

**Updating the Cost of Capital for the
Transmission Price Control Rollover**

Ofgem – Phase 2 Final Report

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1 INTRODUCTION

TPCR4

- 1.1 The Final Proposals of the fourth Transmission Price Control Review (TPCR4) were published on 4 December 2006, to apply from the period 1 April 2007 to 31 March 2012.
- 1.2 On 21 December 2009 Ofgem published an open letter providing notification of the Authority's decision to implement the next price control (RIIO-T1) from 1 April 2013, while allowing for a one year “adapted roll-over” of the current price control (TPCR4) for the period from 1 April 2012 to 31 March 2013. This was to enable TPCR5 to reflect fully the conclusions of the RPI-X@20 project and other relevant developments in the transmission sector.
- 1.3 The rate of return allowed under TPCR4 was a “vanilla” weighted average cost of capital (WACC) of 5.05 per cent.

Key Developments since TPCR4

Macroeconomic context

- 1.4 In macroeconomic terms, the context since TPCR4 has changed dramatically. At the time of that decision, the economy was still in a boom period, and leverage was increasing across the economy and particularly in the utilities sector. Many of the key building blocks for the WACC were based on the seminal Smithers & Co (2003) paper¹, which in turn considered data from 2002 and earlier — significantly influenced by developments from the mid-1990s onwards — and a specially-commissioned Smithers & Co (2006) paper².
- 1.5 Since that time, the financial crisis began in 2007 with a seizing up of credit markets, 2007 and 2008 saw the first serious challenge to the Bank of England's credibility since the introduction of inflation targeting in 1992 with consumer price inflation repeatedly exceeding 3 per cent, 2008-9 saw the worst recession in the UK since the 1920s, and inflation has returned as an issue over the past year, again being consistently above 3 per cent for much of the past year and now forecast perhaps to reach as high as 5 per cent later in 2011.

Recent regulatory decisions

- 1.6 There have been a number of key regulatory decisions regarding the cost of capital since 2006, including the London Airports (2007), Ofwat (2009), and OpenReach (2009), and the Competition Commissions' judgement on the Bristol Water case (2010). Of particular

¹ Smithers & Co (2003), *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.*, <http://www.ofgem.gov.uk/Networks/Policy/Documents/1/2198-jointregscoc.pdf>

² Smithers & Co (2006), *Report on the Cost of Capital provided to Ofgem*

relevance for the TPCR4 rollover has been the judgements made about generic components of the “capital asset pricing model” (CAPM) upon which UK regulators base their WACC decisions. Broadly speaking, the following trends can be noted:

- (a) Risk-free rate judgements have tended to fall over time, from figures of 2-2.5 per cent in 2005/6 (as per the TPCR4 decision) to figures closer to 1-2 per cent today (e.g. the 1.5 per cent figure in the Ofcom OpenReach consultation launched in January 2011).
- (b) Equity Risk Premium (ERP) judgements have tended to rise, from typical figures of around 4.5 per cent in 2005/2006 (as per the TPCR4 judgement) with an intermediate phase during the height of the credit crisis when figures above 5 per cent were used (e.g. 5.25 for Electricity Distribution in 2009, 5.4 for Water in 2009) to the most recent figures being around 5 per cent (e.g. 5.0 per cent in the Bristol Water judgement, and 5.0 in Ofcom’s OpenReach consultation launched in January 2011).
- (c) Debt premium judgements fell through 2006/7, then rose dramatically during the credit crunch, and now have started to fall again (though not typically back to their 2007 lows).
- (d) Recent judgements have started to incorporate estimates of a “debt beta” as well as equity beta (e.g. the London Airports (2007), OpenReach (January 2011 consultation)).
- (e) Estimates of equity betas have not tended to change much during the credit crunch.

Objectives of Phase 2

- 1.7 Our objective in this review is not to reconsider the WACC from scratch. Instead, we
- (a) consider each of the components of the WACC, bearing in mind how they were calculated in 2006 (not challenging the broad methodology used then);
 - (b) review how the data used in the 2006 calculation have evolved since that time;
 - (c) consider whether evolutions in those data justify recommending a change in that component of the WACC in the context of a one-year

2 NEW DATA RANGES FOR WACC ELEMENTS

Introduction

- 2.1 This section considers the 2006 TPCR4 estimates of the following components of the weighted average cost of capital (WACC):
- (a) the risk-free rate;
 - (b) the equity risk premium;
 - (c) the equity beta; and
 - (d) the debt premium.
- 2.2 We have been instructed to assume a figure of 60 per cent for gearing, as per 2006.
- 2.3 Using the same methodology as employed in TPCR4 we consider, for each of the above components of the WACC, how market data from December 2006 to December 2010 have developed and the extent to which these developments are considered material enough, even in the context of a one-year roll-over, to warrant a re-consideration of the final proposals set out in TPCR4. Where any developments in the data relevant to the WACC components are justified as material we propose a new range.

Risk Free Rate

- 2.4 Ofgem, in its final proposals for TPCR4, concluded that 2.5 per cent was the appropriate measure of the risk free rate based on the analysis in the Smithers & Co (2006) report.³ Ofgem also highlighted at the time that this rate was broadly consistent with previous decisions taken by themselves and other regulators.

The methodology used to estimate the risk-free rate

- 2.5 The risk free rate estimate of 2.5 per cent originally came from the earlier Smithers & Co (2003) report, and was based on analysis of the equilibrium short-term risk-free rate using sample data from the 1990s. The approach taken in the Smithers & Co (2006) report was to consider whether developments in UK government bond yields justified an alteration of their original estimate. In considering UK government bond yields, Smithers & Co placed greater weight on yields on nominal rather than index-link bonds.
- 2.6 According to the report, recent movements (at the time of the report) in implied inflation (calculated by subtracting yields on index-linked bonds from yields on nominal bonds) suggested that yields on index-linked gilts may have been providing a downwardly biased

³ Smithers & Co (2006), *Report on the Cost of Capital provided to Ofgem*

view of forward looking real returns.⁴ Smithers & Co argued, therefore, that since regulated companies rarely issue index-linked corporate bonds, using yields on index-linked government bonds as a benchmark in setting the cost of capital may introduce a downward bias in the cost of debt.

