**WATER SERVICES REGULATION AUTHORITY
WATER INDUSTRY ACT 1991, SECTION 12**

BRISTOL WATER plc

Notice of Reference: Determination of Adjustment Factor for the period 2010-2015

8 February 2010

1.   (a)   Bristol Water plc ("the Company") holds an Appointment as a water undertaker for the purposes of Part II of the Water Industry Act 1991 ("the Appointment");

      (b)   on 26 November 2009, the Water Services Regulation Authority ("Ofwat") made a final determination ("the Disputed Determination") of the Adjustment Factor for the Company for the period 2010-2015. The terms of the Disputed Determination are set out in Schedule 1 hereto;

      (c)   the Company has required Ofwat to refer the Disputed Determination to the Competition Commission ("the Commission"). The terms of the Company's notice are set out in Schedule 2 hereto.

2.   Ofwat, as required by section 12(3)(a) of the Water Industry Act 1991 and the Appointment, refers the Disputed Determination to the Commission.

3.   The Commission shall report on and determine the Disputed Determination within a period of six months from the date of this reference ("the Initial Period"). If, after receiving representations from the Commission, Ofwat is satisfied that that there are special reasons why the Commission cannot report within the Initial Period then Ofwat may extend the Initial Period by no more than six months.

**Signed for and on behalf of the
Water Services Regulation Authority**

**Regina Finn
Chief Executive**

Protecting consumers, promoting value and safeguarding the future

Mr Alan Parsons
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26 November 2009

Dear Alan

Final determination of price limits 2010-15

We have completed our assessment of your business plan and I now enclose the formal notification of our determination of price limits. The annexes to this letter set out:

- K factors and infrastructure charge (Annex A);
- key financial assumptions (Annex B); and
- notified items and land sales (Annex C).

Our supplementary report (which accompanies this letter) explains our decisions and expectations in more detail. All expenditure in this letter and its annexes and in the supplementary report is in 2007-08 prices. Bills and the infrastructure charge limit are quoted in 2009-10 prices.

We will announce this final determination to the London Stock Exchange tomorrow at 7.00 am. We will also place it on our web site along with our document summarising our general approach and the key outputs and assumptions for the industry.

You have two months to decide whether to ask us to refer any determination to the Competition Commission. If you wish to refer the determination you must let us know by 5:00pm on 26 January 2010.

Yours sincerely

Regina Finn
Chief Executive
Water Services Regulation Authority (Ofwat)

Notification by the Water Services Regulation Authority of determination of adjustment factors and standard infrastructure charges for Bristol Water Plc

Introduction

Under condition B of your licence, the prices which you may charge for water services are limited by a formula which restricts the weighted average increase in charges in any charging year to RPI plus an adjustment factor (K) designed to take account of your individual circumstances (the RPI+K formula). Our final decisions will take effect on 1 April 2010.

Our statutory duties

Under the terms of the Water Industry Act 1991, as amended, when we determine adjustment factors and standard infrastructure charges, we are required to exercise and perform our powers and duties in the manner we consider is best calculated:

- to further the consumer objective;

- to secure that each company holding an appointment as a water undertaker properly carries out its functions; and

- to secure that each such company is able (in particular, by securing reasonable returns on its capital)to finance the proper carrying out of its functions.

The consumer objective is to protect the interests of consumers, wherever appropriate by promoting effective competition between persons engaged in, or in commercial activities connected with, the provision of water services.

Subject to these considerations, we are also required, among other things, to exercise our duties in the manner we consider is best calculated to promote economy and efficiency by companies in their work and to contribute to the achievement of sustainable development.

In addition, we are required to have regard to guidance issued by the Secretary of State for the Environment, Food and Rural Affairs. We have described the approach we have taken in making our determinations in 'Future water and sewerage charges 2010-15: Final determinations'.

Adjustment factors

The adjustment factors we are proposing to determine for Bristol Water Plc for the five years starting on 1 April 2010 are set out below:

Charging year beginning April	Adjustment factor
2010	0.60
2011	4.2
2012	4.0
2013	0.3
2014	-0.2

Revised standard infrastructure charges

We have also reviewed, under the provisions of condition C of the licence, the limit on the charge which you can levy when properties are connected to water services, for domestic purposes, for the first time. The standard amount we propose to determine for the service in 2010-11 is £297.32. The limit in subsequent years will be inflated by RPI.

Summary of assumptions

We set out in tables 1-4 the specific financial assumptions and projections included in our final determination for the period 2010-15. These will enable you to the carry out the company's functions and obligations set out in the Water Industry Act 1991, other relevant legislation and your instrument of appointment. We will assess you against the delivery of the output requirements, not on how much money you spend.

You must:

- Ensure there is no deterioration in service to consumers or in the level of compliance with all environmental consents and licences. Our draft price limits assume that the current levels of service to customers will, as a minimum, be maintained. This means compliance with drinking water quality regulations and other measures that we use to assess your company's performance. Compliance with environmental consents and licences covers abstraction from, and discharges (continuous and intermittent, etc) to, the water environment.

- Maintain all your asset systems so that they can sustain (**or achieve**) stable service-ability – fitness for purpose – throughout the period and beyond. In addition, we expect you to deliver the defined maintenance activity outputs as set out in our determination.

- Install a water meter for and bill on a measured basis all those customers that take up the option for a measured service (consistent with the requirements laid down) and allow any customer to revert to an unmeasured service if requested within the time limits set down.

- Meet changes in demand for water service both from new and existing customers, promote the efficient use of water by your customers and ensure that leakage is kept at the sustainable economic level. Where the current security of supply position is not adequate, we have assumed that you will make the required improvements through leakage reduction to its sustainable economic level, enhanced demand management and commissioning new sources to the timetables set out in our determination.

- Deliver the programmes for improving the quality of drinking water and the environment as specified and to the timetables set down in our determinations.

- Deliver the programme of other service improvements.

Notified Items and Land Sales

Notified Items

As part of your determination, the Water Services Regulation Authority ("Ofwat") has decided that the following shall be Notified Items under condition B of your licence:

1. increased costs resulting from the application of permit schemes made by Highways Authorities pursuant to the Traffic Management Act 2004;

2. increased costs necessary to balance water supply and demand, based on companies' application of UKCP09 data and appropriate analytical tools and processes;

3. increases above the 2008-09 reported numbers of Bad Debt and Debt Management Costs; and

4. increased costs resulting from increases in the Environmental Improvement Unit charge component of the Environment Agency's abstraction charge.

Items one to three (inclusive) are one way Notified Items; that is, Ofwat will not exercise its powers under sub-paragraph 14.1(1) or sub-paragraph 14.1(2) of condition B to trigger an interim determination, or take into account any difference favourable to you if you trigger an interim determination on other grounds. Item four is a two-way Notified Item; that is, Ofwat may exercise its powers under sub-paragraph 14.1(1) or sub-paragraph 14.1(2) of condition B to trigger an interim determination and may take into account any difference that was favourable or unfavourable to you at an interim determination.

As for all interim determinations, changes in operating costs and revenue experienced in 2009-2010 will be excluded from consideration as these do not fall within the determination period.

1.   Traffic Management Act 2004—Permit Schemes

For the purpose of this determination, other than in relation to permit schemes that have been submitted by Kent County Council and Transport for London and in relation to which there is a high degree of certainty that companies will incur additional costs, Ofwat has assumed that there will be no charges payable to Highways Authorities in relation to the application of permit schemes made pursuant to the Traffic Management Act 2004. Any reasonable increase in costs, other than penalties or fines, incurred by a company, arising out of the application by Highways Authorities of permit schemes made under the Traffic Management Act 2004 is a Notified Item.

2.   Water supply and demand balance—Climate change and application of UKCP09

For the purposes of this determination, Ofwat notes that the companies, in evaluating costs necessary to balance water supply and demand, have not been able to utilise UKCP09 data sources and appropriate analytical tools published by the UK Climate Impacts Programme on June 18 2009.

Any increase in costs which a company can demonstrate, by applying appropriate analytical tools to UKCP09 according to the process set out below, is necessary to address the impact of climate change on balancing water supply and demand is a Notified Item.

For the purposes of this Notified Item:

- costs include operating and capital expenditure;

- "UKCP09" means data sources published by the UK Climate Impacts Programme on 18 June 2009, or, if UKCP09 is amended or corrected by the UK Climate Impacts Programme, UKCP09 as amended or corrected;

- if, during this price review period, the UK Climate Impacts Programme publishes data which supersedes UKCP09, Ofwat will consider whether to treat demonstrations utilising such data as demonstrations utilising UKCP09; and

- "appropriate analytical tools" means weather generators, maps or other processes or tools either produced by the UK Climate Impacts Programme, or similar to those produced by the UK Climate Impacts Programme, and which are capable of being applied to UKCP09.

For the purposes of this Notified Item, companies shall adopt the following process:

- companies shall, as early as possible, discuss their approach towards utilising UKCP09 with Ofwat and the Environment Agency and shall continue to engage with them throughout;

- companies' analysis must go beyond a simple application of the summary headlines from UKCP09 and must apply UKCP09 data sources, utilising appropriate analytical tools, at a water resource zone level and be consistent with the UKCP09 User Guidance;

- companies should predict supply using bespoke modelling driven by the outputs generated by the application of appropriate analytical tools to UKCP09;

- companies investment proposals must be derived from a reasonable, risk-based, analysis consistent with the range of projected outcomes reflected in the application of a suitable analytical tool to UKCP09; and

- companies should continue to follow the Environment Agency's water resource management plan guidance, as amended from time to time, on climate change for assessing demand and greenhouse gas emissions.

3. Bad debt

1. For the purpose of this determination, Ofwat has assumed that there will be no net increase above the 2008-09 reported numbers in Bad Debt and Debt Management Costs.

2. Any Net Increase which relates to households is a Notified Item PROVIDED THAT:

    (i) the company provides information documenting the Net Increase to the reasonable satisfaction of Ofwat;

(ii)   the company provides evidence to the reasonable satisfaction of Ofwat that the Net Increase reasonably relates to a significant deterioration in economic circumstances affecting the company's operating area relative to 2008-09; and

(iii)   the company demonstrates to the reasonable satisfaction of Ofwat that it has pro-actively applied best practice within a coherent strategy on debt prevention and management to maximise cost-effective revenue collection. This strategy on debt collection and management should include (without limitation) tariff design, billing, revenue collection and debt recovery.

3.   The following words shall have the following meanings for the purposes of this Notified Item:

Bad Debt and Debt Management Costs means any (or all) of the following costs to the company:

(i)   financing costs associated with increases in revenue outstanding;

(ii)   outstanding revenue written-off;

(iii)   operating costs involved in managing outstanding revenue; and/or

(iv)   capital expenditure due to investment in debt management systems.

Net Increase means any net increase in Bad Debt and Debt Management Costs incurred in a Relevant Year above costs incurred for the same in 2008-09;

Relevant Year means any continuous twelve month period commencing on the first day of the company's Charging Year (as defined in the relevant company's charging scheme) falling in 2010 or any anniversary thereafter.

4.   Increases in Environmental Improvement Unit Charge Component of the Environment Agency's abstraction charges

1.   For the purposes of this determination, Ofwat has assumed that there will be no Real Change in the Environmental Improvement Unit Charge component of the Environment Agency's abstraction charge.

2.   To the extent that the Company or Ofwat demonstrates to the reasonable satisfaction of the other that there is a Real Change in the Environmental Improvement Unit Charge in any Relevant Year then the amount of this Real Change in such Relevant Year is a Notified Item.

3.   The following words shall have the following meaning for the purposes of this notified item:

Environmental Improvement Unit Charge means the environmental improvement unit charge which is calculated in accordance with the Environment Agency Scheme of Abstraction Charges in force at the material time;

Real Change means any change (including nil change) in a Relevant Year in the Environmental Improvement Unit Charge at a rate that is other than the rate of change of the Relevant RPI;

Relevant Year means any continuous twelve month period commencing on the first day of the company's Charging Year (as defined in the relevant company's charging scheme) falling in 2010 or any anniversary thereafter; and

Relevant RPI means the November retail price index immediately preceding commencement of the Relevant Year.

Land sales

For the purposes of this price review, we have assumed that the value of proceeds of the sale of protected land is zero in each of the five consecutive charging years starting on 1 April 2010. The notified values for the relevant disposal of identified land and non identified land are therefore zero in each of these years.

Schedule 2

BRISTOL
WATER

Mr P Fletcher
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21 January 2010

By Fax and Post

Final Determination for Bristol Water plc

Following on from my email of this morning, on behalf of my Board, I confirm we formally dispute your Final Determination of water charges for the period 2010-2015. Accordingly we require Ofwat to refer the Final Determination for Bristol Water plc published by Ofwat on 26 November 2009 to the Competition Commission for determination in accordance with Section 12 of the Water Industry Act 1991 (as amended) and paragraph B 15 of our Instrument of Appointment.

I would appreciate your confirmation that you have received this letter and that it fully meets your notification requirements.

Alan Parsons

The regulatory framework

Introduction

1. Ofwat is the independent economic regulator of the privatized water and sewerage industry in England and Wales. Prior to 1 April 2006 its functions rested with the Director General of Water Services. The current regulatory framework for water is set out in the Water Industry Act 1991, as amended, in particular, by the Water Act 2003 and by orders transferring certain functions of the Secretary of State to the National Assembly for Wales.

2. One of Ofwat's main functions is to limit increases in standard charges made for the supply of water, and to conduct periodic reviews of the prices charged by the WaSCs. In accordance with the licence conditions, these reviews take place every five years. The aim of these reviews is to set price limits which will secure that an efficient company is able (by securing reasonable returns on capital) to finance the proper carrying out of its functions, while delivering value for money to its customers. Ofwat expects each company to deliver a good service to its customers over the five years of the review period, within the context of its 25-year strategic direction statement.

3. Within a common methodological framework, Ofwat sets price limits on a company-by-company basis for each year from 2010 to 2015. The price limit is the percentage by which a company can change its overall average charges above or below inflation each year.

Framework for setting price limits

4. Each company sets its own strategy and business plan for the five-year period, taking into account consumer needs, carbon impacts, climate change, demographic changes and environmental changes. Ofwat scrutinizes and challenges the draft and final plans to ensure optimal costs and benefits and compliance with the company's Strategic Direction Statement, and sets the price limit. The framework for setting price limits can be summarized as follows:

    (a) a five-year price cap that is (largely) independent of actual operating costs over the period, and so encourages cost savings;

    (b) a regulatory capital value (RCV) which represents the amount that the company's owners (shareholders and debt holders) are assumed to have invested, and on which they are permitted to earn a return at least equal to the cost of capital that Ofwat determines;

    (c) an asset management assessment (AMA) intended to ensure efficient capital maintenance and a capital expenditure incentive scheme (CIS) that is intended to encourage accurate projection of capital expenditure (capex) as well as capex efficiencies;

    (d) an adjustment to reward companies which provide good quality of service, and penalize those that do not (known as the Overall Performance Adjustment or OPA);

(e) full periodic reviews every five years, including explicit efficiency challenges to companies' projections of both opex and capex; and

(f) provision for interim determinations to manage risk and uncertainty between these periodic reviews.

5.   Ofwat sets the price cap at a level which should ensure that the company is able to finance its functions, in particular by securing reasonable returns on its capital (as measured by the RCV).

Price caps

6.   A key element of the regulatory framework is the setting by Ofwat of the price cap. In simple terms, this is the overall permitted increase in a basket of tariffs, which is capped at RPI+K+U where RPI is the retail prices index for the year ending in the November prior to the charging year and starting in the preceding November, K is the Adjustment Factor, and U is unused K carried forward. This arises where a company has not put up prices as much as it could have.

The formula

7.   The formula for the tariff basket, also known as Weighted Average Charges Increase (WACI), means the sum calculated as follows:

$$W_t \left(\frac{A_t(i)}{A_{t-1}(i)} \cdot r(i) \right) + \left(\frac{B_t(j)}{B_{t-1}(j)} \cdot r(j) \right) - 1$$

where:

W_t is the Weighted Average Charges Increase for the Charging Year;

i identifies the Unmeasured Basket Item;

j identifies the Measured Basket Item;

$A_{t-1}(i)$ is the Average Charge Per Chargeable Supply in respect of the Unmeasured Basket Item i for the Prior Year;

$B_t(j)$ is the Weighting Year Revenue in respect of the Measured Basket Item j for the Charging Year;

$B_{t-1}(j)$ is the Weighting Year Revenue in respect of the Measured Basket Item j for the Prior Year; and

r(i) or r(j) is the revenue (exclusive of VAT) which accrued to the Appointee in the Weighting Year from all Standard Charges other than Excluded Charges in respect of the Unmeasured Basket Item or the Measured Basket Item (as the case may be), divided by the aggregate of such revenues for both Basket Items. In the case of the Measured Basket Item, standard charges include non-volumetric charges, for example standing charges.

8.   In this formula:

Charging Year' means a year commencing on 1 April;

'Prior Year' means the year commencing 1 April immediately prior to the relevant Charging Year; and

'Basket Items' are:

(a) unmeasured water supply; and

(b) measured water supply.

Where:

> a measured supply or service is one where all or some of the charges for that supply or service are based on measured quantities of volume and an unmeasured supply or service in any other;

and

> 'Unmeasured Basket Item' means item *(a)* in the definition of Basket Items; and

> 'Measured Basket Items' means item *(b)* in the definition of Basket Items.

'Average Charge per Chargeable Supply' means in respect of the Unmeasured Basket Item for a specified year, the amount R/N, where:

> R is the annual revenue (exclusive of VAT) which would accrue to the Appointee in respect of the Unmeasured Basket Item if all Standard Charges (other than Excluded Charges) made or to be made in respect of the Unmeasured Basket Item in the specified year were applied to all Chargeable Supplies of the Appointee which would have been subject to those Standard Charges as at 1 December preceding the specified year;

and

> N is the number of Chargeable Supplies as at 1 December for which the Appointee would have been entitled to make those Standard Charges;

'Weighting Year Revenue' means the revenue (exclusive of VAT) which would have accrued to the Appointee in the Weighting Year in respect of the Measured Basket Item, if all Standard Charges (including any non volumetric charge, for example standing charges) other than Excluded Charges made or to be made in respect of that Measured Basket Item in the Charging Year or, as the case may be, the Prior Year had applied; and

'Weighting Year' means the financial year of the Appointee ended last before 7 October in the Prior Year.

9.   The formula for the WACI requires a separate calculation of the year-on-year increase for each of the two basket items (measured and unmeasured). A weighted average of the two increases is then calculated. It is that weighted average increase that must not exceed RPI + K.

10.   The weighting for each basket item (ie the 'r(i)' and 'r(j)' in the WACI formula) is based on the revenue for each basket item. So for measured water, for example, the weighting 'r(measured water)' is the proportion that revenue from measured water services in the year bears to the total revenue in the year from both basket items. For this calculation, the revenue to be used is the revenue from two years earlier than the charging year. This is because, when prices are set in or around January for a year

beginning on 1 April, the most recent year for which revenue data is known is the last complete accounting year.

11. The increase in respect of unmeasured supply is the increase from one year to the next of the average charge (shown in the formula as the increase in 'A(i)' for one year over the previous year). The average charge is calculated as the total of all unmeasured charges divided by the number of customers (strictly, the number of Chargeable Supplies). However, in calculating the revenue relating to the supply, it is the revenue that would be generated if the company's customers for that service, as at the preceding 1 December, were customers in respect of that service throughout the year in question.

12. The increase in respect of measured supply is the increase from one year to the next of the revenue (shown in the formula as the increase in 'B(j)' for one year over the previous year). The revenue for the charging and prior year is calculated as the revenue that would have accrued if the proposed charges for the year in question had been applied to the consumption of measured services two years earlier than the charging year. (Strictly, it is the company's most recent financial year ending before the October preceding the Charging Year in question. However, since all companies have a financial year ending on 31 March, the effect is that, for a charging year running from 1 April in any calendar year, it is the 2013 revenue from customers and services supplied in the year starting on 1 April two years previously that is to be used.)

The effect of a price cap

13. The price cap is not dependent on the company's actual costs and therefore the company has an incentive to control its costs during the price-cap period. (This differs from 'rate-of-return' regulation, under which companies cannot earn profits in excess of the cost of capital and thus have no incentive to control their costs.) If the regulator sets the price cap for the next review period on the basis of the company's existing costs, the company will see benefit in allowing costs to increase towards the end of the current period so that it has a bigger opportunity to profit from cost saving in the next period. This is a shortcoming of price caps in their simplest form.

14. One way of addressing this is for the regulator to take its own view of an efficient company's costs. Ofwat does this mainly on the basis of its comparisons between different water companies' costs, which it considers provide information about relative efficiency. Ofwat uses such comparisons directly in its operating expenditure (opex) projections.

RCV and allowed return on capital

15. Water companies are capital-intensive businesses. In principle, a regulator could try to develop a view of a company's efficient level of capital-related costs in a similar way to that for opex, using inter-company comparisons. However, this has not happened in the water industry, nor in the utilities sector more generally or for airports. This is for two main reasons. First, it is very difficult to calculate an efficient level of capital-related costs given the geographical and historical differences between companies. Second, given the uncertainties, any attempt to use such techniques would expose the companies to significant regulatory risk (ie of tough future regulatory decisions leaving companies with 'stranded' assets). This risk would be costly because it would cause investors to require a higher return on their investments, resulting in a higher cost of capital.

16.   The approach that has been taken by regulators, including Ofwat, is to set price caps to cover depreciation (including the depreciation of a company's underground infrastructure, as reflected in the infrastructure renewals charge (IRC)) plus an allowed return on the company's RCV (and implied tax payments). The allowed percentage return is based on the company's estimated cost of capital. The RCV represents the amount that the company's owners (shareholders and debt holders) are assumed to have invested and represents the company's value at privatization[1] plus subsequent capex less subsequent depreciation and IRC.

17.   As long as this approach is maintained by Ofwat (and by the CC when Ofwat determinations are referred to it), today's RCV can be established on the basis of privatization value and subsequent capex less depreciation and IRC.[2] Projected RCV for 2010/11 to 2014/15 also depends on projected future capex, depreciation and IRC.

CIS

18.   In previous periodic reviews, Ofwat based its price caps on its own projections of the company's required capex (and based RCV for the following periods on the lower of its projected capex and the company's actual capex). In this periodic review, Ofwat introduced the CIS, which is a scheme for dealing with differences between the company's capex projections and Ofwat's own projections of capex (see Appendix H).

Quality of service

19.   Simple price caps can incentivize companies to reduce quality of service—if lower quality of service enables its costs to be reduced, a company's profits will be higher for the remainder of the price-cap period if it reduces service quality. Ofwat's framework therefore includes the OPA, an adjustment that increases K by up to 0.5 or reduces K by up to 1.0 according to the company's quality of service performance in the previous five years.

Periodic reviews and interim determinations

20.   Ofwat carries out a very extensive information-gathering and analytical exercise in order to enable it to set price caps. This is known as a periodic review. However, in order to manage the risks and uncertainties inherent in estimating future costs and revenue, water company licences also include provision for interim determinations of K (IDoK). Companies can apply for an IDoK where there is a large enough impact on cash flow from one or both of:

   (a) a relevant change in circumstances (RCC)—broadly, new legal requirements or changes to existing legal requirements;

   (b) a change in an NI compared with Ofwat's assumption in its final determination. In PR09 Ofwat notified four items related to bad debt, abstraction charges, climate change and traffic management permit schemes;[3] and

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[1]Approximately the value at the end of the first day's trading. Water-only companies (WoCs) subject to the statutory Water Companies Act 1991 were not privatized but an analogous value was calculated.
[2]Ofwat only recognizes capex in the RCV if it was included in the calculations underlying Ofwat's (or where relevant the CC's) final determination of the price cap (or where relevant an interim determination). RCV is also affected by various allowances and adjustments that are part of the regulatory framework.
[3]See Appendix A schedule 1 (Ofwat letter to Bristol Water covering the final determination).

(c) a relevant disposal of land—broadly, gains or losses from disposals of protected land.

There is also provision in licences for companies (or Ofwat) to seek revised price limits if any circumstance (other than an RCC) occurs which has or will have a substantial adverse (or favourable) effect on the company, other than an effect which would have been avoided by prudent management action.

21. Ofwat considers that the provision for interim determinations reduces risk and the cost of capital. Ofwat also has informal mechanisms for dealing with changes that affect the assumptions that have been made at a periodic review—logging up and the change protocol,[4] described below.

Logging up

22. 'Logging up' is an informal process by which Ofwat takes into account at the next periodic review any qualifying net additional costs (or reductions in outputs and associated costs, as the case may be) which have not been taken into account in the current periodic review or in an interim determination of K. Such costs will relate to 'specified items'—that is to say, a 'relevant change of circumstance', as defined in Condition B of the company's licence (broadly, new legal requirements or changes to existing legal requirements and gains or losses from disposals of land) or to notified items.

23. Capital expenditure which has been logged up will be added to the RCV at the start of the next price-setting period, and companies earn a rate of return at the cost of capital on the logged-up capital costs from the date they are added to the RCV. If the expenditure relates to above ground (or depreciable assets), companies are also allowed a current cost depreciation charge in price limits.

24. The value of such expenditure is not the actual costs incurred, but Ofwat's expectation of the costs that an efficient company would incur. In addition, the costs must exceed 2 per cent of the previous year's turnover (the 'triviality test') in order to qualify for logging up. Thus the effect is that companies are themselves required to finance logged-up capital costs between the date on which such costs are incurred and the start of the next periodic review.

25. Revenue losses or gains resulting from specified items may be logged up. Revenue losses will give a lower revenue base for Ofwat's calculations at the next periodic review, and so a higher price limit in the first year of the next price-setting period. Revenue gains will result in a higher revenue base and so a lower price limit.

26. Increases in operating expenditure resulting from specified items may be logged up and included in the base operating expenditure which forms the starting point for Ofwat's assumptions at the next periodic review. Companies must fund the additional operating cost, or revenue loss, from the date the cost, or loss, is incurred until the start of the next periodic review.

Change protocol

27. A particular problem has been created by uncertainties as to the cost of compliance with the Water Framework Directive (for example, costs associated with River Basin

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[4]Ofwat's change protocol process is described in detail in its document *Change protocol for 2010–15:* www.ofwat.gov.uk/pricereview/pr09phase3/gud_pro_ddchgprotocol2010.pdf.

Management Plans and Water Resource Management Plans). Ofwat has therefore provided a change protocol which sets out the framework for dealing with the financial implications of compliance.

28. Companies may make a change protocol submission before either a request for logging up or logging down, or for an interim determination of K. The protocol applies to changes to output requirements arising from: changes to statutory outcomes or new evidence necessitating new actions required by the water quality regulators; changes relating to a notified item; or changes to service levels associated with an urgent customer priority (that is to say, changes that are driven by customers, including changes in demand, rather than changes in statutory requirements).

29. Such changes to output requirements must be 'financially significant', which Ofwat considers to be the case when the net present value of the costs and savings associated with the change up to the next pricing period exceeds 2 per cent of the relevant service turnover. (The impacts of related changes associated with a specific change in circumstance or improvement programme driver can be aggregated.)

30. The procedure is that the company submits an outline report to Ofwat and CCWater setting out the reasons for the proposed change. Ofwat will then confirm whether the company should send in a detailed report on the matter. Ofwat will review the full report and will advise the company within 40 working days whether it agrees the proposed financial adjustments. If Ofwat does confirm the expenditure, this gives the company an assurance that reasonable net additional costs arising from the confirmed changes will be reflected in future price limits or, where applicable, through an interim or substantial effect determination.
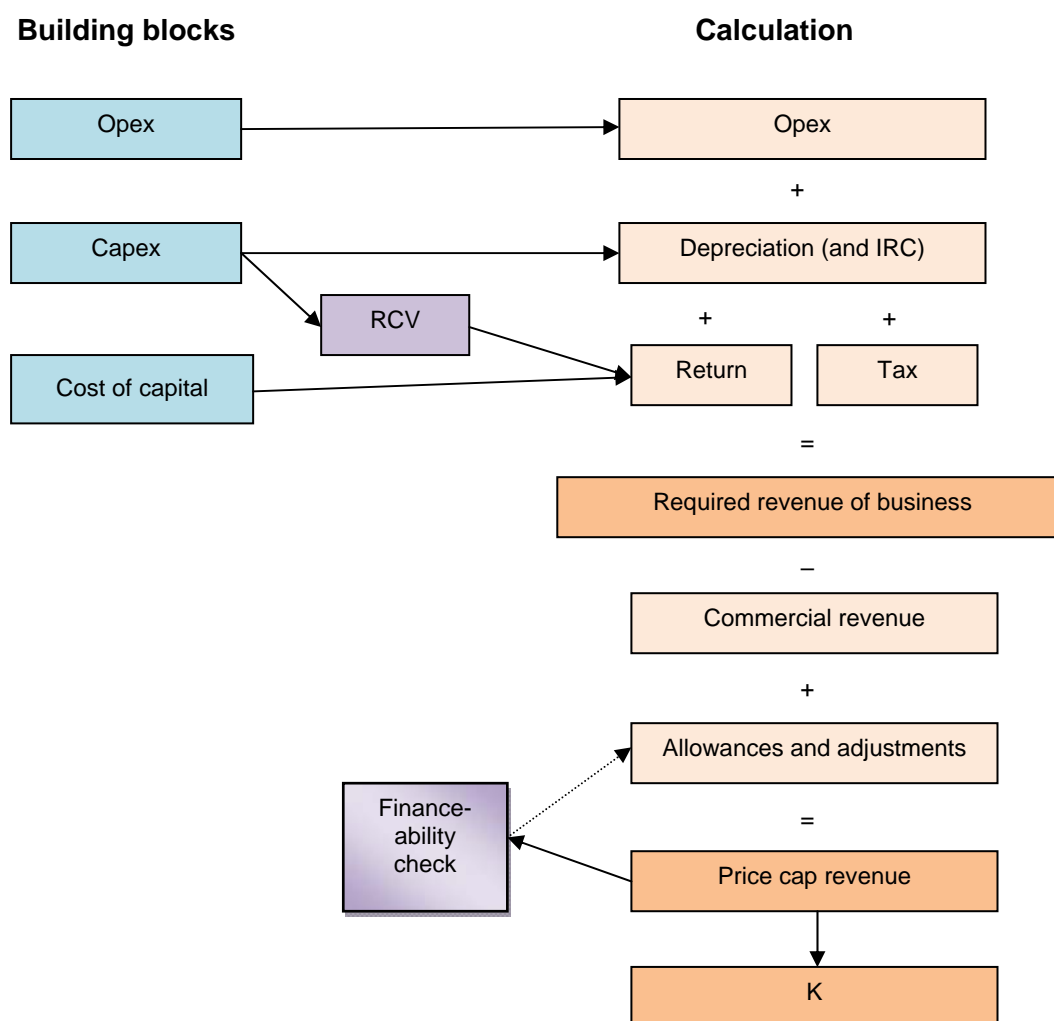
Calculating K

31. The method used by Ofwat is similar to that used by other regulators and by the CC in the airports inquiries. The licensed business is treated as a stand-alone entity and the key step is to calculate the revenue required by that business over the period of the price cap. The calculation (highly simplified) is illustrated in Figure 1. Once the required revenue of the business has been calculated, the revenue needed from the price cap can be calculated by subtracting projected revenue from non-price-capped customers (commercial revenue) and making the appropriate adjustments (eg the CIS allowed revenue adjustment and OPA adjustment which are mentioned above).

32. The business's required revenue is the sum of its opex, depreciation including IRC and its required return (plus implied tax payment). Its required return in each year is its projected RCV times its cost of capital. Therefore, the main factors affecting the business's required revenue (apart from RCV at the beginning of the period) are the projections for the period of its:

(a) opex;

(b) capex (which affects projections of both depreciation (including IRC) and return, the latter through projected RCV); and

(c) cost of capital.

These are known as the main 'building blocks' of the price control. In addition, there are a large number of other factors such as future tax rates (which affect projected tax payments) and assumed asset lives (which affect projected depreciation).

FIGURE 1

Calculating K

Building blocks   **Calculation**

| Opex | | Opex |

                                                          +

| Capex | | Depreciation (and IRC) |

           | RCV | +   +

| Cost of capital | | Return | | Tax |

                                                          =

                                    | Required revenue of business |

                                                          –

                                              | Commercial revenue |

                                                          +

                                         | Allowances and adjustments |

| Finance-ability check | =

                                              | Price cap revenue |

                                                          | K |

Source: CC.

33.   The relevant cost of capital is a weighted average of the cost of debt and the cost of equity. The assumed percentage of debt used in calculating the weighted average cost of capital (WACC) is known as the gearing: Ofwat has assumed 52.5 per cent gearing for WoCs, of which Bristol Water is one.

34.   In line with other regulators, Ofwat checks that its assumed level of gearing is consistent with acceptable financial ratios for the business (shown as the 'financeability' check in Figure 1). The financeability check requires Ofwat to make assumptions about dividend payments as well as the cost of debt and equity. If, after the initial calculation of K, Ofwat considers that the financial ratios are not acceptable, it assumes that the company will, if necessary, issue additional equity. As there is a cost to issuing equity (which in Ofwat's model is treated as an adjustment—see Figure 1), this increases the value of K, though the effect is not large.

The role of cost benefit analysis

Ofwat guidance

1.   Ofwat published Guidance in December 2007[1] regarding CBA. It said that it did not wish to be overly prescriptive.[2] It expected companies to carry out both a 'top-down' appraisal (where the cost benefit of the overall business plan was assessed) and bottom-up appraisals of individual projects or sub-programmes (groups of small individual schemes).[3] With regard to costs, 'each company must continue to demonstrate that all investment proposals are the least-cost methods of delivering the optimal balance of inputs and outputs'.[4]

2.   Ofwat indicated how benefits may be estimated from measurement of customers' willingness to pay.[5] Measuring 'revealed preferences' was difficult given the monopolistic nature of the water industry (which means that consumers are unable to choose between products of companies with different levels of service). Stated preference surveys were more appropriate:

> However, choices consumers are given should be set in the context of other pressure on water bills as well as the overall demands on consumers' budgets. The surveys should clearly set out what current levels of service for each attribute are and how these could improve/deteriorate for a given change in price. The surveys must also include some mechanism for checking people fully appreciate the overall bill changes implied by their choices and ensure they are not selecting each improvement/deterioration in isolation.

Finally, willingness to pay could be assessed using generally accepted figures or figures obtained in a relevant similar assessment (benefit transfer techniques).

Application

3.   Although it appears that Ofwat requires a CBA for the entire business plan,[6] it does not require that consumer willingness to pay must be demonstrated for every project. Capital maintenance is reviewed via the AMA process. Supply demand capex is principally appraised by means of an engineering assessment, although companies must show that their plans are an efficient way of dealing with any shortfall identified. Other statutory requirements must be met, and although Ofwat stated that CBA should still be applied, it required the use of least-cost planning to identify the most efficient input mix for a given output or set of outputs rather than a full comparison of benefits with costs.

