



INDEXING THE ALLOWED RATE OF RETURN ORR / OFWAT

September 2007

Final Report

Submitted by:

Cambridge Economic Policy Associates Ltd.

 **CAMBRIDGE ECONOMIC
POLICY ASSOCIATES**

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1. EXECUTIVE SUMMARY

1.1. Background

Most UK regulators of network industries set the allowed real weighted average cost of capital (WACC) at a fixed value ex ante for the period of the price control (usually five years). For much of this decade the allowed cost of debt embedded in the WACC has been set by regulators at a level significantly higher than the actual cost of debt over the period. As a result customers/users have paid higher prices and returns on equity have been higher than expected when the price control was set. This appears to be one of the factors explaining why many regulated businesses are valued at significant premia to their regulated capital values (RCVs).

In 'Financing Networks' (2006) Ofwat raised the possibility of indexing part of the allowed return. ORR consulted on the issue in September 2006, concluding in February 2007 that in principle there is merit in the approach. CEPA has been asked by Ofwat and ORR to explore the practicalities and detailed design issues involved in implementing a form of indexation of the allowed cost of debt or its component parts to a pre-determined external benchmark.

1.2. Rationale for indexing the cost of capital

The report first considers the rationale for such an approach. In essence the rationale is that it may enable regulators to reduce the current 'headroom' between the allowed and actual cost of debt, thereby benefiting customers/users. The extent of the headroom will vary depending on market conditions and by regulated sector, but we argue that all regulators' views about the asymmetry of risks in setting the cost of capital means that it is always positive.

The result of introducing indexation would be to set the allowed cost of debt closer to the ex ante expected cost of debt of an efficiently financed business. The immediate reduction in prices paid by customers would be offset by a risk that prices might increase in the future if interest rates rise significantly.

The indexation mechanism would ensure that the regulated businesses could continue to finance their capital programmes in the event that the actual cost of debt increased during the price control period above the level anticipated when the allowed cost of debt was set.

Our analysis suggests that a well designed adjustment mechanism would retain strong incentives for regulated companies to finance their businesses efficiently. The key issue considered in the report is whether a robust mechanism can be devised that will, in practice, deliver the theoretical benefits.

It has been argued that an indexation mechanism should not be introduced since it is the regulated company that is best placed to manage interest rate risk. This misses the point. The rationale for indexing an element of the cost of capital relates to regulators' behaviour in setting the cost of debt – i.e. the 'headroom' between the actual cost of debt

and the allowed cost of debt – and is independent of the company’s ability or otherwise to manage financing risk.

1.3. Incentive effects and dead weight gains and losses

Indexation of the cost of debt

The report considers the incentive effects of indexation of the cost of debt and the possible ‘dead-weight gains and losses’ arising from introduction of such a mechanism. These effects depend on the specific mechanics adopted for the indexation mechanism. In particular they differ depending on:

- whether indexation applies to the whole of the notional debt¹ funding the RCV or only to the incremental notional debt funding the incremental capital programme over the price control period; and
- whether the indexation mechanism is symmetric (up and down) or asymmetric (up only).

The conclusions of the analysis are that introduction of an indexation mechanism for the allowed cost of debt would:

- Have no material impact on the gearing decision in industries such as water and rail where the gearing decision is normally dominated by the treatment of taxation costs.
- If the mechanism was symmetric and applied to the whole of the notional debt that funds the RCV there may be a tendency for borrowers to increase the proportion of floating debt to fixed debt. If a symmetric mechanism applied only to incremental notional debt then this tendency is likely to be weak.
- If the mechanism applied only to incremental notional debt then there would be no dead weight gains or losses on existing debt arising from indexation. The present value gain on existing cheap fixed rate debt would be lower to the extent that the allowed cost of debt was set at a lower rate with indexation than without.
- If the mechanism applied to the whole notional debt funding the RCV then there would be potential dead weight gains and losses. Upward movements in the benchmark would increase the already significant gains accruing to companies because the allowed cost of debt was set much higher than the actual cost during the current price control period. Downward movements in the benchmark would squeeze cash flow cover and could cause a de-rating of corporate bonds, triggering an adverse market response and claims of regulatory inconsistency.

¹ ‘Notional debt’ is the amount of debt implied by the notional gearing used by the regulator in setting the WACC.

Indexation of the cost of equity

As part of the study we have considered whether it would be appropriate to index the cost of equity as well as the cost of debt. We conclude that in the absence of easily observable and reliable estimates of the equity risk premium (and by extension the cost of equity) it is not possible to create a reliable index of changes in the cost of equity necessary for a robust indexation mechanism

Conclusion and impact on markets of implementation

The conclusions of our analysis are that if an indexation mechanism is introduced it should be symmetric and should adjust the allowed cost of debt relating to the incremental notional debt only in a single review period²

As with any regulatory innovation, the market response will depend on the extent to which the regulator is careful to signal its intentions well in advance, frame proposals in the context of regulatory continuity and an evolution of approach in light of market developments. Financial markets and regulated companies understand that the allowed WACC and (specifically the cost of debt) will be reduced at future price control reviews³. In this context the regulator should cast indexation as a mechanism for managing risk intelligently and for ensuring companies are able to finance their capital programmes.

We discuss the possible response of debt and equity markets and argue that:

- Debt markets and rating agencies will focus primarily on the reduction in the allowed cost of debt, rather than the indexation mechanism per se. But to the extent that they do, we believe that they are likely to be relaxed if the mechanism applies to incremental notional debt only
- Equity markets will focus on where fair value lies after the valuation and on the headline WACC and allowed cost of equity numbers. To the extent that they focus on change in equity risk as a result of introduction of a symmetric indexation mechanism it is likely to be viewed as reducing equity risk.

1.4. Mechanics of indexation

The report considers whether the adjustment mechanism should apply to the whole of the real cost of debt or to one or more of its component parts i.e. risk free rate and the debt premium.

It notes that, given that regulators set allowed revenues in real terms and index them annually for changes in general inflation, the indexation mechanism should adjust for changes in the real cost of debt, not changes in the nominal cost.

² This means that when indexation is rolled forward to the next period, the amount of existing debt against which a non-indexed cost of debt is applied will include the existing debt at the beginning of price review period 1 and any additional notional debt in price review period 1.

³ Assuming that underlying market conditions remain as they have been in recent years

In principle, indexation should apply to the whole of the cost of debt. In our view an appropriate benchmark for the cost of debt is the cost of A- rated corporate debt issues. This rating is viewed as consistent with the notional gearing used by regulators when setting the allowed WACC.

There are available measures of the cost of nominal rated corporate bonds. The practical challenge is to devise suitable measures of changes in their real cost. Various methodologies for compiling an index of changes in the real cost of nominal bonds are considered in the report. There are issues around the suitability of changes in the cost of index-linked debt as a reliable proxy for changes in the real cost of nominal debt. The report suggests various ways that an appropriate benchmark could be devised to derive a 'base year' value for an indexation mechanism.

The report then considers the mechanics of an adjustment mechanism. It concludes that:

- The composition of the benchmark and its base year value should be determined and published at the start of the review period.
- There should be a 'tolerance band' around the base year value of the benchmark. If changes in the benchmark value remain within the tolerance band there would be no adjustment to the allowed COD. The width of the tolerance band would be a function of the 'gap' between the allowed cost of debt for the next review period and the recent average actual cost of debt in the period preceding the start of the review period.
- If the value of the benchmark fell above or below the tolerance-band for a defined period, say, six consecutive months, then an adjustment to the allowed cost of debt would be triggered.
- The amount of the accrued adjustment to the allowed cost of debt would be pre-specified. It might be the whole of the amount of the change in the benchmark from the base year value less the width of the tolerance band.
- The adjustment to the allowed cost of debt would be applied to the notional debt relating to the incremental RCV e.g. if there was £100 million addition to the RCV and the specified marginal notional gearing were 60% then the allowed cost of debt adjustment would apply to £60 million of notional debt. The adjustment could apply either to the whole of the incremental notional debt over the five year period or to notional debt over the remainder of the five year period from the time when the mechanism was triggered.
- Normally the accrued adjustment to allowed revenue would be logged up/down and funded in an adjustment to allowed revenues over the subsequent five year period. As now, there would be provision, if the benchmark value exceeded the tolerance band by a large amount from early in the five year period, to allow a company to seek an interim review if it could show that delay in funding the higher cost of debt was prejudicing its ability to finance its capital programme.

1.5. Selecting a benchmark for the cost of debt

The principles that should inform the selection of appropriate benchmarks are:

- *Non-controllability*: the benchmarks clearly must not be subject to influence by the regulated businesses or their funders.
- *Transparency*: benchmarks must be transparent, their basis of computation easily understood and the source information should be prepared and published by a recognised independent, authority e.g. Bank of England.
- *Correlation*: movements in the benchmark should be well correlated with changes in the cost of borrowing of an efficient notional regulated company.
- *Diversification*: the components of the benchmark should be well diversified to avoid a situation where event risk affecting a single component of the benchmark could result in inappropriate change in the overall benchmark value.

We set out three possible approaches to benchmarking the real cost of debt.

It is important to note that the indexation mechanism is not concerned with the absolute level. It measures from the base value in the real cost of debt over the price control period. All of the following would give an appropriate measure of changes in the real cost of debt that would be faced by an efficiently financed regulated business. More work is required to decide which of these approaches is most appropriate.

Option 1: Nominal cost of debt deflated to real cost of corporate debt

The first approach involves specifying a portfolio of medium and long term 'conventional' corporate bonds with A- rating. This reflects a judgement about the broad shape of the maturity profile of a regulated borrower. Judgements of this sort are currently implicit in the allowed WACC determinations made by regulators. With this approach these judgements would be more explicit. But borrowers would continue to be free to make their own judgements about how each of them chose to finance their businesses.

The benchmark nominal cost of debt should be deflated to determine the real cost of debt. Two approaches are outlined:

- Deflate by annual movements in the RPI (on the basis that the allowed real cost of capital is inflated by RPI), or
- Deflate by the expected (probability weighted) value of inflation as published from time to time by the Bank of England based on the difference between index linked and nominal gilts with maturities reflecting the same debt maturity profile and weightings as used in the benchmark portfolio.

Option 2: Components of the cost of debt

Alternatively the components of the cost of debt, the risk-free rate and debt premium could be benchmarked as follows.

- *Debt premium* The difference between the nominal cost of debt of the bond portfolio set out above and an agreed measure of the nominal risk free rate applicable at each maturity (e.g. benchmark nominal gilts).
- *Risk free rate* (a) The real risk free rate of index-linked gilts for bonds with the same maturity profile and weightings as used in benchmark portfolio; and/or (b) the implicit real risk free rate obtained by deflating nominal government bonds with the same maturity profile and weightings as set out above.

Option 3: Blended approach

Perhaps the most robust approach to deriving the benchmark would be to develop a composite measure of changes in the real cost of corporate debt (Option 1) and the components approach (Option 2) – thereby using information from all of the available sources.

1.6. Conclusions

Our conclusions are as follows:

- There is a valid rationale for pursuing further the idea of an adjustment to the allowed cost of debt in the event that the actual rate over a five year price control period falls outside the range expected when the allowed cost of debt was set.
- Mechanisms can be devised that enable such a mechanism to be adopted without inducing significant adverse incentive or dead-weight effects.
- We recommend further detailed consideration of mechanisms that would be used to adjust the allowed cost of debt that are symmetric (operate if rates move higher or lower than expected) and that adjust allowed revenues relating to the cost of debt for incremental notional debt only.
- The adjustment mechanism should reflect movements from an agreed base year level in a benchmark of the real cost of debt of a portfolio of relevant A- rated securities.
- The suggested mechanics of an adjustment mechanism would involve setting a tolerance band within which there would be no adjustment of the allowed cost of debt. Adjustments would normally be logged up/down and net adjustments taken into account when setting prices at the subsequent price control review. Therefore there would be no increase in unpredictability of prices during the five year review period unless there was a large unanticipated movement in real interest rates that an interim review was triggered.

- There are no major issues of regulatory consistency with the proposed mechanism. The indexation mechanism would operate only in respect of incremental debt; and the logging up/down mechanism and interim review in exceptional circumstances are both recognised features of the current regulatory regime.

2. INTRODUCTION

2.1. Introduction

Most UK regulators of network industries set the allowed weighted average cost of capital (WACC) at a fixed value ex ante for the period of the price control (usually five years). This means that, once the allowed WACC has been set, customers are protected from any unexpected increases in the cost of capital that would have raised the actual WACC above the allowed WACC during the price control period.

This approach leaves the risk of the actual cost of finance rising above the allowed WACC with companies and generates strong incentives for them to fund themselves as inexpensively/efficiently as possible.

However throughout this decade the allowed cost of debt has been set by regulators at a level that has been significantly higher than the actual cost of debt. This appears to be one of the factors explaining why many regulated businesses have been valued in financial markets at significant premia to their regulated capital values (RCVs).

In 2006 'Financing Networks' Ofwat raised the possibility of indexing part of the allowed WACC while ORR consulted on the issue in September 2006, concluding in February 2007 that, in principle, there is merit in the approach.

The Office of Rail Regulation (ORR) and the Office of Water Services (Ofwat) have now jointly contracted Cambridge Economic Policy Associates (CEPA) to explore the practicalities and design issues involved in indexing either the cost of debt as a whole or a part of the cost of debt to a pre-determined external benchmark.

2.2. Terms of Reference

The terms of reference for this work are to explore the practicalities and design issues involved in indexing either the cost of debt as a whole or a part of the cost of debt to a pre-determined external benchmark.

In particular the study is to include:

- An assessment of the appropriate component of the allowed return to be benchmarked, i.e. total cost of debt or debt premium or risk-free rate.
- A discussion of how the indexation should be transmitted into allowed revenues, the implications of the possible approaches and a recommendation as to the appropriate approach for both Ofwat and ORR. For example, the allowed return might track the index or changes to the allowed return might only be made in the event that the index exceeds a pre-determined level.
- An assessment of the principles for determining the composition of the external benchmark.
- Proposals on the composition of the external benchmark, for example in terms of the types of security to be included in the index (including maturity, credit

rating and indexation) and the period over which benchmark components should be assessed.

- An analysis of the implications of the proposed approach for the incentives facing the regulated company, the efficient financial structure and economic regulation (including the treatment of embedded debt and the risk of introducing systematic risk should several regulators adopt similar benchmarks).

The full terms of reference are set out in Annex B.

We have not been asked to consider alternative structures that might achieve similar risk allocation for elements of the cost of capital. For example, the Office of the PPP Arbiter (OPPPA) employs an approach where the cost of capital is set for the life of an asset.

