margin risk will remain as DNO costs remain a function of volume. The removal of DPCR4 volume drivers and their replacement with a series of other mechanisms is a significant change in how margin risk is managed. However, it is not yet clear whether this will have a material impact on its overall allocation.

Opex (non-volume related) risk

Operating cost risk is based on the degree to which regulation allows the pass-through of costs to users, and how much these costs vary in practice.

Due to the inclusion of opex in the IQI incentive scheme, for DPCR5 DNOs will bear some of the costs from overspend, but less than previously. Similarly, a greater proportion of any savings achieved will be shared with consumers.

Note that we do not discuss changes to pensions allowances in this paper, but see *CEPA: Ofgem's Price Control Pension Principles Consultation, September 2009* for a discussion of potential changes to pension allowances and impact on the cost of capital.

Capex risk

Capital expenditure risk is affected by two dimensions of the regime:

- treatment of overspend – whether the difference is passed through to consumers or borne by the company; and
- treatment of benefits – how companies are rewarded for efficiency gains.

Both of these are functions of the size of the investment programme relative to the RAB as it influences the magnitude of any mistakes or judgements.

Capex remains regulated within the IQI. Adjustments to the setting of capex allowances means less of a safety margin for DNOs, but a greater reward incentive enables potentially greater rewards.

Incentives risk

Incentive mechanisms outside the direct price control have become increasingly important in several regulatory regimes. Both their size and the variation of payments can have a material impact on companies' overall risk profiles. Generally for DPCR5 Ofgem has made it more difficult for DNOs to achieve rewards through tighter setting of targets, but has increased the incentive should targets be met.

Regulatory risk

Regulatory risk primarily refers to the consistency, credibility and predictability of the regime. This relates to how likely it is that the regulatory goal posts will move. Perceptions of this may be affected by the transparency of decisions, how frequently major changes have occurred, and how established the regulator is in its position.

6.3. Relative analysis

Table 6.1 below attempts to answer the question of whether each regime is more or less risky than DPCR5. In order to come to an overall conclusion we consider whether the regulated environment is higher, lower or similar risk to DPCR5 for each regime and risk category.

Table 6.1: Risk across UK regulated utilities compared to DPCR5

Regime {& asset beta}	Risk category					Conclusion
	Volume or market	Opex	Capex	Incentives	Regulatory	
DPCR4 (Ofgem) {0.6 – 1.0}	**LOWER** Hybrid rev/price cap Volume drivers in place.	**HIGHER** Inclusion of Opex in the IQI for DPCR5 reduces this opex exposure from 100%.	**LOWER** Stronger efficiency incentives in a recalibrated IQI will increase exposure to variation in capex but overall effect is relatively neutral.	**HIGHER** Incentive payments have been significantly tightened for DPCR5 in response to large returns in DPCR4.	**HIGHER** Although major changes were predictable, most have now been implemented. However consultation on pensions is not yet complete.	Following the implementation of major changes, it is likely that risk will be found to be **higher** than DPCR5**.**
GDPCR (Ofgem) {1.0}	**SIMILAR** Hybrid rev/price cap Slightly higher margin risk given mismatch of a hybrid price cap with low operational gearing.	**HIGHER** Similar to DPCR4.	**HIGHER** Risky given high levels of capex and recent overspends.		**SIMILAR** Established regime. Largely predictable despite major changes being recently implemented.	Despite some differences, overall risk is **similar** to DPCR5
Transmission (Ofgem) {0.5}	**LOWER** Revenue cap Very limited exposure to volume risk despite revenue drivers supplementing the revenue cap.	**HIGHER** Some pass-throughs but most risks lie with companies	**HIGHER** Risks are reduced with capex revenue drivers, but the move of some revenue drivers to logging-up systems from being automatic may increase risk.	**LOWER** Relatively tight caps and collars limit exposure.	**HIGHER** Established regime. However concerns are increasing regarding the system.	Despite some higher risk areas, the low risk nature of the business places it **lower** than DPCR5
PR09 (Ofwat) {0.9}	**HIGHER** Price cap Companies only face volume risk for metered customers. The weather is a greater risk – more diversifiable than if market related.	**HIGHER** Cost risks are faced by the companies.	**SIMILAR/ LOWER** Similar menu regulation in place on capex.	**AS YET UNCLEAR** Greater downside risk and negative bias on incentive payments.	**SIMILAR** Following the Cave review there is momentum towards greater change in the regulatory regime. However the shape of the regime to come is yet to crystallise.	Major changes will be occurring over AMP5, meaning that its risk is likely to be **similar or potentially even higher** than DPCR5.
BAA Heathrow (CAA) {0.9 – 1.15}	**HIGHER** Price cap BAA bear volume risk in the review period (mostly non-diversifiable).	**HIGHER** Some pass-throughs exist, but most cost risk is faced by the company.	**HIGHER** Costs incurred are usually allowed for when rolling the RAB forward.		**HIGHER** Undergoing DFT review and CC market investigation.	High volume risk is the key determinant in the judgement that overall risk is **higher** than DPCR5.