4.   Accordingly, within the context of its determination for Bristol Water, Ofwat appeared to require full CBA for resilience schemes. It is these schemes we are principally concerned with in this appendix.

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[1]Available at www.ofwat.gov.uk/legacy/aptrix/ofwat/publish.nsf/Content/pr0908.html.
[2]Guidance, paragraph 2.5.
[3]Guidance, paragraph 2.2(i).
[4]Guidance, paragraph 3.1.
[5]Guidance, paragraph 3.2.1.
[6]www.ofwat.gov.uk/pricereview/pap_pos_pr09method080327.pdf, paragraph 3.4.

Bristol Water cost benefit analysis

5. Bristol Water commissioned surveys of household and non-household customers in order to obtain evidence on customers' willingness to pay for improvements in their water service (the Holden Pearmain survey—see Appendix D). The general approach used is a type of stated preference approach known as a choice experiment: respondents were shown a card with three options regarding aspects of their water service, and asked to choose between the options. This process was repeated with different options.

6. Bristol Water used the survey results to calculate customers' average willingness to pay for improvements in their water service. Bristol Water did not supply us with an explanation of how it did this, but we understand that the process involved using the results of the choice experiments to estimate individual utility under the assumption that choices are described by the multinomial logit model.

7. Our understanding is that Bristol Water used these average willingness-to-pay figures together with other relevant information (such as the number of customers affected and timescale) to calculate annual benefits of its proposed improvements in service, such as its resilience schemes. We understand that it then calculated the present value of benefits from each scheme and compared this with the present value of the costs. Bristol Water used the Government's recommended social rate of time preference (3.5 per cent) to discount benefits and costs.

Halcrow assessment

8. Halcrow carried out reviews of Bristol Water's application of CBA to its capital maintenance and resilience schemes:[7]

   (a) On the mains replacement scheme FBPB16, Halcrow believed that the approach applied to calculate whether or not this scheme was cost beneficial had a number of shortcomings, and that significant unquantified uncertainties existed that could have had a material impact on the calculated ratio of benefits to costs.

   (b) On the resilience schemes, Halcrow believed that neither of the two approaches used by Bristol Water provided a robust assessment of customer benefits.

CC assessment

9. Appendix D contains our review of the survey evidence we received. We note that the Holden Pearmain survey Bristol Water used to generate customers' willingness to pay for service improvements was an extremely complex stated preference exercise, which may mean that the respondents did not fully understand the questions. Further, Bristol Water, in discussion with Ofwat,[8] stated that the relevant questions 'had more of a marketing than academic approach with language customers could understand and questions they could relate to'. We noted that such questions might not be appropriate in this case, and we would question the usefulness of the results obtained.

10. We are concerned that Bristol Water has not provided a clear explanation of how it used the survey responses to calculate customers' willingness to pay for service improvements. We also have not seen any evidence of the statistical significance of

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[7][✄]
[8][✄]

the results that could be used to put a confidence interval around willingness-to-pay figures. This is potentially important in considering resilience and risk because the Holden Pearmain choice experiments did not suggest that these were particularly important issues for consumers. (The Holden Pearmain choice experiments suggested that the most important attribute for domestic consumers was the change to their annual water bill (score of 40 per cent) followed by replacement of lead pipes (12 per cent) and leakage (6.2 per cent). Differences in the risk of having no water for two months due to drought had a score of 5.7 per cent and short-term interruptions to supply had a score of 2.0 per cent, the second lowest of all the attributes considered.)

11.   In its response to our provisional findings, Bristol Water said that a comparison of results on willingness to pay showed that its valuations were at the lower end of the range obtained by other companies, and this should provide confidence that its valuation was not an overestimate.[9] However, as we have not seen the surveys done by other companies, we do not necessarily accept that they provide confidence in Bristol Water's estimate. We note that the other surveys may well be subject to similar problems to Bristol Water's, and the extremely wide range of results (with the highest figure appearing to be more than 1,000 times the lowest) calls into question the reliability of these surveys.

12.   Prior to our provisional findings, Bristol Water did not supply us with any appraisal documents showing its discounted cash flow[10] (DCF) calculations of benefits and costs and the sensitivities examined. We expressed concern that we had not seen evidence of Bristol Water having examined the full range of data available and tested the assumptions used in its CBA appropriately.

13.   Subsequent to our provisional findings, at our request, Bristol Water supplied us with what it described as updated CBAs for its resilience schemes and the CBA for its smart metering proposal.[11] Having seen this material, our concerns with the robustness of Bristol Water's CBAs remain. Bristol Water supplied us only with spreadsheets: even taking into account the material in Bristol Water's FBP and SoC, we did not see what we considered to be adequate discussion of the available options, the reasons supporting Bristol Water's favoured option and the risks attached. Examples of our specific concerns are that:

   (a) The Holden Pearmain choice experiments included an option with different risks of an interruption to supply (one-off incidents of more than 6 hours) between 1.0 and 0.1 per cent and a further option with different risks of having no water (water only available from standpipes for two months as a result of drought) between 0.2 and 2.0 per cent. We understand that Bristol Water used data on the first option to calculate a willingness to pay of £0.77 to reduce the risk of a 6 or more hour supply interruption from 0.5 to 0.2 per cent (2,500 to 1,000 customers affected).[12] Bristol Water then assumed that willingness to pay to avoid a supply interruption of one week would be 10.4 times the figures quoted for a supply interruption of 6 or more hours,[13] giving a figure of £8.00 (£0.77 times 10.4) per domestic consumer. However, the data for the second option (having no water for two months) showed a willingness to pay among residential consumers of only £0.12 for

[9]Bristol Water comments on provisional findings, section 3, paragraphs 41&42.
[10]DCF is a method of valuing a series of future cash flows taking into account the time value of money. All such cash flows are estimated and discounted to give their present values. The sum of all such discounted future cash flows, both incoming and outgoing, is the net present value (NPV).
[11][✂]
[12]FBP, part C1, paragraph 4.1.2.
[13]FBP, part B6, paragraph 3.4.4.

reducing the risk of having no water from 0.5 to 0.2 per cent:[14] this is 67 times less than the figure for residential consumers implicitly used by Bristol Water. The second option also showed a willingness to pay of £5.35 for reducing the risk of having no water from 2.0 to 1.0 per cent, implying £1.60 for reducing the risk by 0.3 per cent within this interval: this is still five times less than the figure for residential consumers implicitly used by Bristol Water.

(b) In the case of the resilience schemes, Halcrow's report suggested that Bristol Water's CBA used inflated probabilities for the risk of interruption lasting seven days or more (this was associated with Halcrow's view that Bristol Water had taken insufficient account in its analysis of mitigation measures).[15] Bristol Water said that its updated CBAs adopted CC positions on various issues including the risk of asset breakdown/failure and mitigation. Bristol Water's view was that, even after taking into account the potential concerns raised by Halcrow and the CC, its resilience schemes remained cost beneficial by a substantial margin.[16] However, Halcrow told us that it still had fundamental concerns with Bristol Water's assessment of the likelihood of critical failure valuation for eight of the nine risks (all except the risk of mechanical failure). Halcrow still considered that Bristol Water had not provided sufficient evidence to demonstrate that a robust risk assessment had been carried out, which had taken into account local mitigation measures and planning/operational fall-back processes. On this basis, Halcrow felt that Bristol Water had overstated the risks and hence that the associated investment had still not been adequately justified.[17]

(c) Bristol Water's CBA of its proposed trial of smart meters appeared to assume what it set out to test. Bristol Water said in its SoC that the aim of the proposed trial was to understand the practicalities and costs of implementing a fixed radio network to enable meter information to be downloaded remotely and frequently, and to confirm the actual levels of leakage and cost reduction in order to enable a robust assessment of the costs and benefits of a large-scale roll-out of smart metering to be determined. However, its CBA of this trial simply made assumptions about the costs and the level of leakage reduction and cost savings that would result from the installation of smart meters; that is, it assumed what it set out to test. We would have expected a CBA of a trial of an innovative product to set out what information currently existed about that product and how the trial would improve that information, and on that basis to attempt to quantify the value of the information benefits obtained from the trial. We were particularly surprised that Bristol Water's CBA of its smart metering trial did not include any analysis of sensitivity to risk.[18]

14. Bristol Water did not submit its CBA methods to a peer review.[19] This further reduces our confidence in its CBA analysis.

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[14]FBP, part C1, paragraph 4.3.2.
[15][✂]
[16]Bristol Water comments on provisional findings, section 3, paragraphs 29–31.
[17]Halcrow response to comments on provisional findings, section 5.
[18]For the reasons set out in this paragraph, we do not agree with Halcrow's view that 'Bristol Water has presented a robust analysis that demonstrates a positive cost benefit ratio of the smart metering trial which is strongly underpinned by the customers willingness to pay for greater headroom between supply and demand'. We note that Halcrow also made different comments which are in line with our own assessment: specifically Halcrow said that 'the deliverable is just … "a trial" and does not necessarily benefit customers'; and that 'smart metering costs are known but benefits (in terms of leakage reduction) are not'.
[19]Bristol Water told us that it did approach someone to do a peer review but they were too busy doing peer reviews for other companies. [✂] Ofwat stated [✂] that only two other small water companies did not undertake peer review but they were companies with limited proposals for additional capital investment.

Discount rate

15.   In our provisional findings, we also expressed concern that we had not seen evidence that Bristol Water had applied DCF techniques properly. Bristol Water had annualized capital costs using the time value of money (3.5 per cent),[20] but we noted that this was not in accordance with Ofwat guidance,[21] which required capital costs to be converted into annualized values using the company's cost of capital. We considered that, because of the way prices were determined, Ofwat's procedure was the correct procedure, and we also noted that, unless the DCF analysis considered tax explicitly, the appropriate cost of capital would be a pre-tax cost of capital rather than the 'vanilla' cost of capital used in financial modelling. We noted that this was likely to be significantly higher than the social rate of time preference (3.5 per cent) used by Bristol Water, which suggested that Bristol Water's CBA was likely to have significantly understated annualized costs.

16.   In its response to our provisional findings, Bristol Water said that it thought the use of a pre-tax cost of capital was not consistent with Green Book rules that required taxes to be excluded from CBA as they were transfers of wealth within the economy.[22] However, in our view, it is the pre-tax cost of capital that drives the prices that customers pay, and it is necessary to use a pre-tax cost of capital to ensure consistency between costs (to customers) and willingness-to-pay benefits to customers.

17.   Bristol Water's updated resilience CBAs did address this aspect of our provisional findings, as an option incorporating a pre-tax cost of capital was included. As our other concerns with Bristol Water's CBAs remained, this change did not alter our view that the resilience schemes were inadequately justified.

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[20]FBP, part C8, paragraph 2.2.5.
[21]Ofwat document PR09/08, section 3.3.2, discounting.
[22]Bristol Water comments on provisional findings, section 3, paragraph 54.

Surveys

Introduction

1.   We received survey evidence from Bristol Water, Ofwat, and CCWater.

2.   This appendix reviews the surveys presented to us, and in addition looks at surveys mentioned by Bristol Water in its FBP. The surveys considered consumers' willingness to pay for a variety of water and sewerage improvements.

The surveys

3.   The surveys reviewed are:

(a) Bristol Water Pricing Research (MRUK—2009);

(b) Understanding Customer Views [Jointly commissioned[1]] (BMG/MVA—2009);

(c) Bristol Water Willingness to pay (Holden Pearmain—2008);

(d) CCWater Charging Research (ORC International—2007);

(e) CCWater Customer views on draft determinations (Accent—2009);

(f) Consumer Priorities for PR09 (Corr Willbourn—2008);

(g) DEFRA National Water Environment Benefits Survey (NERA/Accent—2007);

(h) UKWIR Acceptability of Drinking Water—Willingness to Pay (MVA—2008); and

(i) CCWater on determination research (Harris Interactive—2010).

4.   For each survey we set out, as appropriate:

*   the key results;

*   methodology;

*   our assessment; and

*   other parties' views.

5.   Bristol Water submitted that the results of surveys it commissioned complemented the other surveys and showed that customers were willing to pay more for water improvements.[2]

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[1]Ofwat, Defra, Welsh Assembly Government, CCWater, Environment Agency, DWI, Natural England, Water UK.
[2][✂]

(a) Bristol Water Pricing Research (MRUK—2009)

Key results

6. 53 per cent of respondents felt that their current bill for water and sewerage was good value for money.

7. 44 per cent of respondents stated that they would prefer their bill to increase by £4 a month and have the service maintained and in some areas improved.

8. A further 14 per cent stated that they would prefer their bill to increase by more than £4 a month and see wider improvements to service.[3]

Methodology

9. The survey conducted on behalf of Bristol Water was carried out in February and March 2009. The interview was conducted over the telephone, with the water bill payer. A total of 867 interviews were achieved and the results weighted to represent the known quotas by age of respondents in the Bristol area.[4]

10. MRUK struggled to reach respondents in the younger age category (up to 34) and had to rely on weighting to achieve a representative sample. It is not clear why they did not interview enough people in this group. It could be due to younger people not actually being the bill payer, as quotas were set on census data and not bill payer demographics, or due to younger people not having a landline or being out more often when interviewers tried to call.

Assessment

11. The survey did not begin or end with any general questions to allow customers to put their expenditure on water into the context of their other household expenditure (eg questions on how people prioritized spending more money on water versus spending more on the NHS/other utilities/transport etc).

12. The questionnaire asked respondents to consider a £4 a month price rise by 2015, which was not a clear definition for consumers to understand and could have affected their answers: 2015 might have seemed a long way off; and it was not clear if the £4 was at today's prices. Asking the question with the same numbers in a different way could have produced different answers.

13. The questions used in the stated preference exercise included phrases such as: 'being without water',[5] 'left without water',[6] 'for some weeks',[7] and 'hosepipe bans or standpipes will increase'.[8] Such phrases were likely to have elicited high importance ratings.

14. Price increase questions followed on from the importance questions, which might have increased the likelihood that respondents would state that they were willing to pay more.

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[3]In response to Q28 in MRUK's survey.
[4]Quotas, by age and gender, were set using head of household information from the census and this would not necessarily match closely to bill payer demographics.
[5]Q16 of survey.
[6]Q10 of survey.
[7]Q7 of survey.
[8]Q19 of survey.

15. The questions presented possible price rises in small amounts, eg '11p', which might have led people to think that they were small increases and to have been more likely to say 'yes' to paying them.

16. We concluded that the questions might lack balance and could elicit higher support for price increases than would otherwise be the case. Therefore, we found that drawing conclusions about consumers' willingness to pay from the results of this survey was difficult.

Other parties' views

17. Ofwat told us that, although Bristol Water argued that its research showed that customers supported its proposals, Ofwat's own analysis of the research did not provide it with confidence that this conclusion was robust. Ofwat stated that there were significant flaws in the research design, such as not offering customers an appropriate range of options to choose between and not presenting bill increases as an annual amount.[9]

(b) Understanding Customer Views [Jointly commissioned[11]] (BMG/MVA—2009)

Key results

18. 37 per cent of customers stated that the current water and sewerage service were good value for money.

19. Having been presented with the proposed new water and sewerage service levels for 2010–15, and the overall bill increase, 24 per cent of people felt that the plans were acceptable.

Methodology

20. The survey was commissioned by Ofwat, and conducted jointly on its behalf and for a variety of other stakeholders.[10] It was carried out in September to November 2008. The survey asked consumers across England and Wales for their views on future services and bill levels for water and sewerage.

21. The survey collected attitudinal information on current services and on proposed future water and sewerage services, as defined in each company's draft business plan.

22. Respondents were presented with information on current and proposed services using 'show cards' incorporating specific company information in a standardized format. This approach was to allow for comparisons across companies. The show cards were compiled by Ofwat and the other regulators, and agreed by the companies.

23. A total of 6,000 respondents across England and Wales were interviewed, with 277 in the Bristol area. The survey aimed to reach a representative sample of water bill payers.

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[9]Ofwat response to Bristol Water SoC, Annex G, paragraph 4.1.
[10]This survey was conducted on behalf of Ofwat, Defra, Welsh Assembly Government, CCWater, Environment Agency, DWI, Natural England, Water UK.

24.   The survey began with framing questions before asking about value for money. For example, respondents were asked to state which issues were important to them in their local area (eg education, transport, health services, etc) and what contact they had with their water company. Respondents were also asked initial questions regarding how much they believed they paid for their water, along with a measure of how accurate they believed this estimate to be.

25.   The survey used a stated preference exercise, using balanced statements based on Bristol Water's actual business plans. The examples presented gave current bill prices and new bill prices to allow respondents to make direct comparisons.

Assessment

26.   As the survey was designed to be representative across England and Wales the fairly low sample size in Bristol (277) only provides estimates with an accuracy of +/– 6 per cent. While this sample was small, it did provide an acceptable level of accuracy for such a consumer survey. The overall sample size of 6,175, and the consistency in results across areas, gave further weight to the findings.

Other parties' views

27.   This survey was carried out on behalf of several stakeholders: Water UK; CCWater; Defra; Welsh Assembly Government; Environment Agency; Natural England; and Drinking Water Inspectorate; all of which were satisfied that the methodology and results were robust.

28.   Bristol Water told us that it had serious reservations about the conduct of this research and did not believe that the respondents in the Bristol Water supply area were representative of its customer base.[11] Bristol Water said that:

    (a) there had been a major reclassification of respondents into socio-economic groups between the interim and final results;

    (b) the income distribution was not typical of Bristol's supply area; and

    (c) there were anomalies in the responses to the question on uninformed value for money.

29.   Bristol Water's Reporter (Atkins Ltd) reviewed this survey.[12] The Reporter agreed with Bristol Water's concerns that the sample used was not representative.

30.   Bristol Water's concern was raised with the stakeholders and resulted in the survey company seeking the views of more consumers in Bristol in order to balance its sample. These steps, along with the fact that the answers were balanced across the socio-economic groups, led us to accept that the sample was a fair representation of Bristol Water's customers.[13]

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[11][✂]
[12][✂]
[13]Paragraph 5.7 of CCWater's first submission confirms this approach.

31.   Portsmouth Water,[14] a water-only company, expressed concerns over the combination of water and sewerage bills in the survey. Ofwat acknowledged this shortcoming of the survey in 'PR09 Quantitative Research into Customer Priorities'.

32.   We found that, whilst the sample might not be fully aligned to Bristol Water's customer base, it did appear to give consistent results across the socio-economic groups, as shown in Table 1.

TABLE 1   **Customers' views on the acceptability of Bristol Water's price proposals, reproduced by CCWater**

| Respondent's view	Socio-economic group (%)			Household income (Gross pa) (%)				
	AB	C	DE	<£10,000	£10,000– 20,000	£20,000– 30,000	£30,000+	DK
Completely unacceptable	16	21	11	19	17	21	10	16
Unacceptable	41	54	64	55	55	64	47	53
Acceptable	40	23	19	21	27	12	39	27
Very acceptable	0	0	1	1	0	0	0	0
Don't know/can't say	3	2	5	4	2	3	4	4
No of respondents	63	133	74	80	64	33	49	51
% of respondents	23	49	28	29	23	12	18	18

Source: CCWater submission Table 2.

33.   CCWater produced a chart showing that, both in terms of the extent of the proposed price increase and how many consumers found the proposed price increase acceptable, Bristol Water was an outlier compared with other water companies. This chart is reproduced as Figure 1.

[14]Portsmouth Water submission to the CC, section 6. See: www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/second_redacted_submission_bristol_water.pdf.

FIGURE 1

Acceptability of bill rise at draft business plan

Source: CCWater's initial submission, Figure 1.
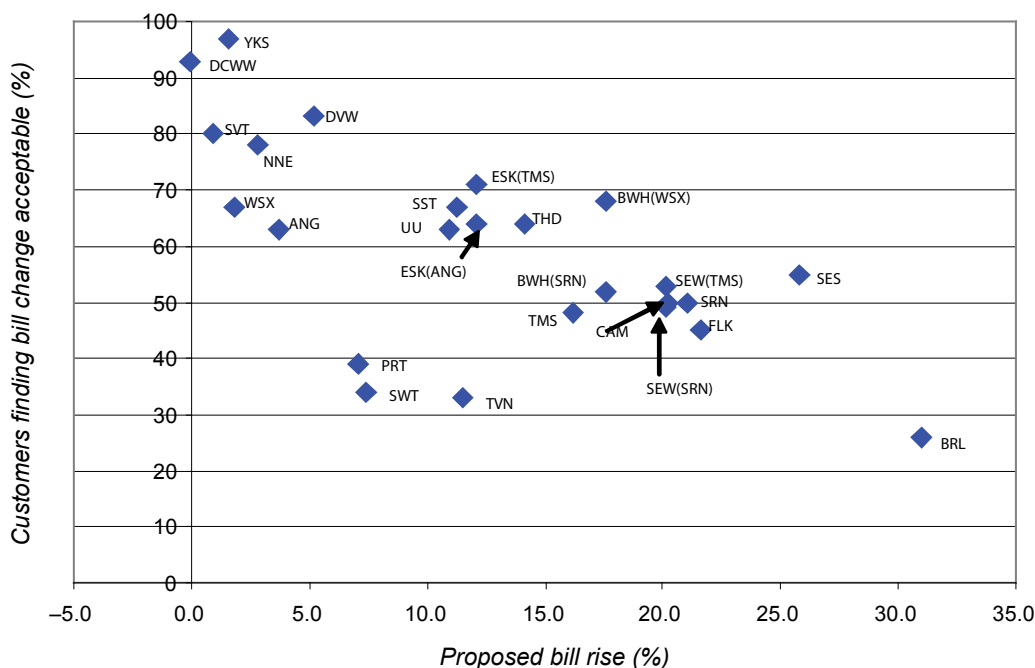
Key

ANG	Anglian	FLK	Folkestone & Dover	SVT	Severn Trent
BRL	Bristol	NNE	Northumbrian	SWT	South West
BWH	Bournemouth & WH	PRT	Portsmouth	THD	Tendring Hundred
CAM	Cambridge	SES	Sutton & E Surrey	TMS	Thames
DCWW	Dwr Cymru	SEW	South East	TVN	Three Valleys
DVW	Dee Valley	SRN	Southern	UU	United Utilities
ESK	Essex & Suffolk	SST	South Staffs	WSX	Wessex
				YKS	Yorkshire

34. Figure 1 suggests that Bristol Water's proposed bill rise is out of line with the other water companies, including Wessex. This may explain why consumers in Bristol did not find the proposed price rise acceptable.

35. Bristol Water also commissioned Dr Iain McLaurin of Statistical Information Solutions to review the survey. Dr McLaurin raised some concerns with the sampling methodology, which he said could have produced the anomalous results for Bristol. His concerns focused on the fact that a cluster sample[15] was taken and that the sample did not represent the population in terms of income or socio-economic group. Dr McLaurin suggested that weighting the survey results could have overcome some of these issues.[16]

36. We considered these concerns and noted that the survey's approach appeared to be in line with accepted practice. The survey report[17] states:

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[15]Cluster sampling involves sampling from smaller areas within the target area in order to increase interviewer efficiency.
[16]The sample was meant to be representative of water bill payers and therefore any weighting should be designed with this in mind.
[17]*Understanding customers' views: PR09 Quantitative Research into Customers' Priorities – Overall Report* www.ofwat.gov.uk/pricereview/pr09phase3/pap_rsh_pr09quantrshmain.pdf—2.4.8 and 2.4.9.

Census Output Areas (OAs) were listed by local authority and ward and an appropriate proportion were selected randomly to ensure geographical representativeness. The randomly selected OAs were cross-referenced with the Postal Address File (PAF) to derive a detailed address list for each survey site. Broad quotas were then set according to 2001 Census statistics for each.

Exact detail of how the quotas were used is not provided.

37.   Whilst weighting would have been a sensible approach in this case the results by each income and socio-economic group did not seem to alter very much.[18] Therefore, weighting the results would have had a limited affect on the estimates which the survey produced.

(c) Bristol Water Willingness to pay (Holden-Pearmain—2008)

Key results

38.   Around 75 per cent of respondents would find a £5 reduction acceptable if offered an alternative service package.

39.   Quality of drinking water, replacing lead pipes and leakage were all highly important to consumers and it was in these areas that consumers were most willing to pay for improvements.

Methodology

40.   The main objective of the survey was to enable Bristol Water to include consumer priorities for service levels and bills into its business plan, so as to be able to deliver to its consumers what they wanted and what they were willing to pay for in a sustainable way. The survey aimed to assess consumers' willingness to pay across different aspects of the service and sought to ascertain what service areas were most important to consumers. The survey also sought to establish whether consumer views on these issues were consistent.

41.   Two exercises were undertaken for business and residential customers. Only the residential results have been reviewed here for similarity to the other surveys.

42.   1,000 face-to-face interviews were conducted in consumers' homes for 30 minutes each.

Assessment

43.   The survey did not include questions about the value for money of the services provided, which limited the extent to which its results could be compared with the results of other surveys.

44.   The survey used very complex 'Willingness to Pay' exercises, which might mean that the respondents did not fully understand what was being asked (eg using terminology such as 'likelihood' which can be difficult to interpret, and using percentage changes which many respondents would have struggled with). Bristol Water said that the questions had more of a marketing than an academic approach, and used language

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[18]See Table 1.

which customers could understand.[19] We noted that, nevertheless, such questions might not be appropriate in this case, and we would question the usefulness of the results obtained from the techniques used in asking the questions ie the Gabor Granger and Conjoint exercises.

45.   There were no overall results on willingness to pay as the results were split by different factors.

46.   The quotas appeared to be based on the population from the 2001 census, and not the bill-paying population, which is significantly different. As a result, the demographics of the sample in the survey over-represented young people (eg students and people living at home with their parents who are non-bill payers).

47.   Bristol Water told us that the survey showed that consumers had a clear willingness to pay for service improvements.[20]

Other people's views

48.   Bristol Water's Reporter reviewed the consumer research.[21] The Reporter said that, although there was a difference of opinion between Bristol Water and Ofwat on several points, the research was still sufficient to enable a cost benefit analysis of Bristol Water's proposals to be undertaken. We noted that it was unclear exactly which aspects of the survey were assessed by the Reporter.

49.   Ofwat stated that this research had a number of weaknesses, which included Bristol Water's failure to remind customers to consider their choices within the context of other impacts on their budget, and its failure to inform customers of current service levels and consequently the lack of opportunity to opt only for the maintenance of current service levels.[22] Ofwat said that if the survey were used to establish willingness to pay, any flaws in it would cast doubt on the results of any subsequent cost benefit analysis.[23]

(d) CCWater Charging Research (ORC International—2007)

Key results

50.   60 per cent of respondents thought that their water bill offered value for money and 39 per cent accepted a £2 increase in order to fund 'Watersure'.

Methodology

51.   This survey was carried out in 2007 using a face-to-face interview with 1,665 respondents across ten water companies. Results were not given for Bristol Water.

Assessment

52.   The survey was to assess metering and the Watersure scheme, which is designed to help people pay their bills. As such, the survey was not of interest in understanding consumers' willingness to pay.

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[19]Annex 8 of Ofwat initial submission, paragraph 6.2.
[20][✀]
[21][✀]
[22]Ofwat response to Bristol Water SoC, paragraph 4.2.
[23]Ofwat response to Bristol Water SoC, paragraph 4.3.

Other people's views

53.   Bristol Water reviewed this research and told us that it had taken account of the broad views expressed in it.[24]

(e) CCWater Customer views on draft determinations (Accent—2009)

Key results

54.   One-third of water and sewerage company customers said that the services were good value for money, whilst, for the water-only companies' customers, just over half said that the services were good value for money.

55.   Nearly half of all respondents, 47 per cent, said that current bills were affordable.

56.   Approximately 82 per cent of respondents said that the draft determination proposals were acceptable, and almost two-thirds of these (65 per cent) thought they would be affordable.

Methodology

57.   The survey was conducted through a combination of face-to-face in-home interviews and online interviews, with people being recruited from two online panels.

58.   4,694 customers were surveyed (of which 200 were from the Bristol Water area).

59.   A stated preference exercise was used to elicit customers' willingness to pay in regard to their water bill.

Assessment

60.   The survey used the figures from the draft determinations of each of the water companies. As these figures were significantly different from the final determinations, the results were unlikely to be a true representation of customers' willingness to pay.

(f) Consumer Priorities for PR09 (Corr Willbourn—2008)

Key results

61.   The key finding from this research was that customers want an efficient, safe, reliable supply of water at a reasonable cost now and in the future, and everything else is of less importance.[25]

62.   Consumers perceived there to be no justification for bill increases and respondents felt that the water companies were making too much profit already.

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[24] [✂]

[25] 'Deliberative Research concerning Consumers' Priorities for PR09 for the Water Industry Stakeholder Steering Group' Corr Willbourn Research and Development p20.

Methodology

63.   The objective of this research was, for each water and sewerage company region, to explore and understand consumers' expectations and priorities in respect of water and sewerage services, in particular for the period 2010 to 2015, but also beyond. The survey sought to show how consumers' views were affected by an increased knowledge of the issues.

64.   This qualitative, deliberative research was commissioned by key stakeholders.[26] The research followed a three-stage approach:

    (a) discussion groups (45 minutes);

    (b) self-guided deliberation (two weeks); and

    (c) deliberative workshop (3 hours).

65.   The information given to respondents included profit information for the companies involved.

66.   The research was carried out in ten separate areas across the UK and used generic increases for its pricing information.

Assessment

67.   The consumers in the Bristol Water area were represented only by one group of eight people in the 50- to 64-year-old, C2D socio-economic group. This sample provided unreliable evidence for the whole of the Bristol Water area.

Other people's views

68.   Bristol Water reviewed this research and told us that it did not feel that it covered a wide enough section of Bristol Water's customer base to be regarded as representative.[27]

(g) DEFRA National Water Environment Benefits Survey (NERA/Accent—2007)[28]

Key results

69.   The mean value for willingness to pay, based on an increase to the current bill, lies somewhere between £44.50 and £167.90 per household per year.

Methodology

70.   The survey was designed to estimate, in monetary terms, the value placed by households in England and Wales on improvements to the water environment brought about by the Water Framework Directive. The questionnaire used a variety of stated preference techniques to elicit consumers' willingness to pay for such improvements.

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[26]CCWater, DEFRA, Drinking water inspectorate, Environment agency, Natural England, Ofwat, Water UK, and the Welsh Assembly Government.

[27][✂]

[28]www.wfdcrp.co.uk/pdf%5CCRPSG%204bcd%20Final.pdf for full report (www.wfdcrp.co.uk/ shows all appendices and related documents).

71.   An extensive quantitative questionnaire was used and administered via computer in hall tests. A total of 1,487 interviews were completed in 50 locations across England and Wales. None of the locations were in the Bristol Water area, and only Shaftesbury and Taunton were in Wessex Water's area.

Assessment

72.   The questionnaire was lengthy and took respondents through a series of very complex stated preference exercises. It is possible that respondents struggled to understand what was expected of them. It is also possible that, with such a long survey, respondent fatigue might have set in and consumers might have answered some questions with little thought.

73.   As Bristol Water was not covered by the areas chosen, the results could not be attributed to Bristol Water's customers.

Other people's views

74.   Bristol Water reviewed the survey and told us that, whilst many of the improvements posited in the survey would be undertaken by sewerage companies rather than Bristol Water, it had taken account of the views expressed.[29]

75.   Bristol Water noted that, according to this survey, 46 per cent of respondents considered that improvements should continue whatever the cost, and a further 39 per cent stated that improvements should be carried out if the costs were not excessive.

(h) UKWIR Acceptability of Drinking Water—Willingness to Pay (MVA—2008)

Key results

76.   17 per cent of respondents rated water bills as very good value for money, and a further 42 per cent rated them as fairly good value for money.

77.   Respondents were prepared to pay between £1 and £7 more a year for improvements to the aesthetics of water.

Methodology

78.   The survey was conducted in 2007 by interviewing 1,000 respondents face-to-face in their homes across ten regions of the UK.

79.   Quotas of people to obtain by gender, age and socio-economic group were based on the population in the regions selected, and not by water bill payers.

Assessment

80.   The sample for the survey was based on the ten original CCWater Regions, so Bristol Water customers were covered under Wessex. As there were only 49 respondents for the whole of Wessex, the number of respondents from the Bristol Water area would have been even smaller.

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[29][✄]

81.   In the stated preference willingness to pay exercise, the survey only focused on the aesthetics of water and did not combine this with other elements of water prices.

Other people's views

82.   Bristol Water reviewed this survey and noted its conclusions.[30]

(i) CCWater research on customers' reactions to Ofwat's final determination (Harris Interactive—May 2010)

Key results

83.   55 per cent of respondents considered that Bristol Water provided very, or fairly good, value for money.

84.   19 per cent of respondents accepted the price increase attached to Bristol Water's FBP, and 61 per cent did not.

85.   49 per cent of respondents accepted the price increase associated with Ofwat's final determination, although 31 per cent did not.

Methodology

86.   The survey, conducted on behalf of CCWater, was carried out in April 2010 and used a stated preference exercise to understand consumers' willingness to pay based on Bristol Water's FBP and Ofwat's final determination. The survey was carried out using online and face-to-face interviewing, and 437 respondents from the Bristol Water area completed the survey.[31]

87.   The survey collated respondents' views on the current value for money of the service provided and then collated views on consumers' willingness to pay increased prices based on both Bristol Water's FBP and Ofwat's final determination.

88.   Results were weighted to census data for the Bristol area.

Assessment

89.   The survey is based on the proposed costs under Bristol Water's FBP and Ofwat's final determination and as such is the most realistic set of figures with which to present consumers.

90.   Weighting the results to the census population meant that the sample over-represented young people (due to many young people living at home with parents or in student households and not being bill payers) and it is unclear whether this affected the results presented.

91.   The survey found that 55 per cent of consumers considered Bristol Water to offer value for money, which is in line with the MRUK survey (53 per cent), and the ORC International survey (60 per cent).

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[30] [✄]
[31] 272 online and 165 face to face.

92. Respondents were not told which set of options were from Bristol Water and which were from Ofwat—they were simply labelled plan A and B. The order in which these options were presented to consumers was also rotated. These two factors together would limit any bias in respondents' answers.

93. Owing to the fact that respondents had to compare the two plans along with rating how important the various areas of improvement were, the questions were in places quite long. Whilst this may have proved confusing to some respondents, the questions appear to have been asked in a sensible way and have given respondents all the information they needed to give a considered answer.

Other people's views

94. Bristol Water reviewed[32] this survey and commented:

    (a) the response of the value for money question confirmed that there was an anomaly with the sample in the BMG/MVA report;

    (b) the research confirmed the high importance that customers attached to resilient water supply;

    (c) some of the scenarios investigated were not consistent with the bill differences, undermining the usefulness of some questions; and

    (d) the approach to overall acceptability of price increases was methodologically incorrect.