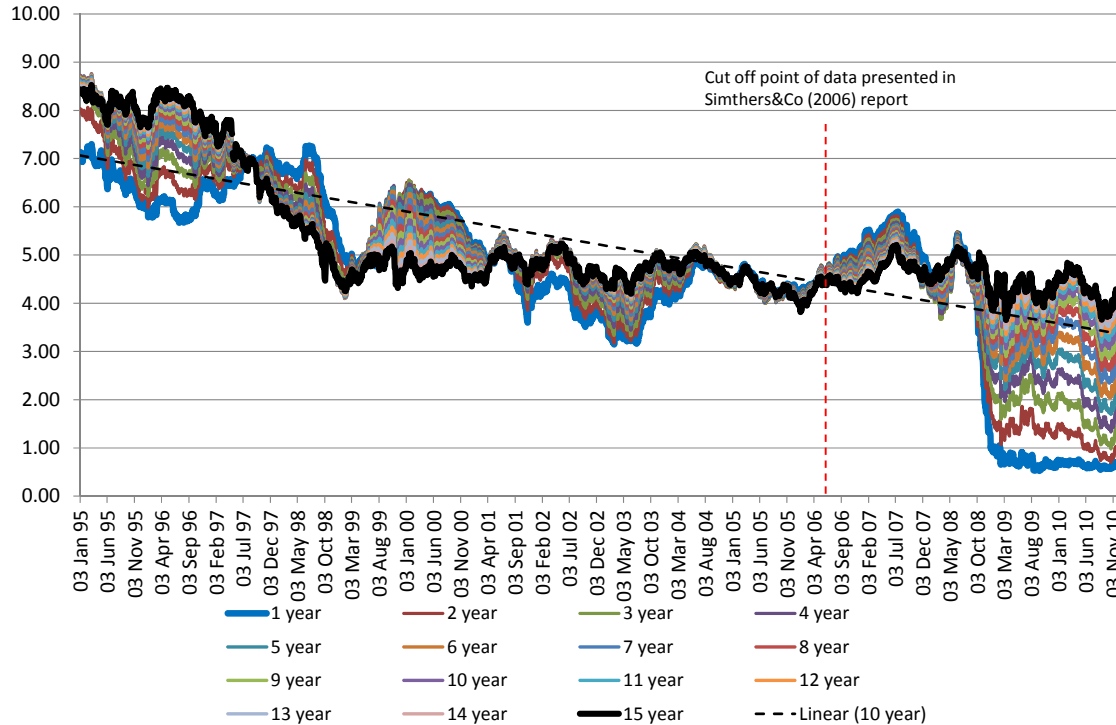
- 2.7 Given the absence of any evidence of a significant term premium (which Smithers & Co argued should be applied to the risk free rate in order to estimate it accurately) they concluded that the best current market-based estimate of the forward looking risk free rate was the nominal yield on medium-term government bonds less the Bank of England's inflation target of 2 per cent. As data on nominal yields around the time of the Smithers & Co (2006) report (less the 2 per cent target inflation figure) equated to approximately 2-2.5 per cent, Smithers & Co maintained the view that 2.5 per cent was still an appropriate estimate of the risk free rate.

Market developments since TPCR4

- 2.8 In considering recent development in market data, we apply the same approach as that taken in the Smithers & Co (2006) report (i.e. focusing largely on developments in nominal rather than index-linked bond yields since mid-2006).
- 2.9 Figure 2.1 presents yields on UK nominal government bonds across maturities of one to 15 years (the longest and shortest maturities are highlighted in black and blue respectively). This figure also indicates the approximate cut-off date of the data used in the Smithers & Co (2006) report. As can be seen by this cut-off line, at the time the Smithers & Co report was published, differences between yields of different maturities had all but disappeared.
- 2.10 However, more recent data on nominal yields illustrate that this was a short-term phenomenon. Two key developments illustrated in Figure 2.1 are of note:
- (a) spreads across different maturities began to deviate rather considerably towards the end of 2008 (with yields on short-term nominal bonds exhibiting higher yields than bonds of longer-term maturity) which coincided with the onset of the turbulence in financial markets in the UK and internationally; and
 - (b) yields of bonds of all maturities have exhibited a steady downward trend over the last 15 years (Figure 2.1 illustrates the linear trend line for a 10 year bond).

⁴ The explanation provided for this finding was that the gap between nominal and index-linked gilt reflects a risk premium as well as forecasts of future inflation.

Figure 2.1: Nominal bond yields on UK Government bonds (1995-2010) with maturities of between one and 15 years (%)



Source: Bank of England

- 2.11 Not only do the significant reduction in bond yields of all maturities and the growth in the variation of yields across maturities represent a considerable deviation from the developments that prevailed at the time of the Smithers & Co (2006) report, these developments also represent a marked deviation from historic trends. Despite the recent unprecedented reduction in nominal (and indeed real) yields, there has, however, been a sustained underlying downward trend in yields over the last 15 years (as evidenced in Figure 2.1).
- 2.12 Considering developments on medium term bonds (as did Smithers & Co), which we take to be bonds with maturities of between 7 and 10 years, yields on these bonds have fallen rather dramatically in comparison to those on bonds with longer maturities.
- 2.13 Even if one were to place greater focus on the longer- (rather than the shorter-) term yields presented in Figure 2.1 (as the change in these have been less material), one might still conclude that a real risk free rate of 2.5 per cent should be revised downwards on the

basis of recent developments in expectations of inflation for the next few years which deviate substantially from the 2 per cent assumed in the Smithers & Co (2006) report.

- 2.14 Assuming an inflation rate equivalent to the inflation target of 2 per cent may be a perfectly valid approach when considering longer term time periods.⁵ However, applying this rate to a one year roll over in the context of sustained above target inflation rates would be a considerably less appropriate approach to adopt. Indeed, as indicated by the data on independent forecasts of CPI over the next year (see Table 2.1 below), CPI inflation is expected to be above the Bank of England target rate (though the average for the period to 2014 is close to target — this is, however, likely to be updated given the rise in inflation expectations and forecasts since the time of the November forecasts that are the most recent available from the Treasury running to 2014).

