THE ALLOWED COST OF CAPITAL: COST OF EQUITY SECTION UPDATE

OFGEM: GDPCR 2008 - 2013

July 2007

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IMPORTANT NOTICE

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1. INTRODUCTION

This short report provides an updated Cost of Equity Section for CEPA's April 2007 report on The Allowed Cost of Capital. The update corrects a computational error in the calculation of the MR ratios. This update does not change the conclusions presented in CEPA's April 2007 report on The Allowed Cost of Capital, but is provided in the interests of transparency and completeness.

2. COST OF EQUITY

2.1. Introduction

In this section we consider the background to recent decisions on the cost of equity, the weakness of a purely CAPM-derived technical approach, and the market evidence on the actual cost of equity.

2.2. Background

Ofgem, as with most regulators, recognise that there are practical and theoretical limitations of a purely technical, CAPM-based approach to setting the cost of equity. CAPM assumes that parameter values estimated from historic data are valid indicators of prospective values. However, CAPM is a poor predictor of historic excess returns[1]. Parameter value estimates have high standard errors and selection of 'central' or 'most likely' values is subject to considerable uncertainty. Uncritical use of historic values often result in prospective cost of equity estimates that are implausible when regard is had to direct market evidence.

The failure of CAPM to generate robust estimates of the cost of capital is highlighted by both Ofgem and Ofwat in their 2004 price control determinations.

'In determining its cost of equity assumption for the final proposals, Ofgem has had regard to traditional methods such as CAPM as well as wider market evidence, including data on the aggregate return on equity over time. As part of this review, Ofgem commissioned Smithers & Co to present a report on beta estimates for a range of companies in the electricity and water sectors[2]. Smithers & Co found strong evidence of parameter instability for several of the companies. This was problematic given that a fundamental assumption underlying the traditional CAPM approach is that beta remains stable over time…Given this background, Ofgem decided also to have regard to other methods in determining the appropriate cost of equity.'

Source: Ofgem (2004), pp105-6

'It is apparent that applying the CAPM framework on its own could produce a very wide range for the cost of capital. This arises principally because of an extended period of volatility in the capital markets worldwide and the impact of this on some of the components underlying CAPM, particularly the risk-free rate and equity beta factors. For example, currently beta factors for the listed water companies are around 0.4 – a significant decline since the last review. They were as low as 0.3 in 2002-03. This decline is likely to reflect wider market influences rather than a fundamental change in the business risk faced by the water companies. Another component of CAPM, the equity risk premium, has always been difficult to measure with any precision. In our methodology paper, we recognised that in assessing the cost of capital, it was possible that we would need to supplement a CAPM-based approach using current market data with other techniques and evidence.

[1] See Fama & French (1989)

[2] Smithers (2003)

'At the lower end of the range, the CAPM evidence appears to conflict with market reality, and we have discounted it. This is a similar approach to that taken by Ofgem, which in its March 2004 consultation document on its review of price controls for distribution network operators, proposed a cost of capital range of 4.2% to 5.0% on a post-tax basis. Ofgem's range excluded the bottom of a very wide range 'supported by the available data' of 3.0% to 5.0%.

'Such volatility in the capital markets means that, in our view, and in the view of our advisers, less reliance than at previous price reviews should be placed on the conventional methods of assessing the cost of equity such as CAPM.'

Source: Ofwat (2004) pp220-1

Nevertheless CAPM remains, as stated, the framework of choice of almost all regulators when determining the cost of capital.

In line with Ofgem's approach in the TPCR, our approach is to place weight on market evidence of the **aggregate** return on equity, rather than each component specified in CAPM. The next section summarises the market evidence we examined and the conclusions we have drawn.

2.2.1. TPCR 2006

In the Transmission Price Control Review 2006, key considerations for Ofgem's cost of equity were as follows:

- The Smithers report substantially confirmed the range of 6.5% -7.5% for the long-term aggregate market return on equity that was estimated in 2004, even though the evidence that the beta estimates are lower than 1 would suggest a lower equity return.
- In setting the cost of equity, Ofgem considered, among other factors, the difficulty of assessing whether the estimates suggested by the Smithers report are representative of long-term trends and decided to rely more on the range of total market returns than on the component parts of the CAPM. The cost of equity was set at 7%.