95. CCWater responded[33] by explaining that the research was designed to test the overall package of costs and not the individual elements.

96. CCWater also responded[34] to Bristol Waters' criticism of the BMG/MVA survey and the perceived biased nature of the sample in Q9. CCWater pointed out that this was a framing question and that the answers to Q18 were a better comparator as they were based on an informed view.

[32] [✂]
[33] [✂]
[34] [✂]

Capex overview

The parties' views on capital expenditure

1.   Table 1 compares the views of Bristol Water and Ofwat on capital expenditure (capex) requirements during the PR09 period.

TABLE 1   **Summary of the parties' views on capital expenditure**

			£ million
Capex post CIS (5 year total)	*Bristol Water FBP*	*Ofwat FD09*	*Difference*
Base (capital maintenance)	130.9	148.0	17.1
Supply/demand balance	90.2	47.8	(42.4)
Enhanced service levels (resilience)	43.9	17.2	(26.7)
Quality	54.0	31.3	(22.7)
Total	319.0	244.3	(74.7)

Source: Extract from Ofwat Introduction to Reference to the Competition Commission, Table 2, p13, paragraph 2.7.1, and CC analysis.

Bristol Water's planned capital programme

2.   Bristol Water's Final Business Plan (FBP) outlined a total increase to capital expenditure of £165.1 million for PR09 compared to PR04.

TABLE 2   **Summary of Bristol Water's view of capital investment programme**

			£ million
	Capex PR04 period	*Capex PR09 period*	*Increase*
Capital maintenance—stable serviceability	94.9	130.9	36.0
Supply/demand balance—meeting growth and increases in demand	8.0	90.2	82.2
Improving resilience	28.0	43.9	15.9
Improving water quality	23.0	54.0	31.0
Total	153.9	319.0	165.1

Source: Bristol Water SoC—Table 36—E.2.3.

Ofwat's approach to Bristol Water's planned capital programme in FD09

3.   Ofwat challenged Bristol Water's proposals in several areas. Ofwat's approach is detailed in its 'Capital expenditure for 2010–15' document.[1] In total, Ofwat made one-sided adjustments totalling £83.7 million to baseline gross capex (pre-efficiency challenge) and £4.5 million of two-sided adjustments, as set out in Table 3 (see Appendix H for an explanation of these terms).

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[1]Ofwat view on companies' draft business plans' document:
www.ofwat.gov.uk/pricereview/pr09phase2/pap_pos_cis191208.pdf.

TABLE 3 **Summary of Ofwat view of capital investment programme**

	£ million	
	CIS baseline summary	FD09 assumption
Capital maintenance— infrastructure and non-infrastructure	137.7	148.1
Supply/demand balance	44.0	47.8
Improving resilience	16.0	17.1
Water quality	29.1	31.3
Total	227.2	244.3

Source: Ofwat FD09 Bristol Water supplementary report, Table 4.2b, p39.

TABLE 4 **Summary of Ofwat adjustments to Bristol Water's view of capital investment programme**

	AMP5 £m
One-sided adjustments	
Resilience schemes (Southern, Tetbury & Oldford)	25.4
AMA challenge	21.5
Mains replacement—removed through exceptional items process	19.7
Trunk mains—relining removed through exceptional items process	6.3
Mains requisitions	4.6
Optional meter installations	3.7
Smart metering	2.0
Other	0.5
Total	83.7
Two-sided adjustments	(4.5)
Honeyhurst–Cheddar supply scheme	2.9
Cheddar reservoir (15% cost reduction)	1.5
Quality-related lead CP pipe replacement (customer side)	0.2
Total	4.5

Source: Ofwat FD09 Bristol Water supplementary report, Tables 4.3.2 a and b, pp42&43.

Capital maintenance

Capital maintenance—differences in views on capital maintenance

4.   Table 5 summarizes the areas where differences of opinion existed between Bristol Water and Ofwat in relation to specific schemes classified as capital maintenance by Ofwat. There was disagreement regarding the allocation of certain schemes, which Bristol Water argued should be classified as Quality or Supply/Demand enhancement schemes and Ofwat classified as capital maintenance (and either excluded from price limits or subjected to the AMA process). These schemes are listed under 'Ofwat one-sided transfers' in Table 5 and included here.

TABLE 5 **Summary of differences in views on capital maintenance capex (total for 2010/11 to 2014/15), with CC determination**

£ million

	Bristol Water FBP	FBP after Ofwat transfers	Ofwat FD	CC determination	CC less Ofwat
Capital maintenance					
Trunk mains relining*		23.8	17.5	23.8	6.3
Mains & communication pipe replacement		63.6	43.9	50.8	6.9
Line of works aqueduct*		9.0	9.0	9.0	0.0
Meter replacement		3.5	3.5	3.5	0.0
Purton		0.0	0.0	[✄]	[✄]
Chew Stoke		[✄]	0.0	[✄]	[✄]
Other		84.2	86.8	86.8	0.0
Total before AMA	130.9	186.5	160.7	179.0	18.2
AMA			−21.5	−21.0	0.4
Total capital maintenance after AMA	**130.9**	**186.5**	**139.3**	**157.9**	**18.7**

Source: CC calculations.

*Ofwat treated £10.6 million of trunk mains relining expenditure and all £9.0 million of line of works aqueduct expenditure as exceptional items outside AMA. In our determination, we have also treated an additional £6.3 million trunk mains relining expenditure relating to the Shipton Moyne Tolldown DWI scheme as exceptional outside AMA.

Stable serviceability—Bristol Water's view

5.　Bristol Water stated that a sustainable level of planned maintenance was vital to enable its assets to deliver the outputs required of them on a reliable basis. It said that:

> Ofwat has not allowed for the additional maintenance funding which Bristol Water considers necessary to achieve stable serviceability. Bristol Water considers achieving stable serviceability over the PR09 Period will be unattainable based on the allowance for maintenance funding contained in FD09.[2]

6.　Regarding Ofwat's current assessment of Bristol Water as 'stable' in terms of serviceability, Bristol Water noted that Ofwat also stated that 'the overall assessment this year has been very close to being marginal'.[3]

Stable serviceability—Ofwat's view

7.　Ofwat makes annual assessments of the serviceability of companies' assets. Table 6 sets out its view of Bristol Water serviceability since 2000.

TABLE 6 **Bristol Water serviceability assessments made by Ofwat, 2000/01 to 2008/09**

Year	Infrastructure	Non-infrastructure
2000/01	Stable	Stable
2001/02	Stable	Stable
2002/03	Stable	Stable
2003/04	Marginal	Stable
2004/05	Marginal	Stable
2005/06	Marginal	Stable
2006/07	Marginal	Stable
2007/08	Stable	Stable
2008/09	Stable	Stable

Source: Bristol Water's SoC, Table 16, paragraph 408.

[2]Bristol Water SoC, paragraph 629.
[3][✄]

8. Ofwat considers two asset categories for WoCs: water infrastructure (WIRE) and water non-infrastructure (WMNI). It assesses each category against key performance measures. Ofwat said that:

> Serviceability is a key concept for our approach to capital maintenance. We have developed this approach whereby using a basket of measures, called serviceability indicators (measuring asset performance and service to customers) we can make an assessment of a company's 'serviceability'. For each company we have developed a performance range which we think is delivering an appropriate level of service. Broadly speaking, if the basket of measures operate in this range (and is not moving persistently up or down) we determine that the company has stable serviceability.[4]

9. As a minimum, Ofwat therefore requires the water companies to maintain (or achieve and maintain) stable serviceability.[5] The detailed indicators for stable serviceability are as set out in Ofwat's Report on water company performance 2008/09[6] but at a high level these are to:

(a) maintain assets fit for purpose;

(b) comply with statutory standards;

(c) deliver other defined service levels; and

(d) deliver the 2010–15 enhancement programme throughout the period 2010–15 and beyond.

10. Ofwat said that it set price limits:

> which allow all companies to achieve or maintain stable serviceability. Where a company proposed an increase in capital expenditure to improve serviceability beyond stable, then we required the company to show that customers were willing to pay for it. In our most recent assessment (2008–09), BRL had stable serviceability for both water infrastructure and water non-infrastructure. It is from this position (having considered the associated expenditure and arguments that the future might be different) that we made our price limit decisions.[7]

11. Ofwat's total FD09 assumption for capital maintenance–infrastructure expenditure was £87.2 million pre-AMA. As set out in Ofwat's FD09 Bristol Water supplementary report,[8] Ofwat set specific outputs for trunk mains relining (£10.6 million) and the line of works (£9.0 million). Ofwat said that 'Accordingly, we see our final determination including £67.6m to maintain stable serviceability. Our assumptions challenge the effectiveness and efficiency of the whole capital maintenance programme for infrastructure and not just one sub-component such as mains renewals'.[9]

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[4]Ofwat response to Bristol Water, Annex D, paragraph 2.1.1.
[5]Service and delivery—performance of the water companies in England and Wales 2008–09, p26: www.ofwat.gov.uk/regulating/reporting/rpt_los_2008-09.pdf .
[6]Service and delivery—performance of the water companies in England and Wales 2008–09 report: Supporting information, p65: www.ofwat.gov.uk/regulating/reporting/rpt_los_2008-09supinfo.pdf.
[7]Ofwat response to Bristol Water, Annex D, paragraph 2.1.2.
[8][✂]
[9][✂]

12.　Ofwat told us that while it took the view that companies should manage and prioritize their investment to deliver stable serviceability, it did accept that there were elements of companies' plans where there was less flexibility because some schemes were the only option, or because they contributed to achieving specific outputs. In view of this, it told us that:

> We have reviewed BRL's plan and we consider that the items that make up £17.1m in table 50 of BRL's Statement of Case, which BRL have termed 'Other maintenance' (which includes activity like mains flushing, mains diversions, GIS updates) are areas where they have reduced flexibility. It is for BRL to determine the priorities to deliver their outputs, but for this calculation we have assumed the £17.1m will be prioritised.[10]

13.　Given the assumptions made about prioritization, Table 7 sets out Ofwat's view of the amount of expenditure FD09 assumes to maintain stable serviceability.

TABLE 7　**Summary of differences in views on capex available for mains replacement**

	£ million	
	Bristol Water's FBP view	Ofwat's FD09 view
Total infrastructure expenditure	125.7	87.2
Exceptional items with specific outputs (Ofwat set specific outputs for trunk mains and line of works)	45.5*	19.6
Reduced flexibility maintenance costs. Termed 'other' and 'other maintenance' by Bristol Water	17.1	17.1
Expenditure remaining to maintain stable serviceability	*63.1*	*50.5*

Source: Ofwat response to CC queries, 18 March 2010, question B4, Table 2.

*This is made up of £16.8 million for trunk mains replacement, £9.0 million for line of works and £19.7 million for 'mains replacement amalgamated'.

14.　Ofwat told us that as the AMA challenge was only applied to a proportion of Bristol Water's plan, the calculation used to determine the capital maintenance component of its final determination could not be used to calculate the impact on a specific scheme/sub-programme of the AMA challenge. It told us that in financial terms it had made a challenge that amounted to 20 per cent of Bristol Water's forecast of what it needed to maintain stable serviceability. Table 8 sets out the reduction of 20 per cent to the parts of the capital maintenance plan that in Ofwat's view were within Bristol Water's management control.

TABLE 8　**Ofwat allocation of FD09 infrastructure expenditure (post-AMA challenge)**

	£ million	
	Bristol Water's FBP view	Ofwat's FD09 view
Total expenditure to maintain stable serviceability	63.1	50.5
Mains renewal	31.8	25.4
Communication pipe renewal	12.1	9.7
Remaining infra expenditure to maintain stable serviceability (eg for dams and aqueducts)	19.2	15.4

Source: Ofwat response to CC queries, 18 March 2010, question B4, Table 2.

[10][✂]

Capital maintenance—trunk mains relining

> *Bristol Water's view*

15.   Bristol Water proposed to spend £23.8 million on trunk mains relining to reline 58.6km of trunk mains. Bristol Water considered that expenditure on this counted towards water 'Quality'[11] and that it was required by the DWI to undertake this scheme in its entirety.

16.   In relation to the Shipton Moyne area of trunk mains, Bristol Water disagreed with Ofwat's assertion that targeted mains rehabilitation or mains flushing would be a more cost-effective solution for the Shipton Moyne scheme.[12] A signed undertaking, specifying the slip-lining work to be undertaken, was submitted by Bristol Water to the DWI on 15 June 2010. Bristol Water told us that 'It accepts that undertakings can be amended by agreement with the DWI [but that] this is unusual and Bristol Water believes arises in less than 10% of cases'.[13]

17.   It therefore told us that the scheme costs should be allowed in full. It also noted that:

> A log down at 2015 can be made if this is to be treated as quality enhancement expenditure … If the scheme remains classified as maintenance then log downs do not apply. Bristol Water is strongly incentivised to minimise this cost so that it can utilise any savings in other areas that have been cut back.[14]

18.   The DWI undertaking is included in Appendix F.

> *Ofwat's view*

19.   Ofwat, however, considered that the entire mains relining scheme should be transferred to capital maintenance. It funded £10.6 million as an exceptional item within capital maintenance and challenged the remaining £6.9 million through the AMA process. It said that the £6.9 million represented its view of the structural benefit of the scheme, that it believed that the ongoing maintenance of trunk mains should be targeted effectively and efficiently as part of Bristol Water's day-to-day maintenance activities and that it would expect future maintenance of the trunk mains to be assessed as part of the main body of capital maintenance expenditure.[15]

20.   As part of the above transfer, Ofwat also transferred the Shipton Moyne–Tolldown slip-lining (with a cost of £6.3 million) to capital maintenance and excluded it entirely from price limits as it believed that there was a more cost-effective solution, namely targeted mains rehabilitation or mains flushing.[16,17] It said that this was allowed for within overall capital maintenance infrastructure expenditure and no specific allowance was required.[18]

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[11]Bristol Water SoC, Table 27, paragraphs 269 & 796.
[12]Bristol Water reply to Ofwat's response, paragraph 241.
[13][✄]
[14][✄]
[15][✄]
[16]Annex D of Ofwat reply to Bristol Water SoC, paragraphs 2.6.3 & 2.6.4.
[17][✄]
[18]Annex D of Ofwat reply to Bristol Water SoC, paragraphs 2.6.3 & 2.6.4.

Reporter's view

21.   The Reporter supported Bristol Water's view on the extent of the overall slip-lining scheme required but not on its allocation to Quality 'on the basis of Ofwat guidance which stated that no mains schemes would be supported under Quality.'[19] However, the Reporter also noted that for certain elements of the overall mains relining scheme

> there was a case for Q[uality] funding because for these mains the work was related to deterioration of raw water quality, which Ofwat have identified as a valid driver to include work under the water quality driver. We found it difficult to understand why there was a 'blanket' refusal from Ofwat to provide appropriate funding where a quality case could be demonstrated.[20]

22.   For the Shipton Moyne–Tolldown scheme specifically, the Reporter told us that 'We did not consider there was sufficient evidence for the Shipton Moyne to Tolldown scheme to be supported under Q[uality] as it did not appear to be related to a deterioration in raw water quality'.[21]

23.   For this scheme, the Reporter supported the inclusion of the scheme in price limits but noted that further investigatory work was required. She said that 'on balance we support the inclusion of this mains in the programme … however this is … a potentially localised problem … the company needs to investigate the issues … before committing itself to relining the whole system'.[22]

24.   Commenting on the DWI's approach to Bristol Water's mains relining scheme, the Reporter noted that:

> We also … considered the inclusion of all elements of the mains relining programme under one Undertaking by the DWI was in error. There are distinct elements to the overall scheme which could have been covered by separate Undertakings—the Shipton Moyne to Tolldown scheme is one that we consider to be a separate scheme. However, we understand that the DWI is committed to the overall scheme being held under one Undertaking.[23]

Halcrow's view

25.   In its conclusion to its initial review, Halcrow said that:

> Since the precise solution to the water quality problems within the Shipton Moyne–Tolldown downstream network cannot be definitively stated at this time, the costs to Bristol Water … are not known … Our view is that Bristol Water needs to undertake a detailed investigation to identify and implement a robust solution to resolve the water quality problems downstream of the Shipton Moyne–Tolldown main and thereby to meet the DWI undertaking.[24]

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[19] [✄]
[20] [✄]
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The unusual nature, size and strategic nature of this main are likely to be of significantly greater unit cost than standard distribution mains and this may jeopardise the Company's ability to deliver the total output length for the funding currently allowed. Therefore once Bristol Water has confirmed the solution through detailed investigation and if material, we recommend that the Reporter reviews optioneering, solution and costs and allow Ofwat to review the Determination.[25]

26. Following the signing of the DWI Undertaking, Halcrow noted that:

We do not consider that the lining of the trunk main has yet been proven as the full solution to the water quality problems, so the work may be done but the problem may still remain … We believe that it would be prudent for BRL to undertake further investigatory work and that £0.5m should be sufficient to undertake this and to satisfactorily cost the works that are deemed necessary … We also confirm that should the lining of the trunk main be allowed, then £6.3m would seem to be a reasonable central cost estimate. [26]

Capital maintenance—mains replacement scheme

Bristol Water's view

27. Bristol Water's FBP included capital expenditure of £63.1 million for mains replacement. It stated that this was equivalent to a replacement rate of 1.0 per cent a year[27] and it considered that the scheme should be categorized as supply demand balance expenditure.

28. Bristol Water considered that the level of mains replacement allowed in FD09 would result in deterioration in the leakage performance of mains up to 2014/15[28] and was likely to lead to an increase in the number, frequency and severity of mains bursts.[29] It said that a step increase to replace 67km a year (from 30km a year) was therefore required, that its targeted approach to mains replacement had addressed the worst-performing assets and current performance levels were not sustainable at current replacement rates.[30]

29. Bristol Water noted that its serviceability requirement was to meet the Reference Level for mains bursts set by Ofwat at a company-specific level and Bristol Water had been consistently above that level recently.[31]

30. In its response to our provisional findings, Bristol Water said that the allowance for mains replacement in the provisional findings of 47.5km per year was insufficient to allow Bristol Water to meet Ofwat's stable serviceability criteria.[32] Ofwat's criteria require performing at, or around, a company-specific reference level, in addition to achieving a stable burst level.

31. At the second hearing Bristol Water noted that its current burst rate was above its Ofwat reference level by approximately 10 per cent and its FBP included a 'glide

[25][✂]
[26][✂]
[27]Bristol Water SoC, paragraph 787.
[28]Bristol Water reply to Ofwat's response, paragraph 249.
[29]Bristol Water SoC, paragraph 790.
[30]Bristol Water reply to Ofwat's response, paragraph 76.
[31]Bristol Water reply to Ofwat's response, paragraph 75.
[32]Bristol Water response to provisional findings, Section 6, part B4, paragraph 23.

path' to achieve that level over ten years.[33] It also reiterated that in terms of lengths replaced in the previous period, it had rehabilitated less length of mains than Ofwat had funded but spent more, by targeting shorter lengths of main that had higher burst rates, which resulted in higher unit costs per metre but was more effective in terms of pounds per burst rate reduction.[34]

32.   Bristol Water also noted that less onerous leakage targets may be more appropriate given the lower level of mains replacement activity.[35]

Ofwat's view

33.   Ofwat said that the mains replacement scheme should be allocated to capital maintenance. It transferred the scheme and then disallowed £19.7 million of mains replacement expenditure through the 'exceptional item' process (ie on a case by case basis outside the AMA challenge process)[36] and stated that 'We note that both burst mains and distribution losses are stable with the renewal activity achieved in AMP4'.

34.   Ofwat considered that Bristol Water's case for an increase in renewal rates was not well justified[37] and stated that a 1 per cent rate would lead to an improvement in serviceability and went beyond maintaining stable service.[38] It noted that during the AMP4 period Bristol Water achieved stable serviceability from a less than stable position by undertaking around 0.4 per cent renewal a year.[39]

35.   Ofwat said that it had concerns with Bristol Water's approach saying that it challenged this throughout the FD09 process on the grounds that 'the BRL modelling does not align with industry best practice (using the UKWIR methodology) … and the assumed rate of deterioration proposed is significant and does not align with the observed history of deterioration (and is a higher rate compared with other companies)'.[40]

36.   Ofwat said that although there was no specific requirement for Bristol Water to have used the UKWIR methodology as part of its analysis 'it allows each company to express why its assets are different and communicate to Ofwat the reasons for change. BRL have chosen to not apply this methodology and as such may have made a tactical error'.[41]

37.   Ofwat's view was that it lacked evidence on the robustness of the Bristol Water model:

> The evidence presented by BRL took the form of outputs from their model together with a description of the model concept and a brief statement on validation. The detail of how the results have been calculated is not expressed … Our understanding is limited to inputs

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[33][✂]
[34]Bristol Water response to provisional findings, Section 6, part B4, paragraph 26.
[35]Bristol Water response to provisional findings, Section 6, part B4, paragraph 26.
[36][✂]
[37][✂]
[38]Ofwat response to Bristol Water SoC, Annex D, paragraphs 2.5.3 & 2.5.4.
[39]Ofwat response to Bristol Water SoC, Annex D, paragraph 2.5.3.
[40]Ofwat response to Bristol Water SoC, Annex D, paragraph 2.5.4.
[41][✂]

and outputs from the model with no explanation of why there is a difference; to us the model still appears as a 'black box'.[42]

38. From Table 8 in paragraph 14 above, it can be seen that Ofwat has included £35.1 million for Bristol Water's mains renewal programme (£25.4 million for 'mains renewal' and £9.7 million for 'communication pipe renewal'), given the assumptions it has made regarding Bristol Water's potential prioritization of expenditure within this category.

39. Bristol Water's FBP stated that it planned to replace 67km of mains per year.[43] This translates into a mains renewal unit cost of £[✂].[44] Ofwat told us that:

> Using this figure, the £35.1 million we allowed would deliver 186km over 5 years—an average of 37km per year. From the information provided in part C3 of BRL's final business plan (asset inventory) BRL have 6,114km of mains (up to 320mm diameter). Using this figure our allowance would be equivalent to an annual renewal rate of 0.6%. We believe that we have made more than sufficient assumptions within price limits for BRL to maintain serviceability. In its analysis BRL suggests that it has far less discretion as to where it can invest and in this way.[45]

40. In its response to our provisional findings, Ofwat noted that it still had concerns about the robustness of Bristol Water's deterioration model[46] and considered that its price limits assumptions (of a renewal rate of 37 km per year) would be sufficient to allow Bristol Water to maintain stable serviceability. It said that one of the key factors in reaching this conclusion was the evidence provided in JR10 that the company had improved serviceability from marginal to stable in 2005–10 for a much lower length of 137.4km.[47]

Reporter's view

41. The Reporter supported the level of mains replacement proposed by Bristol Water: 'We consider the AMP5 proposals are appropriately and well justified' and the Reporter considered Ofwat's comment that Bristol Water could 'improve the targeting of its mains' to be wrong.[48]

Third party's views

42. We note CCWater's view that the historical replacement rate of 0.4 per cent has seen Bristol move from 'marginal' (2003–2007) to 'stable' serviceability (2007 onwards) and therefore a 1 per cent rate was higher than required to achieve stable serviceability.[49]

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[42][✂]
[43]The schemes associated with this activity are 'mains replacement amalgamated' (£31.8 million + £12.1 million + £19.7 million (part of the £45.5 million that BRL proposed as Exceptional items) and 'CP replacement amalgamated' at a forecast cost of £63.6 million' (from BRL's PR09 submissions) during 2010–15.
[44][✂]
[45][✂]
[46]Ofwat response to provisional findings, paragraph 2.4.17.
[47]Ofwat response to provisional findings, paragraph 2.4.8.
[48][✂]
[49]CCWater first submission, paragraphs 6.3–6.5.

Halcrow's views

43.　Halcrow examined the sensitivity of the risk to service to the mains replacement rate and its calculations indicated the following predicted performance.[50]

TABLE 9　**Mains renewal—Halcrow view of required replacement rate to achieve stable serviceability**

Replacement rate, km/year (% network by length per year)	Future trend in burst counts	Probability of burst count exceeding upper limit for at least one year by 2014* %
33km (0.50%) (AMP4 rate)	Deteriorating	>79
37km (0.56%) (Ofwat 'supported level')	Deteriorating	79
40km (0.60%)	Deteriorating	76
42.5km (0.64%)	Deteriorating	74
45km (0.68%)	Stable	72
47.5km (0.72%)	Stable	69
50km (0.75%)	Stable	67
52.5km (0.79%)	Improving	64
55km (0.83%)	Improving	62
60km (0.90%) (FBP burst model)	Improving	57
67km (1.01%) (FBP optimized)	Improving	<57

Source: Halcrow report, workstream 1—Capital Maintenance, paragraph 21.

*Probability figures are based upon a measure of past variability in burst counts. They are not statistical measures derived from the predictive model outputs.

44.　In conclusion, Halcrow said that:

> we have poor confidence that 37km per annum will maintain stable serviceability and support leakage targets, but we have greater confidence that a rate between 45km and 50km per annum will deliver stable service and support leakage initiatives. … Reducing the mains replacement rate from what Bristol Water estimated to be an optimum level (67km or 1.0%/annum) will result in other residual risks in terms of managing leakage levels and the general water resource balance.[51]

45.　In its response to Ofwat's comments on the robustness of Bristol Water's deterioration model, Halcrow said that:

> we have noted that the model differs from that recommended in the UKWIR study ... However, we believe that this does not materially alter the outputs and predictions over the AMP 5 period. We have made reference to the fact that the model does not provide measures of variation around the central estimate but we feel that this does not have a major impact on outputs for the short term (i.e. AMP 5 period).[52]

In its response to Bristol Water's comments that the reference level for bursts will not be met with the level of mains replacement allowed for in our provisional findings, Halcrow said that:

> Our work on the model and the sensitivity of burst rate trends to different levels of mains rehabilitation indicates that the trend would be stable for rates between 45 and 50km/annum … We accept that there will remain a risk of the reference level being exceeded … but our investigations would indicate that a level of mains rehabilitation within

[50][✂]
[51][✂]
[52][✂]

the range we propose will deliver a stable serviceability trend. We accept that there remains a risk of the burst count limit being exceeded. However, we are of the view that the risk level is reasonable and manageable through optimum targeting of mains rehabilitation.[53]

Capital maintenance—Purton raw water reservoir

Bristol Water's view

46.   After Bristol Water finalized its business plan, it identified additional work costing £[✂] million at Purton raw water reservoir to address a high level of leakage, which did not commence until after the FBP was completed. It noted that the requirement to resolve the issue was a legal obligation from the Reservoirs Act.[54]

47.   In its response to our provisional findings, Bristol Water said that 'Halcrow … noted that the current estimate of £[✂] "is a reasonable reflection of the scale of works [required]" … PFs allowance of zero is ... not a central estimate of the cost based on the information currently available'.[55]

Ofwat's view

48.   Ofwat did not include the expenditure in the FD09 because it considered that Bristol Water's failure to include the work in the FBP, before the leakage had occurred, indicated an inadequacy in Bristol Water's business planning approach.[56] It told us that there had been problems at the reservoir in 1995, 1996, 2005 and 2007, which suggested that the event might have been foreseeable.[57] It did, however, accept that there was new information, but making an allowance would rebalance the risk the company faced, which should be reflected in, for instance, its cost of capital.[58] In its response to our provisional findings, it said that it accepted the provisional findings' view that the proposals for Purton Reservoir were necessary but not yet reliably costed.[59]

Reporter's view

49.   This scheme was not addressed by the Reporter as it was proposed by Bristol Water post-FBP.

Halcrow view

50.   Halcrow said that:

> we do not agree with Ofwat's argument that Bristol Water should have taken account of the possibility of problems at Purton as part of their risk management … The Bristol Water argument that the proposed works at Purton represent substantial and unforeseeable expenditure appears reasonable … We support the remedial works for Purton Reservoir … Further work (outside this project commission) is required

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[53][✂]
[54]Bristol Water reply to Ofwat response, paragraph 222.
[55]Bristol Water response to provisional findings, section 6, Capex, part B2, paragraph 9.
[56]Bristol Water SoC, paragraph 692.
[57][✂]
[58][✂]
[59]Ofwat response to provisional findings, paragraph 2.5.1.

to provide assurances over the cost and scope of work needed. This should be undertaken by the Reporter as part of the normal audit process.[60]

51. In its response to Bristol Water's comments on the provisional findings that the scheme had been sufficiently reliably costed for us to make a central estimate for funding the scheme, Halcrow said that:

> We believe that the Laing O'Rourke estimate for Purton raw water reservoir is a reasonable reflection of the scale of works required. It is, of course, an estimate and not a tender and the contractor's pricing may have been influenced by tactical factors. Nevertheless the figure has been obtained as a result of a proper process and there is no reason to question its validity.[61]

Capital maintenance—Chew Stoke

Bristol Water's view

52. After Bristol Water finalized its business plan, it identified additional work costing £[✂] million at Chew Stoke to address additional capital expenditure requirements. In its response to Ofwat, Bristol Water said that:

> Refurbishment of Chew Stoke was included in Bristol Water's plan for 2009/10 … As a result of additional unanticipated capital expenditure requirements, expenditure on Chew Stoke has been deferred to avoid expenditure exceeding the investment ceiling.… if Bristol Water had included unanticipated expenditure relating to 2009/10 in its FBP for the PR09 Period, then expenditure on Chew Stoke would have been included in the AMP5 period in the business plan.[62]

53. Bristol Water disagreed with the suggestion that a provision was made for Chew Stoke in the PR04 FD:

> The PR04 FBP included a proposed level of expenditure of £12.9m … over the AMP4 period. In FD09, Ofwat allowed expenditure of £7.1m for pumping stations within the non-infrastructure maintenance allocation. This did not specify where the work should be undertaken. Actual expenditure during the period was £3.9m … Given this reduction, Bristol Water does not consider that it is reasonable to assume that all the proposals within its business plan would be undertaken.[63]

54. In its response to queries in relation to its relative enhancement and MNI expenditure compared to the PR04 projected amount (an overspend on enhancement and an underspend on MNI), Bristol Water noted that:

> The investment ceiling in place for 2005–10 provides a significant penalty for companies that invest in excess of the ceiling as no return is provided on this investment. This ceiling relates to both enhancement and non-infrastructure maintenance … The outputs associated with the enhancement programme were project specific … Bristol Water was

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[60][✂]
[61][✂]
[62]Bristol Water reply to Ofwat, paragraph 226.
[63][✂]

required to deliver these specific project based outputs. Therefore it could not avoid incurring the capital expenditure required.[64]

55.   Bristol Water suggested that it would not be possible to defer expenditure on Chew Stoke beyond AMP5. It explained that:

> Bristol Water has had to optimise capital expenditure carefully within the overall budget restraint of the investment ceiling. High costs schemes such as refurbishment of Victoria, Blagdon, and Chew Stoke were deferred as refurbishment of a greater number of smaller (and less costly) pumping stations provided greater customer benefit. … Refurbishment of Chew Stoke will take place early in AMP5 as continuing deferral will lead to an unacceptable supply risk for customers.[65]

Ofwat's view

56.   Ofwat did not include the expenditure in its FD09 because it considered that it had not seen sufficient evidence to support the expenditure. Ofwat said that 'In relation to Chew Stoke pumping station, we have no comment (as we have not seen substantive proposals), save that it is illustrative of a corporate strategy of de-risking the business to detriment of the customer'.[66]

57.   In response to the specific question of whether a provision was made for Chew Stoke in the PR04 FD, Ofwat noted that:

> Chew Stoke was listed in BRL's PR04 FBP as being one of the sites that they needed to maintain during the period 2005–10. Therefore a provision was made for it in the PR04 FD but it wasn't listed as a defined output—the output is stable serviceability. We cannot provide evidence that expenditure specifically for Chew stoke was included in the FBP forecast for 09–10.[67]

Reporter's view

58.   This scheme was not addressed by the Reporter as it was proposed by Bristol Water post-FBP.

Halcrow view

59.   Following our provisional findings, Halcrow reviewed the costings provided by Bristol Water for the Chew Stoke scheme. It said that:

> Bristol Water has supplied a Project Brief for an Outline Design and Costing of the refurbishment of the Chew Stoke PS and a consultant's Outline Design Report (dated December 2009). We have found these documents to be sufficient for the purposes of assessing the reasonableness of the cost estimates and believe them to be comprehensive and competently prepared.[68]

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[64] [✂]
[65] [✂]
[66] Ofwat response to Bristol Water SoC, Annex D, paragraph 2.4.6.
[67] [✂]
[68] [✂]

60.   It also noted that:

> Risks appear to have been suitably considered from an engineering
> perspective yet a 10% contingency (£[✂]) has also been added. Thus,
> we would consider that a central cost would lie in the range £[✂] to
> £[✂] (subject to any generic capex efficiency challenges).[69]

Supply demand balance

61.   Bristol Water argued for total capex of £61.2 million in relation to supply demand
        balance projects, ie investment to increase levels of water supply relative to demand
        in Bristol Water's territory via leakage reduction, source development and capacity
        increases. Ofwat provided £45.1 million.

TABLE 10   **Summary of differences in views on supply demand balance capex, with CC determination**

£ million

Comprising	Bristol Water's FBP view*	Ofwat's FD09 view	CC determination	Difference (CC – Ofwat)
Active leakage control scheme	1.3	1.0	1.3	0.3
Pressure management	1.0	1.0	1.0	0.0
Cheddar Reservoir	9.9	8.4	4.1	−4.4
Honeyhurst–Cheddar scheme	2.8	0.0	0.0	0.0
Meter optants	14.7	11.0‡	12.3§	1.3
Smart metering trial	2.0	0.0	0.0	0.0
Mains requisitions	17.5	12.8	13.2¶	0.4
New developments	1.8	1.3	1.3	0.0
Infrastructure charge receipts	0.0	0.6	0.6	0.0
Other (not disputed—Mendip scheme and new service reservoirs)	22.7	22.4	22.4	0.0
Total supply demand	**73.7**	**58.5**	**56.2**	**−2.3**

Source: CC analysis.

*Bristol Water SoC, Tables 41 and 42.
†Ofwat FD09 Bristol Water supplementary report, paragraph 4.4.2.
‡Ofwat FD09 Bristol Water supplementary report, paragraph 4.4.7.
§Calculation: Ofwat figure plus additional £1.3 million for latest meter optant figures—see determination, paragraph 3.93.
¶Calculation: CC view equates to revised Bristol Water position per SoC (ie reduced FBP expenditure requirement by
£4.2 million)—see determination, paragraphs 3.101 & 3.102.

Bristol Water overview

62.   Bristol Water said that increased demand for water was anticipated in its supply area,
        due to forecast population growth.