Table 2.1: Average forecasts for CPI to 2014

	2011	2012	2013	2014	Average yearly inflation (%) ¹
Consumer prices index (CPI)	2.8	1.7	2.0	2.2	2.1
Retail prices index (RPI)	3.5	2.6	3.0	3.3	3.1

Notes: ¹ The yearly average is calculated using the geometric mean.

Source: 'Forecasts for the UK Economy' HM Treasury (November 2010).

- 2.15 We quote forecasts for CPI because that is the Bank of England's target, but the more relevant inflation measure for the purpose of deflating nominal bond yields to obtain real yields is RPI — on long-term averages, about 0.8 per cent higher than CPI because of a combination of differences in the averaging methodology (the RPI uses arithmetic averaging whilst the CPI uses geometric averaging) and a difference in coverage (the CPI covers only just over 70 per cent of the goods and services included in the RPI basket — for this reason the CPI is not typically considered a measure of changes in the cost of living but is, instead, merely a policy target⁶). For the year 2010, RPI inflation was 4.8 per cent and CPI inflation 3.7 per cent. Mervyn King, Governor of the Bank of England, stated in a recent speech⁷ that CPI inflation is expected to rise further during 2011, peaking at between 4 and 5 per cent.
- 2.16 If we were to deflate the nominal bond yields from Figure 2.1 by the average RPI forecasts of 3.1 for the period to 2014, they would range from strongly negative to around one per cent.

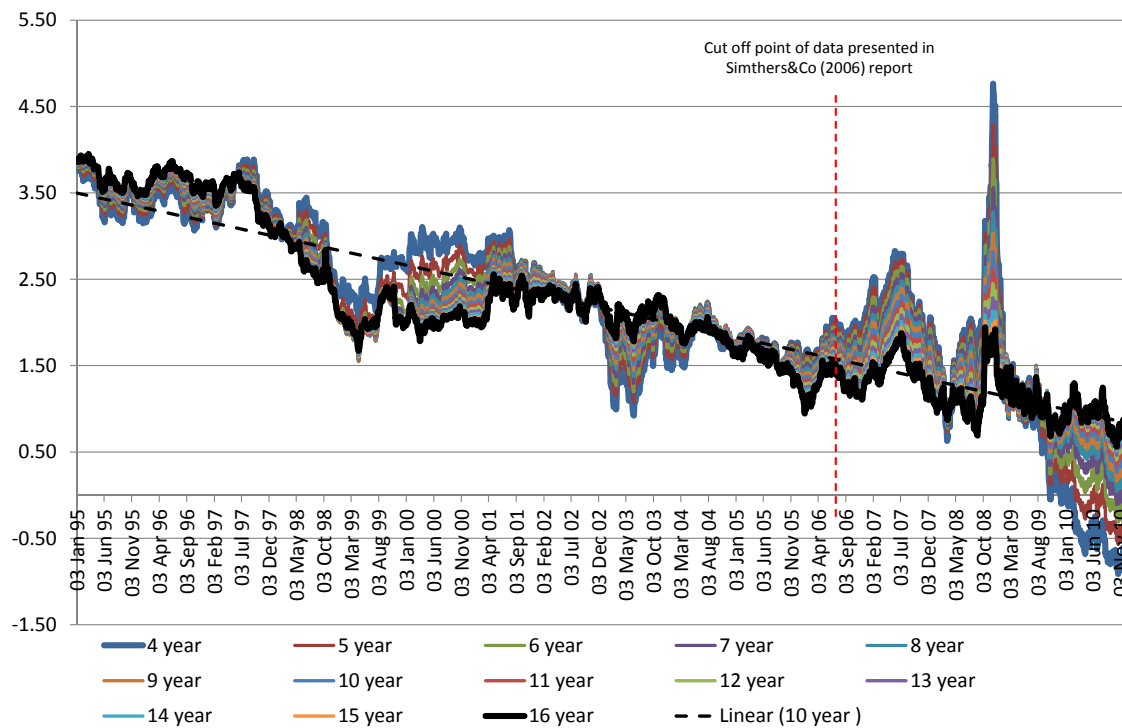
⁵ We do not here enter into the debate as to whether CPI or RPI is a more appropriate basis for such an adjustment, but take the Smithers & Co position that CPI is to be preferred as given.

⁶ Alternatively, since the CPI is the UK name for the European Union's Harmonised Index of Consumer Prices (HICP), it can be viewed as a consistent basis on which to compare inflation rates across EU Member States.

⁷ <http://www.bankofengland.co.uk/publications/speeches/2011/speech471.pdf>

- 2.17 Figure 2.2 provides an update of the data presented by Smithers & Co on index-linked gilts on bonds with maturities of between 4 and 16 years and Figure 2.3 presents the implied inflation forecasts calculated by subtracting real from nominal yields.
- 2.18 As illustrated in Figure 2.2, from mid-2008 yields on index-linked bonds have also fallen to unprecedented lows. Volatility in yields across all maturities also increased, particularly between late 2008 and mid-2009 which was also the period during which financial markets were subject to significant market turbulence.