2.3. Report structure

The report is structured as follows:

Section 3 considers the rationale for indexation of some or all of the allowed cost of debt.

Section 4 sets out five criteria against which any proposed approach to indexation should be assessed, namely:

- the impact on incentives to finance businesses efficiently;
- whether there are deadweight gains or losses;
- the market response to regulatory innovation;
- the impact on customer prices; and
- the regulatory burden.

Section 4 then addresses the different incentive and deadweight effects of symmetric and asymmetric indexation arrangements; and of indexation that applies to the whole of the notional debt funding the RCV or to only the incremental notional debt relating to the incremental capital programme over the five year period.

Section 5 sets out suggested principles that should be applied when determining appropriate benchmarks for the cost of debt. It then goes on to consider the options for cost of debt benchmarks - for further consideration and consultation. It also briefly summarises the reasons that indexation of the whole or part of the cost of equity is not feasible.

Section 6 considers in more detail possible mechanisms for benchmarking and adjusting the allowed cost of debt. Specifically it considers:

- whether the adjustment to the allowed cost of debt should be applied to the total notional debt or just to the incremental notional debt;
- whether the adjustment mechanism should be symmetric or asymmetric;

- whether all movements in the benchmark should cause a change in the allowed cost of debt or whether there should be tolerance bands;
- the periodicity of the adjustment mechanism and the amount of the adjustment; and
- the method for adjusting allowed revenues if adjustment payments are triggered, including logging-up/down, interim determinations (IDOKs) and automatic intra-period adjustments.

Section 7 sets out some simple simulations to illustrate how certain indexation arrangements might have operated had they been applied in earlier price control periods.

Section 8 sets out our conclusions and recommendations.

Annex A provides additional supporting evidence and analysis.

2.4. Approach to the counterfactual

We consider the expected benefits, costs and risks to customers/users and the change in incentives acting on the regulated companies and the way these changes might influence their financing of their businesses. The assessment of the benefits and costs of indexation mechanisms is dependent on the precise specification of the indexation mechanics. It is also dependent on judgments about how much lower the *ex ante* allowed cost of debt for the next price control period would be with and without indexation of the allowed cost of debt.

In order to explore this we consider in various points in the paper⁴ how the arguments might be affected by the different potential states of the world.

- Continuing with the current methodology for setting the allowed WACC and assuming the allowed cost of debt continues to be set at a significant premium to the observed recent historic actual cost of debt for the next price control period (e.g. to around 50-75bp) (referred to hereafter as **Counterfactual 1**).
- Continuing with the current methodology for setting the allowed WACC and assuming that the headroom between the allowed cost of debt and recent historic actual cost of debt is narrowed significantly (e.g. to around 25bp) for the next price control period and no indexation mechanism is introduced (referred to hereafter as **Counterfactual 2**).
- Continuing with the current methodology for setting the allowed WACC and assuming the premium between the allowed cost of debt and recent historic actual cost of debt is narrowed significantly for the next price control period (compared with Counterfactual 1 or 2) and a new cost of debt indexation mechanism is introduced (referred to hereafter as the **Indexation Approach**).

⁴ Particularly section 4.5 which considers the issue of risk sharing with customers and Section 7 which explores how indexation mechanism might have operated in the past.

The majority of the paper is concerned with the current situation where the allowed cost of debt is significantly higher than the actual cost and increases in real interest rates are viewed as more likely than large falls. However the paper also discusses at various points how indexation mechanisms would operate in alternative market conditions, e.g. in the event of a sustained fall in the real cost of debt over the period relative to the allowed cost of debt.

3. RATIONALE FOR INDEXATION

3.1. Setting the allowed cost of capital

Regulators set the allowed WACC for a five year period at the level judged to reflect the cost of capital that would be incurred by an efficiently financed, notionally geared regulated company. To set the allowed WACC regulators must form a view about the appropriate notional gearing and about the cost of debt and equity at that notional gearing. Since the yield curve is typically not flat (for example, the yield curve is currently downward sloping – so there is a negative term premium) regulators must also implicitly form a view about the debt term structure when setting the allowed cost of debt.

When the determination of the allowed WACC is being made, regulators know the current and historic cost of debt but not the actual cost of debt of an efficiently financed business over the next price control period. Therefore they must form a judgment about the future cost of debt based on all available information.

3.2. Rationale for indexation

3.2.1. The benefits of a historically low cost of debt have not been shared with customers/ users

Over the last two review periods in a range of sectors (and in particular since 1999) regulators have set the ex ante allowed cost of debt at levels that have been significantly higher than the actual cost of debt.⁵ The result has been that allowed revenues to fund the cost of debt have significantly exceeded the actual costs of debt of regulated companies. Consequently the prices paid by customers/users have been higher than they would have been if the allowed cost of debt had reflected actual market conditions. As a result shareholders of regulated companies have earned actual returns on equity significantly in excess of the allowed cost of equity.⁶

Putting the same point another way, customers/users have paid a very large ‘insurance premium’ for the privilege of not sharing the risk of sharply rising real interest rates, the insurance premium being in simple terms the ‘headroom’ between the allowed cost of debt and the actual cost of debt of an efficiently financed business over the period.

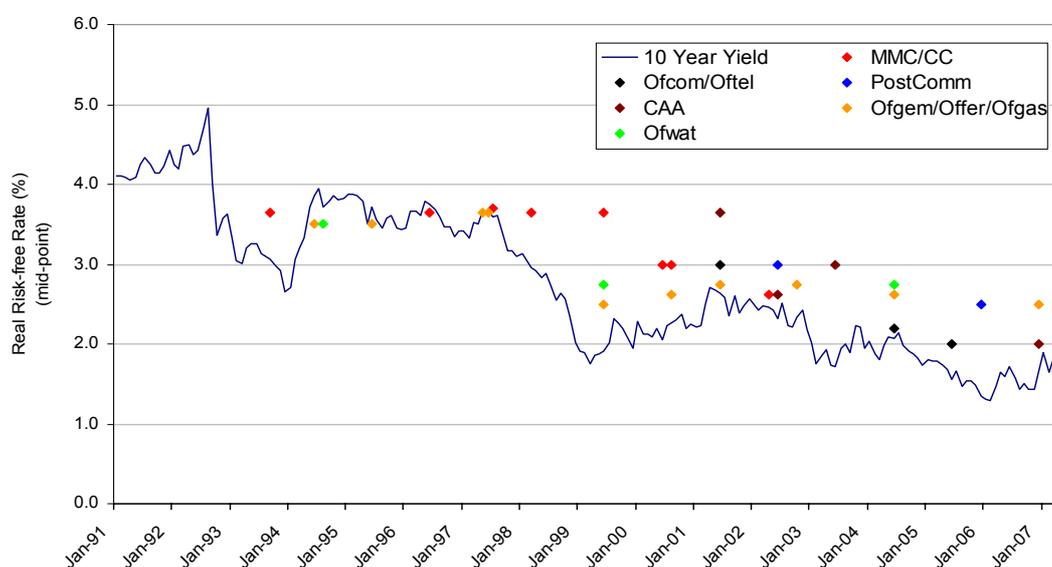
Figure 3.1 illustrates the point. It plots how regulators’ determinations of the risk free rate (one component of the cost of debt) have compared with the actual risk free rate as measured in this case by the yield on benchmark 10 year gilts. It shows that: (i) there has been a lag between downward movements in the actual risk free rate and regulators’ decisions to lower the allowed risk free rate; and (ii) even then regulators have

⁵ We focus primarily in this report on indexing the cost of debt. Whether it would be possible to index the overall cost of capital is discussed in Section 4.

⁶ No-equity companies such as Network Rail and Welsh Water have generated higher internal cash flow than was anticipated when the determinations were made.

consistently ‘aimed off’ leaving significant headroom between the allowed rate and the (historically low) observed rate⁷.

Figure 3.1: Benchmark risk free rate compared with UK regulatory decisions



First Economics⁸ notes that since 2002, regulators’ determinations of the allowed cost of debt have left a wide gap between the allowed and actual cost. They note that ‘a rough rule of thumb would be that companies can expect to see regulators use a risk free rate worth at least 50 basis points and perhaps as much as 125 basis points above prevailing market levels’ when setting the allowed risk free rate. As recently as December 2006 Ofgem set the allowed risk free rate at a level 100 basis points higher than the short-term historic rate. The same ‘headroom’ is observed when comparing the allowed debt premium with the actual debt premium and the allowed cost of debt with the actual cost of debt⁹.

3.2.2. Regulators have erred on the side of caution in order to avoid putting at risk the ability of the regulated companies’ to finance themselves

In estimating the WACC, regulators are seeking to forecast the cost of capital that would be faced by an efficiently operated and financed business with similar assets and business risks as the regulated utility in the forthcoming price control period. This is the ‘risk-adjusted’ WACC referred to by ORR / Ofwat in the terms of reference.

In order to do this, regulators have typically considered spot, short and long-run historic average information on the cost of debt and equity for a notionally geared company. The

⁷ We note that the WACC is just one judgement that regulators are required to make in arriving at the total allowed revenue in a price review. In practice there may be some trade-off between these assumptions. But this is not sufficient to explain the persistent headroom observed in regulators’ recent decisions.

⁸ ‘Automatic Annual Adjustments of the Cost of Capital: A Discussion Paper’ First Economics, March 2007.

⁹ See CEPA, “The Allowed Cost of Capital, Ofgem: GDPCR 2008 – 2013”, prepared as a submission by Centrica to Ofgem and available at <http://www.ofgem.gov.uk/Networks/GasDistr/GDPCR7-13/Documents1/Centrica%20Response%204CD%20-%20Part%201%20-%20Not%20confidential.pdf>

dilemma they have faced throughout this decade is whether to set the allowed cost of debt at a level that reflects the historically low short run average cost (which an efficiently financed company might expect to have made use of) or whether to allow some headroom for the possibility that market conditions might change during the forthcoming review period (i.e. to allow for some element of mean reversion).

The risk of setting the WACC too low is that the regulated utility may be unable to finance itself¹⁰, which has implications for both the delivery of its capital expenditure programme and for the longer-term market perception of regulatory risk and therefore for the markets' required returns.

Given these risks regulators have understandably erred on the side of caution. For example, Ofgem at the end of 2006, noted that 'One of the main objectives in setting the cost of capital is to facilitate the necessary capital formation' and therefore it set the allowed cost of debt 'above that implied by current market levels' (at 3.75%) when the actual real cost of debt was more than 100 basis points lower than this. Likewise Ofwat in 2004 used allowed cost of debt assumptions that were much higher than short term average rates because 'there is much greater risk that rates will rise over the period than that they will remain unchanged or fall.'

Furthermore, regulators have taken into account the fact that utilities funded sunk capital expenditure (now in the RCV), in part with fixed interest debt in the 1990s when real interest rates were significantly higher than now.

The result is that, as recently as the end of 2006, the allowed real cost of debt has been set more than 1.5% higher than the recent average actual cost of debt of an efficiently finance regulated company.

3.2.3. Regulators are always likely with the current methodology to err on the side of caution and allow 'headroom' when setting the allowed cost of debt

Most regulators have a statutory duty to ensure that regulated businesses are able to finance their activities. Therefore it is natural and appropriate that, in circumstances where there is bound to be uncertainty about future financial market conditions, regulators will err on the side of caution and allow headroom when setting the allowed WACC and allowed cost of debt (we discuss below the factors that might affect this).

Indeed some regulators are on record as saying that this is the appropriate way for them to act to ensure they comply with their statutory duty because the cost of getting the allowed WACC too low is more serious (inability of businesses to finance their activities) than the cost of getting the allowed WACC too high (a 'small' percentage annual increase in customer/user prices)¹¹. Therefore, so long as regulators continue to set a fixed ex ante allowed WACC for five years and view the risk of getting the allowed WACC 'wrong' as asymmetric, they are likely to continue to 'aim high'. The result will be that

¹⁰ Regulated companies faced both 'financing risk' on new debt raised for additional capital investment and 're-financing risk' in relation to existing (non-amortising) debt at maturity.

¹¹ For example CAA, "Airports price control review: Initial proposals for Heathrow, Gatwick and Stansted" December 2006.

customers/users will continue to pay a high ‘insurance premium’ for the privilege of not sharing in the small risk of a large, sustained rise in real interest rates over the price control period. (Also, actual returns on equity are likely to be higher than the ex ante allowed cost of equity.)

The factors that affect the size of the headroom that regulators allow include the following.

- **Market conditions:** in terms of differences between spot, short-term average and long-term average rates – which will determine the cost of debt that an efficiently financed company might be expected to have on existing / embedded debt.

In current circumstances, where the short-term average cost of debt is well below the long-term average, the ‘headroom’ between the allowed and actual cost is large. However, in making a case for indexation, it is also necessary to consider other market conditions.

For example, if the short-term average (or spot) cost of debt rises from current historical low rates to above the very long-run average. In these circumstances the ‘gap’ between the allowed and actual cost might be expected to narrow compared with today (since regulators might reasonably expect downward movements in rates as opposed to further increases). However, in our view it is unlikely that regulators would set the allowed cost of debt significantly lower than the short-term actual cost of debt¹² - and so headroom would still exist. Furthermore, if rates were to fall over the review period without indexation such a ‘gap’ would widen. Symmetric indexation would provide a mechanism for sharing with customers a declining real cost of debt.

In general then, although the size of the ‘gap’ is likely to be highest in the current market situation, we believe that regulators stated views (about the asymmetry of risks of getting the cost of debt too low or too high) mean that such a gap will always exist.

- **Capital expenditure** required in the forthcoming price review period. Other things being equal, it is reasonable to expect the size of the headroom to reflect the change in the RCV as a proportion of the opening RCV. If the additions to the RCV are large compared with starting values in the period, greater weight might be placed by the regulator on the uncertain rates on future debt; than on the cost of debt that relates to the existing debt of an efficiently operated utility.
- **Floating rate debt.** The greater the proportion of floating rate debt that the regulator judges might be appropriate for an efficiently financed company, the larger the headroom that might be appropriate (at least compared with the current spot rates).
- **Refinancing risk** on (non-amortising) debt expected to mature in the next period. The headroom between the actual and allowed cost of debt might be expected to be

¹² This might be appropriate if the average cost of debt of an efficiently financed company over the period was below current spot rates reflecting the presence of significant amounts of ‘cheaper’ embedded debt.

larger the greater the proportion of fixed rate debt that is expected to be re-financed in the forthcoming review period. However, note that the approach that regulators take here should relate to an assumption about the level of re-financing necessary for an efficiently financed utility – which itself reflects the mix of fixed and index-linked debt of different maturities and floating rate debt.