63.   Bristol Water said that 'the most cost-effective way of meeting this increased demand
        is a combination of new resources and further reductions in leakage as set out in the
        Water Resources Management Plan (WRMP) approved by the Environment Agency
        (EA) and Defra'.[70] It said that the reductions in leakage 'cannot be achieved without
        tackling the legacy of an ageing water distribution system'[71] and that additional
        storage and network capacity improvements were required.

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[69][✂]
[70]Bristol Water SoC paragraph 17.
[71]Bristol Water SoC paragraph 17.

64.   Bristol Water allocated a percentage of the costs of replacing mains and communi-
       cation pipes to supply/demand 'proportional to the value of the benefits delivered by
       the schemes'.[72] This was transferred by Ofwat to the capital maintenance category.

65.   Bristol Water had recently developed a revised forecast to provide an updated view
       of the water resource supply/demand balance to Halcrow. In summary, the loss of a
       potential new customer ([✂]) is expected to be offset by increased demand due to
       population growth. Bristol Water suggested that 'This update indicates there is no
       scope to defer any of the proposals Bristol Water put forward in its SoC (NB. Ofwat
       excluded the Honeyhurst to Cheddar scheme)'.[73]

Ofwat overview

66.   Ofwat said that:

       > Between draft and final determination, we listened to the arguments put
       > forward by the company, and in particular those that attracted strong
       > support from the company's reporter. We made significant adjustments
       > to our decisions where we had removed expenditure at the draft deter-
       > mination, we also took into account new information where it seemed
       > reasonable to do so, for example, the effect of new ONS population
       > projections on long-term resource development enabled us to make an
       > allowance at final determination for Cheddar reservoir.[74]

67.   Between draft and final determination, Ofwat increased the assumed capital
       expenditure for Bristol Water under the supply/demand driver from £30.4 million to
       £45.1 million.[75]

TABLE 11 **Summary of Ofwat expenditure adjustments (pre-efficiency)—AMP5 totals**

	£ million	
	Capital expenditure	Operating expenditure
Amount company submitted net of grants and contributions (G&C) and net of transfers	61.156	11.330
Total value of Ofwat challenge:	16.023	5.113
One-sided expenditure adjustments	10.610	3.720
Two-sided expenditure adjustments	4.297	0.083
Operating expenditure rebasing	N/A	1.310
Increase in contributions (one-sided)	1.116	N/A
Amount assumed in final price limits net of G&C	45.136	6.217

Source: Ofwat FD09 Bristol Water supplementary report, Table 4.4.1, p51.

Supply/demand balance—leakage reduction

   Active leakage control scheme—Bristol Water's view

68.   Bristol Water's view was that a £1.28 million scheme was required for a leakage
       target of 49Ml/d.[76] The 49 Ml/d target required a total reduction of 5.9 Ml/d in leakage
       with 3.6 Ml/d to come through active leakage control (ALC) and 0.9 Ml/d through
       'interaction effects' between leakage reduction methods.

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[72]Bristol Water reply to Ofwat response, paragraph 220.
[73][✂]
[74]Ofwat response to Bristol Water SoC, Annex D, 3.1.1.
[75]Ofwat response to Bristol Water SoC, Annex D, 3.1.2.
[76]Bristol Water SoC, Table 27.

ALC—Ofwat's view

69.　Ofwat made a £0.3 million reduction to ALC expenditure in price limits for the same leakage target of 49 Ml/d. It said that a 5.0 Ml/d reduction in leakage was required with 3.6 Ml/d to come through ALC, but that it was not convinced of the 'interaction effects' between the proposed leakage options.

ALC—Reporter's view

70.　The Reporter supported the overall leakage control plans in the FBP and said that she considered Bristol Water's methodology to be industry best practice.[77]

ALC—Halcrow conclusions

71.　Halcrow said that:

> Bristol Water considered it had provided sufficient explanation with Part C of the Final Business Plan which stated 'When all schemes are implemented in combination, the total benefit from the leakage schemes will be lower than the sum of the individually applied components because of the interactions between them. For example, as mains are replaced, the burst frequency declines, reducing the benefit attributable to ALC and pressure control. The cost optimiser used for the WRP (ELLEN) takes these interactions into account.'

> During the meeting with Ofwat there was … agreement that, from a technical viewpoint, there would be interactions between the leakage programmes that included mains replacement, pressure management and active leakage control. As explained by Bristol Water 'as mains are replaced, the burst frequency declines, reducing the benefit attributable to ALC and pressure control'. We agree that Bristol Water did not present clear supporting evidence for the magnitude of the level of interactions within its Final Business Plan.

> Following the meeting with Bristol Water, a table of leakage savings was prepared using its ELLEN model which demonstrated that burst leakage would be expected to rise following the impact of mains replacement and pressure management, which would require additional ALC resources. The reason for this was the assignment of benefits between 'background' and 'burst' leakage, if different assumptions had been used then it would suggest additional mains replacement would be required.[78]

> We consider that Bristol Water has provided sufficient additional evidence (such as their experience of reducing leakage over a 20-week period and which was not included within the Final Business Plan), to support the interactions between leakage reduction methods and so should be allowed the full investment required to reduce leakage through ALC to achieve a total reduction of 3.6 Ml/d.[79]

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[77][✂]
[78][✂]
[79][✂]

Supply/demand balance—Cheddar reservoir

Preparatory work for Cheddar reservoir—Bristol Water's view

72.   Bristol Water proposed to spend £9.85 million on preparatory work for a new reservoir at Cheddar.[80]

73.   In response to Ofwat's FD09 15 per cent challenge on costs, Bristol Water argued that it did not include full details of the costs for the scheme in its FBP as there had been no previous query in relation to the scheme from Ofwat, but that these were available.[81]

74.   Following our second hearing, Bristol Water provided defined outputs for this scheme as set out in Table 12.

TABLE 12   **Cheddar Reservoir defined outputs**

Defined output	*Studies included*	*Bristol Water cost (£m)*
Initial geotechnical investigation	Preliminary ground investigation	[✂]
Environmental/ecological surveys	Baseline studies including: — Protected species — Flood risk assessment — Hydrology — Water Quality — Noise — Potential impact on SSSI	[✂]
Archaeological surveys	Archaeological surveys	[✂]
Site optioneering and site selection	Pre-feasibility (engineering) Water course modification (flow studies)	[✂]
Preparation of EIA screening report	Pre-feasibility (environmental) Feasibility & outline design (environmental) Pre-feasibility (water resource)	[✂]
EIA completed	EIA and statutory environmental statements	[✂]
Planning permission	Feasibility outline design (Engineering) —90% Water resources modelling (90%) Planning fees Legal fees (50%) Public inquiry fees	[✂]
Land purchase	Feasibility outline design (Engineering) —10% Water resources modelling (10%) Compulsory purchase fees Legal fees (50%) Agent fees Land purchase	[✂]
Total		**9.85**

Source: Bristol Water letter to CC, dated 12 July 2010 and Halcrow response to comments on provisional findings, dated 13 July 2010.

Notes:
1. A contingency [✂] of 20 per cent of all consultancy/design fees is included in the above costs.
2. A Bristol Water staff cost allowance [✂] of 50 per cent of all consultancy costs (excluding ground investigation and archaeology) is included in the above costs.

75.   Since the FBP, Bristol Water updated its demand forecast in response to the loss of a potential new customer and a higher population forecast from ONS (which is supported by the latest 2009/10 population served). These changes were in

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[80]Bristol Water SoC, Table 41.
[81]Bristol Water reply to Ofwat's response, paragraphs 273 & 274.

response to new information not available at the time the FBP was prepared. Bristol Water concluded that the changes would largely cancel during AMP5, and result in higher demand in AMP6 and beyond.

Ofwat's view

76. Ofwat reduced the proposed costs for the Cheddar Reservoir preparatory work by approximately 15 per cent (£1.5 million). It said that this was because Bristol Water had not provided sufficiently detailed evidence in its Final Business Plan of both the costs involved and the specific work to be undertaken.[82] Nor had it discussed any outputs for this scheme, against which Ofwat could measure efficiency of the scheme, progress and completion.

77. In its response to our provisional findings, Ofwat urged us to reconsider this scheme, given revised council housing targets and that a commercial supply contract with Helius, the promoter of a power station was no longer needed.[83]

78. Following its review of Bristol Water's defined outputs for the scheme, Ofwat noted that the major expenditure was for land purchase and that purchase was timetabled for the last day of the next price review period (31 March 2015).[84] In particular, it noted that Ofwat's estimate of the land cost would be £[✂] million (while Bristol Water outlined costs of £[✂] million as set out in Table 12) and that:

> the proposed timing of the output would make it impossible for us to adjust price limits the next time around. We think it would be better for customers to schedule this output for the beginning of the next period rather than the end of this one. Alternatively, you could recommend a notified item for the company to use should the land purchase … be necessary.[85]

Reporter's view

79. The Reporter supported inclusion of the costs for preparatory work for the Cheddar Reservoir and commented that 'The methodology that supports the scheme costs has been carried out to a level of detail appropriate to the design stage the project is at'.[86]

Halcrow's view

80. In its initial review, Halcrow said that:

> We consider that Bristol Water has made robust estimates of the planning phase for the reservoir. Given that the ongoing appeal by Bristol Water will delay the start of any investigations we consider that Bristol Water may have difficulty making the full investment in an efficient manner within the remaining years of AMP5. Accordingly, we recommend that the full amount of investment is allowed only if Bristol Water assigns and agrees defined outputs (such as purchase of x

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[82][✂]
[83]Ofwat response to provisional findings, paragraphs 2.10.2–2.10.8.
[84][✂]
[85][✂]
[86][✂]

hectares of land, completion of an environmental study, etc) against which the investment can be measured.[87]

81.   Halcrow reviewed Bristol Water's revised supply demand forecasts and the defined outputs it produced for the scheme following the second hearing. It said that:

> We consider that the updated supply-demand balance presented by the company is reasonable, and is considered to reflect the latest information available. We concur with Bristol Water's view that the changes are unlikely to affect the timing for the Cheddar Reservoir so materially as to warrant the deferment of the planning phase as proposed, and as such we recommend that the planning phase is implemented during AMP5.[88]

> We consider that Bristol Water has defined sensible AMP5 outputs and has assigned appropriate costs to each of the outputs. The costs are consistent with the costing spreadsheet we reviewed previously.[89]

Supply/demand balance—Honeyhurst–Cheddar scheme

Bristol Water's view

82.   Bristol Water proposed the Honeyhurst–Cheddar supply scheme entailing construction of a new main to take water from the Honeyhurst Well directly to Cheddar treatment works, making new water available in 2015/16 to contribute to meeting the projected increase in demand. The estimated cost of the scheme was £2.9 million.[90]

83.   Bristol Water justified supply-demand investment in AMP5 by placing a customer value on headroom,[91] and due to updated ONS forecasts of population growth, higher than those used in the FBP.[92]

84.   In its response to our provisional findings, Bristol Water stated that it regarded completion of the work as set out in the WRMP to be a 'legal obligation'.[93] However, it also offered to withdraw its claim with regard to the Scheme.[94] It said that this was in 'an effort to assist the CC in its deliberations by minimising the scale of Bristol Water's capex programme and, hence, the financing strain'.[95]

Ofwat's view

85.   Ofwat did not allow this scheme, on the basis that it could be delayed until the following review period without endangering Bristol Water's supply-demand balance.[96]

86.   Ofwat disagreed that completion of the work was a legal obligation. It stated that 'no water undertaking is legally committed to discharge its WRMP and neither Ofwat nor

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[87] [✂]
[88] [✂]
[89] [✂]
[90] Bristol Water SoC, paragraph 660.
[91] Bristol Water—reply to Ofwat's response, 17 March 2010, p70, paragraph 271.
[92] Bristol Water—reply to Ofwat's response, 17 March 2010, p70, paragraph 272.
[93] Bristol Water response to provisional findings, section 6 Capex, section B7, paragraph 34.
[94] Bristol Water response to provisional findings, section C.6.2.
[95] [✂]
[96] [✂]

the Competition Commission is obliged to secure funding for all matters contained in the WRMP'.[97]

Reporter's view

87. The Reporter supported timing in AMP5, stating that there would be a 'supply demand deficit … from 2014/15' if there were no interventions.[98]

Halcrow's view

88. Halcrow said that:

> The revised forecast would change all elements of the supply-demand balance, but the greatest impact would likely to be on the timing of Honeyhurst to Cheddar, since this is the first scheme proposed by Bristol Water, towards the end of AMP5 … based on the FBP demand forecast the Honeyhurst to Cheddar scheme is justified on WTP … We feel … this scheme could be deferred without resulting in a decline in the level of service provided to customers … The changes to the demand forecast may, however, result in justification of the scheme in AMP5 based on achieving the target headroom alone (the 'traditional' approach); this appears to be the suggestion by Bristol Water.[99]

89. Halcrow also said that:

> Although we have not challenged the willingness-to-pay study, Bristol Water has used this to make a strong case for the inclusion of this scheme based on customers' willingness to pay … However, the view expressed by Ofwat was that the overall bill increase faced by Bristol Water's customers was too great and we think this scheme could be deferred into AMP6 … We also consider that Bristol Water should re-assess the timing for delivery of this scheme … (without the additional headroom justified through the willingness to pay analysis) and provide this information to the Competition Commission.[100]

Supply demand balance—meter optants

Bristol Water's view

90. Bristol Water said that in its FBP, it forecast that 45,508 unmeasured customers would opt for a meter during the PR09 period. In the FD09, Ofwat assumed that 35,389 optional meters would need to be installed, assuming that the average number of optants over the PR09 period would equal the average number over the first four years of the PR04 period.[101] Bristol Water said that its estimate for optional meter installations for AMP5 took account of the rising trend in meter optants, which was supported by year-to-date figures for 2009/10.

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[97][✂]
[98][✂]
[99][✂]
[100][✂]
[101]Bristol Water SoC, paragraphs 803 & 804 [✂].

91.   Bristol Water also included in its plan the installation of 16,800 selective meters[102] (ie meters that it chose to install rather than meters that customers requested) to meter customers with large gardens on change of occupier and to install meters when communication pipes were replaced. These were included by Ofwat within FD09.

92.   Bristol Water therefore had a total programme to install 62,308 meters during AMP5 and said that FD09 underestimated expenditure on optional meter installations by £3.7 million.[103]

93.   As at the end of February 2010, Bristol Water said that it had installed 7,416 optional meters for the year 2009/10 and that the forecast for the year end was now 8,350.[104]

94.   In its response to our provisional findings, Bristol Water said that it thought it under-estimated the number of optants, but overestimated unit costs, and on balance considered the expenditure allowed by the provisional findings sufficient to meet Bristol Water's obligations.

95.   In its June 2010 Return, Bristol Water said that it had installed 7,807 meters for households requesting to be installed on a measured basis,[105] 543 fewer meters than indicated by the February 2010 forecast.

Ofwat's view

96.   Ofwat said that it had allowed a reasonable number of meter installations and noted that if this was incorrect, Bristol Water could request that expenditure was logged up.[106]

97.   Ofwat said that it had 'set price limits allowing the company to install a total of 52,210 meters in AMP 5—this figure is made up of 35,389 optional meters and 16,820 selective meters'.[107] It said that it made this allowance rather than the number Bristol Water proposed because:

        (a) The rate of increase in meter optants in the previous AMP period did rise, but from a low base of only around 3,300 optants in 2004/05, and it was not convinced that the increase in metering seen previously would be repeated at the same high rate now that the number of meter installations was much higher.

        (b) Bristol Water based its assumption on the significant rise in bills it proposed, and following FD09, bills would not rise as significantly as Bristol Water assumed. It said that a downward adjustment on the number of meters proposed by Bristol Water was also justified on this basis.[108]

98.   In its response to our provisional findings, Ofwat noted that Bristol Water's June Return figure showed that it actually installed 7,807 optional meters during the reporting year.[109] Ofwat therefore stated that 'Given the information provided in BRL's final business plan, and the information we have subsequently received in

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[102]Bristol Water SoC, table 27, paragraph 627, p157.
[103]Bristol Water SoC, paragraph 805.
[104]Bristol Water reply to Ofwat's response, paragraph 270.
[105]Bristol Water June Return 2010, p39, paragraph 165.
[106]Ofwat response to Bristol Water, paragraph 3.9.1.
[107][✂]
[108][✂]
[109]Ofwat response to CC provisional findings, paragraph 2.10.10.

JR10, we see no reason to change our final determination conclusions about the likely number of optional meters that BRL will install during AMP5'.[110]

99. In relation to unit costs of metering, in its response to our provisional findings, Ofwat said that:

> In its response to our draft determination, BRL asked us to take account of the higher cost of some meters in determining the average unit cost. We responded to this in our final determination by using the unit costs of meters in different locations to calculate an average unit cost. We think that, whatever assumptions the CC makes about the number of optional meters, the unit cost per additional optional meter should be £[✂], which is consistent with the unit cost BRL states in both its final business plan and its response to our draft determination as the unit cost per optional meter.[111]

Reporter's view

100. The Reporter reviewed assumptions made and confirmed the supporting calculations and source data for Bristol Water's metering forecasts. She commented that she saw the assumptions and approach used by Bristol Water as reasonable.[112]

Halcrow view

101. Halcrow suggests that unit capex costs per meter can vary widely by company (it notes a range of between £160 and £400[113]) and that a unit cost per meter installed of £[✂] is 'a reasonable central estimate'.[114]

Supply/demand balance—smart metering trial

Bristol Water's view

102. Bristol Water proposed spending £2.0 million on a smart metering trial.[115] It presented the benefits for the scheme on the basis of a CBA[116] and said that smart metering could help reduce demand, increase the sustainability of the water industry, and assist Bristol Water to meet its environmental and carbon targets.[117] In its response to our provisional findings, Bristol Water said that it 'accepted the amendment' to exclude the smart metering trial from its capex programme, in addition to the Honeyhurst to Cheddar scheme.[118] It said that this was in 'solely in the interests of minimising the scale of the capex programme and, hence financing strain'.[119]

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[110]Ofwat response to CC provisional findings, paragraph 2.10.12.
[111]Ofwat response to provisional findings, paragraphs 2.10.13 & 2.10.14.
[112][✂]
[113][✂]
[114][✂]
[115]Bristol Water SoC, paragraph 668.
[116]Ibid paragraph 672
[117]Ibid paragraph 667.
[118]Bristol Water response to CC provisional findings, paragraph 86.
[119]Bristol Water response to CC provisional findings, paragraph 87.

Ofwat's view

103.   Ofwat agreed that there was value in assessing the potential benefits of installing smart meters and noted that following on from the recommendations of the Walker Review it would lead a steering group of stakeholders to look at the potential benefits.[120] However, it felt that Bristol Water did not explain the benefits that its proposed smart metering trial would bring specifically to its own customers.[121] It also noted that:

>   it is not at all clear that companies should pass the costs of such trials on to their customers. Some companies, including Wessex Water, have financed smart meter trials themselves. Innovative companies might also look to suppliers of meters to share the costs ... Accordingly, we continue to disagree with BRL that its customers should pay for a trial that would bring benefits to the industry as a whole. [122]

Smart metering trial—Halcrow conclusions

104.   Halcrow said that 'We consider that in its current form the full investment for the trial should not be included. We agree with Ofwat that Bristol Water should seek to offset the costs & risks, possibly with a manufacturer who would be likely to benefit in the longer term'.[123]

Supply/demand balance—mains requisitions

Bristol Water's view

105.   Bristol Water said that in its response to Ofwat's draft determination, it reduced its forecast expenditure for mains requisitions by £4.2 million compared with the FBP reflecting out-turn information that had become available. Ofwat, by a different method of calculation (the validity of which is disputed by Bristol Water), deducted £4.6 million in FD09 because it assumed a lower cost per connection than Bristol Water.[124]

106.   However, Bristol Water said that Ofwat had imposed an arbitrary cap on mains requisition expenditure at the amount per connection it assessed Bristol Water had spent in the PR04 period. It said that this did not take account of the different balance of trunk main schemes to mains requisitions in the PR09 period. Bristol Water considered Ofwat's forecast to be too low. In its response to DD09, it said that it believed this:

>   unrealistic outcome results from the application of an inappropriate cap that does not take into account different levels of activity on trunk mains between AMP periods. Proposed expenditure on trunk mains in AMP5 is £17.5m compared to expenditure of only £2.8m during AMP4, which related solely to the first phase of the North Bristol Trunk Mains Scheme.[125]

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[120]Ofwat response to Bristol Water SoC, Annex D, paragraph 3.6.1.
[121]Ibid paragraph 3.6.1.
[122]Ibid paragraph 3.6.2.
[123][✂]
[124]Bristol Water SoC, paragraph 801.
[125][✂]

Ofwat's view

107.   Ofwat said that it capped the unit cost at the historical unit cost level of £[✂], [126] leading to a reduction in expenditure of £4.6 million from the FBP position, and that 'we reduced expenditure by £4.6m from the level that BRL proposed, and that BRL now thinks this cap is excessive by only £0.4m, suggests that our assumption about unit costs is substantially correct'.

108.   Ofwat said that it based the cap it applied to the unit cost of mains requisitions and new development on the assumption that unit costs should not rise from the costs incurred in the previous AMP. However, Ofwat said that 'we applied the cap only when water companies were unable to explain to us why unit costs had risen. If they could explain the increase satisfactorily, we made an allowance for a rise in unit costs in price limits. BRL did not do this'. [127]

Supply/demand balance—new developments

Bristol Water's view

109.   Bristol Water argued that FD09 had assumed additional developer contributions of £0.5 million, as a result of Ofwat's reallocation of part of the expenditure in the FBP on a new trunk main from Banwell to Hutton (£[✂] million) and the South East Trunk Main Scheme (£[✂] million) from growth to new development. [128] Bristol Water argued that the two new trunk mains schemes were driven by the need to balance supply and demand, not by developer activity, and that there was, therefore, no mechanism for it to obtain contributions from developers for these mains. It said that Ofwat's allocation of these schemes, and its assumption that developers would contribute, was therefore unjustified. [129]

Ofwat's view

110.   Ofwat said that:

> Where a water company installs infrastructure to service new housing or industrial developments, we classify this under the new development driver. Where we classify expenditure as new development, we expect each company to recover some of the cost from the developer in the form of contributions. Where a company undertakes activity to meet growing demand from new and existing consumers, we classify this under the growth driver. We do not expect a company to recover from developers the costs of growth schemes. [130]

111.   In relation to the Banwell Spring–Hutton and South East Trunk Main schemes specifically, Ofwat said that:

> We accepted that the correct allocation of expenditure for these schemes was entirely to growth drivers … Accordingly, we have not assumed contributions from developers towards these schemes, and

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[126] Ofwat response to Bristol Water, paragraph 3.13.4.
[127] [✂]
[128] Bristol Water SoC, F.4.2.8, paragraph 809.
[129] Ibid paragraph 811.
[130] [✂]

we have made a full allowance for these schemes in price limits. The company's claim is therefore incorrect.[131]

112. However, in its FD09 Bristol Water supplementary report, Ofwat said that:

> We uplifted your forecast requisitions by £0.526m over AMP5, as a one-sided adjustment. Having revised the expenditure allocation as above for the final determination, and after allowing for the impact of our efficiency assumptions on new development expenditure, we now assume that you will receive an additional £0.498m in developer contributions, compared with your business plan assumptions.[132]

113. The additional £0.498 million assumed for developer contributions therefore arises from Ofwat's allocation of 70 per cent of the North Bristol Trunk Mains Phases 2 and 3 to new development drivers (Bristol Water allocated this scheme entirely to growth drivers).

Supply/demand balance—infrastructure charge receipts

114. The parties agreed the additional infrastructure charge revenue of £0.6 million included in FD09, due to a higher assumed infrastructure charge per connection (as the amount included in the FBP of £253.00 per connection was lower than the minimum legal minimum infrastructure charge of £276.81).[133]

Resilience

Bristol Water view

115. Bristol Water said that a key element of its plan to enhance customer service standards was to invest in improving the resilience of supply and that it aimed to ensure that, by 2020, no areas with a population of more than 25,000 people would be dependent on a single water supply asset.

116. Bristol Water proposed five schemes to improve the resilience of supply to 643,000 consumers, which it said were 'at risk of an extended interruption of supply in the event of a failure of single critical assets'.[134] These schemes were:

(a) Durdham Downs/North Bristol Support scheme, benefiting 185,000 customers;

(b) Oldford scheme, benefiting 41,000 customers;

(c) Tetbury scheme, benefiting 10,000 customers;

(d) Southern scheme, benefiting 204,000 customers; and

(e) Victoria Pumping Station refurbishment, with a benefit to an additional 203,000 customers if Durdham Downs, Southern and Victoria schemes are all completed.

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[131]Ofwat response to Bristol Water, paragraphs 3.12.3 & 3.12.4.
[132][✂]
[133][✂]
[134]Bristol Water SoC D.3.3.1, paragraph 639.

117. Bristol Water estimated that the overall likelihood of a one-week interruption to supply in each of the relevant areas was at least once in 20 years and once in eight years for Oldford.[135]

118. In its FBP, Bristol Water identified specific synergies that were designed into its proposed capital programme in relation to its resilience schemes. These included:

(a) a £1.2 million reduction in the cost of the Oldford resilience scheme due to a synergy with the Egford nitrate control scheme;

(b) a £2.9 million saving available during AMP6 from undertaking the Southern resilience scheme and replacing the Axbridge–Barrow raw water main at the same time; and

(c) a £4.9 million refurbishment of the Victoria Pumping Station, which in combination with other projects (the Durdham Down and Southern resilience schemes) could deliver significant additional benefits, providing protection to a population of 203,000.

119. In its FBP, Bristol Water allocated 50 per cent of the capex relating to the Victoria Pumping Station refurbishment to resilience and 50 per cent to capital maintenance expenditure on the basis that the new pumping station would have 50 per cent additional pumping capacity and therefore contributed to both resilience and maintenance.[136]

120. In response to our provisional findings, Bristol Water said that there had been a consistent undervaluation by Ofwat and subsequently by the CC in the provisional findings, of the attitude of customers towards and willingness to pay for resilience schemes.[137] It also said that the CC was in effect being forced to determine a standard for resilience for Bristol Water, at least in the short term, because of the absence of clear government or Ofwat guidance.[138]

121. Bristol Water also suggested in respect of Halcrow's report that it emphasized 'resolving mechanical failures within 24 hours' which diverted attention from 'the rarer, but very real risks, of longer-term outage'[139] and that there were 'clear risks associated with each of the three rejected resilience schemes … where 35 hours is an inadequate time for returning to normal service'.[140]

Ofwat view

122. Ofwat said that in relation to Bristol's proposed resilience schemes, it made a scope challenge where it was not convinced that the project would deliver sufficient benefits to consumers. It said that it made this:

> absolute challenge, removing all expenditure, if any of the following criteria applied:
>
> (a) The CBA did not support the project or was constructed in a way that produced significant doubts concerning its outcome.

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[135]FBP, Part B6, p29, and Bristol Water's SoC, paragraph 704.
[136]Bristol Water SoC D.3.3.1, paragraph 733.
[137]Bristol Water comments on provisional findings, Section 3, Resilience, paragraph 2.
[138]Ibid paragraph 6.
[139]Ibid paragraph 14.
[140]Ibid paragraph 16.

(b) The project outputs were not presented, meaning that the benefit was not explicit.

(c) The project is not consistent with relevant Ofwat policies.

(d) The information presented was so poor that it was not possible to determine whether or not the scheme is needed.

(e) Supplementary evidence casts significant doubt on the credibility of the proposals.

(f) No outputs were set for cases where all expenditure was removed.[141]

123. Ofwat noted that Bristol Water had proposed 'the highest proportion of total expenditure on resilience in the sector'[142] and informed Bristol Water that:

> Since resilience schemes represent a discretionary service enhancement, they must be supported by robust evidence that your customers are willing to pay for a reduction in risk in the context of your overall plan. In assessing resilience schemes it is therefore essential to take account of all appropriate evidence of customers' views. This includes both benefit estimation techniques used in your CBA as well as the views of your overall plan elicited from both your own and the joint stakeholder research.[143]

Durdham Down

124. Ofwat allowed the Durdham Down resilience scheme in full in price limits. It said that:

> Despite our reservations regarding your overall approach to resilience, in particular your quantification of the risks to service and your willingness-to-pay methodology, we consider this scheme offers tangible benefits to consumers. This scheme has the largest cost benefit ratio of your network resilience proposals and represents the most robust and convincing case. We have therefore included your proposed expenditure for this scheme in price limits.[144]

Victoria Pumping Station

125. Ofwat allowed the proposed expenditure for Victoria Pumping Station in full, but transferred 100 per cent of the proposed expenditure to capital maintenance on the basis that 'In view of the fact that we have not included expenditure for the resilience schemes associated with this project in price limits, we have transferred the proportion of expenditure for this scheme which you allocated to enhanced service levels to capital maintenance'.[145]

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[141] [✂]
[142] [✂]
[143] [✂]
[144] [✂]
[145] [✂]

Southern, Oldford and Tetbury resilience schemes

126. Ofwat did not include expenditure for these proposed schemes in price limits. It informed Bristol that 'This is primarily on the basis that your plan as a whole is un-acceptable to consumers. This is compounded by the fact that we have concerns with your methodology which casts doubts on whether these schemes offer sufficient benefits to consumers for the costs you propose.'[146]

127. In response to our provisional findings, Ofwat noted that:

> It appears that there is a fundamental difference between us and Halcrow on the one hand and BRL on the other. Our view is that operational mitigation measures can usually reduce resilience risk to a reasonable and acceptable level. We hold this view because that is what we see happen.[147]

Reporter's view

128. In relation to the five proposed resilience schemes, the Reporter said that 'based on the evidence we have been presented with and our detailed discussions with the Company, we consider the Company's plan to be fully justified'[148] and that 'We confirm that an output has been clearly defined in terms of increased service to consumers against each of the Company's proposals'.[149]

Halcrow view

Durdham Down and Victoria Pumping Station schemes

129. Halcrow said that:

> Although we have expressed concern about the reliability of the risk assessment process and its use to decide investment based on 7 day failure events or longer, we recognise that in the event that Victoria Pumping Station failed [✂] this would put 184,700 consumers at risk of being without water supplies. The refurbishment of Victoria Pumping Station and implementation of Durdham Down Resilience Scheme will safeguard these consumers against failure scenarios involving the pumping station, mains and Durdham Down Tower and Service Reservoir.[150]

130. Halcrow was also supportive of Ofwat's transfer of the capex for Victoria Pumping station to capital maintenance. It said that:

> The Victoria Pumping station is being replaced with a new pumping station with additional pumping capacity to address poor reliability, and to provide a back up in the event Durdham Down Tower/storage system fails or needs maintenance … It would be reasonable to expect that some form of standby capability (to allow for maintenance) would be both good engineering practice and system design. The additional

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[146][✂]
[147]Ofwat response to the provisional findings, paragraph 2.12.6.
[148][✂]
[149][✂]
[150][✂]

pumping capacity does not provide levels of enhanced service over and above what would be deemed reasonable under capital maintenance … The investment at this pumping station in our opinion is considered to be 100% Capital Maintenance.[151]

Southern, Oldford and Tetbury schemes—Halcrow conclusion

131. Halcrow said in relation to all three disputed schemes that:

We consider that although Bristol Water has quantified a number of risks and described the basis for assessing these … the risk evaluation is not robust, carries a low confidence and is pessimistic. On the basis of the evidence as presented, we do not believe that the need has been established … Bristol Water should consider local risk mitigation measures to improve both system reliability and resilience, which should include recommendations made in the flood risk analysis report … In conclusion, we do not consider that Bristol Water has established a robust and compelling business case for investment.[152]

132. Halcrow also considered Bristol Water's response to our provisional findings but said in its view:

In line with our draft report and the CC PF's we do not believe that undue focus has been placed on mechanical failure and undervalued other risks but instead, the report findings have highlighted additional concerns involving the low confidence associated with return periods, local mitigation measures and residual risk.[153]

133. Halcrow also noted that:

Although there are no standard 'acceptable risk values' for various hazards across the industry, the risk assessment process does provide a means for companies to establish and prioritise the risks being faced. This will enable management to identify and implement the most cost-effective mix of physical mitigation measures and generic and specific planning/operational processes … BRL has not provided sufficient evidence to demonstrate that a robust risk assessment has been carried out which takes into account local mitigation measures (which we would expect them already to have in place) and their planning/operational fall-back processes. On this basis, we feel that the risks are overstated and thus the associated investment for the Southern (which includes Banwell and Cheddar sites), Oldford and Tetbury resilience schemes is not adequately justified.[154]

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[151] [✂]
[152] [✂]
[153] [✂]
[154] [✂]

Bristol Water undertaking to the DWI

BRISTOL WATER PLC

UNDERTAKING FOR THE PURPOSES OF SECTION 19 OF THE WATER INDUSTRY ACT 1991

THIS UNDERTAKING is given by Bristol Water ("the Company") pursuant to Section 19(1)(b) of the Water Industry Act 1991 on 15 June 2010.

WHEREAS:-

(A) The Company has been appointed by the Secretary of State for Environment, Food and Rural Affairs as a water undertaker pursuant to the Water Industry Act 1991 ("the Act").

(B) Section 68(1)(a) of the Act requires every water undertaker supplying water to any premises for domestic or food production purposes to supply only water which is wholesome at the time of supply.

(C) The Water Supply (Water Quality) Regulations 2000 as amended in 2007 ("the Regulations") prescribe, for the purpose of determining the wholesomeness of water, requirements as to the concentrations or values of properties, elements, organisms and substances to be present in or absent from it.

(D) This Undertaking is given pursuant to Section 19 of the Act for the purposes of securing or facilitating compliance with the Regulations.

THE COMPANY HEREBY UNDERTAKES AS FOLLOWS:-

1. **SUBJECT** to the following provisions, the Company shall carry out, or procure the carrying out of, the works, or other measures specified in the Schedule of Works.

2. **THE** Company undertakes to secure that each of the steps included in the Works is completed on or before the respective dates specified in the Schedule ("the Delivery Date"), provided that if after the giving of this undertaking the Company has good reason to believe that:

> (a) it will be unable to secure the completion of any steps included in the Works on or before the relevant Target Date by reasons of acts, omissions or events not reasonably within its control, or

> (b) in the light of engineering or other advice received after the date of this Undertaking, it is expedient to make modifications to the technical specification of any step included in the Works,

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the Company shall forthwith deliver to the Secretary of State a proposed new undertaking in writing sealed by the Company in the form of this undertaking but modified to include the revised Target Date, or the proposed modification, or both and such proposed new undertaking shall, if accepted by the Secretary of State signing and dating a letter of acceptance, have effect from the date of acceptance as a new undertaking replacing this undertaking.