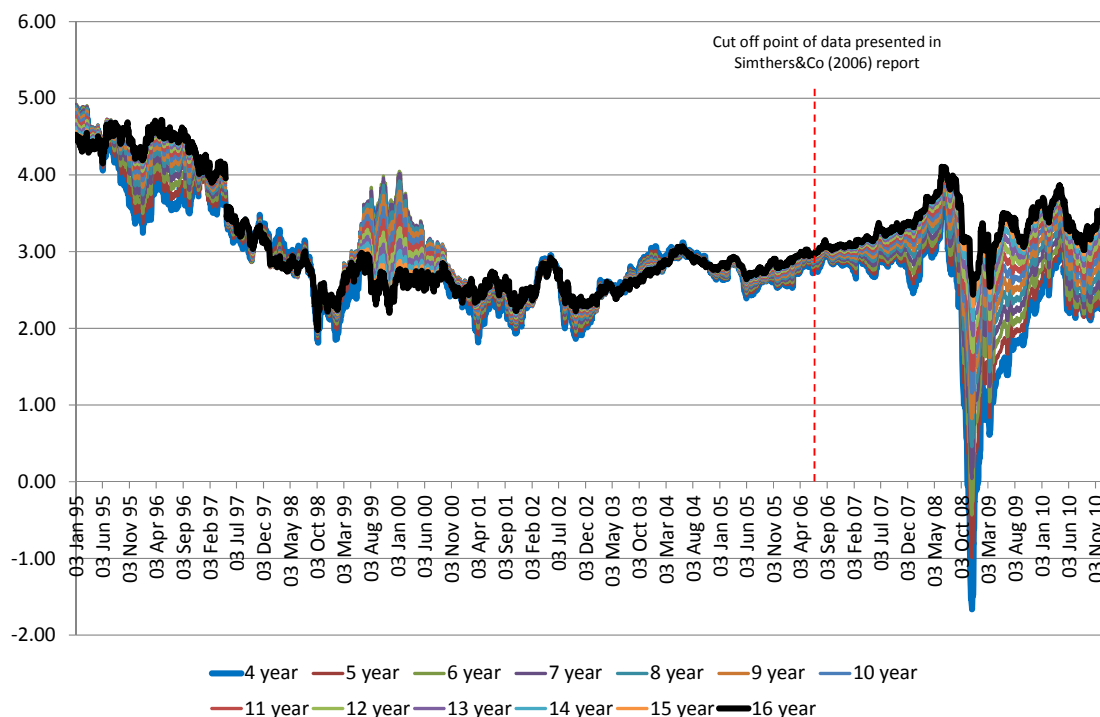
Figure 2.2: Index-linked yields on UK Government bonds (1995-2010) with maturities of between four and 16 years (%)



Source: Bank of England

- 2.19 As illustrated in Figure 2.1 and 2.2, developments in nominal yields were not as volatile and those in index-linked yields. Thus, implied market inflation expectations became very volatile during the period of financial market turbulence, although less so more recently.

Figure 2.3: Implied inflation rates (1995-2010) (%)¹



Notes: ¹ Implied inflation rates are calculated by subtracting index-linked yields on government bonds from nominal yields
 Source: Bank of England

Implications of recent market developments for the one-year roll-over of TPCR4

- 2.20 As highlighted above, in their analysis, Smithers & Co placed very little weight on data on index-linked yields on government bonds. Thus, to ensure consistency and transparency between the information used in 2006 and the information used in this current analysis, our conclusions are based predominantly on the data on nominal yields presented in Figure 2.1 and inflation expectations presented in Table 2.1.
- 2.21 Clearly, assessing whether there has been a material change in the data since 2006 has to be balanced against the instability of adjusting the risk-free rate in the context of a one-year roll over as this is a common component of the cost of capital and thus any changes would necessarily be reflected in the cost of debt and in the cost of equity (unless off-setting adjustments were made to the estimates of the debt and market equity premium).
- 2.22 On balance, it is our view that the declining trend in the nominal yields combined with above target short-term inflation expectations does warrant a reconsideration of the risk-free rate, even in the context of a one year roll-over of price controls.

- 2.23 There is no reliable precise mechanical method by which to calculate the risk-free rate and thus some element of judgement is required. Market proxies for the risk-free rate have been on a sustained underlying downward trend for the past ten years.
- 2.24 However, we do not believe that recent negative values for five year bonds can properly be taken as indicative that risk-free rates are now negative. Ten year government bonds are likely to be downwards biased by around 100 basis points by quantitative easing (as estimated by the Bank of England)^{8 9}, and there is also likely to be an element of inflation risk hedging in five-year index-linked gilt yields. Focusing upon the 10-year benchmark, a 100 basis points adjustment would suggest a spot rate of around 1.5 per cent, in line with the five year averages for 10 year index-linked bonds (indeed, also the average for five year index-linked bonds).
- 2.25 We take particular note of the recent precedent of the Competition Commission's choice of a 1-2 per cent range in the Bristol Water judgement, and observe that this naturally encompasses not only the 1.5 per cent estimate for (quantitative-easing-adjusted) 10 year index-linked bonds, but also, towards the bottom of the range the inflation-adjusted 10 year nominal bonds adjusted further for quantitative easing, and at the top of the range the comparatively recent regulatory determinations in the Stansted and Ofwat cases, both of which were 2.0 per cent.
- 2.26 Our preferred range is therefore 1-2 per cent. Our recommended point estimate, for the purposes of the rollover, is 1.5 per cent.

Equity Risk Premium

- 2.27 The TPCR4 determination does not explicitly favour any equity risk premium (ERP). However, given a risk-free rate of 2.5 and the apparent favouring of an equity beta of 1.0¹⁰, the choice of 7.0 per cent for the cost of equity¹¹ implies an equity risk premium of 4.5 per cent.
- 2.28 In 2006, Smithers & Co suggested that the (arithmetic) equity risk premium lies in the range 4 to 5, though they place greater weight on their estimate of total market returns at 6.5 to 7.5 per cent.¹²
- 2.29 The standard bases for choosing an equity risk premium involve a combination of consideration of the seminal work by Dimson, Marsh and Staunton (DMS) and the total

⁸ "New Instruments of Monetary Policy: The Challenges", Speech by Spencer Dale, Executive Director and Chief Economist at the Bank of England, *Remarks at the CIMF and IMF Conference, Cambridge* (12 March 2010), available at: <http://www.bankofengland.co.uk/publications/news/2010/027.htm>

⁹ "The financial market impacts of quantitative easing", Joyce. M et al. (July 2010, revised August 2010), Bank of England, *Working Paper. 393*, available at: <http://www.bankofengland.co.uk/publications/workingpapers/wp393.pdf>

¹⁰ *Transmission Price Control Review: Final Proposals*, 4 December 2006, paragraph 8.15

¹¹ *Transmission Price Control Review: Final Proposals*, 4 December 2006, Table 8.1

¹² *Report on the Cost of Capital provided to Ofgem*, 1 September 2006, pp37-38.

market return. The latest DMS recommendation for the ERP is 4-5 for the world¹³ and the long-term arithmetic figure for the UK for 1900-2009 stands at 5.2 per cent.¹⁴ The standard argument, drawn from Smithers & Co (2003), is that the arithmetic mean is the correct concept, but that the arithmetic mean of an assumed normal distribution will tend to over-state returns relative to the arithmetic mean of a lognormal distribution. If (as seems plausible) there is at least some skew in equity returns, that would favour some edging down upon the “raw” DMS figure of 5.2 per cent. Figures in the range 4.5-5 are certainly defensible for this.