The extent of any headroom in the allowed WACC and cost of debt may also be affected by the extent to which there are other regulatory mechanisms available to manage risk (e.g. re-openers that permit an interim review in defined circumstances).¹³

3.3. Summary and other issues

The argument in favour of some form of indexation is that it would permit regulators to reduce the amount of headroom between the actual and allowed cost of debt - thereby giving customers/users an immediate benefit, while ensuring that, should the actual cost of debt of an efficiently financed business increase above the allowed cost of debt during the price control period, the regulated companies would still be able to finance their capital programmes and earn the allowed return on equity. The greater the size of the headroom the stronger the rationale for some form of indexation¹⁴.

It has been argued that the presence of a significant gap between the allowed and actual cost of debt is not a sufficient reason to adopt indexation. Some companies may achieve this position through particularly efficient financing in earlier periods. However, when the ‘gap’ is large and the gains are being realised by all regulated borrowers, it seems clear that the reason for the gap is not particularly efficient financing decisions by a few borrowers. Rather it is evidence that the actual cost of debt in the period is significantly lower than the expected cost of debt when the allowed rate was set.

It has also been argued that introduction of cost of debt indexation mechanisms runs counter to the principle that regulated companies are best placed to manage interest rate risk. It is clearly the case that financing decisions should rest with the regulated companies once allowed revenues have been set. However, as noted above the regulators’ approach of ‘aiming’ high when setting the allowed cost of debt means that the regulated companies bear very little interest rate risk in the forthcoming review period and that consumers bear the cost of possible interest rate rises in the form of a high ‘insurance’ premium added to maximum prices.

The fundamental issue is not therefore whether companies should in principle retain the risks associated with their financing decisions. Rather it is whether the cost to consumers of transferring that risk to the regulated companies is reasonable. If without indexation there is a large observable gap between the allowed and actual cost of debt then the cost

¹³ In principle it might be possible for a regulator to set the allowed cost of debt equal to the expected rate over the period without any headroom and rely only on existing risk management mechanisms (e.g. re-openers). This has not been the approach used in practice. In CEPA’s view this is because regulators are rightly concerned about the impact that such an approach would have on the market’s view of regulatory risk (since it could be expected to increase the likelihood of re-openers during the price control period).

¹⁴ As noted section 2.4, in what follows we discuss the case for indexation in the context of a number of different counterfactuals in relation to the size of the headroom.

of risk transfer is high. If introduction of indexation reduces that gap then the benefits to consumers may justify some marginal impact on the financing decisions of regulated companies. In Section 4 of this report, we conclude that an appropriately designed indexation mechanism would not have a significant adverse impact on the incentives on the regulated companies to finance themselves efficiently. Therefore the issue is whether the gains in terms of lower prices for consumers are large enough to warrant some impact on marginal financing decisions. We consider this question in Section 7 of the report.

Decisions about hedging of interest rate risk are conceptually the same as decisions about the proportions of fixed and floating rate debt. Hedging or swaps convert an uncertain future amount into a certain amount for a fee. The expected cost of hedged and unhedged debt are the same if markets are efficient. As we note in our July paper on the appropriate risk-adjusted cost of debt for Network Rail, if Network Rail has hedged ORR might take into account the reduced interest rate volatility over the next review period and reduce the extent to which it allows for mean reversion, i.e. reduce the 'gap' between the allowed and actual cost of debt over the period. Were it to do this it would reduce the need for cost of debt indexation.

In addition, indexation may appear a sound idea in principle. However, there are numerous instances where new regulatory initiatives that appeared to be sound in principle turn out in practice to have unintended adverse consequences. This may be because there are design problems and/or because of changes in behaviour of the companies and/or financial markets.

This report is concerned with the practicalities and design issues involved in indexing some or all of the allowed cost of debt to external benchmarks. It considers whether there are major design problems and whether there are likely to be material unintended adverse behavioural responses by the regulated companies or the providers of finance.

4. IMPLICATIONS OF ADOPTING ALLOWED COST OF DEBT INDEXATION

This section first sets out five criteria for assessing indexation options. It then evaluates the pros and cons of possible indexation options comparing them with the Counterfactuals 1 and 2 described earlier.

4.1. Criteria

We have identified five main criteria for assessing the indexation options. They are set out in Table 4.1.

Table 4.1: Criteria for assessing indexation options

Criteria	Relevant factors
1. Incentives on companies	<ul style="list-style-type: none"> • What is the impact on incentives for efficient financing of the business?
2. Deadweight gains/losses	<ul style="list-style-type: none"> • What effect does indexation have on existing debt raised to fund the 'sunk' RCV?
3. Market response and impact on equity investors	<ul style="list-style-type: none"> • Does indexation change market expectations about returns on equity/equity risks? • Does it change the perception of regulatory risks/regulatory consistency?
4. Risk sharing/Impact on customers and government budget	<ul style="list-style-type: none"> • What is the magnitude of any immediate price reduction? • What increase in risk is borne by customers / users? • What is the impact on predictability of government (e.g. DfI) transfers?
5. Regulatory burden	<ul style="list-style-type: none"> • Is there an increase in regulatory burden for companies? • For regulators? • Is it feasible to design mechanics 'fit for purpose' in accordance with sound principles?

4.2. Incentives on companies

The analysis of the incentive effects of indexation of the allowed cost of debt (or its component parts) proceeds as follows:

- First we consider the incentives to fund efficiently acting on a business trading in competitive markets whose revenues are not directly linked to the cost of capital.
- Second we consider the incentives to fund efficiently acting on a regulated business operating within the current regulatory regime where the allowed cost of debt is fixed ex ante for five year periods.

- Third we consider the change in incentives to fund efficiently acting on a regulated business operating within the current regulatory regime except that indexation of the allowed cost of debt intra-period is now permitted.

4.2.1. Non-regulated company

In this case we assume that the company is not regulated and its outputs are priced in competitive markets. The company has to finance a large capital programme consisting of primarily long life assets e.g. an electricity generating company in England. To finance its capital programme it will need to access significant amounts of external finance, either debt or equity. Its objective will be to minimise the cost of finance over the full life of the assets and thereby maximise returns on equity. Other things being equal, if it funds itself efficiently it can expect to remain competitive in the market for its outputs (since the long-run cost of supply will include the marginal cost of finance of an efficient supplier).

The cost of debt and equity in the financial markets are the expected returns required by providers of debt and equity, respectively, on investments of comparable risk. They are 'givens' for the company seeking to raise external capital. The company has to decide its least cost financing strategy. It must decide on the:

- (i) proportions of debt and equity;
- (ii) proportions of fixed and floating debt; and
- (iii) maturity structure of the debt portfolio (i.e. percentages of short, medium and long-term debt).

Optimal gearing

The first of these decisions is about optimal gearing. The conventional approach is to increase gearing to the point where the marginal default risk just equals the marginal tax shield benefit of additional debt. This gearing level is referred to as optimal gearing. Optimal gearing will differ depending on the volatility of pre-finance cash flows and to some extent on the correlation of financing costs with changes in pre-finance cash flows (which may itself impact on the decision about the proportions of fixed and floating debt).

Fixed or floating rate debt

The second of the decisions is about the proportion of fixed and floating debt. The company does not know ex ante what the cost of finance will be over the life of the assets. It does know that if it were to contract solely floating rate debt then:

- It would pay a cost of debt based on the average cost of floating rate debt over the life of the assets.
- There would be major exposure to short-term interest rate movements and therefore significant uncertainty about annual financing costs and annual profitability.

- There would be little, if any, risk that, if interest rates fell, the cost of finance would prove to be more expensive than the cost available to competitors.
- But, if interest rates rose, there would be an opportunity loss because the borrower would have foregone the opportunity to fix the cost of debt at a lower rate and therefore to lock-in a financing advantage and earn higher profits than it would have with wholly floating rate debt.

The borrower also knows that if it were to contract solely fixed rate debt then:

- It would pay the cost of debt in the loan agreement for the life of the loan.
- There would be less uncertainty about annual financing costs.
- There would be greater risk that the cost of finance would be ‘out of the money’ if interest rates fell. The company’s cost of finance would be higher than if it had wholly floating rate debt and profits would be lower.
- But, if interest rates rose there would be an increase in profits compared to the situation where all debt was floating because the lower fixed rate would be locked-in for the term of the loan. In this circumstance the company would achieve higher profits and competitive advantage over competitors that financed themselves differently..

Maturity profile

The third of the decisions is about the maturity structure of the loan portfolio. If all debt were contracted at a fixed rate for the full (long) life of the assets then the opportunity to benefit from rising interest rates would be maximised. However the risk of fixing the cost of debt, and then finding that interest rates fell, would also be greatest. On the other hand if all debt were contracted at a fixed rate for only a short term then the opportunity to profit from higher interest rates would be lower (because early refinancing at market would remove this profit opportunity) but equally the risks of ‘out of the money’ debt, if interest rates fell, would also be reduced.

In practice, faced with financial market uncertainty, most companies adopt the approach of maintaining a balanced portfolio of fixed and floating debt and short, medium term and long term debt. When market expectations are that rates will increase over the life of the assets the proportion of longer-term, fixed rate debt will tend to rise. When, as now, the yield curve is downward sloping, companies will tend to extend the maturity of their fixed rate loan portfolio to benefit from the yield advantage at longer tenors.

In competitive industries, if companies make ‘bad bets’ i.e. they contract for fixed rate debt at rates which turn out ex post to be more expensive than they could have funded themselves if they had contracted floating rate debt, then this is a cost that must be absorbed by shareholders.¹⁵ These costs reduce the company’s profitability and may affect its competitiveness, if efficiently financed companies have financed themselves

¹⁵ These ‘bad bets’ generate what regulators refer to as ‘embedded debt’. We return to the treatment of embedded debt of regulated companies later in this section.

more cheaply. This is part of the incentive to finance efficiently. Equally if companies manage to 'bet right' and lock-in fixed rate debt that proves ex post to be lower cost than the cost of floating rate debt over the life of the asset then, in competitive industries, this profit is retained by shareholders. This, too, is part of the incentive to finance the business efficiently.

4.2.2. Regulated company operating within the current regulatory regime

The cost of debt and equity available in the financial markets to a regulated company is also a given; they are determined by the returns available to investors on investments of comparable risk. Each regulated company has to decide its least cost financing strategy including decisions about the 'best' proportions of debt and equity, of fixed and floating debt and the maturity structure of the debt portfolio. The main difference between the situation facing a regulated company and an unregulated company is that for the former there is a link between allowed revenue and the allowed WACC set ex ante by the regulator. Once the allowed WACC is set, the regulated company cannot change it through its financing decisions. It has very similar incentives to an unregulated company, namely, to minimise the cost of finance over the life of its assets. Doing so will maximise the 'gap' between its actual cost of capital and the allowed WACC and thereby maximise profits and the actual return on equity.

The financing decisions taken by a regulated company will be affected in some ways by the form of regulation. In regulated industries where the allowed WACC is set on a post-tax basis at notional gearing and a separate allowance made for taxation costs the decision about appropriate gearing is different to that of a borrower in an unregulated industry. In the former case, because the marginal tax shield benefit from increasing gearing above notional gearing does not accrue to the regulated company, there is no incentive to gear up the regulated entity higher than the notional gearing.¹⁶ This is a deliberate regulatory decision which is intended to influence decisions about actual gearing, in part to reduce the systemic risks associated with many companies adopting a very high level of gearing.

The decisions to be made by a regulated company about the appropriate portfolio of fixed and floating rate debt may also be affected to some extent by the form of regulation. As with an unregulated company, there are risks involved in fixing rates long term because a fall in interest rates will cause the borrower to incur an opportunity loss. If the regulator reduced the allowed cost of debt below the average cost of debt (to reflect the lower marginal cost of debt) then the borrower would incur 'embedded debt' costs that would reduce shareholder returns.

However, regulated companies may bet that regulators will never set the ex ante allowed cost of debt below the actual average cost of debt, because to do so might be perceived as acting in a manner inconsistent with their statutory duties and increase perceived regulatory risk and therefore the cost of finance in the markets. If they adopt this view it

¹⁶ If the parent company has tax capacity at the holding company level there will still be an incentive to optimise corporate gearing but at the holding company level.

may cause them to increase the proportion of long-term fixed rate debt in their portfolios above the level they would have adopted if they felt that embedded costs would reduce shareholder returns.

The other main difference from an unregulated company is that, since total revenues are indexed for inflation and allowed returns set in real terms, there is greater incentive to borrow in the index-linked market.

The financing strategies that have been adopted by most regulated companies accord with expectations given current market conditions. With historically very low real interest rates, an inverted yield curve and particularly low real interest rates in the index-linked market, it is not surprising that regulated network businesses (where they can) have been borrowing a high proportion of their debt at the long end of the fixed interest market and increasing the proportion of debt raised in the index-linked market. In doing so, they have locked-in for the current price control period a significant 'gap' between the allowed and actual cost of debt, to the benefit of their shareholders.

In summary, with the current regulatory regime, regulated companies retain strong incentives to minimise the cost of finance. However, their financing decisions are affected by the form of regulation. Gearing decisions are deliberately affected. The expectation that regulators may finance embedded debt costs and provide financeability uplifts may also impact on financing decisions.

4.2.3. Regulated company with current regime plus cost of debt indexation

In this case the basic regulatory regime remains the same with the allowed cost of debt set ex ante for five year periods and revised at the start of each subsequent five year period in light of market conditions at the time.

Introducing some form of indexation of the allowed cost of debt means that the allowed rate can be changed intra-period in the event that there are large unanticipated movements in the actual cost of debt¹⁷. The fundamental incentive to minimise the cost of finance over the life of the assets remains unchanged. The borrower will seek to fund itself at a lower cost than the allowed WACC to maximise returns on equity. The issue is whether indexation of the allowed cost of debt for movements in debt markets affects incentives acting on regulated companies and if so how.

Gearing

The introduction of indexation is unlikely to change the company's decision about appropriate gearing in those regulated industries where the allowed WACC is set on a post-tax basis and actual taxation costs are separately funded. (This is the basis used by Ofwat and is under consideration by ORR.) The reason is that the major influence on gearing decisions is the treatment of taxation costs. Since this is the same, with and without indexation, there should not be any change in the gearing decision as a result of introducing indexation of the cost of debt.

¹⁷ In the version of indexation discussed later the indexation applies only if there are large variations in the cost of debt from the actual values at the time the price determination is made.

Where allowed revenues for the return on capital are set on a pre-tax basis indexation of the allowed cost of debt should reduce default risk for any given level of gearing and therefore there may be a consequential small increase in optimal gearing.