3. **IF** compliance is achieved with the requirements of any of the Regulations in advance of the Target Date or otherwise than by means of the Works, the Company shall notify the Secretary of State in writing, specifying the nature and extent of compliance so achieved; and if the Secretary of State so notifies the Company this undertaking shall cease to apply to the extent that compliance has actually been achieved.

IN WITNESS of which the Company has caused this Undertaking to be executed the day and year first before written.

Signed

Date

[BRL 2674]

SCHEDULE OF WORKS

UNDERTAKING GIVEN BY BRISTOL WATER PLC IN RESPECT OF IRON IN WATER QUALITY ZONES SUPPLIED BY THE TRUNK MAINS LISTED IN THE ANNEX TO THIS SCHEDULE.

REFERENCE NO: BRL 2674

DATE: 30 May 2010

1	**WATER SUPPLY SYSTEM**

All zones in the connected supply system supplied from the Trunk Mains listed in the Table below which are for the time being listed in the Annex to this Schedule of Works, and which are subject to revision as necessary.

Description	Supplying WTW	Length (m)
Barrow to Long Ashton 24"	Barrow	5251
Barrow to Chelvey 21"	Barrow	8250
Long Ashton to Beggars Bush (Failand Tower) 15"	Barrow	3016
Knowle to Victoria 30"	Barrow	5276
Bedminster to Bristol Bridge 27"	Barrow	5740
Victoria St to St Marks Rd 15"	Barrow	2180
Barrow to Chelvey 14"	Barrow	7718
Shipton Moyne to Tolldown 18"	Shipton Moyne	19678
Filton to Chase 18" (+ Almondsbury to Filton)	Purton/Littleton Mix	1473
Total		58582

2	**NATURE OF CONTRAVENTION AND ITS CAUSE**

The iron parameter exceeds or is at risk of exceeding the prescribed concentration in the zones listed in the Annex to this Schedule because of accumulation of deposits in the parts of the distribution system fed from the Trunk Mains listed in the Table above.

3	**MAXIMUM DEVIATION OF QUALITY**

The prescribed concentration for the iron parameter is 200 µg/l and remains so regardless of this undertaking. However, the prescribed concentration will be exceeded while remedial steps set out in this Schedule are being taken. The Company will take all reasonable steps to ensure that the prescribed concentration is not exceeded but should the concentration of iron in any zone listed in Annex 1 to this Schedule of Works exceed 415 µg/l, the maximum deviation of quality value that the Company has agreed with the local Health Protection Unit, all appropriate means would be taken to minimise the impact of discoloured water on consumers.

4	Steps to be taken	Delivery Date
(a)	Ensure that the iron parameter has been assessed as a hazard as part of the Regulation 27 Risk Assessment for the connected supply system associated with the distribution system according to a Drinking Water Safety Plan approach.	30 September 2009
(b)	Submit a specific Action Plan identifying short, medium and long-term mitigating steps to minimise the risk of the iron parameter associated with the connected supply system supplied by Trunk Mains listed in the Table in Section 1. To include as a minimum the requirements within (c), (d) and (e) and review regularly.	30 June 2010
(c)	**Short term measures**: Develop and implement an enhanced monitoring strategy to supplement current operational monitoring. If the concentration in any water sample exceeds the maximum deviation of quality value set out in Section 3 [415 µg/l], take all appropriate measures to minimise the impact of discoloured water on consumers. Report regulatory exceedances of the standard for the iron parameter to DWI as part of current monthly exception reporting process.	30 June 2010 and after changes made as a result of review, for the duration of the Undertaking
(d)	**Medium Term measures:** Submit a summary of the investigations carried out to confirm the appropriateness of the remedial measures proposed. This should comprise a method statement which includes: (i) The methodology used to determine/confirm the source of the problem and where it impacts, the criteria for selection of each section of main identified for improvement, the improvement options considered and solution proposed. (ii) The criteria by which success will be measured (i.e. inspection, sampling, reduction in discoloured water events/levels of complaints), the length of cleaning and refurbishment completed and how this will be monitored during the programme of work. (iii) The method of post-assessment to determine that the work has been successful.	30 June 2010
(e)	Complete planning, design and procurements arrangements for the renovation of the identified 58.6 km Trunk Mains by sliplining.	31 March 2012
(f)	Complete construction, installation and commissioning of the remedial measures proposed as part of the programme of work : • to renovate the identified 58.6 km Trunk Mains by slip-lining • followed by a one-off systematic cleaning of the downstream distribution system	31 March 2015

4	Steps to be taken	Delivery Date
(g)	**Long term measures:** Continually appraise the risk of the iron parameter as a hazard as part of the regulation 27 Risk Assessment for the connected supply system supplied by Trunk Mains listed in the Table in Section 1 according to a Drinking Water Safety Plan approach, and ensure that Regulation 28 documents are reviewed and updates provided as necessary.	Ongoing
(i)	**Reporting:** At regular intervals provide DWI with reports on progress made with carrying out the steps set out in the Action Plan. Reports to include at least the following details: i) All data from the monitoring of treated water in the supply system supplied by Trunk Mains listed in the Table in Section 1; ii) Details of the remedial steps that comprise the programme of work including commencement and completion dates for investigations, design, tendering, construction and commissioning; iii) Current state of progress with the steps referred to in (i) above; iv) A statement of implications of any slippage of the programme and details of activities planned to bring programme back on target; v) Whether the Company has any other reason to believe it may not be able to meet any of the key dates set out in this Schedule of Work.	At 6 monthly intervals for the duration of the undertaking. Reporting periods are January to June and July to December.
(j)	Continue to monitor at an enhanced frequency for iron for a period of 12 months following commissioning of any work associated with the Action Plan to demonstrate the effectiveness of the remedial measures taken.	31 March 2016 – one year after commissioning
(k)	Provide a final report to DWI on the efficacy of the remedial measures taken as part of the Action Plan. Include as evidence of closure for this scheme appropriate documentation to confirm that the actions set out in this Schedule of Work have been taken.	30 April 2016 – one month after completion of period of demonstration of effectiveness.

ANNEX TO SCHEDULE

Bristol Water

Undertaking in respect of Iron parameter

Supply Zones associated with the Distribution System in Water Quality Zones supplied by the Trunk Mains Listed in Section 1 where there is a risk of exceedences of the iron standard occurring	Population of the supply zone
203	19567
206	31350
207	47453
208	28029
212	22970
213	29634
214	35967
215	33098
216	28364
217	43967
218	30106
222	22164
224	12649
225	28516
227	32942
249	28721

Risk Assessment Reference (name of Regulations 28 Report or Supply System)	DWI Reference
Distribution Safety Plan	BRL 1628 (Distribution)

Asset Management Assessment

1.   This appendix sets out an overview of the Asset Management Assessment (AMA) process, Bristol Water's submission on it, Ofwat's response to that submission and some comments from the Reporter and third parties.

Origins and functioning of the AMA

2.   Water companies' expenditure on capital maintenance forms the largest part of their capex. PR09 price limits include almost £13 billion of expenditure for capital maintenance—an increase of 21 per cent over the previous price review.

3.   The AMA process challenges capital maintenance expenditure by looking at companies' asset management planning processes rather than adopting a bottom-up approach examining each investment component. In this respect, it is similar to statutory financial audits where internal controls and business processes are evaluated to provide confidence in the accuracy of the accounts. The process is set out in more detail in Appendix A to PR09/23.[1] The AMA challenge was applied to approximately £4.2 billion of proposed capital maintenance expenditure.

4.   Between 1999 and 2002, Ofwat and the water industry jointly developed a common framework for capital maintenance. This framework provides an agreed basis for estimating the future capital maintenance required to provide defined levels of service in the most economic manner.[2] After PR04, Ofwat (in consultation with the water industry) developed AMPAP (Asset Management Planning Assessment Process), a tool which enables companies to carry out a self-assessment to establish how well they are applying the common framework principles. AMPAP was then adapted into a set of criteria which Ofwat could use to assess how well companies were applying the common framework. These criteria form the basis of the AMA scoring process.

5.   There are two distinct steps to the AMA process:

(a) assessment and scoring; and

(b) applying the AMA score to the company's capital maintenance expenditure baseline.

Assessment and scoring

6.   The assessment process uses data and commentary on capital maintenance expenditure produced by the company in part B3 of its business plan, and reports from the Reporters. Assessments are undertaken by Ofwat staff assisted by three external consultants.

7.   Scoring is based around 31 components grouped into nine high-level areas. Originally each component was given equal weight, but for FD09 a new weighting was applied. The high-level areas and their weightings are set out in Table 1.

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[1] www.ofwat.gov.uk/pricereview/pr09phase2/pr09phase2letters/ltr_pr0923_amabaselinesettingannex.pdf.
[2] See Ofwat response to Bristol Water SoC, p58.

TABLE 1 **AMA high-level areas and their weightings**

High-level area	Number of components	Weighting %
Stakeholder engagement	3	11
Leadership, policy & strategy	3	8
Management	1	8
Processes	4	10
Systems	2	9
Data	3	18
Analysis	10	16
Reporting	1	6
Balance	4	14

Source: Ofwat (PR09/23 Appendix A, PR09/32 Appendix B).

8.   Each component was scored between 0 and 5. The scoring process used guidelines[3] and was calibrated so that a score of 2 meant that a plan may be adequate to justify a continuance of past expenditure but would not justify expenditure increases; a score of 4 meant that the plan was fully justified against that component's criteria; and a score of 5 meant that the company had exceeded expectations.[4]

9.   Scoring took place on three occasions during the PR09 process. The first was based on water companies' draft business plans as part of the CIS baseline review between August and November 2008. The second was based on water companies' final business plans for the draft determination (April–June 2009), and the third, which formed part of the FD09, took into account further representations from companies (September–October 2009).

10.   Further guidance and information on the criteria used as the basis for the AMA score is set out in Appendix D to PR09/37.

Application of the AMA score

11.   Ofwat took a company's proposed capital maintenance expenditure and applied a four-step process to derive its view of expenditure allowed:[5]

(a) *Step 1:* Ofwat altered the company's figures to allow for transfers and two-sided adjustments. Transfers were items which Ofwat believed companies had mis-classified as other types of expenditure (eg quality enhancement).

(b) *Step 2:* Ofwat removed exceptional items, which it defined as items where either the expenditure was unusual, or there was a discrete output in addition to serviceability parameters.[6] Examples of exceptional items were meter replace-ment schemes and trunk mains relining. These exceptional items were challenged separately, outside the AMA process.

(c) *Step 3:* Ofwat determined the expenditure subject to AMA challenge. This was taken to be twice the uplift amount (the difference between 2005–2010 expendi-ture and the proposed expenditure, as adjusted in Steps 1 and 2).

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[3]Set out in Appendix D to PR09/37: www.ofwat.gov.uk/publications/pricereviewletters/ltr_pr0937_appd.pdf.
[4]PR09/37 Appendix A, p6.
[5]The process is set out in Appendix A of PR09/23:
   www.ofwat.gov.uk/pricereview/pr09phase2/pr09phase2letters/ltr_pr0923_amabaselinesettingannex.pdf.
[6]FD09, p79.

(d) *Step 4:* The challenge amount (ie the reduction or increase in capital maintenance expenditure allowance arising from the AMA process) was determined by the following formula:

Challenge amount = (AMA score – 4) x 25% x Expenditure subject to challenge

12.   From the formula above, it follows that a company with an AMA score of 4 faces no reduction in its expenditure while a company with an AMA score of 3 faces a reduction of 25 per cent of its expenditure subject to challenge. After the first scoring process, between the publication of the CIS baseline and the draft determination, the scoring system was changed so that companies scoring higher than 4 would receive recognition of this in terms of being allowed more than 100 per cent of their proposed expenditure programme (although no companies actually achieved this score).

Ofwat's final determination for Bristol Water[7]

13.   Ofwat's final determination for Bristol Water included the following comments:

> In our view you have not provided sufficient evidence to justify all of the expenditure set out in your plan … We are concerned that you have not demonstrated that your plan is the least cost plan to deliver stable service …You have evolved your process for business planning and information management but we are concerned about the extent of the quality control of these processes … Your plan focuses on risks to the business rather than risks to service to customers posed by the condition and performance of its assets. Your plan appears to be reducing risks in many areas and you have not presented any quantification of risk across the asset base in any form of common currency.[8]

14.   The results of the AMA scoring for Bristol Water are set out in Table 2, along with the average, minimum and maximum scores for all companies.

TABLE 2 **Bristol Water's AMA scores (out of 5)**

	Bristol Water score	Min score across all companies	Average score across all companies	Max score across all companies	Bristol Water rank (out of 21)
Water infrastructure	3.1	2.7	3.5	3.8	17=
Water non-infrastructure	3.0	2.6	3.3	3.7	16=

Source: CC taken from Ofwat FD09, p79.

15.   Ofwat's application of Bristol Water's AMA score is set out in Table 3.

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[7][✂]
[8][✂]

TABLE 3   Ofwat's **capital maintenance expenditure assessment for Bristol Water**

			Sub-service expenditure, £ million		
Item		Formula	WIRE*	WMNI†	Total
A	Bristol Water FBP		73.2	57.7	130.9
B	Transfers		52.6	3.1	55.7
C	FBP after transfers	A+B	125.7	60.9	186.5
D	Exceptional Items		45.5	3.5	49
E	FBP after transfers and exceptionals	C–D	80.2	57.3	137.5
F	AMP4 adjusted expenditure		52.9	39.6	92.5
G	Expenditure subject to AMA challenge	2 x (E–F)	54.6	35.4	90
H	AMA score		3.1	3	
J	AMA challenge (%)	(4–H) x 25	23.1	25	
K	**AMA challenge amount**	G x J	**12.6**	**8.9**	**21.5**

Source: Ofwat final determination supplementary report to Bristol Water, p43.

*Water Infrastructure Renewals Expenditure (WIRE): expenditure to maintain the water service underground assets.
†Water Maintenance Non-Infrastructure (WMNI): expenditure to maintain the depreciable assets associated with delivering the water service.

Bristol Water's view[9]

16.   Bristol Water contended that the £21.5 million reduction in capital maintenance expenditure resulting from the AMA process meant that it was allowed insufficient expenditure to maintain its assets and provide good levels of customer service.

17.   Bristol Water set out a number of concerns with the AMA process. These may be summarized as:[10]

  (a) the fact that the AMA criteria did not relate to underlying physical, engineering or performance characteristics of the assets;

  (b) the arbitrary amount exposed to challenge;

  (c) the 'one size fits all' approach;

  (d) reliance on flawed customer research by Ofwat and failure to take account of customer research commissioned by Bristol Water;

  (e) inconsistency with Reporter's view of Bristol Water's asset planning (leading to inappropriate scores);

  (f) the perverse penalty on companies that had low capital maintenance expenditure in the previous period;

  (g) the effect of the variance in capital maintenance requirement from period to period;

  (h) multiplying effect on the AMA Challenge Amount where capital maintenance expenditure was deferred from one PR Period to the next;

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[9]SoC, paragraphs 816–848.
[10][✂]

(i) absence of any allowance for specific company factors;

(j) Ofwat's failure to provide analysis; and

(k) overall complexity.

Ofwat's response to Bristol Water[11]

18. In its response, Ofwat reiterated its basis for using AMA and the methodology it used. It also addressed two criticisms made by Bristol Water.

19. The first criticism was that AMA is a 'one size fits all process'. Ofwat pointed out that, while the same method and assessment criteria were used for all companies, its assessment was weighted by expenditure. Ofwat cited the high scores of Cambridge and Dee Valley Water as evidence that the AMA approach was not biased against smaller companies.

20. The second criticism was that the amount exposed to challenge was arbitrary and failed to recognize variance in expenditure from period to period. Ofwat responded that 'if a company has unusually low expenditure in the previous period then we consider this when looking at the evidence presented in the plan, the converse is also true'. It also said that 'we considered it important where a company has pro-posed large increases to capital maintenance expenditure that it should provide a commensurate degree of justification and evidence'.[12]

21. Ofwat summarized its case as follows:

> Overall, we regard that the challenges posed to BRL[13] through the AMA process were consistent with our duty to promote economy and efficiency. We see no merit in BRL's assertion that the application of this approach has a negative effect on its business plan and therefore its ability to deliver stable serviceability and note that BRL's expenditure in AMP5 is consistent with historic expenditure.[14]

Bristol Water's reply to Ofwat's response[15]

22. Bristol Water's reply addressed the two Ofwat points above, but also cited nine further concerns.

23. Regarding the first point (the 'one size fits all process'), Bristol Water said that Ofwat's response did not address the issue that smaller companies were more likely than large companies to have lumpy and variable capital maintenance expenditure profiles between periods, and so were more likely to have a large proportion of their expenditure subject to AMA challenge.

24. Regarding the second point (that the amount exposed to challenge is arbitrary), Bristol Water contended that Ofwat had not addressed its contentions that the amount under challenge was not related to any underlying physical, engineering or performance characteristics of the assets, and that the approach rewarded com-panies with high historical maintenance expenditure.

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[11]pp59–62.
[12]Ofwat response to Bristol Water SoC, p61.
[13]BRL is Ofwat's abbreviation for Bristol Water.
[14]Ofwat response to Bristol Water SoC, p62.
[15][✂]

Bristol Water's request for clarification[16]

25. Bristol Water wrote to Ofwat asking for clarification as to whether the AMA method-ology rewarded past inefficiency because inefficient companies with high baseline expenditure in AMP4 would have less expenditure exposed to challenge than efficient companies with low baselines.

26. Ofwat recognized that 'if your historic expenditure had been higher the proportion of your plan that is exposed to a challenge would be lower and if we didn't guard against it this would introduce a perverse penalty for historically low spenders'.[17]

27. Ofwat outlined two mechanisms to guard against this penalty. The first was that 'historically high spenders would have had tougher efficiency challenges through the efficiency challenges derived through the use of econometrics', and secondly that:

> we have carried out analysis to support our understanding of how effective historic investment has been … we would expect that the companies that have traditionally invested significantly above the industry average will need to justify their asset management case to continue to invest at this level … These aspects have been factored into the AMA scores.[18]

28. Bristol Water argued in its SoC that these mechanisms were subjective and that it was unable to determine whether they were effective.[19]

Reporter's view

29. The Reporter was required to confirm whether Bristol Water had addressed the areas of weakness in its planning process and comment on changes that it had made. She noted improvements in the AMA components and said that 'we consider the Company has taken a balanced view of risks across the whole plan and between the Company and the customers'.[20] She also said:

> at the draft Business Plan we made clear in our commentary that we did not think the Company had managed to demonstrate its cases suf-ficiently well, because of the time constraints, and that in some areas the case was still being developed … However, for the final Business Plan we believe that the Company has completed the development of its cases very well (and in line with its intentions). We would expect the Company to score considerably higher in the AMA for the final Business Plan.[21]

30. Bristol Water also cited the Reporter's view on mains maintenance: 'We consider the Company's approach towards mains to be innovative and in our opinion effective',[22] and stated that the Reporter supported the increase in expenditure proposed to address the ageing asset base. Bristol Water quoted the following paragraph from the Reporter's report:

[16][✂]
[17][✂]
[18][✂]
[19]SoC, paragraph 841.
[20][✂]
[21][✂]
[22][✂]

We consider that, in taking a predominantly cost beneficial planning objective, the Company is at risk of having parts of its Capital Maintenance programme reduced by Ofwat because the Regulator does not consider the size of the overall package of investment is supported by customers. We are worried that this will jeopardise asset groups (such as pumping stations exceptional items) which are in dire need of substantial investment. In view of the way that the Company has used CBA [Cost Benefit Analysis] (ie to better justify its selected interventions), we do not believe Ofwat should do this.[23]

Responses to provisional findings

31.   Bristol Water suggested that the CC should abandon the exceptional item challenge and treat all expenditure items as subject to the AMA challenge. Bristol Water also restated its belief that the AMA challenge should be based on objective criteria rather than historical spend.

32.   Ofwat said that it understood our concerns, but disagreed with our approach to assessing them. It did not agree with our capping of the challenge amount at 25 per cent of expenditure, pointing out that this signalled to a water company that it could increase its planned expenditure as much as it liked in the knowledge that it would obtain at least 75 per cent of its plan.

33.   Ofwat also said that it did not agree that there was any evidence that smaller companies' expenditure was more lumpy, but accepted that it might be more difficult for those smaller companies to balance any such lumpy expenditure across their capital maintenance programmes. It also noted that lumpy expenditure tended to occur in the non-infrastructure sub-service.

34.   Ofwat considered that the lumpiness in Bristol Water's maintenance programme was in part caused by Bristol Water's choosing not to invest £12 million on pumping station works in 2005–10. Ofwat also noted that it had allowed a 13 per cent uplift for maintenance expenditure in AMP4 compared with AMP3.[24]

35.   With regard to exceptional items, Ofwat said that it did not believe that an objective decision-making process for assessing such items could be developed owing to the diversity of companies' maintenance plans. It said that it applied a number of questions and challenges to expenditure to determine whether it was exceptional, and that the process of identifying and assessing exceptional items was an iterative one.

36.   After taking into account our concerns, Ofwat concluded that the best approach to AMA was to maintain its calibration of the challenge amount, but to identify lumpy items and treat them as exceptional. It reconsidered the areas that Bristol Water proposed as exceptional, and thought that it would be more appropriate to treat Victoria and Blagdon pumping stations as exceptional items.

Third party views

37.   Portsmouth Water made some similar criticisms to Bristol Water.[25] It said that the AMA process was subjective, that it penalized companies for being sensible in the

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[23][✂]
[24]Ofwat response to provisional findings, paragraph 2.8.13.
[25]Portsmouth Water submission, pp10–11:
     www.competition-commission.org.uk/inquiries/ref2010/bristol/third_party_submissions.htm.

past, and that it was biased against WoCs. It also drew attention to the interaction between AMA and the CIS baseline, suggesting that a company could be penalized twice as a result of this interaction.

38.   South East Water said that while it understood the difficulties Ofwat faced in assessing maintenance requirements, the AMA process had made Ofwat too methodologically driven and the process had become too far removed from the risks faced by companies with ageing infrastructure. It also said that the burden of proof required to avoid a challenge (ie to score 4) was too great, and that there were serviceability and financeability issues resulting from the funding shortfalls caused by AMA challenges.[26]

39.   Dee Valley Water said that the principle of AMA as an assessment tool was sound and that the outcome of the process was satisfactory for it. However, it expressed concern with reliance on prior period expenditure as a baseline and also with Ofwat's decision to change the application of AMA during the PR09 determination process. On the other hand, it noted that 76 per cent of its proposed non-infrastructure capital maintenance expenditure was accounted for as exceptional items, leaving only a small proportion actually assessed through AMA.[27]

40.   Cambridge Water said that it did not feel that AMA penalized companies because of their size.[28]

Workings for calculation of AMA challenge

41.   Table 4 shows the workings for the CC's determination on the calculation of the AMA challenge.

TABLE 4   **CC's determination on capital maintenance expenditure assessment for Bristol Water**

Item		Formula	Sub-service expenditure, £ million WIRE	WMNI	Total
A	Bristol Water FBP		73.2	57.7	130.9
B	Transfers and two-sided adjustments		52.6	5.5	58.1
C	FBP after transfers	A+B	125.7	63.2	189.0
D	Exceptional Items and CC exclusions		38.7	15.4	54.1
E	FBP after transfers and exceptionals	C–D	87.0	47.7	134.7
F	AMP4 adjusted expenditure		52.1	37.8	89.9
G	Expenditure subject to AMA challenge	**2 x (E–F)**	69.8	19.7	89.5
H	AMA score		3.1	3	
J	AMA challenge (%)	(4–H) x 25	23.1	25	
K	AMA challenge amount	GxJ	16.1	4.9	21.0

Source: CC analysis.

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[26]South East Water submission, pp5–6 ibid:
     www.competition-commission.org.uk/inquiries/ref2010/bristol/third_party_submissions.htm.
[27][✂]
[28][✂]

Capital expenditure incentive scheme

Introduction and summary

1. The capital expenditure incentive scheme (CIS) is a method of encouraging companies to make realistic capital expenditure (capex) projections without undermining their incentives to achieve efficiencies in realizing their capex plans. This appendix explains its rationale and how it works.

2. In order to set a price cap, regulators make projections of the revenue needed to cover regulated companies' costs, including capex. It is widely recognized that capex projections are more difficult for regulators than are operating expenditure (opex) projections because capex requirements differ from year to year, as well as from company to company:

    (a) A company may propose an over-ambitious capex plan and then not carry it out. To address this, a regulator needs a method of penalizing companies that do not achieve the projections underlying the regulator's price cap.

    (b) Following on from *(a)*, if a regulator judges capex simply by the amount spent, this gives the company the wrong incentives—it has an incentive to spend up to budget without necessarily making sure the money is spent efficiently. The best way of addressing this risk is for a regulator to define the 'outputs' that capex should achieve. In practice, outputs are a mixture of intermediate outputs such as completing specific projects and more final outputs such as maintaining asset serviceability (though even asset serviceability is an intermediate output—the ultimate outputs are the various dimensions of service itself).[1] Once outputs have been defined, it is usual for any savings (arising from actual capex being lower than projected capex) to be incorporated partially into future price caps, so that they are in effect shared between the company and its customers.

    (c) Even if a regulator has defined the required outputs, there are many difficulties in making unbiased projections at the time the price cap is set of the cost of achieving those outputs. The company is incentivized to exaggerate ('game') the capex in order to obtain a more generous price cap, or at least to make its projections on a highly conservative (ie risk averse) basis. Also, typically, regulators are less able to make projections than companies (due to 'information asymmetry') and therefore are reliant on companies' projections to some extent. It might appear that this could be dealt with by imposing penalties on companies which spent less on capex than they had projected (see *(a)* above) but this would remove the company's incentive to achieve capex efficiencies (by deterring the company from incurring the capex needed to operate most efficiently).

3. The CIS, which addresses the third of these issues, was introduced by Ofwat for the 2009 periodic review, although a broadly similar scheme (known as Information Quality Incentive (IQI)) has been used by Ofgem since 2004. Ofgem is currently carrying out a full review of its approach to price-cap regulation. Ofwat is also, concurrently with our redetermination, commencing a review of its approach to price-cap regulation (inter alia).

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[1] Ideally, outputs would be final in nature so that the company (which is likely to be better informed) rather than the regulator decides which projects are needed.

4.   The CIS fits into the calculation of K as follows:

      (a) Ofwat assesses companies' capex (using tools such as its Asset Management Assessment (AMA) process and cost base) and makes its own projection of each company's capex.

      (b) This is used to calculate the CIS ratio (the ratio of the company's projected capex to Ofwat's projected capex for Ofwat's required outputs) and various associated numbers.

      (c) These associated numbers (together with many other numbers) are fed into the financial model which is used to calculate K.

      This appendix is concerned with the second of these steps, *(b)* above.

5.   Incentivizing accurate capex projections requires that the regulator's projections are independent of the company's projections (otherwise the company still has the incentive to exaggerate its capex knowing that Ofwat will 'aim off' from its projections which it is therefore incentivized to pitch high). It is not clear that this condition of independent assessment is satisfied for CIS. The CIS does not seem to have had the result of pushing CIS ratios for water services to around 100, as would have been expected if CIS were incentivizing accurate projections (though the present outcome is equally consistent both with companies over-projecting and with Ofwat under-projecting).[2] Ofwat told us that, in practice, a regulator's projections could never be entirely free of the influence of the company's management and that it would not necessarily agree that the intended result of CIS was to push CIS ratios to 100. Ofwat said a key aim was introducing incentives around business planning and that it would argue this aim had been achieved.[3]

6.   In the remainder of this appendix, we: (i) explain Ofwat's treatment of capex at previous reviews; (ii) explain what CIS seeks to do, and why; (iii) discuss how it has worked in practice, (iv) summarize comments on CIS from Bristol Water and a third party, South East Water; (v) summarize Ofwat's response to Bristol Water; (vi) discuss this evidence and (vii) show the difference between our estimate of the CIS ratio and Ofwat's.

Ofwat's treatment of capex at previous periodic reviews

7.   To understand the CIS, it is helpful to set out our understanding of how capex was dealt with at previous reviews.

8.   In previous periodic reviews, Ofwat has based its price caps on its own projections of the company's required capex, and has based regulatory capital value (RCV) for the following periods on companies' actual capex (unless actual spend was above Ofwat's projected capex in which case Ofwat used its own projected capex).[4] In practice, companies have been quite successful in keeping capex within Ofwat's projections: Ofwat stated that in PR09 it excluded £305 million from RCV due to companies spending more than it projected, but this only represents about 1.5 per cent of Ofwat's total projected capex at PR04.[5] Ofwat told us that the logging-up process provided a vehicle for companies to argue that extra outputs of benefit to

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[2]However, results for sewerage services are somewhat closer to 100 per cent.
[3][✂]
[4]Also, in order to increase companies' incentive to control capex towards the end of the period, Ofwat's projected capex was retained in RCV for five years from the date the money was projected to be spent.
[5]www.ofwat.gov.uk/pricereview/pr09phase3/det_pr09_finalchap5.pdf.

consumers had been delivered efficiently, and that capital expenditure overspends should be recognized. Ofwat added that many companies had made this case successfully.[6]

9.   Annex 1, summarized in Table 1, gives an example of how this calculation is made.[7] We consider a hypothetical company and assume that it delivers the required outputs. However, we make three different assumptions about how actual capex relates to Ofwat's projected capex:

(a) In Case A, Ofwat projects capex of 100 and the company spends 100 with a net present value (NPV)[8] of 82.1; assuming continuing regulation, it earns revenue from charging present and future customers with an NPV of 82.1 and hence earns exactly the cost of capital on its investment. (Of course the amount paid by present as opposed to future customers will depend on the life of the assets concerned: if the investment is made at the start of the period and the asset life is five years or less, the whole amount will be paid in the period for which the price cap is being set but otherwise some of the amount will be paid in future price-cap periods.)

(b) In Case B, Ofwat projects capex of 100 and the company spends 120 with an NPV of 98.5. However, Ofwat does not increase RCV if actual capex exceeds Ofwat capex (see paragraph 8) and hence customers pay the same as in Case A. The additional net present cost of 16.4 is paid by the company.

TABLE 1   **Impact of different levels of capex (old system)**

	A	B	C
Ofwat capex	100	100	100
Actual capex	100	120	90
NPV actual capex	82.11	98.54	73.90
compared with A		−16.42	8.21
NPV revenue	82.11	82.11	76.25
compared with A		0.00	5.87
NPV gain/loss to company	0.00	−16.42	2.34
Efficiency incentive (%)		100	29

Source: CC calculations (see Annex 1).

(c) In Case C (which history suggests is more likely than Case B), the company spends less than Ofwat's projected capex. Compared with Case A, the company gains because it spends less in the next period than Ofwat assumed when setting the price cap; but (future) customers also gain because RCV is lower over the following five years and hence future price caps are lower.

Under the old system, the company had a very strong incentive to ensure that capex did not exceed Ofwat's projected capex since it, rather than customers, bore all additional costs (efficiency incentive of 100 per cent, Case B in Table 1), but it also had an incentive to reduce capex below Ofwat's projected capex since it obtained a share of the savings (efficiency incentive of 29 per cent,[9] Case C in Table 1).

10.   Arguably, the old system had the following disadvantages:

(a) companies had an incentive to exaggerate their capex in their business plans;

(b) companies had a strong incentive not to exceed Ofwat's allowed capex, with the result that, in effect, it was Ofwat which decided what investment projects would be carried out (beyond those that were required by the environmental regulators); and

(c) as the cap was applied to total capex and companies overspending on projects required by environmental regulators could consequently stay within the cap by delaying maintenance expenditure, a further result could have been deferring maintenance expenditure.

What the CIS seeks to do and why

11. Ofwat said in its framework and approach document that the CIS would improve incentives for companies to submit realistic business plans, with consequent benefits for consumers.[10] Ofwat has also said that it gives companies strong incentives continually to seek out more efficient ways of delivering the expected outputs.[11] Ofwat told us that the disadvantages CIS aimed to address included:[12]

(a) the lack of any financial incentive for companies to be disciplined in the scoping or pricing of capital programmes;

(b) the incentive for companies to 'game' output definition—over-scoping the required asset improvements to deliver given 'outcomes';

(c) the likelihood that the information elicited through the business planning process, and on which Ofwat relied, would be biased;

(d) the creation and reinforcement of a 'shopping list' culture within companies that each item of capex should be itemized and specifically budgeted to Ofwat, and that the price review process itself set 'budgets' for particular purposes within companies; and

(e) the progressive reinforcement of a need for further intrusive regulatory oversight of companies' capex planning.

12. The way CIS has worked is:

(a) Companies submitted draft business plans. From these plans Ofwat calculated its own preliminary view of each company's capex (described as the draft baseline, issued December 2008) and issued a matrix showing the incentives companies would ultimately face for different combinations of projected and actual capex relative to Ofwat's projected capex (see Annex 2).

(b) In the light of this information from Ofwat, companies submitted final business plans (FBPs) giving their final view on projected capex and Ofwat revised its own view of projected capex and issued its draft determinations in August 2009.

(c) Companies made representations on Ofwat's draft determinations, including Ofwat's projected capex, and Ofwat issued its final determinations in November 2009.

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[10]www.ofwat.gov.uk/pricereview/pap_pos_pr09method080327.pdf.
[11]www.ofwat.gov.uk/pricereview/pr09phase2/pap_pos_cis191208.pdf.
[12][✂]

13. A key difference with the old system is that companies' rewards now depended on their own projected capex as well as Ofwat's projected capex and actual capex. In principle, the CIS matrix (see Annex 2) gives companies the incentive to submit unbiased projections of capex.

14. A simplified version of the CIS matrix is shown in Table 2. Our understanding of the way it was intended to work is as follows. First, suppose the company projects capex on a very risk-averse basis at £120 million. Ofwat then makes its own less risk-averse projection of £100 million giving a CIS ratio of 120 (calculated as company's projection/Ofwat's projection x 100). Suppose the company now makes a more realistic capex projection of, say, £90 million. It looks at the matrix and sees that, with a CIS ratio of 120, actual capex of 90 gives it an incentive payment of £1 million (top right-hand figure in the Table 2 matrix). However, the company can also see that if it submits a more realistic projection of £90 million in its FBP, its CIS ratio is 90 and it gets a larger incentive payment of £3.5 million (top left-hand figure in the Table 2 matrix).

TABLE 2 **Simplified CIS matrix**

CIS ratio*	90	100	110	120
Actual capex ratio	Matrix showing total incentive payment (relative to Ofwat projected capex)			
90	**3.50**	3.00	2.25	1.00
100	−0.25	**0.00**	−0.25	−1.00
110	−4.00	−3.00	**−2.75**	−3.00
120	−7.75	−6.00	−5.25	**−5.00**

Source: Annex 2.

*The CIS ratio is the company's projected capex as a percentage of Ofwat's projected capex.