- 2.30 The upper end of this range (5.0) would, in combination with our preferred point estimate for the risk-free rate (1.5) be compatible with the bottom end of the Smithers & Co estimate of total market returns at 6.5-7.5 per cent.

Equity Beta

What was the number produced in TPCR4?

- 2.31 In the TPCR4 Final Proposal Ofgem assumes an equity beta equal to one in setting a cost of equity at 7 per cent. This assumption contrasts with Smithers & Co (2006) findings that equity betas are typically below one, and is justified on the ground that beta estimates have varied significantly since privatisation, and it is therefore difficult to assess whether the estimates suggested by are representative of long term trends.

What was the methodology used to obtain that number?

- 2.32 In Smithers & Co (2006) equity betas were estimated for a pooled sample of nine regulated companies (Scottish Power, Scottish and Southern Energy, Viridian, Centrica, National Grid Transmission, United Utilities, Severn Trent Water, International Power and Kelda Group) using daily company returns and UK market returns (i.e. FTSE All Share) data. Two main estimation methods were used:¹⁵
- (a) The common methodology of estimating betas using rolling regressions (with Newey-West correction to allow for possible heteroskedasticity and serial correlation).
 - (b) The Kalman Filter approach.
- 2.33 From a comparison of the results obtained following the two methodologies Smithers & Co (2006) conclude that the two approaches produce beta estimates that are fairly similar and systematically lower than one. However, the degrees of uncertainty around the estimates are distinctly different: the confidence intervals obtained with the rolling regressions are much smaller than those obtained with the Kaman Filter approach.

¹³ Dimson, Marsh and Staunton, “Credit Suisse Global Investment Returns Sourcebook 2010”, Credit Suisse Research Institute, p34

¹⁴ Dimson, Marsh and Staunton, “Credit Suisse Global Investment Returns Sourcebook 2010”, Credit Suisse Research Institute, p158

¹⁵ Several other approaches were used as a cross check; however, the figures reported in the main body are those to which greater weight was given.

- 2.34 The discrepancy is explained by the assumptions behind the two approaches. The rolling regression approach is likely to underestimate the true degree of uncertainty in beta since the confidence intervals are calculated under the assumption that beta is constant over time. In contrast, the Kalman Filter approach, by allowing betas to vary over time, may overestimate the degree of uncertainty.
- 2.35 Smithers & Co (2006) also note that, despite being very wide, the confidence intervals obtained with the Kalman Filter approach still lie within the 0-1 range for most companies and for most of the time, implying that the probability that any of the companies considered has a beta greater than or equal to one (assumed by Ofgem) is quite low.

What has happened to the data used in that methodology since TPCR4?

- 2.36 The data used to calculate beta are daily company returns and UK market data (i.e. FTSE All Share).
- 2.37 We report below rolling regression beta estimates obtained on more recent data for both the quoted energy sector (Figure 2.4), and three separate listed companies: NG, SSE, and SP (and Figure 2.5).

Figure 2.4: Rolling beta of the energy sector (24 months rolling window)

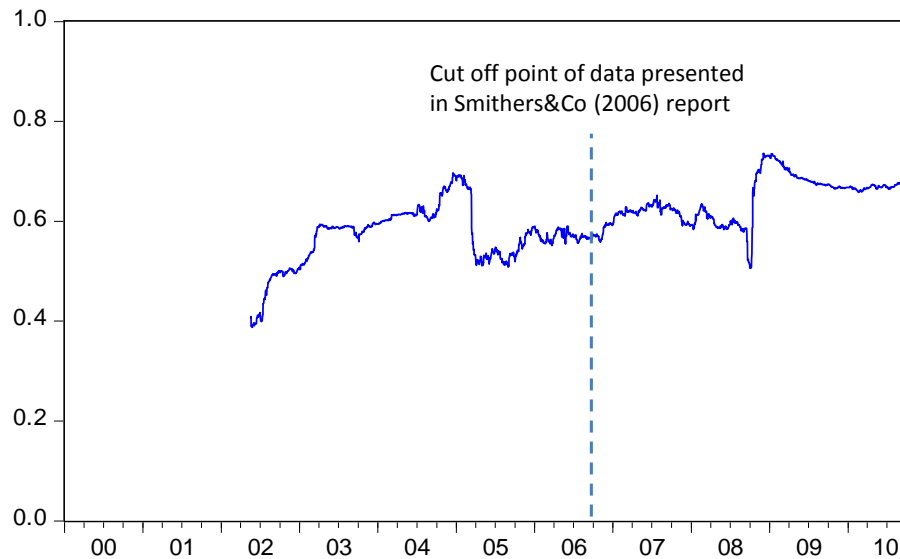
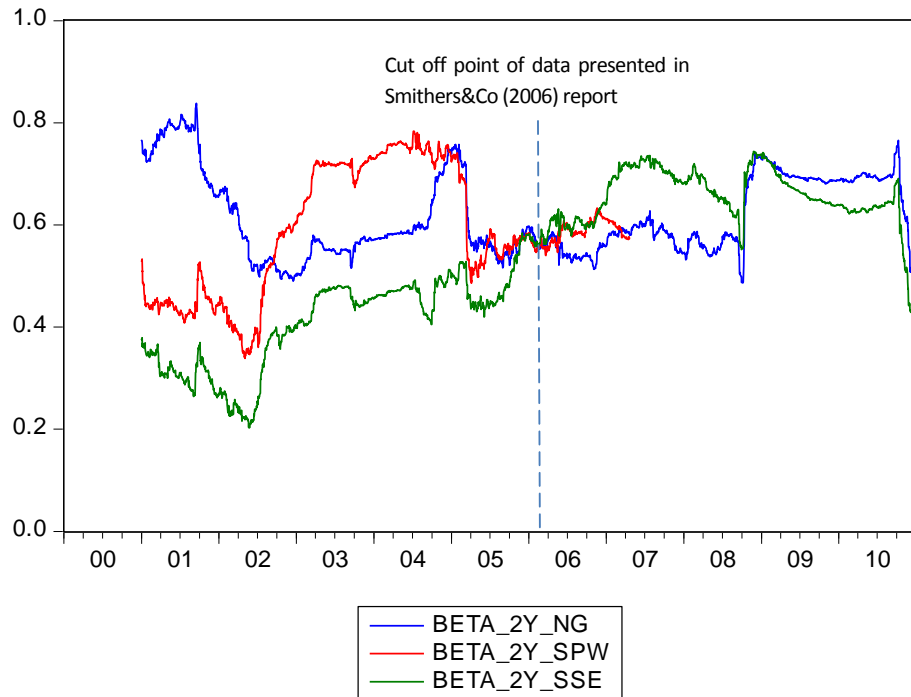