Source: CEPA analysis.

6.4. Conclusion

We have reviewed the relative risk of the proposed regulatory settlement for DPCR5 compared with that of DPCR4 and Ofwat's PR09. We conclude DPCR5 is, *prima facie,* less risky than the current DPCR4, and is likely to be of similar or potentially lower risk compared to Ofwat's PR09 (based on the Draft Determination).

7. CONCLUSION

Table 7.1 below pulls together our analysis on the components of the WACC to produce a narrow range.

Table 7.1: WACC range

Element	Low (%)	High (%)
Gearing	60	62.5
Cost of debt	3.325	3.58
Cost of equity	6.5	7.1
Vanilla WACC	4.6	4.9

Source: CEPA analysis.

We note that our range is below Ofwat's Draft Determination (5.1%) and GDPCR, but believe it is in line with the market evidence.

ANNEX A: OFWAT'S PR09 COST OF CAPITAL PROPOSALS

Obviously an important source of information available for assessing the appropriate allowed WACC is the evidence from other regulatory determinations. Since Ofwat's proposals for PR09[37] were published at a similar time to the Ofgem draft determination this is an important source of information as to how another regulator is addressing key market concerns at the moment.

Table A1 summarises the last determination, Ofwat's consultants view and Ofwat's proposed draft determination of the WACC.

Table A1: Comparison of different estimates of the WACC

	PR04		Europe Economics PR09		Ofwat
	Low	**High**	**Low**	**High**	**Draft PR09**
Gearing (%)	55	55	55	65	57.5
Risk free rate (%)	2.5	3.0	1.5	2.2	2.0
Equity beta	1.0	1.0	0.5	0.9	0.9
ERP	4.0	5.0	4.1	5.4	5.4
Cost of Equity	6.5	8.0	3.5	7.2	7.1
Cost of debt	3.3	4.4	2.5	4.7	3.6
- forward					4.1-4.3
- existing					3.4
Post-tax WACC	5.1		2.5	4.7	4.5
Vanilla WACC	4.2	5.3	2.9	5.6	5.1

Source: Ofwat.

The consultants have taken two interesting approaches:

1. they have made an explicit allowance for the impact of the crisis – shown in Table A2 below; and
2. they have considered a mark-up for the WACC arising from the asymmetric impact of the consequences of the WACC estimation (this is similar to the aiming-off undertaken by Australian regulators) and which adds between 0.5% and 0.8% to the allowed Vanilla WACC.

From the two tables it is possible to see that:

- the consultants have proposed a range for the equity risk premium that has a higher end-point than that traditionally used by Ofwat. Ofwat has based its draft determination on this upper end of the range;
- the implied range for the debt premium is 100bp to 250bp and Ofwat has chosen 160bp for the draft determination;

[37] Ofwat (2009) 'Future water and sewerage charges 2010-15: draft determinations'.