15. Under the Ofwat CIS matrix, the company is in principle incentivized to submit realistic capex projections for values of the CIS ratio up to 130. This is achieved through a number of changes from the old system (and some maths[13]):

(a) Ofwat now calculates K using an allowed capex figure that is greater than its own projected capex (for CIS ratios of less than 130 it is one-quarter of the way between Ofwat's projected capex and the company's own projection).[14]

(b) However, companies submitting projected capex above Ofwat's projected capex are penalized by a reduction in required revenue, while companies submitting projected capex below Ofwat's projected capex benefit from an increase in required revenue.

Both *(a)* and *(b)* affect required revenue in the forthcoming price-cap period and hence prices for 2010/11 to 2014/15. The two effects go in opposite directions.

(c) At the end of the period (ie the end of 2014/15), there is a further 'trueing up' adjustment that ensures companies earn a total incentive payment in line with that in the CIS matrix (see Table 2 and Annex 2).[15]

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[13]The underlying mathematical functions define the matrix for all values of the CIS ratio and the actual capex ratio.
[14]Ofwat also stated that it changed its approach to the cost base and hence one of the factors that determined its capex projections. At previous periodic reviews, Ofwat's capex projections were based on the costs of the company at the efficiency frontier, whereas at this periodic review Ofwat projected capex on the basis of an averagely efficient company.
[15]Also actual capex would be used in RCV from the start of the next period (under the old system, projected RCV was retained in RCV for five years from the date the money was projected to be spent, see the first footnote to paragraph 8).

16. Table 3 shows the calculations for Cases A, B and C in Table 3 under the CIS system (assuming CIS ratios of 120 and 100).[16] Table 3 illustrates that the efficiency incentive is now the same for increases above and below Ofwat's projected capex (it is 30 per cent for a CIS ratio of 100 and 20 per cent for a CIS ratio of 120).

TABLE 3 **Impact of different levels of capex (CIS system assuming CIS ratios of 120 and 100)**

	A	B	C	A	B	C
CIS ratio	120	120	120	100	100	100
Ofwat capex	100	100	100	100	100	100
Actual capex	100	120	90	100	120	90
NPV actual capex	82.11	98.54	73.90	82.11	98.54	73.90
compared with A		(16.42)	8.21	0.00	(16.42)	8.21
NPV revenue	81.29	94.43	74.72	82.11	93.61	76.36
compared with A		(13.14)	6.57		(11.49)	5.75
NPV gain/loss to company	−0.82	−4.11	0.82	0.00	−4.93	2.46
compared with A		(3.28)	1.64		(4.93)	2.46
Efficiency incentive (%)		20	20		30	30

Source: CC calculations (see Annex 3).

17. Figure 1 illustrates the comparison between the old system and CIS. Under the old system, the incentive depended on actual capex relative to Ofwat's projection. Figure 1 shows the large discontinuity whereby the efficiency incentive was 29 per cent for actual capex ratio of below 100 and 100 per cent for actual capex ratio of above 100. Under the CIS system, the incentive depends on the CIS ratio (ie company-projected capex relative to Ofwat's projection) and for each CIS ratio the line in Figure 1 is flat. Under the CIS system, there is much less disincentive to spend over Ofwat's capex (an overspending company loses 20 per cent of the investment at a CIS ratio of 120 and 30 per cent at a CIS ratio of 100, compared with 100 per cent under the old system).

FIGURE 1

Capex efficiency incentives
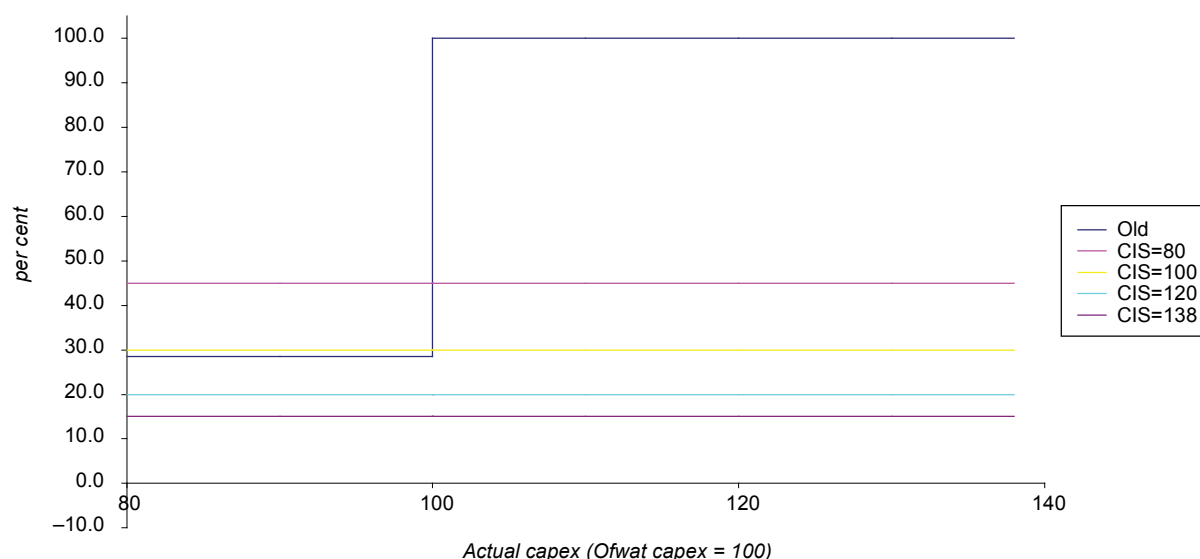
Source: CC.

[16] Annex 3 shows the underlying calculations for a CIS ratio of 120. Based on Ofwat documents, we have assumed that the ratios refer to undiscounted capex and have computed the NPVs implied by undiscounted capex spread evenly over the period. If the ratios refer to NPVs, this would not affect the overall pattern.

How CIS has worked in practice

18.   Bristol Water's CIS ratio in Ofwat's final determination is 138. This means that Bristol Water's assessment of the capex it needs to spend is 38 per cent higher than Ofwat's assessment and that, even if Bristol Water's actual capex was in line with Ofwat's projection, Bristol Water gets a net reduction in required revenue (over the five years) equal to 2.65 per cent of Ofwat's projected capex (also over the five years).[17]

19.   As noted above, the principle of the CIS system is that companies are incentivized to submit unbiased capex projections in their FBPs. This requires that Ofwat's capex projections are independent of the company's projections; otherwise the company still has the incentive to exaggerate its capex. For example, reverting to Table 2, we noted that a company which submitted a very risk-averse projected capex of 120 but expected to spend only 90 would in principle be incentivized by the CIS matrix to revise its capex projection from 120 to 90 (as this increases its incentive payment from 1 to 3.5). However, this assumes that Ofwat's projected capex of 100 (and hence the CIS ratio) is not influenced by the company's own projection. If, however, we assume that the reduction in the company's projected capex from 120 to 90 leads Ofwat to reduce its capex to 90, both the CIS ratio and the actual capex ratio go up to 100 and the incentive payment changes to zero, which leaves the company worse off than before (when company-projected capex of 120 and Ofwat-projected capex of 100 led to incentive payment of 1). It appears that the company is better off submitting upward biased capex as long as this increases Ofwat's projected capex by more than roughly one-third, ie if an upward bias of 30 per cent increases Ofwat's projected capex by around 10 per cent or more.

20.   It is not clear to us that Ofwat's capex projections are independent of companies' own projections. Ofwat tends to develop its capex projections through a series of challenges to companies' capex proposals, which suggests that it may be influenced materially by the level of companies' projected capex. Table 4 shows capex projections for all companies at different stages of the periodic review. The position is complicated by the adjustments (see paragraph 28), but companies' projected capex did reduce between draft and final business plans. This is consistent with CIS principles, albeit it is difficult to draw inferences since such reductions may have occurred even in the absence of CIS. Table 4 also shows that Ofwat increased its projected capex between draft determination and final determination,[18] leading to a further reduction in CIS ratios. In a CIS context, such an increase does not appear to have desirable incentive features since it means that companies submitted capex projections in their FBPs without full information about the consequences. Furthermore, if companies expected that keeping higher projected capex in their FBPs would have influenced Ofwat's projected capex, this would tend to undermine their incentive to make accurate projections. Annex 4 compares Ofwat's adjustment to its projected capex with companies' CIS ratios at draft determination: it suggests that Ofwat increased its projected capex more for companies with higher CIS ratios at draft determination,[19] giving further support to the idea that companies might have expected that keeping higher projected capex in their FBPs would have influenced Ofwat's projected capex, at least if they had anticipated Ofwat's reaction.

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[17]This is the incentive payment in the CIS matrix (see Table 2 and Annex 2).
[18]However, there was little difference between Ofwat's capex projections in its December 2008 draft baseline and those in its August 2009 draft determinations.
[19]OLS regression shows that the relationship is positive and statistically significant at the 1 per cent level.

TABLE 4 **Capex projections and CIS ratios at different stages of PR09**

| | All companies | | | |
| | Capex £bn | | CIS ratio | |
	Companies	Ofwat	Ratio	% change
Draft business plan	27.4			
Adjusted draft business plan	24.3			
Ofwat draft baseline		19.1	127.0	
Final business plan	24.2			
Adjusted final business plan (draft determination)	22.5			
Ofwat draft determination baseline		19.2	116.9	–8.0
Adjusted final business plan (final determination)	23.0			
Ofwat final determination baseline		21.5	106.7	–8.7

Source: CC calculations based for all companies on published Ofwat documents (*Capital expenditure for 2010–15: Ofwat's view on companies' draft business plans*; *Future water and sewerage charges 2010–15: Draft determinations*; and *Future water and sewerage charges 2010–15: final determinations*).

Note: For Bristol Water, Ofwat's draft CIS ratio was 143 and its final determination CIS ratio was 138, reflecting not much movement in either Bristol Water's or Ofwat's capex. For reasons that are unclear to us, Bristol Water's draft determination CIS ratio was higher than both at 161.

21.   Ofwat told us that it was important to remember that the CIS addressed a more nuanced problem than a simple question of 'has the company exaggerated its cost forecasts by X per cent?' Ofwat said that, in practice, the CIS worked as an incentive around discipline in capex programming: if a company included poorly justified expenditures (eg poorly justified resilience schemes) then these would not be included in the baseline, resulting in a higher CIS ratio. Ofwat added that the challenges it applied were not subject to control by company management; they were based on independent review and scrutiny, informed by comparisons with other company submissions. Ofwat said that the increase in its projected capex was the result in large part of an improvement in the quality of evidence provided by companies, through subsequent submissions and clarifications, and the commitment of companies in a number of cases to the delivery of more clearly specified outputs, which allowed Ofwat to include the expenditure in its baseline.[20] Ofwat argued that this demonstrated the desirable incentive features of the CIS process. In Ofwat's view, it would clearly have been perverse for the regulator to wilfully ignore evidence which had become available, and if it were to have done so, this would have had the undesirable outcome of failing to elicit such evidence. Ofwat also said its strong view was that the incentive properties of the CIS would be maintained if its review process was sufficiently robust, and informed by sufficient independent insight, to be able to identify poorly justified expenditure. Ofwat believed that its methods were able to do this, and that any company that submitted inflated or 'gamed' business plans was taking a high risk strategy.

22.   The principles underlying CIS suggest that we would expect CIS ratios to cluster around 100. Table 5 shows that this has not been the case for water services. CIS ratios, especially for the WoCs, have tended to exceed 100 (though results for sewerage are closer to 100). Moreover, the CIS ratio in Ofwat's final determination for Bristol Water and three other companies[21] is in excess of 128. Bristol Water and one other company have a CIS ratio significantly in excess of 130, despite the fact that capex increasing the CIS ratio above 130 gives them no advantage at all.[22] This would tend to be consistent with the idea that companies submitted high capex projections in their FBPs in the hope that this would influence Ofwat to increase its capex projections in its final determinations (although it would also be consistent with

[20][✄]
[21]All of these are also WoCs: South East (129), Veolia East (143), Veolia Central (131).
[22]The CIS incentives are capped at 130 meaning a company is unambiguously worse off if its CIS ratio is over 130.

Ofwat's capex projections being too low). Ofwat said that, while it would expect CIS ratios to cluster around 100 in the long term, in the short term some learning could be required for regulated companies to internalize fully the implications of the CIS for their business planning.

TABLE 5 **CIS ratios in Ofwat's final determination**

	Water	Sewerage
WaSCs		
Anglian	105	99
Dŵr Cymru	105	106
Northumbrian	103	101
Severn Trent	102	102
South West	105	110
Southern	122	112
Thames	125	108
United Utilities	94	108
Wessex	104	97
Yorkshire	100	93
WoCs		
Bournemouth & W Hants	115	
Bristol	138	
Cambridge	101	
Dee Valley	99	
Veolia South East	119	
Portsmouth	108	
South East	129	
South Staffs	107	
Sutton & East Surrey	124	
Veolia East	143	
Veolia Central	<u>131</u>	
Total industry	109	105

Source: Ofwat.

23. Overall, it is not clear that the CIS framework has induced companies to submit unbiased capex projections during the 2009 periodic review. Ofwat said that it was possible that many companies had failed to understand the full implications of submitting poorly justified capex plans, and that, as a result, these companies had received a less favourable price settlement in respect of capex. Ofwat added that it was possible that a future application of the CIS would induce a more comprehensive response from companies.[23] This suggests that CIS is unlikely to be fully effective in incentivizing accurate projections, but that it may, nevertheless, have advantages over the old system.

24. As noted above, compared with the old system, the CIS framework also reduces companies' disincentive to spend in excess of Ofwat's projected capex. In principle, this increases flexibility and makes the system more robust to any errors in Ofwat's capex projections. It will only be possible to assess the benefits of greater flexibility at the end of the current price-cap period (2014/15). The downside to this aspect is that companies also tend to have less incentive to seek capex efficiencies (they have much less incentive to control increases in capex above Ofwat's projected level where the old system had an efficiency incentive of 100 per cent and also less incentive to achieve reductions for values of the CIS ratio above 102).[24]

Bristol Water's and South East Water's arguments

25. During the initial phases of the 2009 periodic review, the companies, including Bristol Water, supported the introduction of CIS. During the course of the periodic review,

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[23][✂]
[24]The efficiency incentive in the CIS matrix drops below 29 per cent for CIS ratios above 102.

companies' attitudes became less supportive, in particular following Ofwat's decision at the time of its draft determinations to change the CIS matrix for companies with CIS ratios in excess of 130. South East Water highlighted what it regarded as Ofwat's poor signalling of changes to CIS, and said that Ofwat's removal (between its draft and final determination) of the originally proposed menu choice left South East Water in a position where it was impossible to predict the likely Ofwat baseline and therefore any likely incentives that may or may not have been available to South East Water.[25]

26. Bristol Water told us that there were a number of weaknesses in the CIS mechanism which undermined its effectiveness, and penalized companies, such as Bristol Water, inappropriately. Bristol Water said that we should reverse Ofwat's CIS adjustments in full.[26]

27. Bristol Water argued that the CIS was fatally flawed in many respects and, despite Ofwat making changes during the course of the periodic review, remained unfit for purpose. One of the consequences, it argued, was that Bristol Water had been penalized unjustly by £8.6 million of revenue reductions for including schemes in its FBP that Bristol Water regarded as cost beneficial and supported by customers.[27]

28. We understand Bristol Water to be making two points here:

   (a) CIS unfairly penalizes Bristol Water; and

   (b) Ofwat excluded schemes that were cost beneficial and supported by customers.

   The second point may be interpreted as an argument that Ofwat should have made two-sided adjustments rather than one-sided adjustments, because Bristol Water's proposed capex has benefits in the form of increased outputs (for example, greater resilience). South East Water said that it believed that Ofwat had applied two-sided adjustments to an overly narrow range of situations and set out the wider range of circumstances which it believed should have led to two-sided adjustments.[28]

29. Subsequently, Bristol Water said that its biggest concern with CIS was the fundamental one that Ofwat's baseline was not correct. Bristol Water said it had not 'overbid' the cost of its capex and its capex projections were the correct ones.[29]

30. While Bristol Water did not accept that any adjustment to its capex projections should be made, it also said that it was wrong for the regulator to make one-sided adjustments where the regulator judged that the proposed outputs were not needed. Bristol Water suggested that, even if we did not accept its proposed capex, we should make two-sided adjustments for its proposed resilience schemes, mains replacements, trunk main relining, optional meter installations and smart metering. Bristol Water accepted that an AMA-type adjustment could be one-sided if based on a realistic assessment of the cost of delivering stable serviceability, but it said that Ofwat's AMA adjustment was not of this type.[30]

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[25]www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/ 100331_south_east_waters_%20submission_to_the_cc%20on_bristol_vs_2_2_.pdf.
[26]SoC, paragraphs 868 & 889.
[27]SoC, paragraph 25.
[28]South East Water's proposals are set out in its submission: www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/ 100331_south_east_waters_%20submission_to_the_cc%20on_bristol_vs_2_2_.pdf.
[29][✂]
[30][✂]

31. Bristol Water also made a number of more specific points about CIS:[31]

 (a) Ofwat's CIS matrix differed from those applied by Ofgem in its IQI application to electricity and gas;

 (b) Ofwat's two-sided adjustments were not neutral;

 (c) the CIS penalized WoCs unfairly;

 (d) by applying cascading reductions on the allowed capex, Ofwat double counted the scope for any efficiency savings; and

 (e) Ofwat's baseline was not a better assessment of the likely cost than a company's FBP.

Ofwat's responses

32. Ofwat disputed that CIS was flawed and reiterated its view that its CIS approach provided the incentive for a company to reveal its true costs ex ante and the incentive to outperform the assumed cost ex post.[32] Ofwat said it had set out clearly the process for CIS at an early stage of PR09 (eg in March 2008 in its Framework paper) and throughout the process. In response to the point made by South East Water (the removal of the originally proposed menu choice), Ofwat said that this was clarified in its March 2008 PR09 Framework paper, before the companies had submitted their draft business plans, leaving ample time for them to respond.[33]

33. Ofwat also stated[34] that the £8.6 million penalty to which Bristol Water referred was ameliorated because:

 (a) Bristol Water's allowed capex was increased by about one-fifth[35] of the difference between its projected capex and Ofwat's projection.

 (b) Ofwat's projected capex (its baseline) included a central view rather than a frontier approach to efficiency. Ofwat said that the capex forecasts embodied in its PR09 baseline were less challenging than the forecasts included in previous price limits so it was easier for companies to outperform the PR09 capex baseline assumptions than PR04-style capex assumptions, which were based on a frontier efficiency style challenge.[36]

34. Ofwat told us that it accepted that companies with CIS ratios of more than 100 might earn less than the cost of capital even if their actual capex was in line with Ofwat's baseline capex projections, all other things being equal to regulatory predictions. However, Ofwat said that its functions did not include a duty to support inefficient companies, or to allow them to continue to be inefficient. To allow a company to continue to be inefficient would be inconsistent with the duties of protecting the interests of consumers and promoting efficiency. Accordingly, Ofwat interpreted its section 2(2A) duty to include a requirement to exercise its powers in the manner best calculated to secure that efficient companies were able to finance the proper carrying out of their functions, in particular by securing reasonable returns on their capital.

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[31]SoC, paragraphs 861–886.
[32]Ofwat response to Bristol Water SoC, paragraph 3.7.4 & Annex B, paragraph 2.4.3.
[33][✂]
[34][✂]
[35]As discussed above, the increase in capex was one-quarter of the difference for companies with CIS ratios up to 130 but was lower for companies such as Bristol Water with CIS ratios above 130.
[36][✂]

Consequently, incentive schemes, such as the CIS, were compatible with section 2(2A) in so far as they promoted efficiency by providing appropriate ongoing incentives to better and more accurate estimation of business plans. Ofwat said that the production of well-balanced, evidence-based, business plans disincentivized gaming, including exaggerating capex requirements and over-scoping the required asset improvements to deliver given outcomes. Ofwat also said that, in practice, the impact of CIS on allowed returns over a five-year regulatory period was not so material as to give rise to concern, since there were a number of checks and balances that ameliorated the impact.

35. On the subject of two-sided versus one-sided adjustments, Ofwat said that its approach to two-sided challenges was set out in its December 2008 document and in its final determination document. These documents stated that Ofwat applied two-sided adjustments only where a challenge or exclusion reflected new guidance on regulatory expectations or outputs (or where Ofwat corrected minor errors). Ofwat said that the incentives for better business planning and information revelation would simply not exist if challenges were implemented on a two-sided basis: the CIS was always clearly about more than pure efficiency—it was intended to be around the overall balance and quality of business plans, addressing at least part of the problem of 'information asymmetry'. Ofwat added that its CIS matrix and the nature of its challenges were communicated clearly to companies before they submitted their final business plans. Ofwat said that its draft baseline constituted a major exercise in exposing the nature of the process to the companies before the submission of their final business plans.

Discussion

36. We used our capex projections as the baseline for any CIS calculations (for our assessment of capex, see Appendix E).

37. We considered two main points about the CIS:

    (a) Whether Ofwat's negative CIS adjustments mean that Bristol Water is unable to finance the proper carrying out of its functions. Ofwat argued that this was not the case as 'the proper carrying out' of functions implied efficiency and an efficient company would not have negative CIS adjustments.

    (b) Whether two-sided adjustments should be limited, as in Ofwat's final determin-ation, to areas where there has been a change during the course of the periodic review, or applied more broadly to areas where there was a difference in view about the outputs required (as proposed by Bristol Water). Ofwat said that CIS was about more than pure efficiency, as it was intended to be around the overall balance and quality of business plans as well.

    These points are considered in our main report. In this appendix we discuss some of the other points raised.

38. With regard to Bristol Water's more specific points (see paragraph 31), we note the following:

    (a) In so far as Ofwat's and Ofgem's approaches differ, Bristol Water has not demon-strated that Ofwat's approach is less good, given that there may be underlying differences between the sectors. Furthermore, Ofwat argued that the differences in the incentive payment matrices were attributable to differences in the approach to the capex projections that determined the incentive payments.

(b) We consider that two-sided adjustments are neutral and the way that Ofwat calculates two-sided adjustments (adjustments to exclude differences in outputs) appears to be correct. Bristol Water's table[37] shows that the first company projects Ofwat's outputs to cost 50 per cent more than Ofwat (150/100) and achieves a CIS ratio of 150, while the second company projects Ofwat's outputs to cost 33 per cent more than Ofwat (200/150) and achieves a CIS ratio of 133.

(c) CIS ratios for WoCs are higher (see Table 5), but this does not demonstrate that the WoCs are penalized unfairly. Bristol Water argued that WoCs suffered from a lack of economies of scale and scope and lower purchasing power but, if this is true, it is not clear that it has affected Bristol Water's CIS ratio (its capex efficiency was slightly better than average). Bristol Water also argued that the WoCs needed higher capex because they had spent less in recent years. However, this is not an argument about CIS; it is about the underlying capex projections.

(d) The CIS does not in itself apply an efficiency reduction to capex. While the CIS framework has a negative impact on some companies which may increase the impact of efficiency reductions, this is an inevitable result of an approach that combines an incentive to achieve capex efficiencies with an incentive to reduce gaming.

(e) This is not an argument about CIS; it is about the underlying capex projections.

39. With regard to Ofwat's argument that the £8.6 million penalty to which Bristol Water referred was ameliorated (see paragraph 33(a)), we note that, even after allowing for Bristol Water's allowed capex being increased by one-fifth of the difference between its projected capex and Ofwat's projection, under the CIS framework Bristol Water would expect to earn less than the cost of capital on its capex even if that capex were in line with Ofwat's own projection. We estimate this as £6 million over five years for Bristol Water in Ofwat's final determination (Ofwat projected capex of £227 million times CIS incentive payment of 2.65 per cent).

40. As regards Ofwat's statement that its baseline included a central view rather than a frontier approach to efficiency (see paragraph 33(b)), it is not clear what inference should be drawn. We consider that it is the expected capex that is relevant to whether the company earns the cost of capital on its capex. Ofwat refers to its projected capex being a 'central view' and it was not clear why capex should be expected to be below Ofwat's own capex projection to offset the negative impact of the CIS incentive payment. Furthermore, the relevance of a comparison to Ofwat's previous periodic review[38] is unclear since there may have been other relevant differences, for example, over the cost of capital where the approach in the previous review seems to have been more generous.

Calculation of CIS ratios

41. As explained in the main text, we agree with Ofwat's approach to CIS. In calculating the CIS ratio, we have therefore only made two-sided adjustments where Ofwat did so or if we ourselves did not fund expenditure that Ofwat did fund (in practice the only example of this was the Cheddar 2 scheme which was already an Ofwat two-sided adjustment). We took the capex Bristol Water proposed in its SoC as the starting point for our CIS calculation and calculated a CIS ratio of 128. Table 6 shows a

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[37]Table 53 in Bristol Water SoC.
[38]In its published final determination document (Appendix 5, p161), Ofwat stated that the efficiency challenge built into its capex baseline was less tough than at previous price reviews.

comparison between the ratio of 128 for our redetermination and Ofwat's CIS ratio of 138.

TABLE 6 **CIS summary**

	CC	Ofwat
FBP net capex	319.1	319.1
SoC changes to FBP net capex	1.0	
Net capex	320.1	319.1
Two-sided adjustments		
Lead CP quality scheme	0.0	–0.2
Honeyhurst-Cheddar	–2.8	–2.8
Cheddar 2	–5.8	–1.5
Total two-sided adjustments	-8.6	–4.5
Adjusted net capex*	311.4	314.6
CC/Ofwat net capex	243.5	227.3
CIS ratio†	128	138

Source: CC calculations.

*Sum of net capex and two-sided adjustments.
†Adjusted net capex divided by CC/Ofwat net capex.

Impact of different levels of capex on revenue required from customers and on company under old system

Assumptions

Ofwat capex	100	spread evenly over 5 years
Asset life	50	years
Inflation	0	%

For simplicity we assume an effective tax rate of 28% and that all cash flows accrue at the end of the year. Hence pre-tax return is equal to RCV at start year times pre-tax WACC.

Pre-tax WACC 6.95 % (assumes vanilla WACC of 5.5%, effective tax rate of 28%, cost of equity of 7.1% and gearing of 52.5%)

See spreadsheet version

TABLE A **Impact assuming actual capex equals Ofwat capex**

	NPV*	Year										Comment
		1	2	3	4	5	6	7	8	9	10	
Capex	82.11	20	20	20	20	20						
Depreciation		0.4	0.8	1.2	1.6	2	2	2	2	2	2	Cumulative capex divided by asset life
RCV† end year		19.6	38.8	57.6	76	94	92	90	88	86	84	RCV at start of year plus capex less depreciation (this table concerned only with new assets arising from capex in years 1 to 5, so RCV at start of year 1 is zero).
Pre-tax return			1.36	2.70	4.00	5.28	6.53	6.39	6.25	6.12	5.98	RCV at start of year times pre-tax WACC
Revenue years 1 to 5	14.94	0.40	2.16	3.90	5.60	7.28						Depreciation plus pre-tax return
Revenue years 6 to 10	24.28						8.53	8.39	8.25	8.12	7.98	See line above
Revenue future	42.90											Assuming continued regulation, end year 10 NPV of future required revenue=RCV at end year 10.
Total revenue	82.11											Sum of three lines above
NPV to company	0.00											NPV of revenue less NPV of capex

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

TABLE B **Impact assuming actual capex is greater than Ofwat capex**

	NPV*	Year									
		1	2	3	4	5	6	7	8	9	10
Actual capex to Ofwat capex		1.2	1.2	1.2	1.2	1.2					
Actual capex	98.54	24	24	24	24	24					
Actual depreciation		0.48	0.96	1.44	1.92	2.4	2.4	2.4	2.4	2.4	2.4
Allowed capex†		20	20	20	20	20					
Allowed depreciation†		0.4	0.8	1.2	1.6	2					
RCV‡ end year		19.6	38.8	57.6	76	94	91.6	89.2	86.8	84.4	82
Pre-tax return			1.36	2.70	4.00	5.28	6.53	6.37	6.20	6.03	5.87
Revenue years 1 to 5	14.94	0.40	2.16	3.90	5.60	7.28					
Revenue years 6 to 10	25.30						8.93	8.77	8.60	8.43	8.27
Revenue future	41.88										
Total revenue	82.11										
NPV to company	(16.42)										

RCV at start of year plus capex less depreciation. The calculation of return and revenue in years 1 to 5 is based on allowed capex and depreciation. The calculation of return and revenue after year 5 reflects actual depreciation and after five years the lower of actual capex and allowed capex.

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†'Allowed' capex and depreciation is that allowed into the calculation of required revenue for years 1 to 5.
‡RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

TABLE C   **Impact assuming actual capex is less than Ofwat capex**

	NPV*	Year									
		1	2	3	4	5	6	7	8	9	10
Actual capex to Ofwat capex		0.9	0.9	0.9	0.9	0.9					
Actual capex	73.90	18	18	18	18	18					
Actual depreciation		0.36	0.72	1.08	1.44	1.8	1.8	1.8	1.8	1.8	1.8
Allowed capex†		20	20	20	20	20					
Allowed depreciation†		0.4	0.8	1.2	1.6	2					
RCV‡ end year		19.6	38.8	57.6	76	94	90.2	86.4	82.6	78.8	75
Pre-tax return			1.36	2.70	4.00	5.28	6.53	6.27	6.00	5.74	5.48
Revenue years 1 to 5	14.94	0.40	2.16	3.90	5.60	7.28					
Revenue years 6 to 10	23.00						8.33	8.07	7.80	7.54	7.28
Revenue future	38.31										
Total revenue	76.25										
NPV to company	2.34										

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†'Allowed' capex and depreciation is that allowed into the calculation of required revenue for years 1 to 5.
‡RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

Ofwat's CIS matrix

The matrix (the section inside the double lined box) shows total incentives for different combinations of CIS ratio (ratio of company to Ofwat-projected capex) and actual capex ratio (ratio of actual capex to Ofwat projected capex).

For CIS ratios up to 130 the highest incentive payment is always obtained where actual capex ratio is equal to CIS ratio (shaded cells). If Ofwat's projected capex is independent of the company's projected capex, the company always has the incentive to submit projected capex equal to its expectation of actual capex.

												Bristol
CIS ratio*	80	85	90	95	100	105	110	115	120	125	130	138
Efficiency incentive†	45.00%	41.25%	37.50%	33.75%	30.00%	27.50%	25.00%	22.50%	20.00%	17.50%	15.00%	15.00%
Allowed capex	95	96.25	97.5	98.75	100	101.25	102.5	103.75	105	106.25	107.5	107.5
Additional income	1.00	0.89	0.69	0.39	0.00	−0.41	−0.88	−1.41	−2.00	−2.66	−3.38	−3.78
Actual capex ratio	Total incentive payment (relative to Ofwat projected capex)‡											
80	**7.75**	7.59	7.25	6.72	6.00	5.44	4.75	3.94	3.00	1.94	0.75	0.35
85	5.50	**5.53**	5.38	5.03	4.50	4.06	3.50	2.81	2.00	1.06	0.00	−0.40
90	3.25	3.47	**3.50**	3.34	3.00	2.69	2.25	1.69	1.00	0.19	−0.75	−1.15
95	1.00	1.41	1.63	**1.66**	1.50	1.31	1.00	0.56	0.00	−0.69	−1.50	−1.90
100	−1.25	−0.66	−0.25	−0.03	**0.00**	−0.06	−0.25	−0.56	−1.00	−1.56	−2.25	−2.65
105	−3.50	−2.72	−2.13	−1.72	−1.50	**−1.44**	−1.50	−1.69	−2.00	−2.44	−3.00	−3.40
110	−5.75	−4.78	−4.00	−3.41	−3.00	−2.81	**−2.75**	−2.81	−3.00	−3.31	−3.75	−4.15
115	−8.00	−6.84	−5.88	−5.09	−4.50	−4.19	−4.00	**−3.94**	−4.00	−4.19	−4.50	−4.90
120	−10.25	−8.91	−7.75	−6.78	−6.00	−5.56	−5.25	−5.06	**−5.00**	−5.06	−5.25	−5.65
125	−12.50	−10.97	−9.63	−8.47	−7.50	−6.94	−6.50	−6.19	−6.00	**−5.94**	−6.00	−6.40
130	−14.75	−13.03	−11.50	−10.16	−9.00	−8.31	−7.75	−7.31	−7.00	−6.81	**−6.75**	−7.15
138	−18.35	−16.33	−14.50	−12.86	−11.40	−10.51	−9.75	−9.11	−8.60	−8.21	**−7.95**	−8.35

Source: Ofwat (all figures, except the 'efficiency incentive' line represent percentages of the baseline expenditure amount).

*The CIS ratio is the company's projected capex as a percentage of Ofwat's projected capex (also known as baseline expenditure amount).
†The 'efficiency incentive' is the proportion of outperformance against the 'allowed expenditure' that a company will retain.
‡The incentive payment figures in the lower part of the matrix show the final rewards (positive figures) or penalties (negative figures) for combinations of CIS ratios and actual expenditure.
Note: The matrix is continuously calculated but is shown as finite options for CIS ratios within the 80 to 130 range to simplify presentation.

Impact of different levels of capex on revenue required and on company under CIS framework

Assumptions

Ofwat capex	100	spread evenly over 5 years
Asset life	50	years
Inflation	0 %	

For simplicity we assume an effective tax rate of 28% and that all cash flows accrue at the end of the year. Hence pre-tax return is equal to RCV at start year times pre-tax WACC.