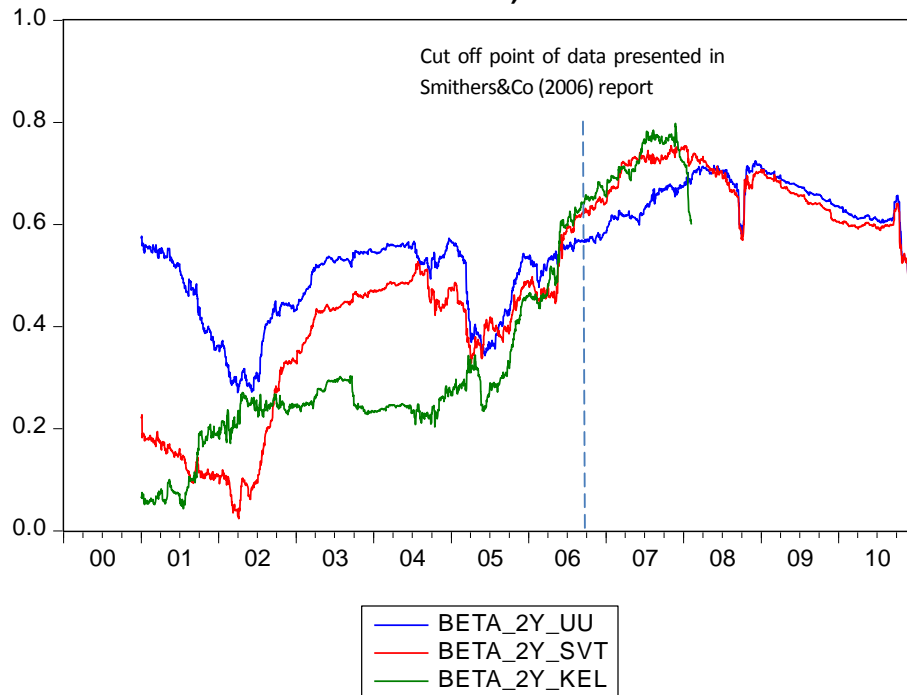
Figure 2.5: Rolling betas for NG, SSE, and SP (24 months rolling window)



Source: Europe Economics based on data from Bloomberg

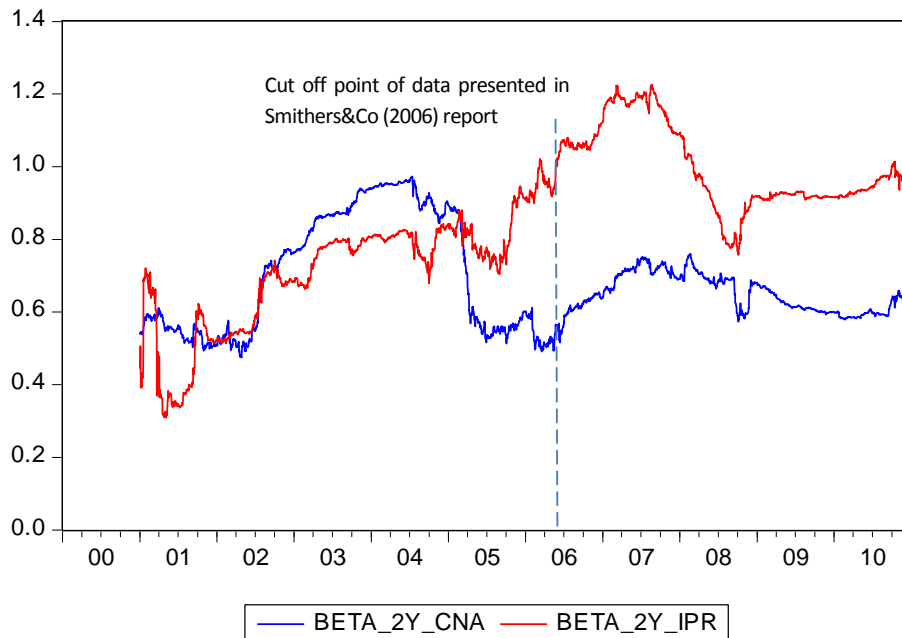
- 2.38 As in Smithers & Co (2006), our evidence suggests that betas are consistently below one. We can also see that the most significant change in betas after 2006 is an upward jump towards mid 2008 (which could be rationalised by the energy price spike). Betas appear to have declined smoothly afterwards, before increasing slightly and then falling sharply at the end of 2010. This could reflect the effect of the 2008 energy price spike dropping out of the rolling twenty four month window in late 2010.
- 2.39 Shown below are two-year rolling regression beta estimates for water (United Utilities, Severn Trent and Kelda) and energy (Centrica, International Power) comparator companies.