2.3. Market evidence

In this section we present the findings of analysis that we have undertaken of the market evidence for the cost of equity.

The evidence comes from three main sources:

- The overall state of the equity market.
- Market valuations to RAB ratios (MR ratios) for listed regulated companies and from asset sales and disposals.
- Evidence of the required cost of equity of infrastructure funds.

2.3.1. Overall state of the markets

The overall state of financial markets are important context for Ofgem in setting the cost of capital. Key features include:

- a global excess in liquidity;
- macro savings / investment balances; and
- UK pension fund appetite for bonds.

These factors are driving down returns on cash and bonds and are also driving down alternative assets including equities. Portfolio investors must choose between cash, bonds, property and equities. With the available returns on two asset classes – cash and bonds - having fallen sharply portfolio investors are forced to accept lower expected returns on property and equities. This is evident in property price inflation and high equity prices. The implications of this for Ofgem are two-fold. First, it points toward a level of equity risk premiums that are currently lower than the long-run average. Second, it underlines the importance of consistency in the direction of change of required returns for the cost of debt and equity in the price determination.

2.3.2. The MR ratio

The MR ratio of a listed regulated business is the ratio of its market capitalisation to its RAB. The MR ratio can provide useful additional information about a company's 'true' WACC.

The premise on which MR analysis is based 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 MR ratio will be 1.0. This is because the NPV of expected net cash flows should, if the regulator's assumptions hold, equal the value of the RAB.

Equally 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 MR ratio will be greater or less than 1.0, respectively.

In assessing the market evidence we considered the market/RAB ratio, which is used to compare the regulator allowed WACC with the market WACC. The ratio is set out below:

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

Once an MR ratio is calculated, an implied cost of equity can be derived, given an assumption about the cost of debt. For example, if an MR ratio of 1.2 is observed, and if the figures for the components of the cost of capital are as assumed in Table 2.1 below, then the implied market WACC is 4.17%. Then substituting an observed cost of debt (to strip out the differential caused by the actual rather than allowed cost of debt) of 3.00%, and rerunning the WACC calculator, gives an implied 'correct' cost of equity of 5.33%.

Table 2.1: MR ratio example

	Formula	Illustration
Allowed cost of debt (CoD)	-	3.50%
Allowed cost of equity (CoE)	-	6.50%
Notional gearing (G)	G = D/RAB	50%
Vanilla WACC (WACC)	WACC = G*CoD + (1-G)*CoE	5%
MR ratio (MR)	-	1.2
Implied Market Vanilla WACC	MWACC = WACC / MR	4.17%
Actual cost of debt (ACoD)	-	3%
Implied cost of equity (MCoE)	MCoE = (MWACC – (G*ACoD))/(1-G)	5.33%

MR ratios for certain companies may be higher or lower than the values for other companies reflecting differential operating and capital efficiency, but the sector average MR ratio provides a useful cross-check on the CAPM derived WACC.

Applying the MR analysis in the gas distribution sector is problematic because of the lack of 'clean'[3] listed gas distribution companies (i.e. since most are owned as part of a wider corporate group including non-regulated assets). MR analysis is most readily applied in other industries where there are broadly comparable and relatively 'clean' regulated companies. The water sector in the UK is a good such example.

In our analysis, we have observed the MR ratio for:

- GDN disposals; and
- other recent transactions in the water sector.

We have also summarised analysts' view of the MR ratios implied by the market valuations in the water sector.

2.3.3. Evidence from GDN disposals

Analysis of the GDN acquisitions shows that all four were acquired on very similar MR ratios. Northern was acquired for the lowest premium of slightly under 13%, Scottish and Southern were acquired for around 13% and Wales & West was acquired for around 14%. These percentages are based on 2005 RABs - they are higher for 2004 RABs.