Pre-tax WACC	6.95 %	(assumes vanilla WACC of 5.5%, effective tax rate of 28%, cost of equity of 7.1% and gearing of 52.5%)
CIS ratio	120	

TABLE A **Impact assuming actual capex equals Ofwat capex**

Assumed CIS ratio   120

	NPV*	1	2	3	4	5	6	7	8	9	10	
					Year							
Ofwat capex	82.11	20	20	20	20	20						
Ofwat depreciation		0.4	0.8	1.2	1.6	2						
Actual capex to Ofwat capex		1	1	1	1	1						
Actual capex	82.11	20	20	20	20	20						
Actual depreciation		0.4	0.8	1.2	1.6	2	2	2	2	2	2	Cumulative capex divided by asset life
Allowed capex†	86.22	21	21	21	21	21						Ofwat capex increased by a percentage equal to one quarter of the difference between CIS ratio and 100
Allowed depreciation†		0.42	0.84	1.26	1.68	2.1						It is assumed that this is based on allowed capex
True-up adjustment	(0.14)					(0.22)						The adjustment that yields the incentive figure in the CIS matrix
RCV‡ end year		20.58	40.74	60.48	79.8	98.7	91.78	89.78	87.78	85.78	83.78	RCV at start of year plus capex less depreciation. For years 1 to 5 it is based on allowed capex and depreciation and for years 6 to 10 it is based on actual capex and depreciation and also includes the true-up adjustment
Pre-tax return			1.43	2.83	4.20	5.55	6.86	6.38	6.24	6.10	5.96	RCV at start of year times pre-tax WACC
CIS additional income	(1.64)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)						
Revenue years 1 to 5	14.04	0.02	1.87	3.69	5.48	7.25						Depreciation plus pre-tax return plus CIS additional income
Revenue years 6 to 10	24.46						8.86	8.38	8.24	8.10	7.96	See line above
Revenue future	42.79											Assuming continued regulation, end year 10 NPV of future required revenue=RCV at end year 10
Total revenue	81.29											Sum of three lines above
NPV to company	(0.82)											NPV of revenue less NPV of capex

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†'Allowed' capex and depreciation is that allowed into the calculation of required revenue for years 1 to 5.
‡RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

TABLE B **Impact assuming actual capex is greater than Ofwat capex**

Assumed CIS ratio   120

	NPV*	Year									
		1	2	3	4	5	6	7	8	9	10
Actual capex to Ofwat capex		1.2	1.2	1.2	1.2	1.2					
Actual capex	98.54	24	24	24	24	24					
Actual depreciation		0.48	0.96	1.44	1.92	2.4	2.4	2.4	2.4	2.4	2.4
Allowed capex†	86.22	21	21	21	21	21					
Allowed depreciation†		0.42	0.84	1.26	1.68	2.1					
True-up adjustment	0.43						0.65				
RCV‡ end year		20.58	40.74	60.48	79.8	98.7	111.05	108.65	106.25	103.85	101.45
Pre-tax return			1.43	2.83	4.20	5.55	6.86	7.72	7.55	7.38	7.22
CIS additional income	(1.64)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)					
Revenue years 1 to 5	14.04	0.02	1.87	3.69	5.48	7.25					
Revenue years 6 to 10	28.58						9.26	10.12	9.95	9.78	9.62
Revenue future	51.81										
Total revenue	94.43										
NPV to company	(4.11)										

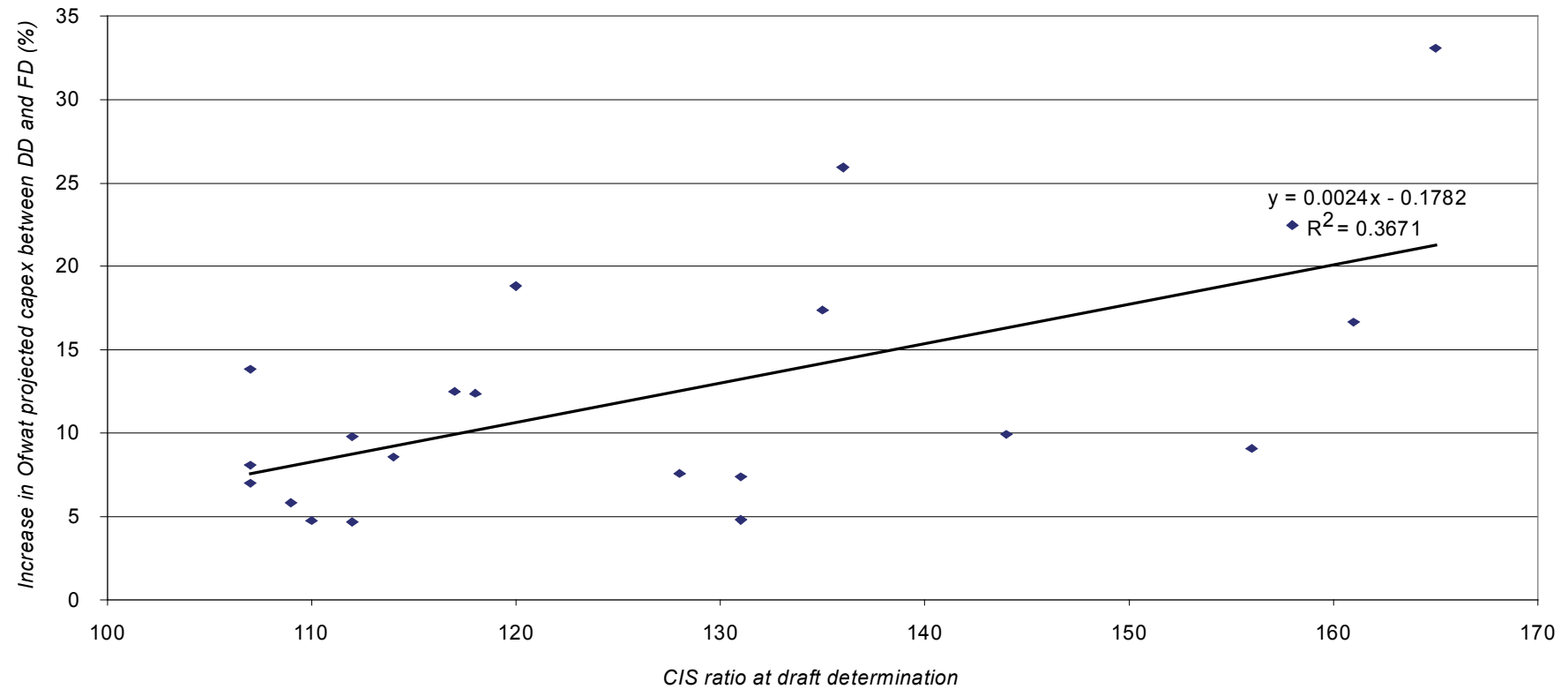Goal seek to give NPV to company of figure from CIS matrix (–4.11)

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†'Allowed' capex and depreciation is that allowed into the calculation of required revenue for years 1 to 5.
‡RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

TABLE C **Impact assuming actual capex is less than Ofwat capex**

Assumed CIS ratio   120

	NPV*	Year									
		1	2	3	4	5	6	7	8	9	10
Actual capex to Ofwat capex		0.9	0.9	0.9	0.9	0.9					
Actual capex	73.90	18	18	18	18	18					
Actual depreciation		0.36	0.72	1.08	1.44	1.8	1.8	1.8	1.8	1.8	1.8
Allowed capex†	86.22	21	21	21	21	21					
Allowed depreciation†		0.42	0.84	1.26	1.68	2.1					
True-up adjustment	(0.43)						(0.65)				
RCV‡ end year		20.58	40.74	60.48	79.8	98.7	82.15	80.35	78.55	76.75	74.95
Pre-tax return			1.43	2.83	4.20	5.55	6.86	5.71	5.58	5.46	5.33
CIS additional income	(1.64)	(0.40)	(0.40)	(0.40)	(0.40)	(0.40)					
Revenue years 1 to 5	14.04	0.02	1.87	3.69	5.48	7.25					
Revenue years 6 to 10	22.40						8.66	7.51	7.38	7.26	7.13
Revenue future	38.28										
Total revenue	74.72										
NPV to company	0.82										

True-up adjustment: Goal seek to give NPV to company of figure from CIS matrix (0.82)

Source: CC calculations.

*NPV at start of year 1 evaluated at pre-tax WACC.
†'Allowed' capex and depreciation is that allowed into the calculation of required revenue for years 1 to 5.
‡RCV relevant to calculating allowed revenue for each regulatory period (years 1 to 5, years 6 to 10 etc).

Comparison of CIS ratios at draft determinations with change in Ofwat projected capex between draft and final determination

Adjustments to base operating expenditure

Overview—framework for adjustments to base operating expenditure

1. This appendix sets out views received on the items of base operating expenditure (opex) in dispute. In total, Bristol Water argued for an additional £23.5 million of adjustments to the base opex allowed for in FD09 and an additional £4.4 million of adjustments to opex relating to capital investments.[1]

The parties' views on adjustments to base operating expenditure

2. A summary of the differences between Bristol Water's view as contained in its SoC and Ofwat's FD09 adjustments to base opex is set out in Table 1. The table also shows Bristol Water's adjustments contained in its FBP and in its response to Ofwat's draft determination; and lastly the CC's determination.

TABLE 1 **Ofwat and Bristol Water proposed adjustments to base opex with CC determination**

						£ million
Adjustments to base opex	Bristol Water FBP	Bristol Water response to draft determination	Bristol Water SoC view	Ofwat view (FD09)*	CC determination	Difference (CC–Ofwat)
1. Pension deficit recovery payments	5.0	4.3	5.7	1.8	2.8	1.0
2. Regular pension contributions	1.8	1.8	2.5	0.6	1.3	0.7
3. Pension Act obligations	0.3	0.3	0.2	0.0	0.0	0.0
4. Energy	6.4	4.1	4.1	5.1	5.1	0.0
5. Training costs	1.8	1.8	1.8	0.0	0.0	0.0
6. Bad debts*	7.7	9.6	12.8	0.0	3.3	3.3
7. Abstraction charges†	3.5	2.4	2.4	0.5	2.4	1.9
8. Highways Agency inspection costs	0.4	0.5	0.5	0.0	0.0	0.0
9. Water efficiency	1.6	1.6	1.6	0.0	0.0	0.0
10. Chemicals	3.7	2.2	0.0	0.0	0.0	0.0
11. Business rates	0.0	0.7	0.2	0.2	0.2	0.0
12. Telecommunications	0.6	0.6	0.6	0.6	0.6	0.0
Total adjustments to base opex	**32.8**	**29.9**	**32.4**	**8.8***	**15.7**	**6.9**
Adjustments to enhancement opex						
13. Supply and demand balance expenditure			8.1	5.8	6.3	0.5
14. Quality enhancement			5.3	3.5	5.3	1.8
15. Service enhancements			0.8	0.6	0.6	0.0
Total additional enhancement opex			**14.2**	**9.9**	**12.2**	**2.3**

Source: CC analysis; Tables 56, 89 and 90 of Bristol Water SoC and Table 4.1.1 of Ofwat's FD09 Bristol Water supplementary report.

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*The total in Table 4.1.1 of Ofwat's FD09 Bristol Water supplementary report is £6.3 million. The difference of £2.5 million is comprised of two differences: the increase of £3.4 million relating to Ofwat's revised view on energy between DD09 and FD09 and a deduction of £0.8 million for 'Operating expenditure from capital maintenance' which Bristol Water has included within supply and demand balance expenditure (see Bristol Water SoC, footnote 693 to Table 89, p277). We have followed Bristol Water's presentation for comparative purposes.
†Subject to an NI in Ofwat's final determination.

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[1]Bristol Water SoC, Table 89, p277.

Adjustments 1–3: Pensions

3.   Issues regarding pensions are set out in Appendix J.

Adjustment 4: Energy

Bristol Water's view

4.   Bristol Water's contractual arrangements for the bulk of its power purchasing relate to a Flexible Purchase electricity contract which it holds with [✂] and which runs until [✂]. In late 2009, Bristol Water agreed a further similar contract with [✂] that runs until [✂]. The wholesale price achieved for 2010/11 of £[✂] MW/h[2] is slightly lower than the forecast of £[✂] MW/hr.[3]

5.   In FD09, Ofwat gave Bristol an allowance of £5.07 million for energy costs. This is higher than both the amount included in Bristol Water's FBP and also its latest forecast (£4.69 million)[4] and therefore Bristol Water did not dispute the up-front allowance made. Bristol Water did, however, note that the FD09 energy allowance was 'close to Bristol Water's latest forecast of additional energy costs'.[5]

6.   However, Bristol Water argued that energy costs should be an NI due to the materiality and recent volatility of these costs. It noted that 'While the FD09 allowance appears to be adequate for the PR09 Period, Bristol Water is still exposed to significant risks'[6] and that 'Over the last five years power, fuel and chemical costs have been extremely volatile, and at current prices power represents about 15% of Bristol Water's operating costs'.[7]

7.   Bristol Water also argued that this should be a two-way NI as 'a risk mitigation measure for power costs is in its customers' best interests as it would allow significant cost reductions to be passed on to customers through reductions to K'.[8]

8.   In respect of the potential for information asymmetry discussed by Ofwat, Bristol Water argued that Ofwat had the advantage of an 'off-setting asymmetry' due to the information it had gathered about the water companies over the years as 'only Ofwat has access to information about all of the Water Companies'.[9]

9.   Regarding the incentive effects of making energy an NI, Bristol Water argued that 'Setting opex targets using central estimates is the only basis that allows an incentive based regime to operate fairly competitive markets … Bristol Water does not have the ability to increase prices because of errors in costing assumptions … and thus remains exposed to risk that normal businesses would not be exposed to'.[10]

10.   It also noted in relation to the protection afforded by RPI indexation that 'Water companies are heavy users of power and so increases in power costs will increase

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[2][✂]
[3]Bristol Water SoC, Table 63, p244.
[4]Bristol Water SoC, Table 98, p289.
[5]Bristol Water SoC, paragraph 1104.
[6]Bristol Water SoC, paragraph 1104.
[7]Bristol Water SoC, paragraph 1322.
[8]Bristol Water SoC, paragraph 1322.
[9]Bristol Water reply to Ofwat's response, 17 March 2010, footnote 20, p10.
[10]Bristol Water reply to Ofwat's response, 17 March 2010, paragraph 177.

the costs of water companies to a greater extent than the weighting of power costs in RPI.'[11]

Ofwat's view

11.   Between draft and final determination, Ofwat increased the allowance made to Bristol Water for energy costs, stating that:

>   having reviewed your representation, current market evidence and potential increases in regulated network charges (pass through costs), we have increased your base year (2008–09) energy costs … In your representation you argued that we should take account of your atypically low power consumption in 2008–09. We have accepted this argument.[12]

12.   However, Ofwat disagreed that energy costs should be an NI. It argued that its approach should not protect companies from normal business risk and should retain the incentive for companies to procure and use energy efficiently. It also noted that water companies also had some protection through the RPI +/– K regime not afforded to companies in the competitive market.[13]

13.   Regarding making energy costs a two-way NI, Ofwat argued that information asymmetry existed in favour of the company and also that it would need to demonstrate that 'the material reduction in costs was not attributable to management action, when the achievement of more favourable financial outcomes is accepted as one of the central aims of management'[14] and therefore it did not consider this to be 'a completely symmetrical risk sharing mechanism'.[15]

Reporter's view

14.   The Reporter discussed the uncertainties related to power costs with Bristol Water. Bristol Water told the Reporter that it was seeking some protection from Ofwat in relation to the risk management associated with future energy prices. The Reporter discussed Bristol Water's approach to procuring energy, noting that it currently benefited from existing contracts which provided some protection from increases in current market rates.[16] These unwound over the final two years of the AMP4 period and at that stage, Bristol Water had yet to make a decision on locking into future contracts.[17]

Adjustment 5: Training costs

Bristol Water's view

15.   During PR09, Bristol Water estimated that it would need to recruit an additional 57 staff to replace staff retiring during the PR09 period, while only six skilled workers retired in the previous six years. Its FBP included an estimate of an additional £1.8 million to cover the human resources planning, recruitment and training costs

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[11]Bristol Water reply to Ofwat's response, 17 March 2010, paragraph 178.
[12][✂]
[13]Ofwat response to Bristol Water's SoC, Annex C, paragraph 2.9.1.
[14]Ofwat response to Bristol Water's SoC, Annex F, paragraph 3.1.
[15]Ibid.
[16][✂]
[17][✂]

associated with addressing this. This estimate was derived from a model by Energy & Utility Skills for assessing training, recruiting and wage costs.[18]

16.   In response to Ofwat's suggestion that a well-managed company would smooth out this expenditure, Bristol Water argued that this would entail 'recruiting new staff well in advance of when they were required … result[ing] in much higher costs in total'.[19]

17.   In its response to our provisional findings, Bristol Water told us that it had taken steps to assess and minimize the required expenditure to the extent possible, and was unaware of any method beyond its current commercial practices for eliminating or severely cutting the costs associated with hiring new technical workers.[20] It said that if it was required to absorb the costs elsewhere, this would amount to increasing the scope of the efficiency challenge.[21] It disputed our provisional view that a competitive market was indifferent to the age profile of the employees of companies within it, since even in such a market, companies had to recover their costs. It said that, in any event, Bristol Water was not in such a market, and was under a duty to supply customers and could not choose to scale back its operations if it faced a shortage of specific technical skills.[22]

Ofwat's view

18.   Ofwat said that Bristol Water did not provide sufficient evidence to convince it of the long-term benefits of this incremental expenditure for customers and the environment (because it made an assumption that companies were already undertaking enough training to comply with legislation and to become more efficient) and that Bristol Water did not make a case which showed that this was anything other than a normal business risk driven by an unusually high number of retirees in a short period. Ofwat took the view that a well-managed and efficient company would consider these matters and take steps to smooth expenditure over the longer period using account-ing provisions if necessary.[23]

19.   In its response to our provisional findings, Ofwat noted that it welcomed the decision not to make an additional allowance for training costs and agreed that this was a normal business risk.[24] In relation to Bristol Water's arguments over regulatory in-consistency between Ofwat's approach and Ofgem's approach for its 2009 electricity distribution price control review, Ofwat said that:

> Although Ofgem made an allowance relating to workforce renewal the position in this sector was different and one where all DNOs had included proposals in their business plans and had started to incur expenditure to address this issue in advance and at their shareholders' expense.[25]

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[18]Bristol Water SoC, paragraphs 960 & 961, p249.
[19]Bristol Water reply to Ofwat's response, paragraph 174.
[20]Bristol Water comments on provisional findings, section 7, paragraphs 46 & 47.
[21]Bristol Water comments on provisional findings, section 7, paragraph 50.
[22]Bristol Water comments on provisional findings, section 7, paragraphs 51 & 52.
[23][✂]
[24]Ofwat response to provisional findings, paragraph 5.9.1.
[25]Ibid, paragraph 5.9.2.

Adjustment 6: Bad debts

Bristol Water's view

> *Opex adjustment for bad debts*

20.   Due to the long-term upward trend in the water industry of bad debt and the impact of the recession, Bristol Water argued for a specific centrally-based operating expenditure allowance for household and commercial bad debt costs alongside a two-way NI which would allow price limits to be adjusted up or down depending on the actual levels of bad debt.

21.   To Ofwat's response that Bristol Water had not used all available best practice in debt collection, Bristol Water argued that its debt collection practices were both prudent and innovative. In particular, Bristol Water noted that its 'Restart scheme,[26] introduced in 1997, was the first such scheme to emerge within the industry'.[27] It also noted that 'Ofwat has not … raised these concerns with Bristol Water previously despite adequate opportunity—for example during Bristol Water's 2007 IDoK during which Ofwat reviewed Bristol Water's approach to bad debt in great detail'.[28]

22.   Bristol Water told us that particular refinements had been made to its debt recovery processes since 2001 (when its joint billing venture with Wessex Water was introduced) including:

(a) introduction in 2002 of a commercial debt collection team, who used the threat of disconnection where necessary;

(b) extension of the Restart scheme into 'Restart Plus' in 2003 (which had fewer restrictions on eligibility and pro-active action before the customer was in arrears);

(c) an increasing use of debtor segmentation since 2005;

(d) introduction in 2006 of doorstep collections for customers wishing to make small, variable cash payments; and

(e) use of the supplier application system for enforced deduction of water debts from government benefits from 2009.[29]

23.   In relation to frequency of billing:

(a) metered domestic customers and small non-households are billed half-yearly;

(b) large users are billed monthly; and

(c) where payment difficulty or business failure is suspected, other non-household customers are billed monthly.[30]

24.   Bristol Water argued that over the AMP4 period its bad debt performance had been 'better than the industry average.[31] We note that this applies only to 2008/09 rather

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[26]This scheme writes off part of customers' debt if they maintain a regular pattern of payments towards their current bill—Bristol Water reply to Ofwat's response, paragraph 164.
[27]Bristol Water reply to Ofwat's response, paragraph 164.
[28]Bristol Water reply to Ofwat's response, paragraph 170.
[29][✕]
[30][✕]

than to the entire AMP4 period.[32] Bristol Water also argued that it had already experienced an increase in bad debt costs compared with the base year 2008/09, and, based on actual experience through December 2009, expected to face bad debt costs £1.5 million higher than the base year in 2009/10.[33]

25. The Bristol Water draft accounts for 2009/10 showed bad debt of £3.7 million, an increase of £1.4 million on 2008/09.[34] However, we noted that Bristol Water's debt write-offs in 2009/10 were only £1.4 million, the remainder of the charge being accounted for by provisions.

26. At the second main party hearing, in response to Ofwat's suggestion that Bristol Water had changed its approach in relation to the bad debt charge,[35] Bristol Water stated that 'There has been … no change in … methodology, the only changes we make are to reflect the actual experience of debt … still outstanding, and that has deteriorated over time'.[36]

27. In its final submission, Bristol Water set out the methodology it used to calculate its provision. It said that:

> Bristol Water consistently uses the remaining uncollected debt including amounts written off as a percentage of turnover for the period five years after billing. For example, for calculating the March 2010 position, experience on 2005/6 billings is used to set the projected unrecoverable percentage … A further provision is made each year for 'worsening experience'. This reflects that 2005/6 billings have been collected, on average, in better economic conditions than is expected for the remaining debt … The methodology means the current year charge to the profit and loss account necessarily includes an updated estimate in respect of recoverability of any prior year debt that remains outstanding, as well as a charge in respect of the current year billings.[37]

28. In response to Ofwat's point that Wessex Water 'has lower debt levels despite having a very similar customer base',[38] Bristol Water noted that it had a joint venture billing and debt collection arrangement with Wessex Water[39] and therefore 'as the procedures are the same, any difference in bad debt performance between the two companies must result from differences in the customer base rather than collection methodology'.[40] It argued that this meant 'the higher bad debt cost in Bristol Water should, therefore, be expected to result in higher costs needing to be reflected in customer charges'.[41]

29. Bristol Water also suggested that Ofwat's approach for calculating bad debts (ie at the time they are written off) was inconsistent with generally accepted accounting

[31]Bristol Water reply to Ofwat's response, paragraph 154.
[32][✂]
[33]Bristol Water SoC, paragraph 1119, p292.
[34]Bristol Water June return 2010, Board Overview.
[35]Ofwat response to provisional findings, paragraph 5.7.36.
[36][✂]
[37][✂]
[38]Ofwat response to Bristol Water, Annex C, paragraph 2.4.15.
[39][✂] Bristol Water and Wessex Water have a joint venture (Bristol Wessex Billing Services Ltd (BWBSL)) that deals with the full spectrum of billing and debt collection for both companies. A single bill is sent by BRWSL for Bristol Water's water and Wessex Water's sewerage charges in the Bristol Water area (and for Wessex Water's water and sewerage charges outside the Bristol Water area).
[40][✂]
[41]Bristol Water reply to Ofwat's response, paragraph 59.

principles (GAAP) and that the correct measure of the cost of bad debt was 'the difference between revenue billed and cash collected'.[42]

30. In its FBP (February 2009), Bristol Water estimated that incremental bad debt costs would amount to £7.7 million (comprising £4.0 million due to the long-term trend and £3.6 million due to the recession). In its SoC[43] (February 2010), Bristol Water increased this to £12.8 million due to a greater estimated effect of the recession. Bristol Water's forecasts were based on:

   (a) the use of Experian forecasts to predict household debt levels across the AMP5 period;[44]

   (b) the use of income deprivation scores to inform bad debt forecasts;[45] and

   (c) assumptions about the impact of forecast increases in unemployment on bad debt levels.[46]

   However, in its response to our provisional findings, Bristol Water reduced its estimated additional bad debt costs to £5.1 million.[47]

   CC estimation of bad debt

31. Based on the Experian study,[48] Bristol Water projected additional bad debt costs of £4 million due to long-term trend factors. However, Experian said that the principal driver of increases in domestic debt in its forecasts was the projected weak macro-economic environment.[49] We allowed separately for this using the latest forecasts (see below). Experian also assumed a significant increase in water charges. We used projected revenue from our provisional findings as an estimate of the base revenue on which bad debt would be charged (we could not use the projected revenue from our final determination as bad debt opex is an input required to calculate projected revenue).

32. In its FBP, Bristol Water said that bad debt arose both from 'can't pays' and 'won't pays'. It said that increases in bad debt as a result of increases in unemployment would primarily increase the number of 'can't pays'; as a result the proportionate increase in bad debt arising from the recession was not likely to be as large as the forecast increase in unemployment.[50] In its FBP, Bristol Water assumed that half of customers currently not paying bills were 'won't pays', reducing the proportionate increase in bad debt due to unemployment by 50 per cent. Subsequently, in its SoC, Bristol Water increased its bad debt forecasts based on its experience in 2009/10. However, we did not consider it appropriate to use its 2009/10 charge as the basis for our future projections since the change compared with earlier years was significantly greater than the average for all other companies.[51]

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[42]Bristol Water reply to Ofwat's response, paragraph 159.
[43]Bristol Water's SoC, Section G.2.5 paragraph 985.
[44]Bristol Water's SoC, Section G.2.5 paragraphs 971–974.
[45]Bristol Water's SoC, Section G.2.5 paragraphs 978–982.
[46]Bristol Water's SoC, Section G.2.5 paragraphs 983–984.
[47]Bristol Water's response to provisional findings, Section 7, Table 4.
[48][✂]
[49][✂]
[50][✂]
[50][✂]
[51]Bristol Water forecast large increases in the residual rate of uncollected revenue even though forecast unemployment in its SoC was broadly similar to that in its FBP.

33. We calculated that the increase in water companies' bad debt charge between 2007/08 and 2009/10 was about 35 per cent compared with a 90 per cent increase in unemployment over the same period.[52] This implies that the average percentage increase in bad debt is about 40 per cent of the percentage increase in unemployment, slightly below Bristol Water's 50 per cent assumption in its FBP. We therefore projected the increase in Bristol Water's bad debt opex over 2008/09 as 40 per cent of the average increase in unemployment expected by independent forecasts.

34. Based on the available evidence, we projected Bristol Water's bad debt on the assumption that bad debt will increase by 40 per cent of the expected increase in unemployment (together with the assumption of an increase in income on which bad debt is charged, in line with our projections at the time of our provisional findings). Our resulting bad debt projections are shown in Table 2.

TABLE 2 **CC forecasts of Bristol Water's bad debt**

	2008/09	2010/11	2011/12	2012/13	2013/14	2014/15
Actual and forecast unemployment (claimant count)*						
Level (m)	1.1	1.7	1.7	1.6	1.5	1.4
Percentage change on 2008/09		58	57	50	37	30
Bad debt (£m)						
Base level of bad debt	2.3	[✂]	[✂]	[✂]	[✂]	[✂]
After revenue growth		[✂]	[✂]	[✂]	[✂]	[✂]
After unemployment growth		[✂]	[✂]	[✂]	[✂]	[✂]
Change over base year		[✂]	[✂]	[✂]	[✂]	[✂]
Total five-year change over base year						3.3

Source: CC calculations.

Source: Forecasts for the UK economy: a comparison of independent forecasts, HM Treasury, May 2010. For 2013/14 and 2014/15, we used the forecasts for 2013.

NI for bad debts

35. Bristol Water argued that bad debts related to items outside management control such as changes in economic conditions[53] and therefore a two-way NI would not reduce incentives to manage bad debt costs. It also argued that the primary incentive to manage bad debt costs was to make cash-flow savings:

> Even with a Notified Item in place, the company still receives a cash flow benefit from improved debt management, and will invariably prefer to collect revenue directly rather than proceed with an uncertain and costly IDoK. This incentive is independent of the operating expenditure allowed in the price determination. Consequently, the incentive to manage bad debt is not affected by the estimate of bad debt included in price limits.[54]

36. Bristol Water also argued that the bad debt NI should include commercial customers as: 'The majority of non-household bad debt arises from properties that include a dwelling, such as public houses, farms, and nursing homes. In such circumstances, there is no ability for Bristol Water to disconnect.'[55]

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[52][✂]
[53]Bristol Water reply to Ofwat's response, paragraph 153.
[54]Bristol Water reply to Ofwat's response, paragraph 151.
[55]Bristol Water reply to Ofwat's response, paragraph 157.

37. Bristol Water indicated that the bad debt charge related to all measured non-household customers in 2009/10 arising from 2009/10 revenue was £252,000 (£205,000 in 2008/09) and that, of this charge, £131,000 or '52% … arises from property types that are highly likely to contain dwellings'.[56]

38. In addition, Bristol Water pointed out that there was some income from unmeasured non-households with a dwelling which Bristol Water would also be unable to disconnect. The total bad debt charge relating to all unmeasured non-households (ie including those without dwellings) was £92,000 in 2009/10 (£21,000 in 2008/09). Bristol Water noted that it was difficult to estimate the number of unmeasured households that had dwellings as the property type was not a good indicator for this.[57]

39. This indicates that the maximum bad debt charge for 2009/10 relating to non-household customers that contain dwellings could be up to £223,000. However, this assumes that the amounts indicated in paragraphs 35 and 36 do not include any non-household customers without dwellings (whom Bristol Water does have the ability to disconnect) and this is therefore likely to be an overestimation of the applicable bad debt charge.

Ofwat's view

Adjustment for bad debts

40. Ofwat did not believe that a specific centrally-based opex allowance should be made for bad debts. It did not accept that Bristol Water had been using all available best practice and considered that there was scope for more effective household revenue collection. In addition, it said that assuming higher future costs now, rather than allowing the company to claim costs if they materialized, would reduce the incentive on the company to make improvements.[58]

41. Ofwat also said that it did not consider that increases in bad debt should be a foregone conclusion, as it was aware of some companies managing to contain debt levels through the introduction of new technology and utilizing best practice. It took the view that making specific allowances for rising bad debt would weaken the incentive on other companies to do the same.[59]

42. In relation to specific debt collection practices, Ofwat noted that 'more companies are adopting good practice and innovative approaches to debt, for example using more targeted debt recovery techniques made possible through effective customer segmentation, or introducing social tariffs where they prove to be self-funding'[60] but that:

> BRL has only recently introduced some of these approaches. In the last year, BRL has procured the Tallyman system, which will allow improved segmentation of customers in order to tailor debt recovery action to specific customer circumstances. It is also introducing its 'Assist' tariff in 2010–11 (which will offer customers in extreme financial difficulty a lower bill based on their ability to pay).[61]

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[56][✂]
[57][✂]
[58][✂]
[59]Ibid, paragraph 2.4.8.
[60]Ibid, paragraph 2.4.15.
[61]Ibid, paragraph 2.4.15.

NI for bad debts

43.   Ofwat agreed with Bristol Water that there should be an NI for bad debt in FD09 because of the continuing difficult economic climate and included a one-way NI for this purpose.[62] However, it said that a two-way NI was not appropriate for this issue because of the information asymmetry involved and the importance of maintaining an incentive for revenue collection.[63]

44.   In relation to the inclusion of commercial companies within the NI regime, Ofwat said that it believed that companies still had very strong powers to deal with commercial debt as they could and did disconnect commercial customers and could make other changes to improve revenue collection—such as moving to monthly billing. It said that Bristol Water's reported debt figures in relation to commercial customers had fallen between 2003/04 and 2008/09 and, accordingly, it was satisfied that limiting the NI to households was appropriate.[64]

Adjustment 7: Abstraction charges

Bristol Water's view

45.   Bristol Water said that abstraction charges levied by the Environment Agency (EA) would increase at a faster rate than inflation over the PR09 period and the latest forecast at 2009/10 was £1.9 million.[65] Bristol Water believed that the EA had given sufficient certainty about abstraction charges over the PR09 period that cost increases in excess of inflation should be included as an addition to base opex and that an NI was inappropriate as the cost increases were reasonably certain.[66]

46.   Specifically, Bristol Water noted that Ofwat did not include allowances for the environmental improvement unit charge component of abstraction charges, and instead an NI was included to cover any changes other than the change arising from RPI.[67]

Ofwat's view

47.   Ofwat said that it increased Bristol Water's base year costs to take account of the known increases in 2009/10 abstraction charges for each EA region but that it did not make any allowance for predicted increases in abstraction charges after 2009/10 given the uncertainty over future cost increases. It did, however, include an NI item for these.[68]

48.   In its response to our provisional findings, Ofwat stated that:

> The PF includes an allowance for the actual increase in 2010–11 abstraction charges; we agree with this as it is consistent with our approach where we took account of the known 2009–10 increases. However, you have also made a provisional assumption for higher

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[62]A one-way NI had also been included for bad debts in previous price reviews. However, this was to allow companies to claim material increases in bad debt arising from the 1999 prohibition on the disconnection of domestic customers. Ofwat said that it did not see a compelling reason to continue the NI for this purpose beyond 2010 as companies now had more experience of managing bad debt following the disconnection ban—Ofwat response to Bristol Water SoC, Annex C, paragraph 2.4.3.
[63]Ofwat response to Bristol Water SoC, Annex C, section 2.4.
[64]Ibid, paragraph 2.4.9.
[65]Bristol Water SoC, paragraph 1122, p292.
[66]Bristol Water SoC, paragraph 1123, p292.
[67]Bristol Water SoC, paragraph 1123, p292.
[68]Ofwat response to Bristol Water SoC, paragraph 2.6.1.

future charges, because you believe that these charges are reason-
ably certain. We do not agree with this view[69] … the EA's approach
seems inappropriate—a year on year increase of 10% (albeit includ-
ing RPI) seems out of place in the new austere economic environ-
ment. Accordingly, we think the best approach to this is the one we
adopted for PR09, but using the new information on the charges for
the current year.[70]

Third party views—Portsmouth Water

49. Portsmouth Water agreed with Bristol Water's view that the increase in abstraction
charges from 2010/11 was a known increase in costs that should be allowed for in
price limits. In response to Ofwat's argument that there was an NI in place, it argued
that 'it will not meet the materiality criteria [for the NI threshold to be reached] for
perhaps 3 or 4 years'.[71] It also noted more generally in relation to NIs that they were
only available 'when the materiality limit has been met and then the Company will
have to meet stringent conditions'.[72]

Third party views—EA

50. Water companies pay the EA charges that are set to recover the costs of managing
water resources and administering abstraction. The EA said in its 'Charges
consultation: Proposed 2010/11 charging schemes' September 2009 document that:

> the government … agreed to increases in water resources charges over
> a number of years ... This is calculated through our Environmental
> Improvement Unit Charge (EIUC) … to moderate the impact on abstrac-
> tors, a cap of 10% was set. For 2009/10 Ministers imposed a reduced
> 5% cap in light of the economic conditions. This has affected the pace
> at which we are able to progress. We are in the process of finalising our
> proposed increase for EIUC for 2010/11. In doing so, we will consider
> the economic climate, the impact on businesses but also the need to
> protect the environment and meet international obligations.[73]

51. Further, the EA told us that 'Our charges are agreed by the Secretary of State on a
yearly basis … he approved the 10% uplift for 2010/11, recognising the environ-
mental requirements and the risk of infraction if we delay implementation of the RSA
programme'.[74]

Adjustment 8: Highways Agency inspection costs

Bristol Water's view

52. On 31 January 2009, the Department for Transport informed Bristol Water that the
fee for random highway inspections was increasing from £25 to £50 per inspection

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[69]Ofwat response to provisional findings, paragraph 5.10.1.
[70]Ibid, paragraph 5.10.9
[71]Submission from Portsmouth Water, 7 March 2010, paragraph 7.2:
www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/submission_from_portsmouth_water.pdf.
[72]Submission from Portsmouth Water, 7 March 2010, paragraph 3.1.2:
www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/submission_from_portsmouth_water.pdf.
[73]www.environment-agency.gov.uk/static/documents/Business/Main_doc.pdf.
[74][✂]

from 6 April 2009.[75] Bristol Water argued that the increases in Highways Agency fees were not reflected in general increases in RPI and that there was certainty that these additional costs would arise, therefore they should be included in the determination of price limits.[76]

Ofwat's view

53. Ofwat's view was that the increase in Highways Agency fees was not material in the context of total opex and therefore no allowance had been made in price limits.[77]

Adjustment 9: Water efficiency

Bristol Water's view

54. Bristol Water said that as part of PR09, Ofwat set out proposals to introduce 'new water efficiency targets' in order to promote sustainability. Bristol Water argued that an allowance should be made for these costs in opex because the proposed water efficiency targets were a new obligation, and the associated costs were not in place during the base year.[78]

55. Bristol Water told us that 'Undertaking the additional activity to save a further 0.5 Ml/d in 2010/11 onwards will inevitably lead to additional costs. A central estimate of costs for the period beyond 2010/11 should, therefore, include the additional costs of meeting this target[79] and that 'Using the Ofwat schedule of options for efficiency savings, Bristol Water has estimated the costs of all these activities and assessed the optimum mix required to deliver the target at minimum cost'.[80]

56. Bristol Water provided us with its analysis of alternative water efficiency measures to those proposed and stated that 'additional approaches were considered … however, such approaches cannot contribute materially to the scale of savings required by the base efficiency target'.[81]

57. In its response to our provisional findings, Bristol Water added that it did not agree that these costs 'can be mitigated by management action', that management had proposed a plan that it believed to be the most efficient method of meeting the new water efficiency targets and that neither the CC nor Ofwat had commented that this plan was inappropriate.[82]

Ofwat's view

58. Ofwat disagreed with Bristol Water's view that the water efficiency targets were a new obligation. It said that since 1996, under section 93A of WIA91, each water company had had a duty to promote the efficient use of water by its customers and that since 2005, this duty had applied to all licensed water suppliers. It said that it was clear from the June return submissions that some companies were undertaking more activity than others, and it therefore put targets in place to clarify the minimum level of activity it expected each company to carry out to meet its statutory water

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[75] Bristol Water SoC, paragraph 992, p258.
[76] Ibid, paragraph 1128, p293.
[77] [✂]
[78] Bristol Water SoC, paragraphs 1129–1131, p294.
[79] Bristol Water reply to Ofwat's response, paragraph 255.
[80] Bristol Water reply to Ofwat's response, paragraph 259.
[81] [✂]
[82] Bristol Water response to provisional findings, Opex Section7, paragraphs 59 & 60.

efficiency duty. It said that it was therefore inappropriate to make any additional allowance in price limits for companies to achieve these targets, since companies should already have been carrying out activity at this level.[83]

Third party views—Portsmouth Water

59. Portsmouth Water supported Bristol Water's view that these were new efficiency targets and that the cost of meeting them should be included in price limits. In response to Ofwat's argument that some companies were undertaking more activity than others, it argued that:

> Portsmouth Water has historically had sufficient resources to meet the demand from customers … and has … therefore, not needed to under-take water efficiency measures at the same level as those with supply difficulties, indeed because of its supply position most water efficiency measures are not cost effective … It is therefore perverse to suggest that Portsmouth Water should now be expected to meet Ofwat's efficiency targets without the funding to do so.[84]

Adjustments 10–12: Chemicals, business rates and telecommunications

60. These items are small in terms of total opex and were not disputed by the parties.

Adjustments 13 to 15: Adjustments to enhancement opex

Adjustment 13: Supply and demand balance

61. We received limited submissions from the parties on these items. See paragraphs 6.82 to 6.85 of our determination.

Adjustment 14: 'Quality' adjustment to base opex

62. The parties called this 'Quality', but we consider it as an adjustment to base opex.

Background

63. There is disagreement between the parties regarding allocation of expenditure between quality and capital maintenance categories. In particular, the trunk mains relining scheme has been transferred by Ofwat to capital maintenance and is there-fore discussed under capital maintenance above.