Figure 2.6: Rolling betas for United Utilities, Severn Trent and Kelda (24 month rolling window)



2.40 Similar trends are apparent for the water comparator companies, with betas again consistently below one. Betas rise after 2006 and then begin to fall after 2007. In 2008 betas undergo a sharp decline, followed by sharp rise and a steady decline thereafter. Again, there is an increase in betas followed by a sharp decline towards the end of 2010.

Figure 2.7: Rolling betas for Centrica and International Power (24 month rolling window)



2.41 From 2006, betas for the energy comparator companies increase, with International Power's beta declining sharply through 2007-2008, whereas Centrica's beta is comparatively steady up to 2008. Both companies' betas undergo a sharp increase in late 2008, levelling out thereafter. Again, in late 2010 there is an increase, followed by a sharp decline, in the companies' betas.

Do the more recent data provide a strong reason to reconsider the number from TPCR4, even in a one-year roll-over?

2.42 The market evidence strongly suggests that betas are consistently well below one. However, the market evidence on betas even at the time of the 2006 determination very clearly indicated a beta much closer to 0.5-0.6 (Smithers & Co recommended a range for equity the mid-point of which implied a beta of 0.5) than to 1.0 — strongly suggesting that the market data was not an important factor in Ofgem's choice of 1.0 at that time. It is not for us, as part of this analysis of a rollover, to challenge the methodology employed to derive that choice of 1.0 (though we do not commit to employing the same methodology in making recommendations for RIIO-T1). For the purposes of this report, we note that, as far as the market data are concerned, the most significant changes in (24 months rolling) betas after 2006 are a discrete upward jump (in mid-2008), and an upward drift (end of 2010). Since the data have changed relatively little and seem to have been fairly unimportant in the 2006 determination anyway, we find no basis for recommending a change to the beta estimate for the rollover period.

Overall Cost of Equity

- 2.43 Since we recommend a risk-free rate of 1.5 and equity risk premium in the region 4.5-5.0, that implies total market returns of 6-6.5, which, at a beta of 1.0, implies a total cost of equity of 6-6.5.
- 2.44 Since the methodology employed to obtain the 2006 determination of 7.0 per cent is not detailed in publically available material, we propose that it is most natural to assume that the 7.0 per cent figure constitutes the centre-point of the 6.5-7.5 per cent range Smithers & Co recommended for total market returns. Because the upper end of the total cost of equity range we propose corresponds to the bottom end of the Smithers & Co range, we suggest that the approach most compatible with that adopted in 2006 is to assume that the cost of equity has fallen to the bottom end of the total market returns range recommended in 2006, and recommend a total cost of equity of 6.5 per cent.

Cost of Debt

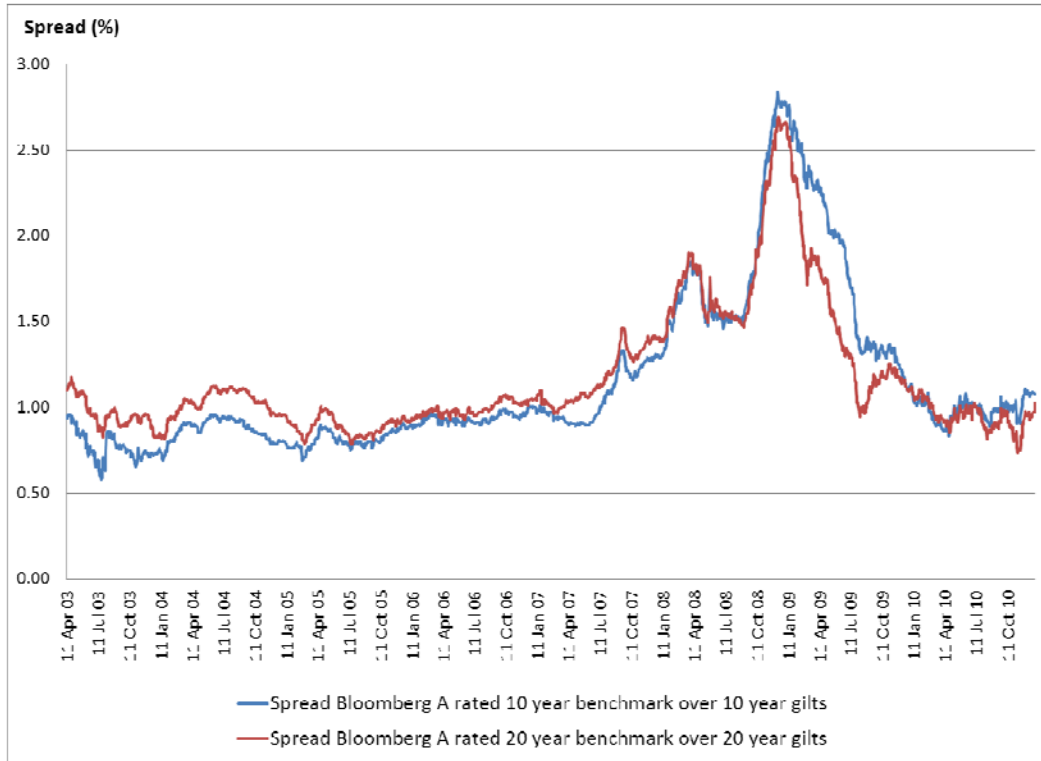
The methodology used to estimate cost of debt during TPCR4

- 2.45 Smithers & Co. (2006) approached the cost of debt assessment via an examination of spreads on benchmark bond indices (both utilities-specific and a general corporate index). They concluded that yields on utility bonds were commoditised in that the maturity and rating were the key drivers of spreads rather than company-specific factors, lending support to the use of wider market benchmarks.
- 2.46 Ofgem, in the TPCR4 final proposals, noted that the observable premium on utility debt was at historically low levels at the time (in the range of 98 to 130 basis points). Because Ofgem wished to take a longer-term view on appropriate returns, it decided in the final TPCR4 proposals to use a cost of debt figure above that implied by market conditions of the time. Analysis of the long-term average of bond spreads supported the range 1.0 per cent to 1.5 per cent.
- 2.47 The estimate of the debt premium was added to the estimate of the risk-free rate (2.5 per cent) to arrive at the final range for the pre-tax real cost of debt of 3.5 to 4.0 per cent, with a point estimate of 3.75.