[3] By 'clean' we mean businesses that are dominated by a single regulated business

Figure 2.1: GDN sales

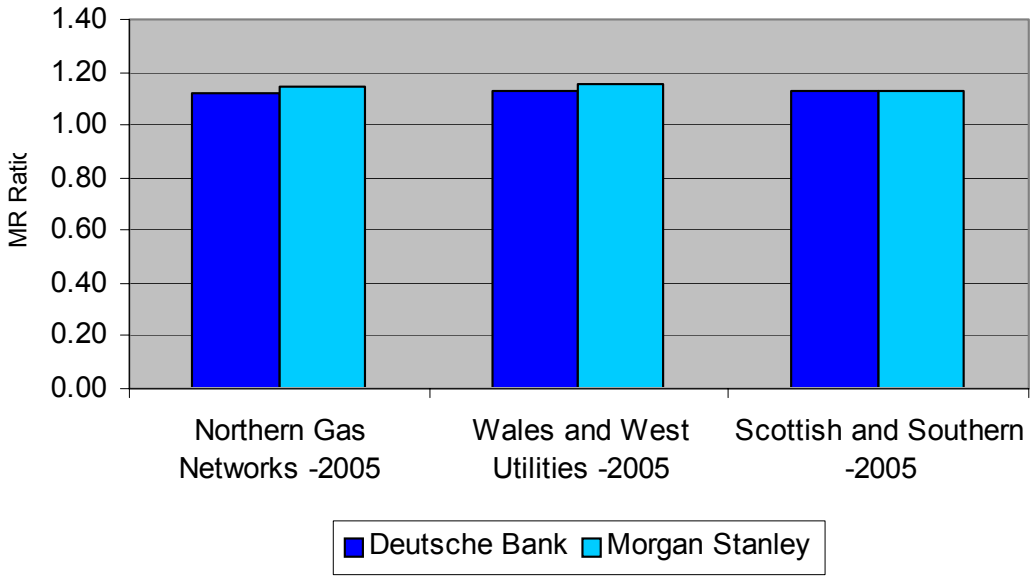


Table 2.2 below shows the cost of equity implied in the GDN sales for a range of different scenarios:

- Scenario 1: the allowed pre-tax cost of debt was as determined by Ofgem for the 2002-07 price control i.e. 4.65%.
- Scenario 2: the allowed pre-tax cost of debt was as determined by Ofgem in DPCR 2004 i.e. 4.10%. Whilst this was not the actual allowed cost of debt for the GDNs, this information was in the public domain and it can be assumed that investors assumed that this would be the actual allowed cost of debt in the next GDN review.
- Scenario 3: allowed pre-tax cost of debt was as allowed by Ofgem in TPRC 2006 i.e. 3.75%.

Of these scenarios, our judgement is that the most appropriate comparators are likely to have been Scenarios 2 and 3. The range for the implied cost of equity from these scenarios is 6.4% - 7.1%.

Another determinant of the results of this analysis is the assumption that is made about the actual cost of debt at the time of the asset disposal / valuation. The lower the assumed actual cost of debt at the time, the greater the implied cost of equity would be.

Given this, for each of the scenarios we have also considered two variants of the actual cost of debt at the time. The low cost of debt is based on the average risk free rate derived from a range of maturities of index-linked gilts at that time and a debt premium of 100 basis points. The higher cost is based on the average real risk free rate from a range of maturities of deflated[4] nominal gilts and a debt premium of 100 basis point.

These ranges are intended to be illustrative only.

[4] Assuming inflation expectations of 2.5%.

Table 2.2: Implied cost of equity in GDN acquisitions

	Scenario 1	Scenario 2	Scenario 3
MR premium	14%	14%	14%
Allowed by Ofgem			
Pre-tax Cost of Debt	4.65%	4.10%	3.75%
Post-tax Cost of Equity	6.25%	6.25%	6.25%
Gearing	62.5%	62.5%	62.5%
Vanilla WACC	5.25%	4.91%	4.69%
Market view			
Implied Vanilla WACC	4.61%	4.30%	4.11%
Observable Cost of Debt - Low	2.62%	2.62%	2.62%
Observable Cost of Debt - High	2.73%	2.73%	2.73%
Implied view on Cost of Equity - High	7.91%	7.11%	6.60%
Implied view on Cost of Equity - Low	7.73%	6.93%	6.41%
Implied view on Cost of Equity- Average	**7.82%**	**7.02%**	**6.51%**

2.3.4. Evidence from other asset sales and disposals

We have also looked at recent transactions in the water sector. The analysis of five recent transactions shows that companies have been acquired on MR ratios in excess of 20%: Thames was acquired at a premium of 25%; Mid Kent at around 26%; Anglian, Sutton and East Surrey and South East at round 30%.