Fixed and floating rate debt

The introduction of indexation of the cost of debt would have some impact on the decision about the proportions of fixed and floating rate debt. We first consider the nature of the effects if indexation arrangements are symmetric (adjust down as well as up) and then if they are asymmetric (adjust up only).

If the indexation arrangement were **symmetric** then:

- Compared to any given fixed/floating portfolio judged to be optimal for new borrowing before indexation was introduced, there would, after indexation was introduced, be greater upside opportunity and greater downside risk for the borrower from the same portfolio. This is because if allowed revenues rose, because market rates rose during the price control period, then the gain from having issued fixed rate debt would increase. Similarly if allowed revenues fell, because market rates fell, then the gain from holding fixed rate debt would reduce and the borrower could incur a loss. Risk averse borrowers are likely to respond to the increased risk by shifting their portfolios in favour of a higher proportion of floating rate debt, thereby reducing the risk exposure. Risk taking borrowers may take the view that the greater profit opportunity justifies the higher risk and therefore leave the balance of their portfolio unchanged.
- In practice companies would respond to the totality of the changes including: (i) the extent of the reduction in the allowed cost of debt associated with introduction of indexation; (ii) whether there was a wide or narrow ‘tolerance band’ before any adjustment to allowed revenues was triggered; (iii) whether the adjustment to allowed revenues applied to the five year period only or throughout the life of the assets¹⁸; and (iv) whether indexation of the cost of debt applied to all the notional debt or only to the incremental notional debt relating to new capital spending over the next five years.

The effects of introducing **asymmetric** indexation arrangements would be different. If the indexation arrangement were asymmetric upwards i.e. the allowed cost of debt changed only if interest rates rose but not if they fell, then:

- After indexation was introduced, there would be greater upside opportunity for gain if rates rose and no greater risk if rates fell. *Ceteris paribus*, borrowers could be expected to increase the proportion of their debt funded at fixed rates. However, an asymmetric arrangement could only be justified if it were accompanied by a materially larger reduction in the ex ante allowed cost of debt than would be appropriate if a symmetric arrangement were introduced. The

¹⁸ Later in the paper we discuss a mechanism where the regulator sets a new ex ante WACC for the subsequent period on the basis of a revised view about the ex ante WACC of an efficiently financed business and indexation over the preceding five year period and then resets the indexation benchmark.

judgment for regulators would then be whether the greater immediate benefits for customers offset sufficiently the greater impact on financing incentives.

In summary the incentive effects of introducing symmetric indexation of the allowed cost of debt if companies act in a risk averse manner would be to increase the proportion of floating rate debt compared to what it would have been without indexation. The strength of this effect would be less if indexation applied to incremental debt only.

If the indexation arrangements apply only for the five year period, with the allowed cost of debt reset at the start of each new period in light of market conditions at the time and only to incremental debt then it seems unlikely that these marginal incentives would have a significant impact on financing decisions.

If the indexation arrangement is asymmetric ‘upwards’ then the marginal incentive would be to increase the proportion of fixed rate debt compared to what it would have been without indexation.

4.3. Embedded costs / ‘deadweight’ gains and losses

As noted above, regulated companies finance their businesses with a mix of fixed and floating rate debt. If fixed rate debt proves to be ‘out-of-the-money’ (i.e. more expensive than floating rate) it is a ‘bad bet’; if it turns out to be ‘in the money’ (i.e. less expensive than floating rate debt) it is a ‘good bet’. It is a key feature of incentive regulation that regulated companies should be able to retain the benefits of ‘good’ financing decisions and should not be ‘bailed out’ if they make ‘bad’ financing decisions.

‘Financing Networks’ (2006) argues that if there is an unavoidable financeability issue in the short term, that, to the extent that any additional revenue might be allowed to the company, it should generally be on a net present value neutral basis.

An important question is whether indexation of the allowed cost of debt should apply to the whole of the notional debt (i.e. notional gearing times the total RCV) or just the notional debt relating to the incremental RCV (i.e. notional gearing times the incremental capital programme over the next five year period).

- If indexation applies to the whole of the notional debt then the size of the ‘gap’ between the allowed and actual cost of sunk debt will change. In this case there will be significant ‘deadweight’¹⁹ effects with shareholders winning or losing as a result of indexation.
- If indexation applies to the incremental notional debt relating to capital expenditure over the next five years then the ‘gap’ between the allowed and actual cost of debt relating to sunk debt will not change. In this latter case the

¹⁹ The term ‘deadweight’ is used to refer to unintended gains and losses that could result from the introduction of an indexation mechanism. We do not use the term in the way usually defined in welfare economics.

indexation applies only at the margin and there are no major ‘deadweight’ gains and losses in the period.²⁰

The respective merits of these approaches are discussed in more detail in Section 6.1.

4.4. Market response and impact on cost of equity

As with any regulatory innovation, the market response will be affected almost as much by the way regulators proceed as by what they do. The now-standard advice is to:

- signal intentions well in advance;
- frame proposals in the context of regulatory continuity and an evolution of approach in light of market developments;
- highlight why the proposals are designed to mitigate financing risk, consult extensively;
- be transparent about proposed mechanics; and
- above all, ‘no unpleasant surprises’ when determinations are announced.

The financial markets and regulated companies expect that the allowed WACC and specifically the allowed cost of debt will be reduced at future price control reviews if market conditions remain as they have been in recent years. They also understand the legitimate difficulty faced by all involved in financial markets in judging the future cost of capital. Any indexation proposal should be cast as a mechanism for managing risk intelligently and for ensuring companies are able to finance their capital programmes.

4.4.1. Debt market concerns

In our view the concerns of the debt markets and rating agencies will focus primarily on the extent of any reduction in the allowed cost of debt and allowed WACC, rather than on the specifics of the indexation mechanism. They are likely to be relaxed about the introduction of an indexation mechanism that applies to incremental notional debt only. This is because their main concern will be the impact of the determination on cash flow cover and ratings of existing debt.

4.4.2. Equity market concerns

The concerns of the equity market will be to determine where fair value lies after the determination. They are likely to focus, at least initially, on the headline allowed WACC and allowed cost of equity numbers. To the extent that they focus on change in equity risk as a result of introduction of indexation, for any given allowed WACC, symmetric indexation is likely to be viewed as reducing equity risk because allowed revenues will increase/decrease as interest rates rise/fall.

²⁰ In subsequent periods there may be differences in the deadweight gains/losses arising from the different fixed/floating decisions induced by indexation in previous periods.

4.5. Risk sharing/Impact on customers and government budget

4.5.1. Counterfactual 1

(Counterfactual 1 is the current position where there is a large 'gap' between the allowed and actual cost of debt.)

The current position is that customers pay a large 'insurance premium' to companies to be insulated from the risk of large increases in the actual cost of debt over the price control period. With the 'headroom' between allowed and actual cost of debt in recent years at about 75-100 basis points, the 'insurance premium' paid by customers is very expensive (prices are significantly higher than they need to be to fund the actual cost of debt). The insurance premium is only worth anything if interest rates rise by more than 100 basis points over the review period.

4.5.2. Counterfactual 2

(In Counterfactual 2, the allowed cost of debt is reduced such that the 'gap' is smaller and no indexation mechanism is introduced.)

In this case the insurance premium is reduced and the value of the insurance is increased (because it is now more likely that rates will rise above the allowed level). In this situation, without indexation, the risk on the company is increased. In the event of the actual marginal cost of debt increasing above the allowed cost of debt the company would lose money (relative to the regulatory settlement) on new borrowings. This would act as a significant disincentive for new capital spending and would reduce the return on equity below the allowed cost.

4.5.3. Counterfactual 2 with indexation

In this case the customers would pay a reduced insurance premium (in the lower allowed cost of debt) but would face greater risk of a future increase in costs if the actual cost of debt increases above the allowed cost of debt. The judgment for regulators is whether they can set the ex ante allowed cost of debt lower than they otherwise would if there are indexation arrangements to share the risk of unexpected changes in the cost of debt (i.e. to reduce the headroom).

Whether indexation proposals impact at all on customer prices during the next review period depends on the mechanism adopted for adjusting allowed revenues. If the approach adopted were to be logging up/down of indexation adjustments during the next price control period, with adjustment of maximum prices in the subsequent review period, there would be no impact on prices during the next period. We see no major difficulties in designing the indexation mechanism to take account of customers' needs for relative predictability and stability in prices during the next five year control period.

Clearly, however, if indexation results in net logging-up over the period there will be greater cost increases for customers during the subsequent period. The trade-off is

between certain lower prices over the next five years and the possibility of greater or lower price changes during the subsequent review period.

4.6. Regulatory burden

The regulatory burden is also an important consideration when evaluating changes to the regulatory framework. Regulators need to take into account the cost of increasing the regulatory burden on themselves and on operating companies. Also the implications, if any, for existing license agreements should be taken into account. We see no major difficulties in designing indexation arrangements which impose an acceptable regulatory burden on regulators and companies and which remain fully within accepted approaches to regulation e.g. logging up/down.

5. WHICH COST OF DEBT PARAMETERS SHOULD BE INDEXED?

5.1. Introduction

As required by the Terms of Reference the main focus of the report is a possible mechanism for indexing the allowed cost of debt. In this section we briefly consider whether indexation should apply to the whole of the allowed cost of debt or to some or all of its component parts, e.g. debt premium, risk free rate. The majority of the section discusses the options for a cost of debt benchmark. The final short section briefly explains why it is not feasible to index the entire allowed WACC.

A key point is that the allowed revenues set by regulators are set in real terms and allowed revenues are then adjusted annually to take account of general inflation. Since the allowed WACC and allowed cost of debt are set in real terms, any indexation of the allowed cost of debt should measure changes in the real cost of debt (not the nominal rate).

5.2. Which components of the cost of debt should be indexed?

The basic proposition underlying the design of an indexation mechanism for the allowed cost of debt is that measurements of the change in the cost of debt that would be incurred by an efficiently financed notional regulated company can be measured by tracking changes in external benchmarks of the cost of debt to companies with comparable credit characteristics.

Specifically, because the notional regulated company is intended to be able to secure a solid investment grade rating (assumed to be in the range BBB+ to A at the regulated company level) with gearing equal to notional gearing (around 60% depending on the regulated industry), an external benchmark of the real cost of debt to borrowers with this rating would provide a valid benchmark for indexing the allowed real cost of debt.

Therefore, in principle, indexation should apply to the whole of the cost of debt, not its component parts. However if there are practical measurement issues that make measurement of the ‘all-in’ real cost of debt problematic then indexation of the one of the component parts (namely either the risk free rate and / or the debt premium) might be an alternative. As we discuss in Section 5.4 our view is that there are a range of options available to regulators to benchmark the full cost of debt (as opposed to only the risk free rate of the debt premium).

5.3. Principles for establishing the benchmark

The characteristics of a suitable benchmark should include:

- *Non-controllability*: the benchmark clearly must not be subject to the influence or control of the regulated companies or their funders.

- *Transparency*: the basis of the benchmark must be transparent and information to determine its value over time provided by an authoritative source e.g. the Bank of England.
- *Correlation*: the benchmark should be constituted so as to offer close correlation in changes in its value with changes in the cost of debt likely to be incurred by an efficiently financed regulated business.
- *Diversification*: the components of the benchmark should be well diversified to avoid a situation where event risk affecting a single component of the benchmark could result in inappropriate change in the benchmark value.

5.4. Identifying a benchmark for the real cost of debt

We consider here the practical issues around developing an index of the real cost of credit-rated debt and its component parts. In this section, we consider three main options for identifying a benchmark for the real cost of debt as follows:

- Option 1: Directly benchmarking the real cost of corporate bonds;
- Option 2: Benchmarking the risk-free rate and debt premium separately; and
- Option 3: Using a composite benchmark for the real cost of debt.

Within each of these main options there are variants (e.g. in relation to how nominal rates are deflated; or with the choice of gilt).

In each of these options, our presumption is that the regulator would set a benchmark that comprised a mix of maturities of the relevant debt benchmark. Our view is that a mix of 10, 20 and 30 year maturities is not an unreasonable portfolio for regulated utilities whose assets are long-lived.

5.4.1. Option 1: Directly benchmark the real cost of rated corporate bonds

There are many transparent and liquid benchmarks of the nominal cost of rated corporate bonds. These measures meet in all respects the criteria for a good benchmark of the nominal cost of rated debt as set out above.

The problem is how to convert the nominal cost of debt to a real cost of debt. To derive the real cost of debt it is necessary to deflate the nominal rate by the expected inflation rate. Reliable measures of expected inflation are in short supply. Possible options are set out below. Further work is required to confirm that a robust and transparent benchmark of the real cost of debt for corporate A- rated bonds can be developed and which of these approaches would be most appropriate.

Inflation expectations implicit in zero coupon yield curves

The Bank of England publishes time series data on the real risk free rate of zero coupon gilts. To do so it employs a methodology for deflating the nominal return to a real return. This methodology could be used to develop a measure of the real cost of corporate debt.

Our understanding of the methodology is that it is based on the difference between the nominal and index linked yields on gilts with the same maturity and adjusting for the time lag in indexation²¹.

The benefit of using this approach is that it draws on a methodology used by an independent, technically sophisticated authority in high regard with the financial markets.

However, to the extent that it is based on the implicit expected inflation rate derived from the difference between nominal and real risk free bonds, it has its limitations. Nominal and index linked gilts are not perfect substitutes and the difference in yields of gilts of the same maturity may not be attributable solely to inflation expectations. In particular, the difference in the yields on index-linked and nominal bonds of comparable maturity: (i) includes an inflation risk-premium; and (ii) might, from time to time, reflect particular market demand for nominal or index linked assets that are not directly related to inflation expectations (see discussion of option 3 below).

Inflation forecasts

The Bank of England publishes periodically its expected (probability weighted) central estimate of medium term inflation. However there is considerable uncertainty about whether their published expectation corresponds closely to the markets' expectations of inflation as embedded in nominal interest rates. Moreover since the Bank of England is required to act so as to keep inflation to a certain level the estimate may be subject to some bias. This is unlikely to offer a useful basis for deriving the real cost of rated debt.

Ex-post inflation adjustment

Deflating by the lagged actual inflation rate as measured by recent movements in the RPI index would be straightforward. Generally historic movements in RPI are not a good measure of prospective inflation. However in regulated industries maximum prices are indexed for annual movements in RPI, so the part of any increase in the nominal cost of borrowing in each year is compensated through the RPI adjustment. Therefore there may be a case for deflating nominal bond yields in each year of the price control period by the actual RPI change in the year²².