- a range for the level of gearing that is higher than that considered in PR04 has been proposed and Ofwat has chosen a point towards the lower end of that range but still higher than the PR04 determination; and
- Ofwat has chosen to introduce a blended cost of debt based on a forward looking estimate in line with the consultants recommendations and an embedded figure.

Table A2: Provisional recommendations on the WACC (Table 8.1)

	Crisis	**Post-Crisis**	**Weighted**
Gearing (%)	55	55	
Risk free rate (%)	1.75	1.75	
Equity beta	0.62	0.62	
ERP	6.0	5.0	
Cost of Equity	5.48	4.86	
Debt premium	2.50	1.50	
Cost of debt	4.25	3.25	
Pre-tax WACC	5.8	4.8	5.2
Post-tax WACC	4.1	3.5	3.8
Vanilla WACC	4.8	4.0	4.3

Source: Ofwat.

ANNEX B: APPROACHES OF OTHER CONSULTANTS

This section outlines the approach taken by three consultancies to calculate the appropriate WACC for a forthcoming price control period.

- Europe Economics "Cost of Capital and Financeability at PR09" for Ofwat (July 2009) http://www.ofwat.gov.uk/pricereview/pr09phase3/rpt_com_pr09cocfinance.pdf
- PWC "Advice on the cost of capital analysis for DPCR5" for Ofgem (July 2009) http://www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/Ofgem%20COC_FINAL_Report%20280709.pdf
- NERA "Distribution Network Operators' Cost of Capital for DPCR5: A Report for the DNOs" (July 2009) http://www.ofgem.gov.uk/NETWORKS/ELECDIST/PRICECNTRLS/DPCR5/Documents1/NERA%20DPCR5%20WACC%20Report.pdf

Although each uses other approaches to check for robustness, they rely on the CAPM methodology to reach their final values or ranges. As such the remainder of this section focuses on their approaches by focusing in turn on the six main elements of the CAPM WACC calculation, the:

- risk-free rate;
- equity risk premium;
- equity beta;
- cost of equity;
- cost of debt; and
- cost of capital.

B.1. Real Risk-Free Rate

Table B1: Consultant approach for setting the risk free rate

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA calculate the CAPM risk-free rate based on ten year trailing averages of UK swap rates adjusted for credit risk. • They found that all measures of the risk free rate were below long-term averages at 1.0 percent (their central estimate of the current rate) after accounting for uncertainty in inflation expectations. • They examined evidence from 5yr and 20yr Index-Linked Gilts, Deflated Gilts and Swap rates. They explain the premium above the long-run trailing average of government bond yields (2.1 percent) due to distortions from pension fund demand depressing yields.	2.5%
Europe Economics for Ofwat (July 2009)	• Europe Economics consider both index-linked and nominal gilt yields, and regulatory precedents, particularly the CoC determination for Stansted Airport. • They avoid placing too much weight on evidence from ILGs given a long-term declining trend. They avoid this by emphasising a 'Bayesian updating process' implying that they do not yet believe that lower gilt yields are persistent. • They state that if there were no regulatory precedent they would consider setting the risk free rate at 1.5 percent or less, significantly undercutting previous decisions, but offset overall by a higher ERP.	1.75%
PWC for Ofgem (July 2009)	• PWC set a range, with its bounds being justified by different pieces of evidence: o the bottom of their range is consistent with the 10yr average on 10yr ILGs, despite acknowledging market distortions; and o the upper end is consistent with other regulatory determinations since 2000. • They examined three approaches: market evidence on ILG yields, the real RFR implied on nominal gilts, and evidence on interest rate swaps.	1.9-2.5%