Figure 2.2: Water company disposals

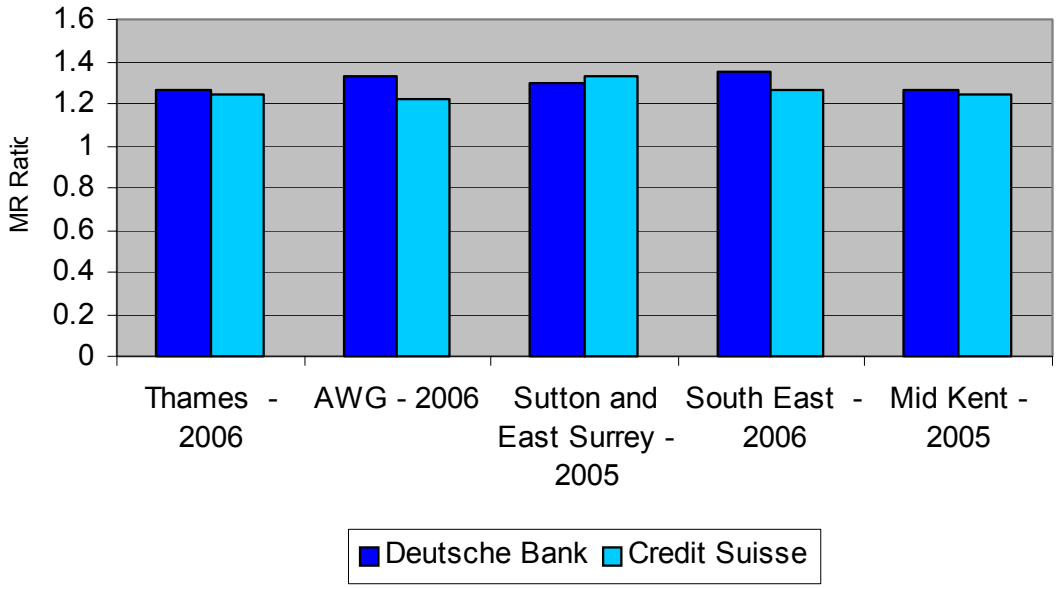


Table 2.3 below illustrates the calculation of the implied cost of equity for the recent acquisitions in the water sector. Given the above estimate of the MR ratio for the five acquisitions, the implied range for the cost of equity is 6.4 – 7.2%.

Table 2.3: Implied cost of equity from water asset sales

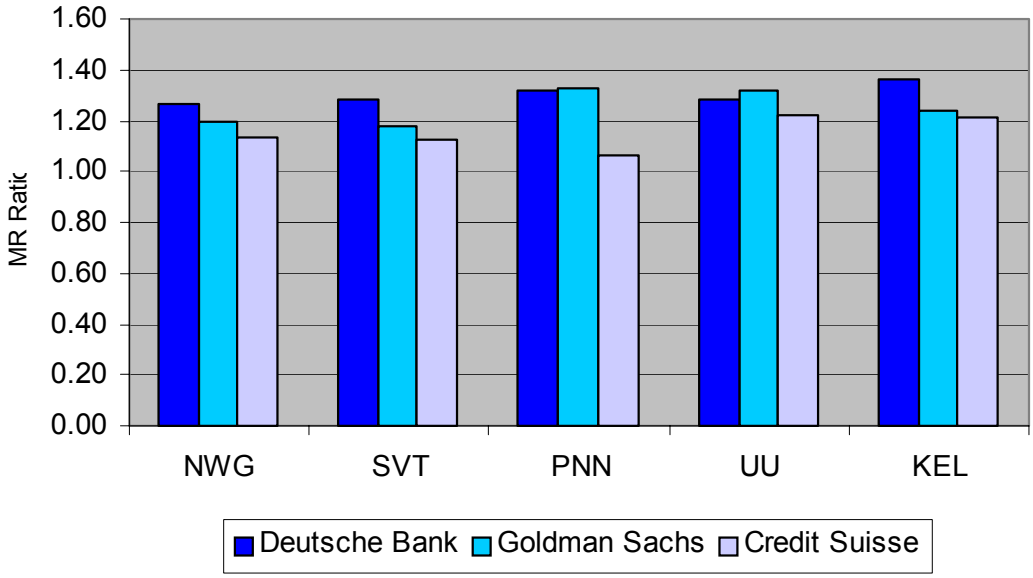
Transaction	Mid Kent	Sutton and East Surrey	Thames	AWG	South East
MR premium	26%	32%	26%	28%	31%
Allowed by Ofwat					
Pre-tax Cost of Debt	4.30%	4.30%	4.30%	4.30%	4.30%
Post-tax Cost of Equity	7.70%	7.70%	7.70%	7.70%	7.70%
Gearing	55%	55%	55%	55%	55%
Vanilla WACC	5.83%	5.83%	5.83%	5.83%	5.83%
Market view					
Implied Vanilla WACC	4.65%	4.43%	4.65%	4.57%	4.45%
Observable Cost of Debt - Low	2.93%	2.48%	2.53%	2.53%	2.53%
Observable Cost of Debt - High	2.81%	2.81%	2.81%	2.81%	2.81%
Implied view on Cost of Equity - High	6.74%	6.82%	7.23%	7.07%	6.80%
Implied view on Cost of Equity - Low	6.89%	6.42%	6.89%	6.73%	6.46%
Implied view on Cost of Equity- Average	**6.82%**	**6.62%**	**7.06%**	**6.90%**	**6.63%**