However, if the approach to implementing indexation involves only making adjustments at the end of the price control period (discussed further in section 5.5), then this approach might have merit. The movements in the nominal cost of debt would be deflated by actual inflation to derive an estimate of the actual real cost of debt. Since the adjustment to the revenues is delayed until the end of the price control period there is no need to have an immediate estimate of the real cost of debt at any one point. Rather, the estimates could either be made:

²¹ See Bank of England, "Notes On The Bank Of England UK Yield Curves" available at <http://213.225.136.206/statistics/yieldcurve/notes%20on%20the%20bofe%20uk%20yield%20curvesV2.pdf>.

²² The RPI may need to be estimated until the 'firm' value of the RPI change is known with ex post adjustment for any difference between estimated and actual values.

- with a lag which provides sufficient time for the actual inflation over the price control period to be known; or
- using actual inflation for the year finishing six months before the calculation date.

This latter approach is the standard way in which inflation adjustments are made to prices for regulated companies – the six month lag is required for a reliable estimate of inflation to be determined. Either of these approaches could be calculated annually (or at some other periodicity, as discussed in Section 5.4) during the price control period so that investors know whether revenues are to be adjusted.

This option should be investigated further as it may offer a simpler solution to some of the alternatives.

5.4.2. Option 2: Benchmark the debt premium and risk free rate

If there is insufficient confidence in a single benchmark for the real cost of corporate debt (i.e. option 1 above) then additional information can be derived from benchmarks of its component parts, namely the debt premium and risk free rate.

Debt premium

Measures of the debt premium can readily be derived by measuring the difference between the nominal cost of debt and the cost of a benchmark nominal risk free rate. The several possible measures of the nominal risk free rate e.g. LIBID, LIBOR or the gilt rate for the relevant maturity.

The difference between these is a valid measure of the debt premium and can be used to track changes over time in the value of the debt premium for any specified portfolio of rated debt securities. There is no reason to believe that changes in the debt premium are correlated with the inflation rate so the problem of deflating the nominal value to derive a real value does not arise²³.

Risk free rate (Index-linked gilts)

Perhaps the best available direct measure of the real risk free rate is the index-linked gilt rate. This offers a reasonably liquid, transparent measure of the real cost of index linked sterling debt for all maturities along the entire yield curve. Changes in the value of the risk free rate using this benchmark provides a reliable measure of changes in the real cost of debt issued in the index linked market.

However, index-linked debt is not a perfect substitute for nominal gilts and real yields in the former may not always be a valid measure of the real cost of nominal gilts. Real rates in the index linked market are currently very low probably, in part, because of high pension fund demand for index linked assets to match their liabilities and a limited supply of issuers that meet their credit requirements. It is far from clear that exclusive

²³ Further work would be required to confirm there is no correlation between the debt premium and actual or expected inflation.

reliance on the real cost of index linked gilts as a measure of the real cost of nominal risk free bonds would be appropriate.

Risk free rate (nominal gilts)

An alternative to the index-linked gilts would be to use nominal gilts and then to use one of the methodologies discussed above to deflate the benchmark to provide a real rate. The use of nominal rates has some advantages since (despite recent use of index-linked debt) regulated companies are likely to continue to finance themselves with a majority of nominal, fixed interest debt instruments. In addition, the prevalence of nominal rate gilts means that there are a wider range of liquid benchmarks (at different maturities) which could be considered.

5.4.3. Option 3: Benchmark a composite measure of the real cost of debt

Probably the most robust approach to deriving the benchmark would be to develop a composite measure of changes in the real cost of corporate debt drawing on all these sources of information.

It is important to recognise that an indexation mechanism is not concerned with the absolute value of the risk free rate, only with changes in its value over time. Therefore a composite measure might have the merit of reducing the risk that factors affect any one of the above benchmarks might result in a significant change in the allowed cost of debt that is not reflected by the regulated utilities actual costs.

For example, a methodology could be specified where changes in the real cost of debt would be derived: (i) directly as indicated in option 1; and (ii) indirectly by measuring changes in benchmark values of the risk free rate and debt premium as in option 2 (both using index-linked and nominal gilts). The change in the benchmark value used for indexation of the allowed real cost of debt would combine these measures in a way pre-specified by the regulator.

The aim should be derive a robust and reliable benchmark for the real cost of debt of a solid investment grade rated debt issuer (for ease of reference, we assume this to be A-).

The value of the benchmark in the base year would be published together with the methodology used to derive it at the start of the price control period. Changes in the value of the benchmark over the price control period would constitute the external benchmark to be used to adjust the allowed cost of debt over the period. Further work is required to develop a specific benchmark but the work undertaken to date suggests to us that a suitable methodology to measure changes in the real cost of debt can be derived.

5.5. Proposed composition of the cost of debt benchmark

Based on option 3 being the most robust approach, the composition of the benchmark could be made up of the following:

(i) Nominal cost of debt: The nominal cost (yield to maturity) of debt of A- rated corporate bonds of 10, 20 and 30 year maturity as published by one the credible financial data

providers, i.e. Bloomberg, Reuters etc. The weightings of the different maturities should be determined based on the debt maturity profile expected to be adopted by an efficient notional borrower (implying a heavy weighting towards the long end of the maturity range).

(ii) Inflation deflator: This needs further analysis (see discussion above) but could be based on the implicit forward inflation rate derived from the difference between index linked and nominal gilts with maturities reflecting the same debt maturity profile and weightings as in (i) above.

(iii) Debt premium The difference between the nominal cost of debt of the bond portfolio in (i) above and an agreed measure of the nominal risk free rate (e.g. the nominal gilt rate of a matching maturity).

(iv) Risk free rate (a) The real risk free rate of index linked gilts for bonds with the same maturity profile and weightings as in (i) above; and (b) the implicit real risk free rate obtained by deflating nominal government bonds with the same maturity profile and weightings as in (i) above.

These benchmarks would be combined in a manner specified ex ante by the regulator and the base year value of the index would be published either at the time of the price control determination or at the start date of the new price control period. The indexation mechanism would be driven off changes in the value of this benchmark from the base year value over the five year period.

5.6. Why not index the whole WACC?

The allowed WACC is made up of the allowed cost of debt and allowed cost of equity. Although there are suitable external benchmarks for the cost of debt there are no similar benchmarks for the cost of equity.

The cost of equity is conceptually made up of the risk free rate and an equity risk premium. Whereas there are available measures of changes in the risk free rate there are no available reliable measures of changes in the equity risk premium. Since the risk free rate is a small part of the total real cost of equity, and there is no reason to believe that changes in the equity risk premium are reliably correlated with changes in the risk free rate, there is no way of compiling a reliable index of changes in the cost of equity as a whole.

We have considered briefly the possibility of indexation applied to only the risk free element of the cost of equity. Whilst this avoids the need to identify a reliable benchmark of the equity risk premium we have not pursued the option in detail because indexation of only a relatively small part of the cost of equity is of limited value and given the additional complexity and added uncertainty for equity investors.

Given the absence of any robust mechanism for indexing the equity risk premium we do not think further consideration should be given to extending indexation to the allowed cost of equity or to the WACC.

6. MECHANICS OF INDEXATION

In this section we discuss in more detail the mechanics of indexation, on the assumption (which we believe is reasonable) that it is possible to find robust benchmarks for the cost of debt.

6.1. Index total notional debt or incremental notional debt?

In Section 3 we set out the broad analysis of the impact of applying indexation of the allowed cost of debt and the issues that arise with embedded debt. We discuss the two main options in more detail here; and raise the possibility of a third option.

6.1.1. Indexation applies to notional debt relating to the incremental RCV only

In this approach, the incremental notional debt is defined as the incremental capital expenditure²⁴ that is expected to be added to the RCV over the next price control period multiplied by the notional marginal debt ratio (which could be assumed to be the same as the notional debt ratio for the business as a whole or another ratio determined by the regulator).

Indexation would apply to the allowed revenues relating to this incremental portion of the total notional debt. In this approach:

- Indexation of the allowed cost of debt relating to incremental debt would ensure that an efficiently operated business should be able to raise the extra debt needed to fund the notional debt portion of the additional capital programme because the marginal revenues would be sufficient to fund the marginal cost of debt even if market rates rose unexpectedly during the period.
- There would be no indexation of the allowed revenues relating to existing debt. As now, regulators would set the ex ante allowed cost of debt for the period and allowed revenues would remain unchanged except for the portion relating to the incremental debt. Companies and their shareholders would continue in the current position in respect of the existing debt portfolio where the expected 'gain' on the fixed debt portfolio is a function of the present value of the 'gap' between the allowed cost of debt and actual cost of debt over the full life of the assets. The expectation is that the introduction of indexation of this sort would allow regulators to reduce the headroom between the actual cost of debt faced by an efficiently financed company and the allowed cost of debt. The result would be that the gains recently made by regulated companies in relation to their existing fixed debt portfolio over the life of the assets would be reduced.

The extent of the reduction would depend on a range of factors that depend on the sector and / or market conditions²⁵. The important point to note is that if indexation only relates to the notional debt funding the additional RCV, then the

²⁴ Net of depreciation.

²⁵ As discussed in Section 3.2.3.

regulator might still need to leave some headroom to allow for re-financing risk over the control period. (See 6.1.3 below).

6.1.2. Indexation applies to the whole notional debt funding the entire RCV

In this approach indexation of the allowed cost of debt would apply to the whole of the notional debt i.e. notional gearing times the entire RCV. There is an efficiency rationale for this approach. Companies have not only to finance their new capital programme but also to refinance existing debt as it falls due. If market rates varied markedly from the ex-ante allowed cost of debt then companies would incur a refinancing gain or loss because the cost of refinancing was not equal to the allowed cost of debt.

However, the current position is one in which the allowed cost of debt has been significantly higher than the actual cost of debt and companies have made substantial financing profits as a result. If symmetric indexation of the allowed cost of debt were applied to the whole of the notional debt then:

- If rates rise through the next price control period so as to cause indexed allowed revenues to increase, then allowed revenues relating to the existing debt would increase even though the cost of the fixed rate component of the portfolio was unchanged. The regulated companies would enjoy greater value gains on their fixed rate portfolios (referred to here as ‘deadweight gains’) than if there was no indexation. This would increase shareholder returns at the expense of customers/users. Whether the companies ended up better or worse off overall depends on the amount by which the ex ante allowed cost of debt was reduced, compared to the no indexation position, when indexation was introduced. Whatever the outcome customer criticism of arrangements that increased companies’ ‘deadweight gains’ could be pronounced.
- If rates fell through the period such as to cause a reduction in allowed revenues to levels where the fixed rate portfolio incurred a loss, rather than a gain, or debt cover ratios were compressed to the point where debt ratings came under pressure then there would be considerable pressure on regulators to reverse the position caused by symmetric indexation. An adverse market reaction and claims of regulatory inconsistency could act to increase concerns about regulatory risk and raise the cost of capital.

6.1.3. Indexation applied to incremental notional debt plus ‘notional’ refinancing allowance

In this approach indexation applies to: (i) notional debt funding the additional RCV; and (ii) some proportion of the existing stock of notional debt that might reasonably require refinancing during the forthcoming price review period²⁶. The reason for presenting the option is that it might allow regulators to further reduce any headroom between the actual cost of existing debt of a notionally financed company and the allowed cost of

²⁶ This amount would relate to a judgement about the appropriate mix of maturities of fixed rate and index-linked debt and floating rate debt.

debt – since it would reduce the refinancing risk faced by an efficiently financed company.

6.1.4. Conclusion

Despite the efficiency arguments in favour of indexation applied to the whole of the notional debt, we judge that the best approach for regulators to adopt is indexation that applies to the incremental notional debt. It might also be possible to introduce a hybrid mechanism which allows for re-financing – and enables regulators to reduce the ‘headroom’ by a greater amount. However, we do not take this idea forward further in this paper given the additional complexity.

6.2. Indexation across periods

A further important consideration is how the mechanism is applied across periods. In the first price review period, the application of an indexation mechanism would involve:

- Setting an allowed cost of debt for the existing notional debt that reflects a judgement by the regulator as to how an efficiently financed utility would have financed itself.
- Setting an allowed cost of debt for new notional debt that is subject to the indexation mechanism. It is possible for this cost of debt to be different from the cost of debt applied to the existing notional debt.

In the second price review period, the regulator would then have two options:

- **Option 1:** Indexed debt set to zero; the ‘original’ new debt becomes ‘existing’ debt; and the applicable cost of debt reset. That is to repeat the above exercise involving: (i) setting the allowed cost of debt for the new (higher) level of existing notional debt²⁷; (ii) rolling forward the indexation of the new notional debt expected to be raised in the forthcoming period.
- **Option 2:** Indexed debt rolled forward; and existing debt and applicable cost of debt unchanged. That is: (i) to leave unchanged the existing notional debt (from the start of the first period in which indexation applied) and the applicable cost of debt; and (ii) continue to apply indexation to all new debt since the start of the first period in which indexation applied.

Our strong conclusion is that the appropriate approach is Option 1 – i.e. to reclassify the additional debt added in period 1 as being existing debt. This is because:

- As alluded to in Section 4.2.3, Option 1 is the best approach to minimise the impact on the incentives for companies to finance themselves efficiently.

²⁷ Options for setting the allowed cost of debt to apply for existing debt include: i) as now with the regulator taking account of market conditions and making a judgement on how an efficiently financed regulated company would finance itself; or ii) a more mechanistic approach whereby, for example, the allowed cost of debt is a weighted average of that allowed at the start of the period for existing debt the rate that applied for any debt raised during the period.

- Over time, Option 2 would mean that indexation would apply to the whole of the notional debt – which suffers from the problems discussed in Section 6.1.2 above.

6.3. Symmetric or asymmetric indexation?

The choice of a symmetric (adjust down as well as up) or asymmetric (adjust up only) might depend on a judgement about:

- The different impacts on financing incentives for regulated companies (*criteria 1 – financing incentives*).
- The applicability of the mechanism in both the current low interest circumstance and future potential market situations (*criteria 3 – regulatory consistency*).
- Risk sharing and the potential to increase the savings for consumers (*criteria 4 – risk sharing*).

We consider each in turn.

6.3.1. Financing incentive

In Section 4 we set out a discussion of the incentives resulting from either a symmetric or asymmetric indexation. In summary, we note that:

- The incentive effects of introducing symmetric indexation of the allowed cost of debt if companies act in a risk averse manner would be to increase the proportion of floating rate debt compared to what it would have been without indexation.
- If the indexation arrangement is asymmetric ‘upwards’ then the marginal incentive would be to increase the proportion of fixed rate debt compared to what it would have been without indexation.

However, as discussed above, our proposal is for the indexation mechanism to apply only for the five year period, with the allowed cost of debt reset at the start of each new period. As such it is, in our view, unlikely that these marginal incentives would have a significant impact on financing decisions.