B.2. Equity Risk Premium

Table B2: Consultant approach for setting the equity risk premium

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA calculate two equity risk premia: o *historic* – 5.4 percent based on arithmetic averages of historic market returns; and o *current* – 7.2-9.5 percent based on dividend growth model analysis. • Their current risk premia is approximately 3 percent above their historic level. They justify this as "fundamental re-pricing of risk in the market," supported by data on implied market volatility and credit default swap markets. • They expect volatility to remain above historic averages for a further 18 months (from July 2009).	7.2-9.5% (Current) 5.4% (Historic)
Europe Economics for Ofwat (July 2009)	• Europe Economics estimate separate crisis (5.0) and post-crisis (6.0) ERPs. • Their judgements are founded on third party estimates of the UK ERP and regulatory precedent. • Once calculating a non-crisis ERP of 5.0 they apply a 20 percent crisis mark-up based on evidence from Cochrane and Piazzesi to reach an upper limit of 6.0. They believe that this mark-up may be conservative.	5.0-6.0%
PWC for Ofgem (July 2009)	• PWC used a range of ex-ante and ex-post information on regulatory decisions and third-party estimations to construct their range. o The top of their range is consistent with a third-party estimate[38] of the whole UK equity market risk premium, given an upward adjustment as a result of the financial crisis. o The bottom of the range is consistent with the mid-point of recent CAA and CC decisions, and the low end of decisions since 2005. • Their estimate is based on the assumption that the premium is a long-term variable that fluctuates little. They suggest that if it were to be thought of as something that varies in the short run, their range would be closer to 6-8 percent, as implied by their DGM analysis. • They do not include a liquidity premia, but suggest that Ofgem might consider its addition.	4.0-5.5%

[38] Dimson, E., Marsh, P. and Staunton, M. (2001) 'Millennium Book II – 101 Years of Investment Returns', ABN/AMRO and London Business School.

B.3. Equity Beta

Table B3: Consultant approach for setting the equity beta

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA calculate two equity beta ranges: o *long-term* – 0.88-1.13; and o *current* – 0.88-1.00. • This is based on a 60 percent gearing assumption and calculation of long-term (0.35) and current (0.40) asset betas. • They draw on asset beta evidence from National Grid and listed UK water and sewerage companies as the best guide to inform their decision on the asset beta. • They find that the most recent evidence from these comparators indicates a reduction in asset betas for DNOs.	0.88-1.00 (Current) 0.88-1.13 (Historic)
Europe Economics for Ofwat (July 2009)	• Europe Economics directly estimated the asset beta for the water industry against a UK portfolio finding a point estimate of 0.65 with a 95 percent confidence interval of 0.52 and 0.77. • These values are re-levered with the notional gearing level to calculate the final range. • Deleveraging this with actual gearing, they found asset betas of 0.10-0.40. • This direct approach is possible given the public listing of companies in this industry.	0.48-0.92
PWC for Ofgem (July 2009)	• PWC calculate an equity beta range of by examining a set of UK and international listed comparators' asset betas, alongside regulatory precedent and consultant team knowledge. • International comparisons provided a range of 0.21-0.46, but UK comparators (including National Grid, SSE, Scottish Power and a selection of WaSCs) indicated a narrower range of 0.39-0.38. • They calculated a range based on two gearing and debt beta assumptions; 55 percent (0.0 debt beta) and 65 percent (0.1 debt beta).	0.5-1.1

B.4. Cost of Equity

Table B4: Consultant approach for setting the cost of equity

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA use an average of historic and current evidence (weighted by forecasts on the length of the recession) to make a judgement of the cost of equity at 8.6 percent. • They calculate a historic CAPM cost of equity at 7.2-8.6, and a current estimate at 7.3-10.5. The current CAPM estimate is backed up by a DGM calculated as 8.0-10.5 creating a combined current range from their overlap at 8.0-10.5. • Their final judgement is based on equal weighting of the midpoints of the historic (7.9 percent) and current (9.3 percent) ranges.	8.6%
Europe Economics for Ofwat (July 2009)	• Calculated directly from crisis and post-crisis parameters to give a crisis cost of equity of 5.48 and post-crisis cost of equity of 4.86. • In order to show how their overall headroom mark-up (4.3 percent) might affect equity providers, they recalculate the cost of equity as if all headroom was applied to the cost of debt. They believe that this would be more than sufficient for investors to provide further equity.	4.86 - 5.48% (real post-tax) 6.3% (with head-room)
PWC for Ofgem (July 2009)	• Calculated directly from low and high ranges • They state that while evidence shows an increase in the cost of equity in the short-term, this must be balanced against movements towards normal conditions and the need for a longer term view.	4.0-8.5%