2.3.5. Analyst view of MR ratios

For National Grid, there are considerable complexities around the value of the US and non-regulated businesses in deriving an MR ratio. Against this background, analysts view the underlying value of the regulated business at a premium of around 15% above the RAB. Taking the allowed WACC as per TPCR 2006, and taking an observed cost of debt of 3.0%, gives an implied cost of equity of 5.9%.

We also looked at recent analyst views on the implied premium to RAB based on the market price for November 2006 for water companies. The MR ratio averages around 1.24 for water companies.

Figure 2.3: MR ratios for water companies



This MR ratio, again given an observed cost of debt of 3.0%, implies a cost of equity of around 6.8%.

2.3.6. Market intelligence from private equity funds

Another source of market information about the required cost of equity is evidence of the required rates of return that private equity and infrastructure fund investors are currently seeking.

Anecdotal evidence (based on conversations with City contacts) suggests that infrastructure fund investors are currently targeting 12% post tax nominal returns (so assumed to be 10% real) on 85% geared investments in comparable utility investments. Analysts commentary supports this assessment:

- For instance, according to Credit Suisse[5], Macquarie's MIFL infra-fund declared that it targets a yield for investors of 8.6% after management charges and the Ontario Teachers' Pension Plan Board, which own 25% of NWG, has delivered a long-term return on equity of 11.7%.
- In the UK water sector, one analyst's view is that "*the indicative returns sought by recent buyers support a sensible minimum IRR currently acceptable to infra-funds investing in UK water of 10% .. .and any infra-fund seeking a 12% IRR would be priced out based on the current market prices and would be stretched to offer a premium, unless they were willing to anticipate receiving a high exit multiple or be prepared to risk holding an unrealised loss for a long period of time*"[6].

Given an assumed 12% required nominal, post-tax return at a high level of gearing, it is possible to impute the notional returns to equity at the assumed notional gearing.

[5] As reported by Credit Suisse, 31st January, 2007.
[6] Ibid, page 22.

Table 2.4 illustrates the notional returns for a 62.5% geared investment, which are calculated by de-levering the financing structure and assuming that notional earnings before interest and taxation of £47m on a notional RAB of £1bn remains constant. This calculation gives a 5.3% real post tax return on equity.

Table 2.4: implied return on equity for private equity funds

Notional RAB	Low	Mid
Notional RAB	£1,000m	£1,000m
Gearing	85%	62.5%
Notional EBIT	£47m	£47m
Interest Cost (3%)	£26m	£318m
Profit after tax (30%)	£15m	£20m
Return on Equity	10%	5.3%

2.4. CAPM

Notwithstanding its theoretical and practical limitations, CAPM is the framework of choice of almost all regulators when determining the cost of capital.

For completeness, in this section we summarise recent regulators' assumptions on the components of the cost of equity required for CAPM and, for illustrative purposes only, we give our assessment of the cost of equity derived by applying CAPM to the gas distribution sector.