We also conclude from this that the differences in symmetric and asymmetric indexation in terms of financing incentives are unlikely to be material factors in choosing between the two approaches.

6.3.2. Applicability in different market situations

Introducing an asymmetric mechanism would fail to put in place an approach that would work effectively in a range of market situations. In particular it would not allow users to benefit from a reduction in the actual cost of debt in the situation in which the allowed cost of debt was higher than long-run averages. Given this, there are good grounds to believe that it would have a negative impact on perceptions of regulatory consistency.

6.3.3. Risk sharing

A symmetric indexation approach has one significant disadvantage in that it exposes the regulated company to some in-period interest rate risk. For example, if the benchmark falls after the regulated company has issued fixed rate debt, the company would be ‘out of the money’. This risk is of course symmetric – i.e. the company would benefit from an increase in the benchmark – and is also only applicable in the period. The regulator may chose to aim fractionally high in order to take account of this risk. In principle, applying an asymmetric indexation might allow the regulator to reduce the allowed cost of debt marginally lower.

6.3.4. Conclusion

Our conclusion is that the most appropriate approach would involve a symmetric mechanism – on grounds that it should be applicable in both current and future market conditions; and that the additional risks faced by a regulated company as a result of a symmetric approach are small.

6.4. Index all cost of debt movements or tolerance band?

The ex ante allowed cost of debt set by regulators includes a risk premium to allow for uncertainty about the actual cost of debt over the price control period. This risk premium is funded in allowed revenues. Although, if indexation applied, the allowed cost of debt would be set at a lower level, the ex ante rate would still contain a (smaller) ‘insurance premium’ to fund fluctuations in the cost of debt. Therefore there is no need to adjust the allowed cost of debt for small or temporary fluctuations in the actual cost of debt.

Therefore we suggest that the indexation mechanism should have a ‘tolerance band’ and that if changes in the actual cost of debt of the benchmark from the base year value do not exceed the ‘width’ of the tolerance band then there would be no adjustment to the allowed cost of debt.

The width of the tolerance band would need to be decided as part of the overall design of the mechanism. In principle:

- The lower the ex ante allowed cost of debt (and therefore the smaller the ‘insurance premium’ against fluctuations in the cost of debt) the narrower the tolerance band should be. Therefore there is a case for the width of the tolerance band to be set at the same time as the ex ante allowed cost of debt is decided.
- The wider the tolerance band, the smaller the impact that indexation has in terms of the reducing the headroom allowed by the regulator²⁸.

²⁸ It is also the case that, the wider the tolerance band the greater the risk that consumers will pay more than the actual cost of debt faced by an efficiently financed company.

6.5. Periodicity/amount of adjustment

Rules would be required defining triggers for when an adjustment to the allowed cost of debt would accrue. Would an adjustment accrue as soon as the benchmark value fell outside the tolerance band or would it have to fall outside for a sustained period? Rules might specify, for example, that the benchmark value would have to fall outside the tolerance band for n consecutive quarters to trigger the adjustment mechanism. The decision about the value of n would be decided at the same time as the width of the tolerance band was set.

Rules would also be needed setting out the amount of the adjustment to the allowed cost of debt if the mechanism was triggered. For example, the adjustment might be the full amount by which the benchmark exceeded the base year value or the amount it exceeded the tolerance band or some other amount pre-specified in the indexation arrangements. Decisions about the amount of the adjustment should be taken at the same time as decisions about the other elements of the indexation mechanism.

6.6. Method for adjusting allowed revenues

There are various options for adjusting allowed revenue to fund the adjustment if it accrues.

- **Option 1: Logging up/down.** If an allowed revenue adjustment accrued then one option is for the accrued revenue to be 'logged-up/down' and funded at the next price control review. The deferral in receipt of the extra revenue could be acknowledged by allowing interest from the time the additional revenue accrued until it was funded in the subsequent price control review. The merit of this approach is two-fold. First there is no increase in price uncertainty over the five year period to which indexation applies. Second logging up/down is a recognised mechanism for dealing with unplanned intra-period change and therefore minimises the amount of regulatory change.
- **Option 2: Interim determination.** If additional allowed revenue is logged up/down and paid in the next price control period it is possible that the regulated company could find that cash flow was squeezed in the current period to the extent that its rating came under threat because cash flow cover was reduced. This is not very likely but should the situation arise it may be appropriate to allow a company the right to seek an interim determination. This would reduce market concerns about introduction of an indexation mechanism and is consistent with established regulatory practice.
- **Option 3: Automatic adjustment mechanism.** This approach involves setting an automatic mechanism to adjust the allowed revenues intra-period once adjustment payments had accrued. Unlike logging-up/down or the interim review, this approach allows the regulated company to adjust its maximum charges to recover the additional allowed revenue within the five year period.

This approach raises greater issues than the other mechanisms about uncertainty for customers/users about prices over the five year period.

We recommend that funding of accrued adjustments arising from the indexation mechanism should normally be by way of logging-up/down and inclusion in maximum prices for the subsequent price control period. However, provision should be retained for a company to seek an interim review in exceptional circumstances where it can show evidence that it would face significant financeability or creditworthiness issues during the period as a result of delay in funding of the accrued adjustment.

7. INDEXATION IN PRACTICE

To understand how an indexation mechanism would work in practice we have simulated the effects for an illustrative set of indexation parameters. Section 7.2 provides illustrations for price control period 2004 - 2009. We have also carried out similar analysis (set out in Annex B) for price control period 1999 - 2004

It is important to emphasise that these simulations and the parameters chosen are illustrative only – and are not included as recommendations as to how an actual indexation mechanism might be designed in practice. They illustrate the mechanics and provide a framework within which detailed design could be undertaken at a later date were it decided to proceed with the concept. In practice the selection of indexation parameters can only be done as part of the overall process of setting maximum prices for the next control period.

7.1. Methodology for analysis

In assessing how an indexation mechanism might work in practice we have measured the cost of debt for illustrative purposes as:

$$\text{Cost of debt} = \text{real risk free rate} + \text{debt premium},$$

Where:

The *real risk free rate* is composite weighted 2/3 BoE real yields on 20 year zero coupon securities and 1/3 yields on long dated index linked gilts²⁹ reflecting the likely debt structure of an efficiently financed regulated company; and

The *debt premium* is the spread over benchmark security for 20 year A- rated corporate debt as measured by Reuters³⁰.

We have focussed primarily on the period 2004 – 2009 as the cost of debt has, to date, been generally declining over this period whilst also showing greater volatility recently making it an interesting period to test the likely effects of indexation. As part of the analysis, we have considered the counterfactuals as described in Section 4.

To illustrate the mechanism for adjusting the allowed cost of debt intra-period we model a tolerance band of 25bp and periodicity of 6 months. Adjustments to the effective allowed cost of debt are symmetric, i.e. above and below the tolerance band.

7.2. Period 2004 - 2009

In what follows, Section 7.2.1 looks at Counterfactuals 1 and 2 where indexation is not in place. They illustrate the cost to consumers of the ‘insurance premium’ that results from regulators’ approach to setting a forward looking cost of debt (i.e. allowing a degree of headroom on the whole notional debt).

²⁹ We have used the ILG maturing 2035 due to the number of data points available in the time series.

³⁰ Since Reuters provide spreads on A and BBB rated debt we have interpolated A- to be weighted 2/3 A and 1/3 BBB.

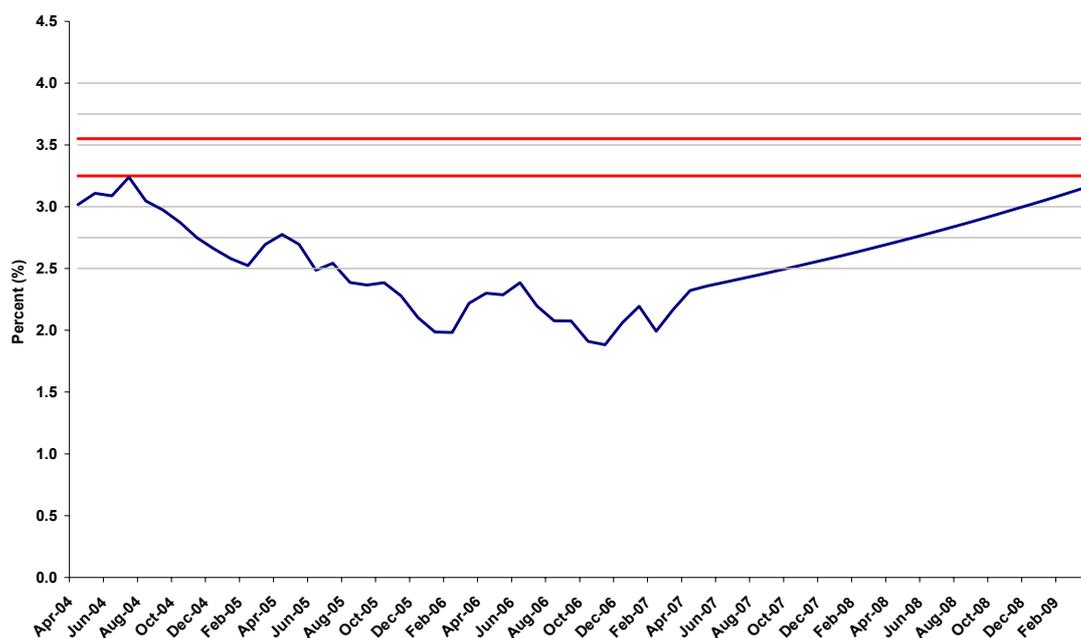
Section 7.2.2 then considers Counterfactual 2 with indexation, illustrating the potential savings to consumers where introduction of indexation enables the regulator to set a lower allowed cost of debt (i.e. by reducing the headroom between the actual cost of debt faced by an efficiently financed business and the allowed cost of debt)

7.2.1. Counterfactuals 1 & 2 (without indexation)

Figure 7.1 shows for the period 2004 – 09 the actual real cost of debt (‘CoD’) (derived as described in section 7.1 above). It also shows:

- *Counterfactual 1* where the allowed CoD is set at 3.55%, equal to the value recently recommended by the Competition Commission as part of the London airports price control review and also Ofgem for the gas distribution networks.
- *Counterfactual 2* where the allowed CoD is set 30bp lower at 3.25%. The rationale for this is that, in light of actual observed CoD, regulators may reasonably be expected to reduce the allowed CoD to leave some, but reduced, headroom between allowed and actual CoD³¹. Counterfactual 2 shows, had the allowed CoD been set at 3.25%, what the headroom would have been.

Figure 7.1: Counterfactual 1 (3.55%) and Counterfactual 2 (3.25%) allowed cost of debt 2004-2009



³¹ It is important to recognise that this is, by definition, an artificial illustration, for example in the sense that it combines historic interest rates (as well as an illustrative projection) with current possible judgements by regulators.

The cost of the ‘insurance’ to customers in the Water and Rail industries resulting from the headroom between the assumed allowed CoD and actual CoD over the period for Counterfactuals 1 and 2 is comprised of:

- the headroom between the allowed cost of debt and the actual cost of debt faced by the company for the notional new debt raised during the period; and
- the headroom between the allowed cost of debt and the actual cost of debt incurred by the company for the existing notional debt stock at the start of the period.

The first part of the cost (i.e. on additional notional debt) is estimated by taking the average differences between the red lines and blue line in Figure 7.1 and multiplying these by the cumulative average annual notional new debt for the sector in question:

- For the period 2004 to 2009 for the water sector this was £106.27m under Counterfactual 1 and £74.83m under Counterfactual 2.
- For Rail it is £318.36m under Counterfactual 1 and £221.49m under Counterfactual 2.

The second element of the cost depends on the actual cost of debt faced by an efficiently financed business over previous price control periods. Tables 7.1 and 7.2 show the total cost to consumers for a range of assumptions about the actual cost of existing debt faced by an efficiently financed company in the Water and Rail sectors. An assessment of this number has not been part of this study. However, based on work carried out by CEPA across a range of regulated sectors, our view is that a reasonable estimate of the actual cost of existing debt faced by most efficiently financed, solid investment grade regulated utilities financing themselves over the last 10 years will be in the range 2.75% - 3.25%³².

Table 7.1: Value of headroom in Water sector (2004 – 2009)

	Actual CoD on existing debt (for an efficiently financed utility)				
	2.50%	2.75%	3.00%	3.25%	3.50%
Counterfactual 1 (3.55%)	£1,181.88	£925.78	£669.68	£413.58	£157.49
Counterfactual 2 (3.25%)	£843.12m	£587.03m	£330.93m	£74.83m	-£181.27m

³² This may not be the same as the actual cost of debt incurred by companies which choose a more highly geared financing strategy. In addition, we aware that some regulated companies may have achieved an even lower average cost of debt.

Table 7.2: Value of headroom in Rail sector (2004 – 2009)

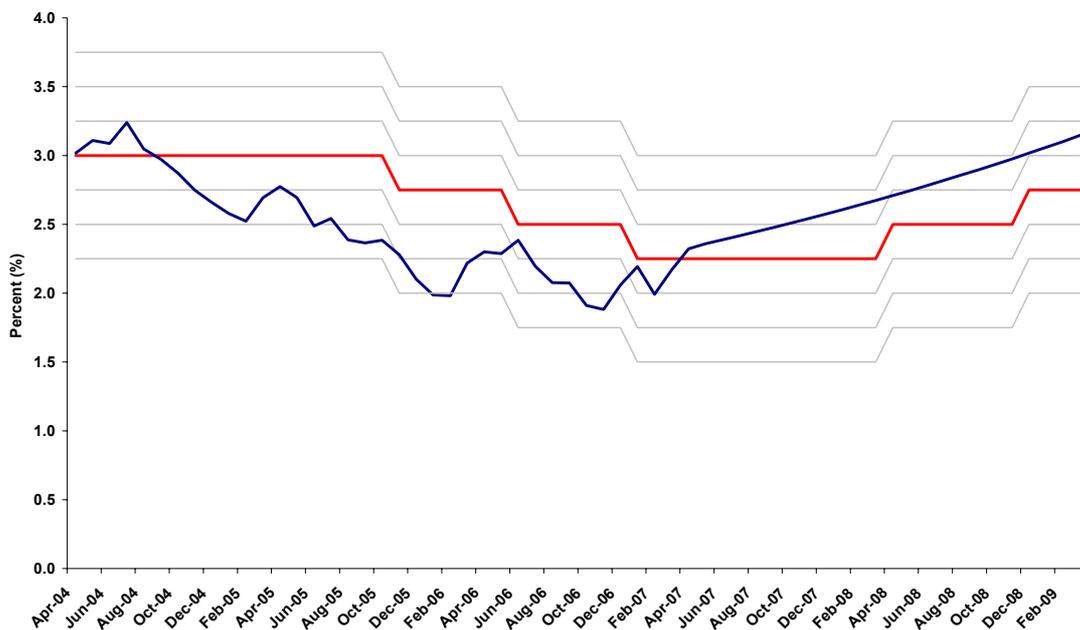
	Actual CoD on existing debt (for an efficiently financed utility)				
	2.50%	2.75%	3.00%	3.25%	3.50%
Counterfactual 1 (3.55%)	£1,093.00	£908.56	£724.12	£539.68	£355.25
Counterfactual 2 (3.25%)	£774.80m	£590.36m	£405.93m	£221.49m	£37.05m

7.2.2. Counterfactual 2 (with Indexation)

As described in Section 4 the introduction of indexation should allow the regulator to reduce the allowed cost of debt and therefore the cost of the headroom paid by consumers.