B.5. Cost of Debt

Table B5: Consultant approach for setting the cost of debt

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA calculate the cost of debt as a weighted average of the cost of: o *embedded* – 3.5 percent (70 percent weighting); and o *new debt* – 3.9-4.5 percent (30 percent weighting). • They calculate the embedded debt rate based on historic benchmark yields and other time series, rather than actual embedded debt in order to maintain incentives to finance themselves efficiently. • The current rate is set as the overlap between short-to-medium and long tenor debt, with the addition of a transaction and pre-funding cost premium of 0.60. This contains a view on the proportion of debt to be refinanced over the price control period and the amount required to financing new investment.	3.6-3.8%
Europe Economics for Ofwat (July 2009)	• Europe Economics calculate separate crisis and post-crisis costs of debt. They set the notional gearing rate at 55 percent consistent with a credit rating of A- or above, giving a crisis cost of debt of 4.25 and post-crisis of 3.25 percent. • They calculate the cost of debt as a debt premium on top of their risk-free rate (1.75 percent). The top of this range is consistent with the top of a range derived from analysis of nominal water company bond spreads. They believe that historic data on spreads prior to mid-2003 provide an indication of where the market may settle. • They also recommend no use of embedded debt adjustments, to take account of pre-funding costs through considering cash balances in financial models, and to not explicitly take account of transaction costs.	3.25-4.25%
PWC for Ofgem (July 2009)	• PWC look at a range of evidence to calculate a range for the debt premium. • They find that the 10yr debt premia on secondary market evidence is 1.2-1.3 percent, but find that this band is too narrow for current conditions. Instead they opt for a range of 1.2-1.5 percent o The lower end is based on 10yr average debt across their sample of UK comparators. o The upper end is based on recent evidence from primary markets. • This premium is added to their risk free rate of 1.9-2.5. They do not include any uplift for transactions costs.	3.1-4.0% (real pre-tax)

B.6. Cost of Capital

Table B6: Consultant approach for setting the cost of capital

Sample	Approach	Decision
NERA for DNOs (July 2009)	• NERA put an emphasis on calculating ranges for a "historic" and "current" WACC ranges with the final decision being an average of these informed by a judgement on the likely path of economic recovery. • They find real post-tax WACCs: o *historic* – 4.4-4.9 percent o *current* – 4.9-6.1 percent • They weight these equally based on an assumption of growth and inflation 'normalising' in 2012 or 2013. They consider that more weight could be put on downside risks, increasing the weight on current estimates.	4.6-5.4% (real post-tax) 5.2-6.0% (real vanilla)
Europe Economics for Ofwat (July 2009)	• Europe Economics provide a final WACC based on a weighted average of their recommended crisis (4.1 percent) and post-crisis (3.5 percent) WACCs, and overall aiming up. • They put a 45 percent weight on crisis WACC reflecting their view of the impact of the crisis. • They calculate headroom by providing a 14.4 percent explicit mark-up on their calculation to account for the asymmetric impact of setting the WACC too low. • They decide that it would be inappropriate to set different WACCs for WaSCs and WoCs.	4.3% (real post-tax) 5.0% (real vanilla)
PWC for Ofgem (July 2009)	• PWC set a range that they believe appropriately reflects longer term conditions. They believe that on balance it is better to take this approach than to strongly reflect current market conditions. • They calculate their final range based upon consideration of notional gearing of 55 percent and 65 percent. They calculate this based on actual gearing levels and consideration of gearing levels consistent with target credit ratings. • They find that the final range is relatively wide, but consistent with current market conditions.	3.0-4.8% (real post-tax) 3.5-5.6% (real vanilla)