2.4.1. Other regulators' decisions

Table 2.5 summarises the recent regulators' assumptions on the cost of equity in the UK. We are aware of the CAA's recent referral of their price review proposals to the Competition Commission. Given the Competition Commission's remit on this we have not included the referral in the table at this point. However, for context the CAA have recommended a cost of equity of 7.7% together with a cost of debt of 3.0%.

Table 2.5: Recent regulators' assumptions on the cost of equity

Regulator	Case	R_f	ERP	β	CoE Range	CoE Used
CAA	BAA (2003)	2.5-2.75%	2.5-4.5%	0.8-1.0	4.5%-7.25%	5.88%*
CAA	Manchester Airport (2003)	2.75-3.25%	3.5-4.0%	0.7-0.9	5.2-6.85%	6.2%*
Postcomm	Royal Mail (2005)	2.5%	3.5%-5.0%	0.81-0.94	7.63-10.27%	9.25%
Ofwat	Water & sewerage (2004)	2.5-3.0%	4.0-5.0%	1.0	6.5-8.0%	7.7%

**denotes mid-point of range prior to any additional 'uplift', for example of 0.5% on the WACC for BAA (2003), Source: CEPA review of regulatory determinations*

2.4.2. CAPM

Given the uncertainties associated with this exercise, we have used a wide range of market evidence and we provide a range of estimates.

Risk free rate

As noted in our analysis on cost of debt our assumed range for the risk free rate is around 1.5% to 2.25%.

Equity Risk Premium

For the equity risk premium we selected the range of 4.0% - 5.0% which is in line with Smithers.[7]

βeta

For the *βeta* component of the CAPM, we again selected the analysis provided by Smithers, which estimated a range of 0.40-0.75.

Table 2.6 below illustrates the results of the CAPM, given the above parameters. As expected, this, in our view, gives an implausibly wide range.

Table 2.6: CAPM calculations

CAPM Calculations	**Low**	**Mid**	**High**
RfR	1.5%	1.87%	2.25%
ERP	4%	4.5%	5.0%
β	0.4	0.575	0.75
CoE= RfR + β (ERP)	3.1%	4.5%	6.0%

[7] The Smithers Report, September 2006.

2.5. Conclusion on cost of equity

In common with Ofgem's proposed approach to estimating the cost of equity CEPA places greater reliance on available market information. This section has reviewed the available market evidence on the cost of equity.

Key points to note are as follows:

- Global liquidity is currently driving returns on all risk bearing assets down. This has two particular implications for Ofgem's price determination. First, there is a clear implication that the current equity market risk premium is likely to be lower than the long run average of 4-5%. Second, this context underlines the importance of consistency in the directions of change compared with the last price review for both cost of debt and equity. The same factors that are pushing down the cost of debt are also pushing down the required returns on equity.
- The trading valuations of listed regulated companies with few non-regulated assets are at a significant premium to their RABs. Adjusting for the 'arbitrage opportunity' arising from the allowed cost of debt being higher than the actual cost of debt suggests the current cost of equity is significantly below 7%. Valuations of asset transactions support this assessment. Based on the analysis in this section the range of actual required returns are as low as 6%.
- Analysis of the returns required in recent disposals of regulated assets, including to infrastructure funds, suggests that the actual cost of equity in these transactions may be much lower. The examples that we have looked at go as low as 5.3%.

A key issue for Ofgem is whether or not to take account of the lower cost of equity that is currently required by infrastructure funds when setting the allowed cost of equity. On the one hand there is clearly risk in basing the determination on these very low costs of equity, without taking account of the possibility of mean reversion over the next price control period.

On the other hand if infrastructure funds have a great deal of institutional funds under management and those institutions are content to earn a lower return on equity then this genuinely reflects a lower market cost of equity.

Our view is that Ofgem should give greatest weight to market evidence of the cost of equity from trading and asset valuations, and that given the risk of mean reversion, it is appropriate to aim for the lower end of our market-based estimates.

This indicates a cost of equity range for GDNs of 6.5-7%. However, when forming its judgement about the 'point estimate' we are of the view that it is reasonable to take account of the entry of infrastructure funds with a low cost of capital. This may suggest adopting a point estimate towards the lower end of this range.