Market developments since TPCR4

- 2.48 Corporate bond spreads were strikingly elevated between the start of 2008 and the middle of 2009, as the crisis took hold.
- 2.49 This is evident in the market data presented in Figure 2.8 below, which shows the spread on the Bloomberg A-rated 10 and 20 year non-financial corporate index over 10 and 20 year UK gilts respectively. (The Smithers & Co. analysis focused on A-rated benchmark yield.)

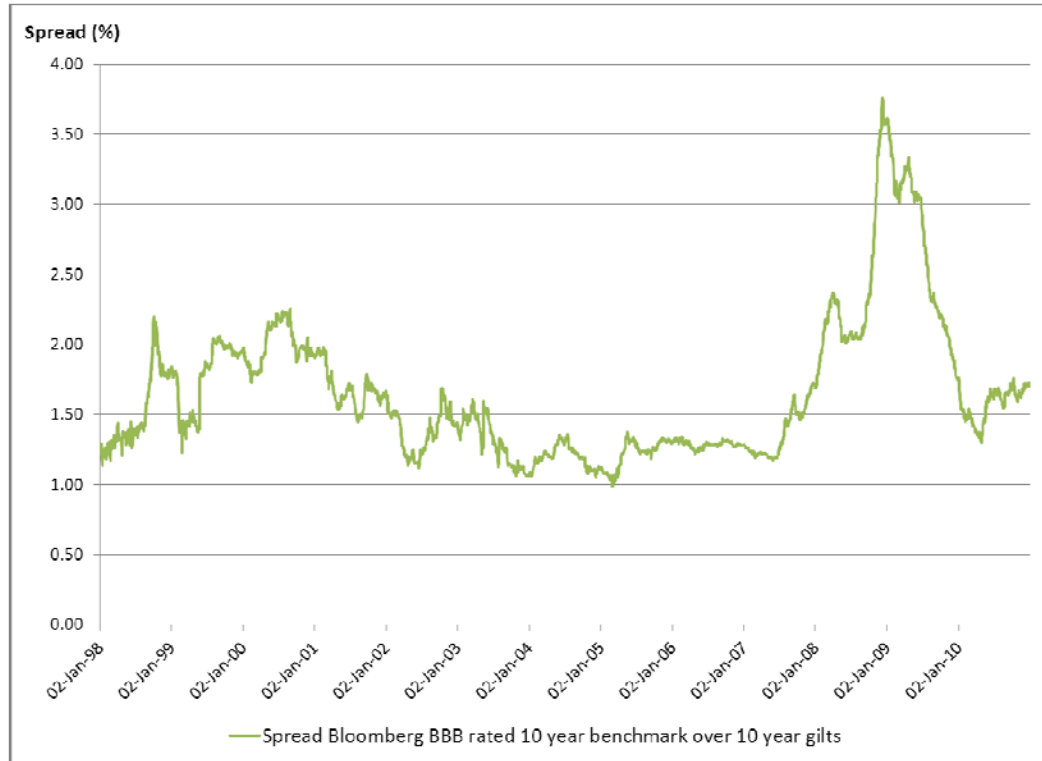
Figure 2.8: Spread on A rated 10 and 20 year Benchmark Non-Financial Corporate Bond Index over 10 and 20 Year Gilts



Source: Bloomberg and Bank of England data

- 2.50 Spreads over gilts were around 1 per cent prior to the onset of the financial crisis, but then rose substantially with spreads on the 10 year index peaking at 2.83 per cent on 11 December 2008.
- 2.51 Spreads returned close to their long-term average of around 1 basis point since the start of 2010 and have remained close to that level. Further, the spreads for two indices of different maturities have also moved close together since the end of 2009.
- 2.52 An examination of the spreads on BBB rated index (see Figure 2.9) shows that their long term-average tends to be closer to 1.5 rather than 1.0.

Figure 2.9: Spread on BBB Rated 10 Year Benchmark Non-Financial Corporate Bond Index over 10 Year Gilts



Source: Bloomberg and Bank of England data

2.53 The table below summarises the key statistics on the spreads observed on these indices since 2003.

Table 2.2: Key Statistics on Bond Spreads since 2003

Bond rating	spot 31/12/2010	Average spread	Upper quartile	Lower quartile
A-rated 10 year	1.08	1.14	1.29	0.87
A-rated 20 year	1	1.16	1.23	0.94
BBB rated 10 year	1.73	1.63	1.79	1.24

Conclusion for the TPCR4 rollover

- 2.54 On the basis of this analysis, which cross-checked the method employed to estimate the debt premium during TPCR4 with updated market data, there is no strong evidence to depart from the range of 1.0 to 1.5 for the debt premium adopted during TPCR4.

3 ROLLOVER DECISION RECOMMENDATION

Component of WACC	TPCR4	Range of relevant regulatory decisions since 2006	Range of new data	Recommendation
Risk free rate	2.5%	1.5-2.5% (all sectors)	1-2%	1.5%
Debt premium	125bps	1.05-1.6 (gas and electricity sectors)	114-163bps	125bps
Cost of debt	3.75%			2.75%
Equity risk premium	Not explicit (chosen figure for cost of equity compatible with 4.5)	4.5-5.4 (all sectors)		Not explicit, but compatible with 5.0
Equity beta	Not explicit (chosen figure for cost of equity compatible with 1.0)	0.64-1 (water, gas and electricity sectors)		No change
Cost of Equity	7.0%			6.5%
Gearing	60%			60%
Vanilla WACC	5.05%			4.25%

3.1 Note that the key driver of reduction in the vanilla WACC is a reduction of 1 per cent in the risk-free rate estimate. Since the risk-free rate enters both the cost of equity and the cost of debt, by itself this would have reduced the vanilla WACC by a full percentage point. However, we implicitly offset some of this effect in the case of the cost of equity by keeping the reduction in the overall cost of equity to 0.5 (dropping the total market return from 7.0 to 6.5 per cent), which is compatible with an assumed rise in the equity risk premium to 5.0 per cent.