Figure 7.2 shows an allowed CoD of 3.0% with the same assumed actual CoD trajectory as above in Section 7.2.1. The sustained reductions in the actual CoD from 2004 through to 2007 trigger three downward shifts in the allowed cost of debt. Conversely, our illustrative assumption of a steadily increasing CoD for the remainder of the period triggers two upward adjustments in the allowed cost of debt.

Figure 7.2: Counterfactual 2 with 3.00% allowed cost of debt and indexation 2004 - 2009



The illustrative benefits to consumers from the introduction of indexation can be broken down into three components:

- The ex ante saving made through the allowed cost of debt applied to the existing debt stock being lower.
- The ex ante saving from the allowed cost of debt applied to new debt being lower.

- The ex post saving (or cost) from adjustments in the allowed cost of debt intra period due to movement outside the tolerance band of the observed actual cost of debt³³.

As discussed in Section 7.2.1 above the size of the first component of any savings is sensitive to: (i) the actual cost of debt on existing debt faced by an efficiently financed company; (ii) the extent to which indexation enables a regulator to reduce the ‘headroom’ between the actual cost of debt on embedded debt and the allowed cost of debt.

Water sector illustration

Figure 7.3 below shows consumer benefits in the water sector assuming that indexation had allowed the regulator to further reduce the cost of debt on both existing and new debt by 25 basis points to 3.00% below the assumed level in Counterfactual 2 (i.e. 3.25%). This would be consistent with the judgement that the actual cost of debt on existing debt for an efficiently financed company is around 3.00%; and that the regulator is able to reduce the allowed cost of debt by the full amount of the implied headroom (under Counterfactual 2).

Taking all of the effects into account suggests that indexation savings in this scenario would have totalled approximately £332.8m³⁴.

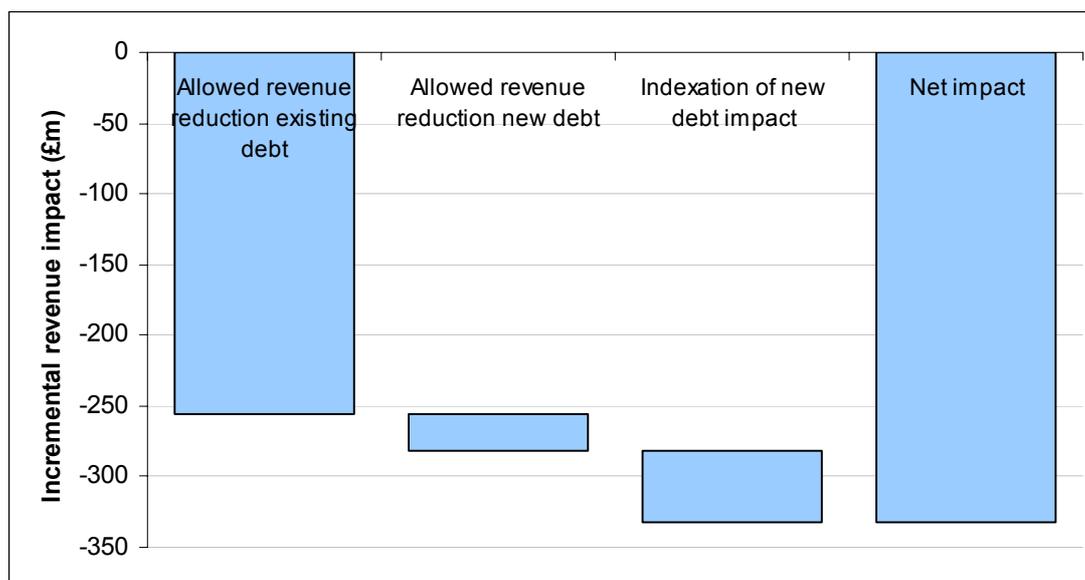
In order to illustrate the range of possible savings available (for other reasonable assumptions) we have also calculated possible upper and lower bounds as follows. In both cases the assumptions impact on the size of the savings shown in the first bar in Figure 7.3.

- An upper bound for the savings might be the situation in which the assumed actual cost of existing debt for the efficiently financed company is 3.00% and that the regulator is able to reduce the allowed cost of existing and new notional debt from Counterfactual 1 (i.e. 3.55%). This would imply savings of £639.1m.
- A lower bound for the savings would be the situation where (under Counterfactual 2) the regulator set the allowed cost of debt at the level judged to be the actual cost of existing debt (i.e. no headroom for existing debt) in this case. Two possible reasons for this are: (i) that the assumed actual cost of existing debt for the efficiently financed company is 3.25%; or (ii) if the assumed actual cost of existing debt is 3.00%, but the regulator is unable to reduce the allowed cost of debt from 3.25% under the proposed indexation measure – because of the need to allow headroom for refinancing of existing debt in the forthcoming period. In this case the total benefit is £77.5m – and the first bar in Figure 7.3 goes to zero.

³³ The last of these can be a cost or a saving depending on whether the actual cost of debt is increasing or decreasing during the period, compared with the starting level. For the period under consideration the actual cost of debt was mostly less than the allowed cost of debt representing further savings to the consumer with an indexation mechanism in place.

³⁴ This is equivalent to a 17 bp reduction on WACC that is applied to the annual average RAB.

Figure 7.3: Cash impact of indexation in the Water sector 2004 – 2009 with 25 basis point reduction in cost of debt for existing and new debt



Rail sector illustration

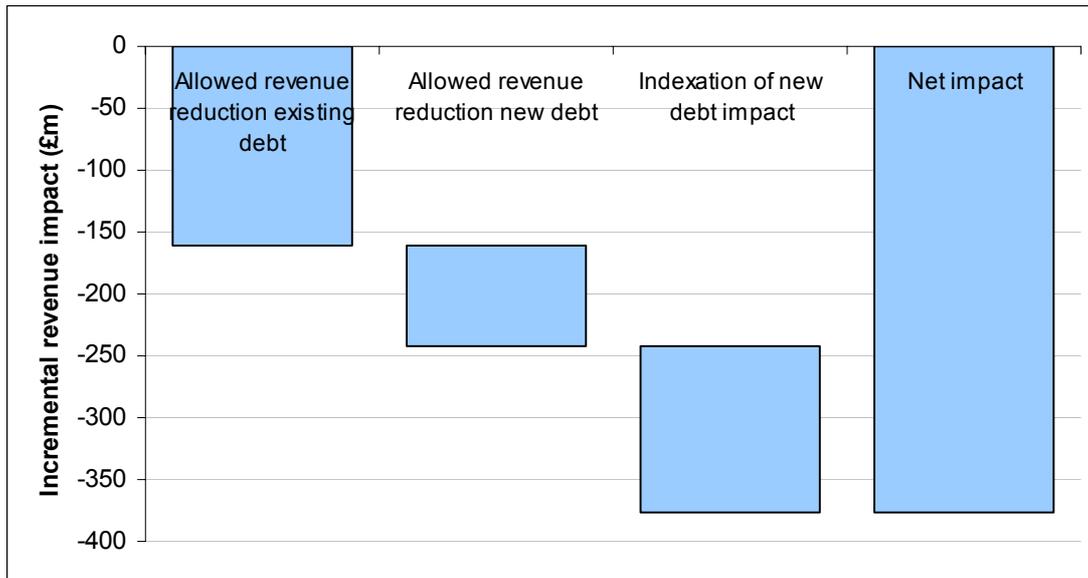
Figure 7.4 shows the same analysis repeated for the Rail sector. It shows that if the allowed cost of debt for both existing and new debt is reduced by 25 bp the net benefits to rail consumers is in this scenario equal to £376.74m³⁵. As noted above in relation to the water sector, this scenario would be consistent with the judgement that the actual cost of debt on existing debt for an efficiently financed company is around 3.00%; and that the regulator is able to reduce the allowed cost of debt by the full amount of the implied headroom (under Counterfactual 2)

Alternative reasonable assumptions would provide a possible upper and lower bounds for the savings:

- An upper bound for the savings might be the situation in which the assumed actual cost of existing debt for the efficiently financed company is 3.00% and that the regulator is able to reduce the allowed cost of existing and new notional debt from Counterfactual 1 (i.e. 3.55%). This would imply savings of £698.2m.
- A lower bound for the savings would be the situation where (under Counterfactual 2) the regulator set the allowed cost of debt at the level judged to be the actual cost of existing debt (i.e. no headroom for existing debt) in this case. In this case the total benefit is £215.97m.

³⁵ This is equivalent to a 47 bp reduction on WACC that is applied to the annual average RAB

Figure 7.4: Cash impact of indexation in the Rail sector 2004 – 2009 with 25 basis point reduction in cost of debt for existing and new debt



8. CONCLUSIONS

Our conclusions are as follows:

- There is a valid rationale for pursuing further the idea of an adjustment to the allowed cost of debt in the event that the actual rate over a five year price control period falls outside the range expected when the allowed cost of debt was set.
- Mechanisms can be devised that enable such a mechanism to be adopted without inducing significant adverse incentive or dead-weight effects.
- We recommend further detailed consideration of mechanisms that would be used to adjust the allowed cost of debt that are symmetric (operate if rates move higher or lower than expected) and that adjust allowed revenues relating to the cost of debt for incremental notional debt only.
- The adjustment mechanism should reflect movements from an agreed base year level in a benchmark of the real cost of debt of a portfolio of relevant A- rated securities.
- The suggested mechanics of an adjustment mechanism would involve setting a tolerance band within which there would be no adjustment of the allowed cost of debt. Adjustments would normally be logged up/down and net adjustments taken into account when setting prices at the subsequent price control review. Therefore there would be no increase in unpredictability of prices during the five year review period unless there was a large unanticipated movement in real interest rates that an interim review was triggered.
- There are no major issues of regulatory consistency with the proposed mechanism. The indexation mechanism would operate only in respect of incremental debt; and the logging up/down mechanism and interim review in exceptional circumstances are both recognised features of the current regulatory regime.

ANNEX A: ORR / OFWAT TERMS OF REFERENCE

A1. Background

UK regulators of network industries have tended to set allowed revenues for regulated companies that incorporates an allowed rate of return based on the risk-adjusted cost of capital, or weighted average cost of capital (WACC).

The rationale for this is that the allowed return should reflect the risks facing the regulated entity, which are a function of its cash flows, and therefore enable an economic and efficient company to finance its business effectively.

The allowed return has tended to be fixed ex ante for the period of the price control (usually five years). This means that customers (and funders, in the case of Network Rail) are protected against adverse movements in the underlying capital markets, leaving this risk with companies and providing companies with strong incentives at least to achieve the allowed rate of return (and to outperform where it faces equity incentives). It also means that they do not benefit from any favourable movements in the market. It has been argued that this approach has led regulators to take a relatively cautious approach to determining the allowed return in order to limit the company's exposure to the downside.

Although we believe that the regulated company is the best placed to manage the risk of changes in the underlying capital markets, there may be an argument for indexing a part of the allowed return to a pre-determined benchmark in order to reduce the level of risk faced. Such an approach could enable regulators to use a less cautious approach to determining the allowed return, potentially improving value for money. It would transfer interest rate risk to consumers.

Ofwat raised the possibility of indexing a part of the allowed return in their February 2006 'Financing Networks' paper written with Ofgem³⁶, while the Office of Rail Regulation (ORR) consulted on the issue in September 2006, concluding in February 2007 that there is merit in the approach in principle³⁷.

Ofwat and ORR now wish to explore the practicalities and detailed design issues of implementing an approach to establishing the allowed return that involves indexing either the cost of debt as a whole or a part of the cost of debt (e.g. debt premium) embedded within the allowed return to a pre-determined external benchmark.

The water sector: context

The Water Services Regulation Authority (Ofwat) is the economic regulator of the water and sewerage industry in England and Wales. Its role is to seek value for consumers. Before 1 April 2006 our functions rested with the Director General of Water Services.

³⁶ Ofwat & Ofgem, February 2006, *Financing networks: A discussion paper*, is available at <http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/FinancingNetworks080206.pdf>

³⁷ ORR's consultation letter, September 2006, *Periodic Review 2008: The treatment of risk and uncertainty*, is available at <http://www.rail-reg.gov.uk/upload/pdf/pr08-risk-let-280906.pdf>. The conclusions were published in chapter 7 of *Periodic review 2008 Advice to Ministers and framework for setting access charges*, which is available at <http://www.rail-reg.gov.uk/upload/pdf/316.pdf>.

The framework for the changeover was outlined in the Water Act 2003. It provides a similar Board-type structure to other economic regulators.

Ofwat has a primary duty to secure that the functions of each undertaker are properly carried out and that they are able to finance their functions, in particular by securing a reasonable rate of return on their capital.

Very significant capital programmes have been a feature of the water industry – some £70 billion will have been spent from privatisation to the end of the current price period.

Customer's annual bills do not provide for the annual capital expenditure pound for pound. Rather, there is an element of customers' annual bills that allows for the investment over the economic life of the asset once constructed. This is done by way of the depreciation charge. Therefore companies need to raise, via the capital markets, the difference between annual expenditure and revenue allowed to cover the annual depreciation charge.

The providers of this capital will expect to be rewarded for their investment i.e. via interest payments or dividends. Therefore Ofwat must allow a return on capital sufficient to attract investors given the risk associated with the companies they are investing in.

Ofwat therefore assumes that efficient companies can earn a return equal to their weighted average cost of capital (WACC). The “weighting” is by means of an assumption of how much debt and equity is invested in the business.

At PR04 we assumed a cost of capital of 5.1% on a fully post tax basis. This included a 4.3% (real) assumption on the cost of debt reflecting a view that the spot rates for the risk free rate and debt premiums at the time were abnormally low. It also reflected the fact that companies have significant amounts of debt issued when interest rates were higher than the prevailing rates and that there is a cost associated with refinancing that debt. In addition the expectation at that time was that interest rates would rise over the period 2005-10. Instead until very recently rates continued to decline. This appears to be one factor affecting the market valuations of the companies, which are trading at significant premiums to the companies' regulatory capital values.

The rail sector: context

The Office of Rail Regulation (ORR) is the safety and economic regulator of the national rail network and the safety regulator for other railways, including underground railways, heritage railways and trams. Established in July 2004 under the Railways and Transport Safety Act 2003, it is an independent statutory body led by a board.

The 2008 Periodic Review (PR2008) will establish Network Rail's required outputs, allowed revenues and access charges for the control period 2009-14 (CP4). A key part of determining allowed revenues will be establishing the appropriate allowed rate of return.

Network Rail is a company limited by guarantee (CLG) that currently benefits from a full faith and credit guarantee from government (the Financial Indemnity Mechanism (FIM)), which is effectively unlimited in terms of both time and amount. As set out in our

February 2007 document³⁸, the intention is to restrict the use of the FIM from CP4 so that Network Rail has to raise any additional debt on an unsupported basis. It will also be charged a fee for the FIM that reflects the value of the resultant credit enhancement it receives. We believe that this will materially strengthen the incentives facing the company to strive for continuous improvements in performance and efficiency.

We also stated in February 2007 that we will provide Network Rail with an allowed rate of return that reflects its risk-adjusted cost of capital.

Part of the return will be used to provide Network Rail with a risk buffer to enable it to manage normal fluctuations in cash flow effectively. To the extent that Network Rail does not use this risk buffer to meet fluctuations in cash flow, it will have discretion over its use, subject to agreed principles.

The residual surplus will be funnelled into a ring-fenced investment fund. This fund will be used to deliver required outputs, except in extremis when Network Rail will be able to draw on it for debt service.

In establishing Network Rail's allowed return, we have stated that we see merit in principle in indexing (a part of) the allowed cost of debt, on the basis that the increased risk facing customers could be more than outweighed by the resultant lowering in Network Rail's cost of capital, thus improving value for money. However, the practicalities of implementation will be a key consideration in deciding whether indexation is ultimately appropriate.

We intend to conclude on this issue in our draft determinations for PR08, scheduled for publication in June 2008.

A2. Required consultancy services

We would like to appoint consultants to undertake a study to explore how indexing all or a part of the cost of debt embedded within the overall allowed return could be implemented in practice.

The study should include:

- An assessment of the appropriate component of the allowed return to be benchmarked, i.e. total cost of debt, debt premium or risk-free rate;
- A discussion of how the indexation should be transmitted into allowed revenues, the implications of the possible approaches, and a recommendation as to the appropriate approach for both Ofwat and ORR. For example, the allowed return might track the index or changes to the allowed return might only be made in the event that the index exceeds a pre-determined level;
- An assessment of the principles for determining the composition of the external benchmark;

³⁸ Chapter 7 of ORR, February 2007, Periodic Review 2008: *Advice to Ministers and framework for setting access charges* (see above).

- Proposals on the composition of the external benchmark, for example in terms of the types of security to be included in the index (including maturity, credit rating and indexation) and the period over which benchmark components should be assessed; and
- An analysis of the implications of the proposed approach for the incentives facing the regulated company, the efficient financial structure and economic regulation (including the treatment of embedded debt and the risk of introducing systematic risk should several regulators adopt similar approaches).

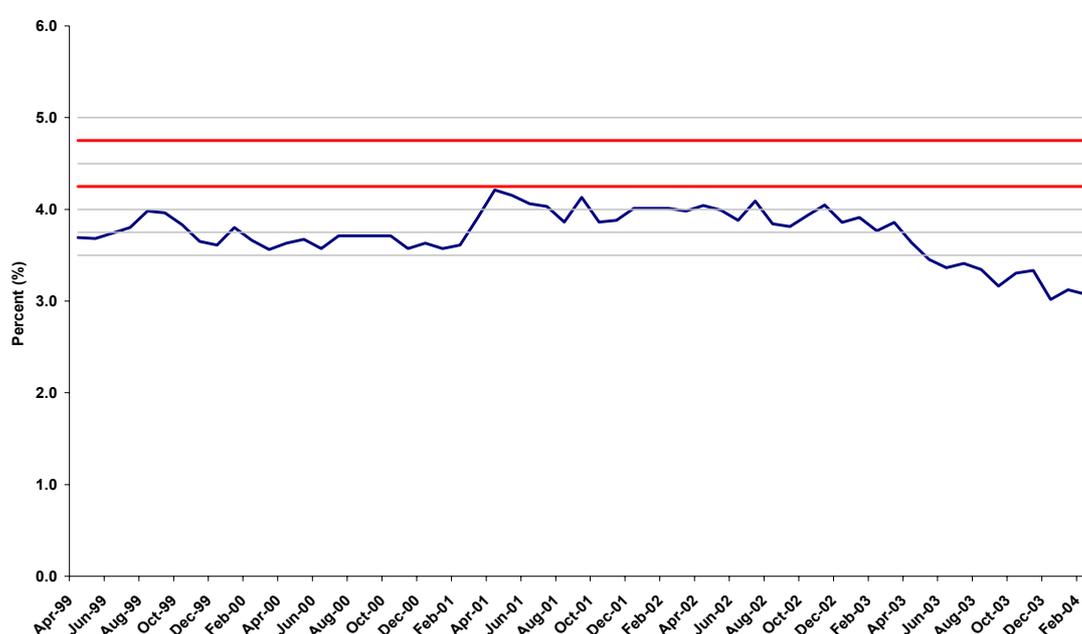
ANNEX B - PERIOD 1999 – 2004 ILLUSTRATIONS

1. Counterfactuals 1 & 2

We have performed similar analysis (to that set out in Section 7) on the price control period 1999 – 2004. As with analysis for 2004-09, it is important to emphasise that the numbers presented are illustrative only, and are sensitive to the precise assumptions made about the counterfactuals and the proposed indexation mechanism.

For the analysis, as shown in Figure B.1, we have assumed an allowed cost of debt of 4.75%³⁹ for Counterfactual 1 and 50bp lower at 4.25% for Counterfactual 2.

Figure B.1: Counterfactual 1 with 4.75% and 4.25% allowed cost of debt 1999-2004



For the period 1999 – 2004 the range of possible costs of the headroom paid by customers is shown in Tables B.1 and B.2. The background to these numbers is explained in more detail in Section 7. The amounts vary according to the assumed actual cost of existing debt for an efficiently financed company. (Note that the range of assumed costs of debt differ from those in Table 7.1 and 7.2 – reflecting the different market conditions at the time).

³⁹ This is pre-tax and is consistent with the post-tax cost of debt range identified by Ofwat in PR99 of 2.8% - 3.5%.

Table B.1: Value of headroom in Water sector (1999 – 2004)

	Actual CoD on existing debt (for an efficiently financed utility)				
	3.50%	3.75%	4.0%	4.25%	4.50%
Counterfactual 1 (4.75%)	£1,206.84	£987.64	£768.45	£549.25	£330.06
Counterfactual 2 (4.25%)	£716.95	£497.75	£278.55	£59.36	-£159.84

Table B.2: Value of headroom in Rail sector (1999 – 2004)

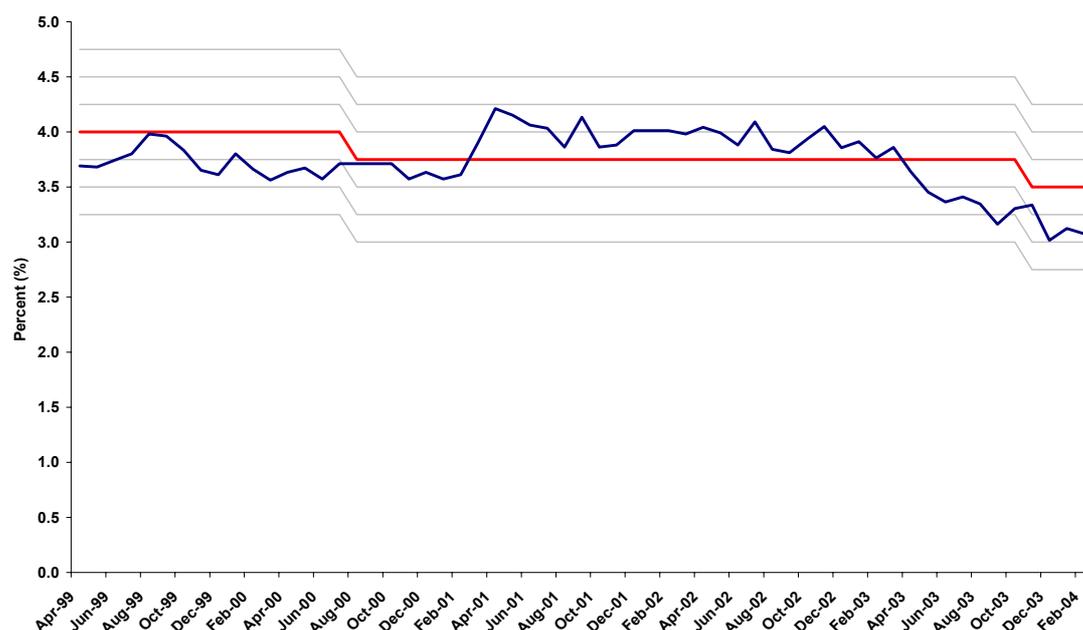
	Actual CoD on existing debt (for an efficiently financed utility)				
	3.50%	3.75%	4.0%	4.25%	4.50%
Counterfactual 1 (4.75%)	£497.48	£443.82	£390.15	£336.49	£282.82
Counterfactual 2 (4.25%)	£289.45	£235.78	£182.12	£128.45	£74.79

2. Counterfactual 2 (with indexation)

As with the 2004 – 2009 analysis we have also considered a Counterfactual 2 scenario with indexation.

Figure B.2 shows that case in which the allowed cost of existing and new debt (with indexation) is 4.0%. The red line (which starts at 4% and ends at 3.5%) shows the movements during the period in the indexed cost of debt applied to the notional debt funding additions to the RCV in the period. It shows that, despite movements in the actual cost of debt (both up and down) it is the decreases that prove more durable and lead to downward adjustments in the allowed rate.

Figure B.2: Counterfactual 2 with 4.00% allowed cost of debt and indexation 1999 - 2004



Water sector

Figure B.3 below shows consumer benefits in the water sector assuming that indexation had allowed the regulator to further reduce the cost of debt on both existing and new debt by a full 25 basis points to 4.00% from Counterfactual 2. This would be consistent with the assumption that the actual cost of debt on existing debt for an efficiently financed company is around 4.00%; and that the regulator is able to reduce the allowed cost of debt by the full amount of the implied headroom (under Counterfactual 2).

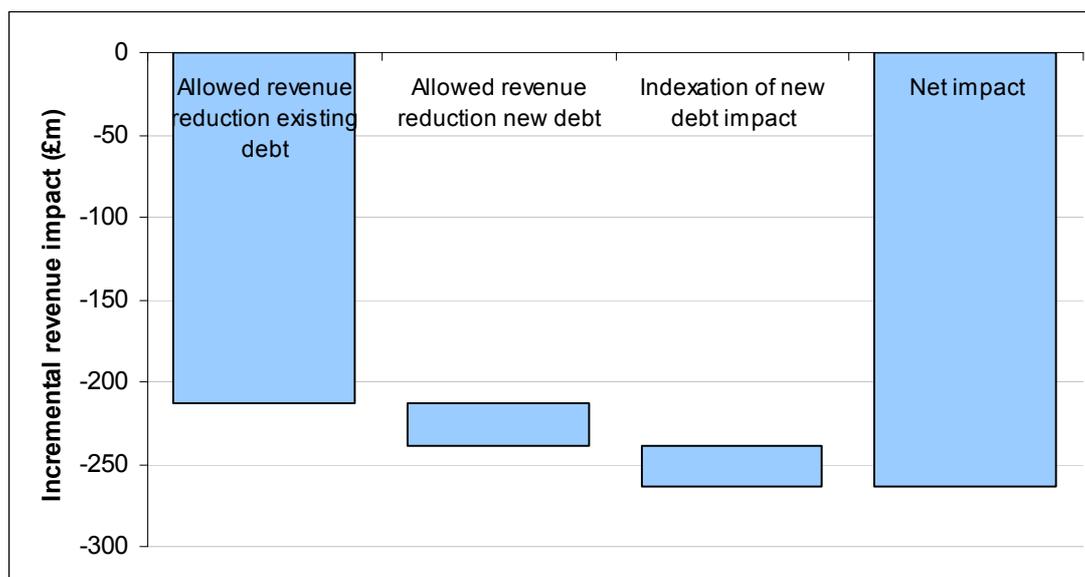
The illustrative savings to consumers in this case amount to £263.9m⁴⁰. The level of savings vary in alternative reasonable scenarios, which may be regarded as providing an upper and lower bound, as follows:

- The introduction of indexation at a rate of 4% for both existing and new notional debt against Counterfactual 1 (i.e. 4.75%), would imply savings of £690.9m.
- Alternatively, under Counterfactual 2, if the starting allowed cost is only reduced for new notional debt to 4.00% (i.e. there are no reductions for existing notional debt, which remains at 4.25%⁴¹) then the total benefit is £50.4m.

⁴⁰ This is equivalent to a 16 bp reduction on WACC that is applied to the annual average RAB

⁴¹ For the reasons discussed in Section 7.2.2

Figure B.3: Cash impact of indexation in the Water sector 1999 – 2004 with 25 basis point reduction in cost of debt for existing and new debt



Rail sector

Figure B.4 below repeats the analysis for the Rail sector. The illustrative benefits for rail consumers in this case (over the period 1999 – 2004) total £149.7m⁴². As before the actual level of savings that may be realised varies depending on what one considers to be the relevant cost of debt to apply to the existing debt stock and the extent to which regulators are able to reduce the headroom:

- An upper bound for savings which assumes an allowed cost of debt 4% for both existing and new notional debt against Counterfactual 1 (i.e. 4.75%), would imply savings of £238.2m
- A lower bound, measured against Counterfactual 2, assumes the starting allowed cost is only reduced for new notional debt to 4.00% with no reductions for existing notional debt (which remains at 4.25%). In this scenario the total benefit is £105.5m.

⁴² This is equivalent to a 32 bp reduction on WACC that is applied to the annual average RAB

Figure B.4: Cash impact of indexation in the Rail sector 1999 – 2004 with 25 basis point reduction in cost of debt for existing and new debt