64. Of the schemes that remain within the quality category in FD09, the parties are broadly in agreement over capital expenditure proposals to improve water quality with the exception of the issue relating to AMP4 quality schemes detailed below.

Bristol Water's view

65. Bristol Water considered that 'it is inappropriate and unnecessary to adjust the efficiency assumptions since, in the relative efficiency analysis, all companies would have benefited from the wet year effect to varying extents. Implementing an

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[83]Ofwat response to Bristol Water SoC, Annex D, paragraph 3.5.3.
[84]Submission from Portsmouth Water, 7 March 2010, paragraph 7.1.

adjustment for only a single company would introduce a bias into the modelling results[85].'

66.   In relation to the Banwell Treatment Works project, Bristol Water noted that Ofwat had made its adjustment based on the difference between the level assumed at FD04 and actual base year costs. Bristol Water's forecast is based on the difference between actual 2009/10 costs and the actual base year costs, which it said was a more accurate assessment as the costs assumed at FD04 had proven to be incorrect.[86]

Ofwat's view

67.   In FD09, Ofwat proposed a reduction in operating costs following completion for the quality schemes allowed for in PR04. The reduction of £1.8 million (compared with the FBP) was to reduce operating expenditure to the capped value from the last price review (to 2007/08 prices).[87] Ofwat made a correction to its approach at FD09 in its response to Bristol Water's SoC, because it accepted Bristol Water's argument that the base year figures were unusually low (due to high rainfall in that year)[88] and that 'going forward a higher allowance might be appropriate'.[89] However, Ofwat also noted that, if it were to revisit these assumptions, 'it would also have to make a parallel adjustment to the operating efficiency assumptions (because these used the weather affected lower figures)'.[90]

68.   Ofwat told us that enhancement opex (pre-efficiency) should be increased by about £1.5 million and catch-up efficiency should also be increased. However, when it tested the impact of this on its 2008/09 relative efficiency analysis (ie if it had taken account of the atypically low base year expenditure relating to the River Axe and Blagdon DAF plants at the time), its assessment of Bristol Water's opex relative efficiency did not change, and Bristol Water remained Upper Band B. So Ofwat's view was that, in practice, enhancement opex (pre-efficiency) should be increased by about £1.5 million whilst catch-up efficiency targets remained the same as in FD09.

69.   The remaining difference of view of £0.3 million relates solely to the Banwell Treatment Works/Blagdon DAF plant. In its response to Bristol Water's SoC, Ofwat acknowledged that it unintentionally omitted the operating expenditure up to the level assumed at FD04.[91] However, it disagreed with Bristol Water that it should have allowed more than this, and said that Bristol Water gave no justification for such an increase.[92]

Adjustment 15: Service enhancements

70.   We received limited submissions from the parties on these items. See paragraph 6.85 of our determination.

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[85]Bristol Water reply to Ofwat's response, paragraph 181.
[86]Bristol Water reply to Ofwat's response, paragraph 180.
[87][✂]
[88]This increased its estimate of costs for completion of the AMP4 quality programme to £2.1 million, compared with £0.6 million in FD09 and the variance between the parties on this issue is now £275,000 over AMP5.
[89]Ofwat response to Bristol Water SoC, Annex C, paragraph 3.1, p47.
[90]Ofwat response to Bristol Water SoC, Annex C, paragraph 3.1, p47.
[91]Ofwat response to Bristol Water SoC, paragraph 3.1, p47.
[92][✂]

Pensions

Summary

1.   Bristol Water argued in its SoC that it should be allowed an additional £6 million for pensions in opex over the PR09 period, over and above its base opex (see Appendix I). This additional allowance relates to three items—deficit recovery payments on its defined benefit pension schemes, ongoing regular contributions on the same schemes, and future obligations arising from the Pensions Act 2008.[1]

Background

2.   Bristol Water operates two defined benefit pension schemes. Employees contribute 3 to 8 per cent of salary and Bristol Water contributes 24 per cent.[2] Both schemes have been closed to new entrants since 2002. For employees joining after this date Bristol Water operates a defined contribution scheme, with employees contributing at least 3 per cent of salary and Bristol Water contributing 6 per cent.[3]

3.   Bristol Water's defined benefit schemes are subject to a formal actuarial valuation every three years. The last valuation was at 31 March 2008, although since then Bristol Water has commissioned interim valuations as at 31 October 2008, 31 March 2009 and an update to the deficit as at 31 December 2009 (the latter prepared after the FD09).

4.   The deficits calculated from these valuations are set out in Table 1.

TABLE 1   **Bristol Water's pension deficit valuations**

Valuation date	Deficit £m	Type	Notes
31 March 2008	1.2	Formal	Basis for agreed payments
31 October 2008	7.2	Update	Basis for Ofwat's allowance
31 March 2009	18.8	Update	
31 December 2009	14	Update	Produced after FD09

Source: SoC, p238, Ofwat response, p40.

5.   Following each formal valuation, Bristol Water agrees with the trustee the amount and timing of payments to recover any deficit. Under an agreement with the trustee in 2004, which was not modified as a result of the March 2008 valuation, Bristol Water made special pension scheme payments of £1.0 million in 2008/09 and is obliged to make payments of £1.0 million in 2009/10 and £0.9 million in 2010/11.

Ofwat's approach

6.   In its framework document and FD09,[4] Ofwat recognized the issue of pension deficits. Its approach was to provide an allowance of 50 per cent of deficit recovery

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[1]SoC, Table 56.
[2]This includes extra payments agreed with the pension trustees. Without the extra payments the figure is 18 per cent.
[3]SoC, paragraphs 911 & 912.
[4]FD09, Section 4.9.2.

payments during the PR09 period, with the remainder coming from Bristol Water's profits, effectively sharing the risk between customers and shareholders.

7.   Ofwat said that it would normally base its allowance on the most recent triennial valuation, but that the recent volatile market conditions meant that it had taken into account updated actuarial information for dates after March 2008. It also assumed a 15-year period for deficit recovery, choosing a longer period partly to reflect the fact that actuarial updates are less robust than triennial valuations.

8.   Regular pension contributions from employers are fully allowed for by Ofwat. This allowance is split between opex and capex.[5] However, the deficit recovery payments are included entirely within opex, even though some of the deficit relates to employees in roles which relate to capex. Bristol Water said that since it was not possible to restate prior capex figures, Ofwat's treatment was an appropriate one.[6]

9.   For PR09, Ofwat changed the basis of the allowance for pension costs from the amount charged in the accounts to cash contributions in response to industry concerns. This results in a change to base opex.

10.   Ofwat allowed £7.8 million for Bristol Water's pension costs, taking Bristol Water's October 2008 pension valuation, and allowing 50 per cent of deficit recovery payments over a ten-year period.

Bristol Water's view

11.   Bristol Water said that to reflect its full pension costs, PR09 would need to take account of:

      (a) an increase in the deficit recovery payments for the defined benefit schemes **(Adjustment 1)** (Statement of Difference table item 22[7]);

      (b) the correct rate of regular contributions for the defined benefit schemes **(Adjustment 2)** (Statement of Difference table item 23); and

      (c) increased costs relating to the Pensions Act 2008, which will affect the defined contribution scheme **(Adjustment 3)** (Statement of Difference table item 24).

Adjustment 1—Increase in deficit recovery payments

Bristol Water's view

12.   Bristol Water is claiming total deficit recovery payments of £5.7 million.[8] This is set out in Table 59 of the SoC, which is reproduced as Table 2.

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[5]For instance, the pension contributions of an employee whose job was concerned with capex would fall within the capex allowance in Ofwat's determination.
[6][✂]
[7][✂]
[8]SoC, paragraphs 915–923.

TABLE 2 **Pension deficit recovery—forecast opex**

£ million, 2007/08 prices

	2009/10	*2010/11*	*2011/12*	*2012/13*	*2013/14*	*2014/15*	*Total PR09 period*
Previously agreed payments	0.616	0.494	[✀]				1.163
Estimated future deficit payments			[✀]	[✀]	[✀]	[✀]	4.544
Total deficit recovery payments	**0.616**	**0.494**	**[✀]**	**[✀]**	**[✀]**	**[✀]**	**5.707**

Source: Table 59, Bristol Water SoC.

For 2010/11, a previously agreed deficit recovery payment of £0.9 million is due to be made (see paragraph 5). Bristol Water argued that a portion (£0.35 million) of this payment related to regular contributions—this is addressed under Adjustment 2. The remaining £0.55 million is deflated to £0.494 million in 2007/08 prices.

13.   Bristol Water argued that for PR09 'the most recent available actuarial valuation of the deficit and recovery payments should be taken into account'.[9] The most recent valuation calculates a deficit of £14.0 million, significantly higher than the £1.2 million deficit calculated at the last triennial valuation at 31 March 2008. The valuation report suggests that in order to pay off this deficit over a ten-year period, additional payments of £1.2 million each year would be required, starting from April 2010. Bristol Water has assumed that the first payment would be the difference between the new suggested payment of £1.2 million and the previously agreed payment of £0.494 million. This gives a figure of £0.706 million, which is assumed to actually be paid in 2011/12 and hence deflated to £0.669 million. The £1.2 million becomes £1.136 million when deflated to 2007/08 prices.

14.   Bristol Water said that it made total deficit recovery payments of £11.6 million during PR04—more than twice the £5 million Ofwat had allowed. It also said that at PR04, Ofwat had set a 13-year period over which deficits were to be recovered, but had changed this at FD09, allowing 'substantially less' than £1 million a year for PR09. Bristol Water argued that this alteration was 'inconsistent with good regulatory practice' and penalized Bristol Water because it was unable to benefit from the additional payments it made during PR04.[10]

15.   Bristol Water also argued for 100 per cent of the deficit recovery payments to be allowed, providing examples from Ofgem (DNOs and Gas Distribution Networks) and Postcomm where this had been done.[11]

Ofwat's view

16.   Ofwat's approach,[12] which it said was consistent with PR04, was to allow 50 per cent of deficit recovery payments in its determinations, thus splitting the risk between customers and shareholders.

17.   It based its draft determinations on the latest formal triennial valuations for each scheme, but took account of subsequent market movements which had increased deficits since the formal valuations. It said that in general, the updated valuations (dated 31 December 2008 or 31 March 2009) provided by companies showed the

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[9]SoC, paragraph 922.
[10]Bristol Water SoC, paragraph 914.
[11]Bristol Water SoC, paragraph 1086.
[12][✀]

deficits at their highest, and that since March 2009 deficits had reduced as financial markets had become more favourable.[13]

18. Ofwat provided further information on its approach to setting the period over which deficit recovery should be allowed.[14] It said that for full actuarial valuations dated later than March 2008 it assumed recovery over ten years. Where the latest full actuarial valuation was older than this (as was the case with Bristol Water) it used updated deficit positions, but assumed a longer recovery period (generally a minimum of 15 years) because these updates were not full valuations and had not been agreed with trustees. It also argued that these updated deficits might capture deficits at their highest points.

19. Ofwat noted that Bristol Water's deficit had shown 'considerable volatility over a relatively short space of time'. It noted that the March 2009 deficit was 15 times the March 2008 deficit, compared with increases of 2 to 2.5 times from other companies. For this reason it decided to base its allowance on the lower October 2008 deficit.[15]

20. Ofwat said that because its projections were not based on the most recent information provided by Bristol Water (ie the March 2009 updated valuation which it rejected), it used a ten-year period for recovery rather than the 15 years it used for other companies.[16]

21. Ofwat acknowledged that the deficit recovery payments made by Bristol Water during PR04 had had an impact on the size of its deficit, but said that, based on the principle of allowing 50 per cent of such payments, Bristol Water's £11.6 million contribution was broadly in line with its expectation and its allowance of £1 million a year.[17]

Bristol Water's reply

22. Bristol Water pointed out the inconsistency between Ofwat saying that updated valuations were 'of limited usefulness', and Ofwat using an updated valuation itself to determine the deficit recovery allowance.[18]

23. Bristol Water also argued that because Ofwat had moved from a 50 per cent allowance over a 13-year period at PR04 to a 50 per cent allowance over a ten-year period at PR09, and because it was not allowing the remainder of deficit recovery payments agreed at PR04, Ofwat was being inconsistent.[19]

24. Bristol Water argued that because it paid more than twice Ofwat's allowance for deficit recovery payments in PR04, it should receive some credit for this.[20]

25. Finally, Bristol Water noted that the reason that it had a bigger proportional change in its deficit during 2008/09 was because the initial 2008 deficit was very low.[21]

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[13]FD09, p102.
[14][✂]
[15]Ofwat response to SoC, paragraph 2.3.13.
[16][✂]
[17]Ofwat response to SoC, paragraph 2.3.9.
[18]Bristol Water reply to Ofwat's response to SoC paragraph 139.
[19]Bristol Water reply to Ofwat's response to SoC, paragraph 141.
[20]Ibid, paragraph 142.
[21]Ibid, paragraph 143.

Bristol Water's response to the CC working paper

26.   In its response to our working paper, Bristol Water made a number of further observations. It said that Ofwat's policy of sharing risks of pension deficit recovery between shareholders and customers was a misnomer, and that shareholders would not benefit from any surplus caused by contributions being too high as any such surplus would be recovered through lower ongoing charges.

27.   Bristol Water said that there was a mismatch between Ofwat's policy of allowing 50 per cent of deficit recovery payments over a period of ten years or longer, and that of the Pensions Regulator's powers to enforce recoveries of 100 per cent of deficits within ten years.

Responses to the provisional findings

28.   While it agreed with our provisional finding that 100 per cent of the deficit should be allowed for, Bristol Water suggested that a ten-year recovery period represented a central estimate of the costs it might face.

29.   Ofwat disagreed with our view that 100 per cent of deficit recovery costs should be allowed. It said that 'The CC's provisional conclusion that pension deficit costs should be a cost pass through item removes all incentives on the company to take appropriate action to manage its pension liability'.[22] It noted a number of factors which it said did not place the pension deficit outside Bristol Water's control. It also said that using the December 2009 deficit valuation gave Bristol Water more certainty over the period and thus reduced shareholders' risk.

Adjustment 2—correct rate of regular payments

Bristol Water's view

30.   At the 2005 triennial valuation (which produced a deficit of £7.2 million), the trustee and Bristol Water agreed an employer contribution rate of 18 per cent, with a special contribution of £7 million and annual contributions of £1 million a year until 2009/10, with a final payment of £0.9 million in 2010/11 agreed between Bristol Water and the trustee. At the 2008 triennial valuation (which produced a much smaller deficit of £1.2 million), it was agreed that this 18 per cent rate and the annual contributions should continue until the 2011 triennial valuation.[23]

31.   Bristol Water argued that in the absence of the annual contributions, the regular employer contribution rate would have needed to be 24 per cent.[24] This is supported by a sentence in the 2008 valuation.[25] This means that £350,000 of the annual payments actually represents a regular contribution, rather than a deficit reduction payment.

32.   Bristol Water also cited the latest update valuation at 31 December 2009. This valuation suggests that employer contributions should rise to 27 per cent of salary from April 2011. This excludes additional deficit recovery contributions.[26]

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[22]Ofwat's response to the provisional findings, paragraph 5.6.5.
[23][✂]
[24]SoC, paragraph 930.
[25][✂]
[26]SoC, paragraph 932.

Ofwat's view

33.   Ofwat argued[27] that Bristol Water's use of the 24 and 27 per cent rates was inconsistent with its response to Ofwat query FBP/BRL/002, the commentary in Bristol Water's June return, the auditor's report on agreed-upon procedures for the June 2009 return and the notes to Bristol Water's 2008/09 accounts.

34.   Ofwat also noted that Bristol Water was attempting to move costs from deficit recovery contributions, which attracted a 50 per cent allowance, to regular contributions, which attracted a 100 per cent allowance.[28]

Responses to provisional findings

35.   In its response to the provisional findings, Ofwat disagreed with our allowance of a 24 per cent contribution rate. It said that Bristol Water had not provided a consistent response to its queries over this matter, that Bristol Water could take measures to reduce the level of ongoing contributions, and that the contribution rate was speculative and had not been finalized with the pension Trustee.

36.   Bristol Water said that the 27 per cent contribution rate specified in the December 2009 valuation was the best estimate based on the latest evidence available.

Increased costs relating to the Pensions Act 2008

Bristol Water's view

37.   The Pensions Act 2008 requires all employees to be enrolled automatically into their employers' pension scheme or to be entered into the new Personal Accounts scheme. Bristol Water currently has 47 staff not taking part in any of its pension schemes and these staff will be required to enrol in a pension scheme, likely to be Bristol Water's defined contribution scheme. Under the Pensions Act, the minimum employer contribution is 3 per cent of salary.

38.   Bristol Water argued[29] for an allowance of £57,000 in each of the years 2012/13, 2013/14 and 2014/15 to take account of these requirements of the Pensions Act 2008. This represents 6 per cent (the employer contribution rate under Bristol Water's defined contribution scheme) of the salaries of the 47 staff currently not enrolled.

Ofwat's view

39.   In its FD09, Ofwat did not make any allowance for additional costs arising from the Pensions Act, as it did not consider them to be material in the context of total operating costs.[30] It told us that one of the criteria it considered was whether other companies included these costs in their business plans and found that Bristol Water was one of only a 'small number' of companies to include these costs.[31]

40.   In its response to Bristol Water's SoC, Ofwat said that Bristol Water had included additional costs in some areas (including Pensions Act obligations) not mentioned by

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[27]Ofwat response to SoC, pp41&42.
[28]Bristol Water refutes this view.
[29]SoC, paragraphs 934 & 935.
[30]FD09, paragraph 4.1.
[31][✁]

nearly all other companies, and that 'it is not clear why [Bristol Water] is so different to other companies'.[32]

Responses to provisional findings

41.   Ofwat agreed with our provisional finding that no additional allowance should be made. Bristol Water said that the costs imposed by the legislation were real and unavoidable, and should be allowed for in our determination.[33]

42.   Bristol Water also said that 'in effect, the CC is advocating a pass through of efficiently incurred pension costs. If this is the case, then it follows that this policy should be applied to the PR04 period.'[34]

Error in base operating expenditure

43.   Bristol Water also highlighted a small difference to base opex[35] arising from the move from an accounting to a cash basis for the determination of regular pension contributions. Bristol Water claimed that Ofwat had used figures from 2007/08, rather than 2008/09, to make this change.[36] Bristol Water told us that the 2008/09 figure was 'more appropriate'.[37] Correcting the difference would lead to a decrease in base opex allowed of £61,000.

44.   The difference arises partly because Ofwat and Bristol Water use slightly different assumptions for the split of pension contributions between opex (which is expensed and is what we are considering here) and capex (which is capitalized). Ofwat uses 79 per cent opex and 21 per cent capex,[38] Bristol Water uses 78 per cent opex and 22 per cent capex. The remainder of the difference is caused by Bristol Water and Ofwat taking different starting points for the 2008/09 service cost.

45.   Ofwat said that Bristol Water's figure was inconsistent with Bristol Water's FBP, the commentary to its June returns, the auditor's report on procedures agreed for the 2009 June return and the notes to Bristol Water's accounts.

The CC's deficit recovery payment allowance

46.   Table 3 below sets out the CC's deficit recovery payment allowance, reconciled to the amounts in Bristol Water's SoC.

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[32]Ofwat response to Bristol Water SoC, p38.
[33]Bristol Water response to provisional findings, Section 7, paragraph 20.
[34]Bristol Water response to provisional findings, Section 7, paragraph 27.
[35]See item 25 in Bristol Water Statement of Differences table, Appendix 7 to its response to Ofwat reply to the SoC.
[36]Bristol Water SoC, paragraph 926.
[37][✂]
[38][✂]

TABLE 3 **CC's deficit recovery allowance**

<div align="right">£ million</div>

	2010/11	2011/12	2012/13	2013/14	2014/15	Total
Bristol Water's position in the SoC	0.494	[✂]	[✂]	[✂]	[✂]	5.707
Add back amount allocated to ongoing contributions (SoC 920)	[✂]					0.314
Remove catch-up payment		[✂]				−0.669
Sub-total	[✂]	[✂]	[✂]	[✂]	[✂]	5.352
Payback deficit over 15 years	[✂]	[✂]	[✂]	[✂]	[✂]	3.080
Allow 90 per cent of the deficit	[✂]	[✂]	[✂]	[✂]	[✂]	2.772

Source: Bristol Water, CC analysis.

Overview of opex efficiency

Ofwat's efficiency assumptions for Bristol Water for PR09

1.   Ofwat's assumptions for its operating efficiency challenge to Bristol Water for PR09 are set out in Table 1.

TABLE 1   **Ofwat's operating expenditure efficiency assumptions**

	%
Catch-up efficiency per year	
Water base service	0.917
Water enhancements	1.388
Continuing efficiency per year	
Water base service	0.250
Water enhancements	0.375

Source: FD09, supplementary report to Bristol Water, p25.

2.   Ofwat assumed that the overall scope for annual efficiencies was 1.167 per cent (0.917 per cent catch-up + 0.25 per cent continuing) for water base services and 1.763 per cent (1.388 per cent catch-up + 0.375 per cent continuing) for water enhancements. The effect of the efficiency assumptions on Ofwat's PR09 allowance for operating expenditure is shown in Table 2.

TABLE 2   **Ofwat's PR09 allowance for operating expenditure**

						£ million, 2007/08 prices
	2010/11	*2011/12*	*2012/13*	*2013/14*	*2014/15*	*Total*
Total forecast operating expenditure before efficiency	[✕]	[✕]	[✕]	[✕]	[✕]	234.2
Efficiency challenge	[✕]	[✕]	[✕]	[✕]	[✕]	(7.8)
Total operating expenditure	[✕]	[✕]	[✕]	[✕]	[✕]	226.5

Source: Bristol Water SoC, p278.

3.   By the end of PR09, Bristol Water is required to reduce its opex by £7.8 million due to the efficiency challenge. Of that, £1.7 million is attributable to continuing efficiency and £6.1 million is attributable to catch-up efficiency.

Ofwat's methodology

Relative efficiency

4.   Ofwat assessed the scope for relative efficiency improvement through the combination of econometric modelling and regulatory judgements.[1] Ofwat used four econometric models corresponding to different service areas:

(a) water distribution;

(b) water resources and treatment;

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[1]Before the modelling, Ofwat made some adjustments to the companies' data. Specifically Ofwat excluded water softening costs from water treatment expenditure and Environment Agency, local authority and third party costs. It also adjusted leakage costs to a common basis.

(c) water power; and

(d) water business activities.

5.   These models related operating expenditure in each of the service areas to different cost drivers. They had been used in broadly the same format by Ofwat in the previous regulatory rounds, including the 1999 Mid Kent and Sutton and East Surrey price determinations; and the CC commented on these models in its redeterminations of these cases.

6.   The models were reviewed by Ofwat's economic adviser, Professor Mark Stewart from the University of Warwick, who assessed their suitability for inclusion in the efficiency analysis. Professor Stewart developed the Overall Service Model (OSM) which is used to cross-check results from Ofwat's econometric models.[2]

7.   The outputs from Ofwat's models are point estimates of the efficiency for each regulated company. Ofwat used the efficiency estimates from the four models together with a number of regulatory judgments in order to determine the efficiency challenge for each company. These regulatory judgments were:

(a) adjustment for company specific factors;

(b) selection of the benchmark company; and

(c) the decision about catch-up factors.

They are discussed below in more detail.

Company-specific adjustment

8.   Ofwat recognized that there were circumstances outside the control of the companies that affected costs but were not included in econometric modelling as cost drivers. For this reason, Ofwat allowed a number of company specific factors, such as complexity of water treatment and traffic congestion.[3] Ofwat used these factors to adjust the total of predicted costs from its models before it calculated the efficiency scores for each company.

9.   Each company had to submit a request explaining and quantifying any factors it wished Ofwat to consider in adjusting the results of the econometric analysis. Ofwat gave feedback to companies ahead of the companies' final business plan (FBP) submissions, when all companies had the opportunity to resubmit claims. According to Ofwat's May 2008 special factor guidance, a company's special factors should not exceed 10 per cent of the modelled operating expenditure.[4]

10.   The application of special factors is one-sided in the sense that Ofwat did not consider any factors that might reduce a company's costs.

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[2]Ofwat response to Bristol Water SoC, Annex C, paragraph 4.5.2.
[3]Traffic congestion affects the speed at which water companies can respond to emergencies.
[4]Ofwat's relative efficiency assessment 2008/09—supporting information, section 6.4, pp25&26, and Ofwat response to Bristol Water SoC, section 4.8.

Determining the benchmark

11.   Ofwat considered whether the company on the efficiency frontier would be appropriate as a benchmark. Specifically, the benchmark company needed to satisfy several criteria to make it suitable for comparison with the rest of the sector:

   (a) there are no special concerns about the consistency of the benchmark company's data;

   (b) the company has no special characteristics outside management control which significantly reduce costs relative to the sector as a whole; and

   (c) the company must represent a reasonable proportion of the sector (to date, the threshold has been about 3 per cent of the industry by service turnover).

   The identity of the benchmark company has changed from one determination to the next. For PR09, Ofwat chose Yorkshire Water as the benchmark company.[5]

Catch-up factors

12.   Once it had chosen the benchmark company, Ofwat calculated the difference between each company's (adjusted) costs and that of the benchmark. As part of this process, Ofwat reduced the difference between actual costs and the cost predicted by its models by 10 per cent for each non-benchmark company in order to take some account of possible error in the data. This had the effect of reducing the efficiency challenge.

13.   Once the calculations were complete, the companies were classified into different efficiency bands:[6]

   A = within 5 per cent of benchmark.

   B = within between 5 and 15 per cent of benchmark.

   C = within between 15 and 25 per cent of benchmark.

   D = within between 25 and 35 per cent of benchmark.

   E = more than 35 per cent away from the benchmark.

14.   For price-setting purposes, Ofwat then divided the bands into half bands ('upper' and 'lower') and took the mid-point of each half band as representative of all companies in that half band. Each company was assumed to be able to close 60 per cent of the identified efficiency gap between the particular half band and the benchmark company by 2014/15.[7]

15.   In PR09, Bristol Water was identified as being in Band 'B Upper' for water base services resulting in the catch-up efficiency challenge of 0.917 per cent as shown in Table 1 above. The complete list of relative efficiency bands is shown in Annex 1.

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[5]Relative efficiency assessment for operating expenditure 2008/09 (PR09/39 letter from Ofwat's Director of Network Regulation to all regulated companies).
[6]Ofwat promoted companies that were close to the border of a band. In PR09, Ofwat promoted two companies to the next band in its water service relative efficiency assessment.
[7]Ofwat, Relative efficiency assessment 2008/09—supporting information, section 2.5.

Continuing efficiency

16.   Ofwat reached a view on the scope for efficiency improvements by the leading or frontier firm on the basis of several different pieces of evidence. According to Ofwat, this involved a great deal of judgement and was not a mechanistic process. For PR09, Ofwat considered the following:

   (a) advice from consultants with expertise in this field;

   (b) each company's views in its business plans on the scope for future efficiency;

   (c) the significant future capital programme included in price limits; and

   (d) the latest available information on forecast changes in input prices, particularly labour.

17.   On the basis of the information from the above sources, Ofwat assumed a continuing efficiency improvement factor of 0.25 per cent a year for both water and sewerage base operating expenditure after taking into account real price effects.[8]

18.   After publishing PR09/28 *Scope for efficiency studies,* Ofwat revisited its conclusion regarding continuing efficiency as part of both its draft and final determinations, taking into account the latest economic data, including trends in both future productivity and input prices, and how these would affect the scope for future efficiency. It looked particularly closely at trends in labour costs as these formed a significant proportion of the industry input costs for opex.

19.   Ofwat concluded that there was still scope for the best performing companies to make further real efficiency improvements at the rate of 0.25 per cent a year.[9]

Bristol Water's critique of Ofwat's methodology

20.   Bristol Water objected to Ofwat's assessment of both relative and continuing efficiency. Bristol Water submitted that there were serious flaws and uncertainties in Ofwat's catch-up assessment. Bristol Water argued that Ofwat's assessment of continuing efficiency lacked transparency and adequate reasoning, and that its judgement about the scope for the industry to make further real efficiency gains was erroneous.[10]

21.   Bristol Water carried out its own assessment of the potential for improved operating efficiency during PR09. It argued that while it would strive to make further substantial efficiency improvement over PR09, any gains in that direction would be offset by a real increase in input costs resulting in a rate of overall efficiency improvement of 0 per cent.[11]

Bristol Water's submission on catch-up efficiency

22.   Bristol Water's submission on catch-up efficiency made the following points:

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[8]Bristol Water proposed an alternative interpretation, namely that Ofwat's figure did not take into account the real price effects (Bristol Water letter to CC dated 20 May 2010). We wrote to Ofwat and it confirmed that our interpretation was 'much more correct' (Bristol Water letter to CC dated 26 May 2010).
[9]Ofwat, Relative efficiency assessment 2008/09—supporting information, section 2.5; and FD 2010–15, section 4.10.2.
[10]Bristol Water SoC, Section H.4.
[11]Bristol Water SoC, paragraph 897.

(a) Ofwat had not made sufficient allowance for special factors that affected Bristol Water's costs;

(b) Ofwat erred in making the regional wage adjustment in its modelling;

(c) the 60 per cent rate of catch-up was unrealistic and at odds with the evidence;

(d) Ofwat's reliance on a single efficiency assessment technique was at odds with the best practice in benchmarking; and

(e) there were statistical problems with two of Ofwat's econometric models.

These are considered below in more detail.

Partial allowance of special factor claim

23.   For PR09, Ofwat allowed Bristol Water special factors totalling 14 per cent of the modelled operating expenditure. This was in excess of Ofwat's own threshold of 10 per cent, as explained in paragraph 9 above. As no other company was allowed more than the 10 per cent limit, Bristol Water argued that this was a recognition on Ofwat's part of the importance of these special factors for Bristol Water.[12]

24.   Ofwat allowed special factors of £5.172 million, which was 29 per cent lower than Bristol Water had sought. Specifically:

(a) only 50 per cent of the indirect costs were allowed for the Purton and Littleton treatment works;[13]

(b) only 50 per cent of the claim was allowed for treatment complexity; and

(c) Ofwat reduced the congestion allowance by 10 per cent.

Purton and Littleton

25.   Bristol Water obtained a significant fraction (40 per cent in 2008/09) of its water by abstraction from the Gloucester Sharpness Canal. According to Bristol Water, the water in this canal was of very variable and often poor quality. As a result of this, additional costs were incurred at the Purton and Littleton works.

26.   Bristol Water identified additional costs of water treatment at Purton and Littleton in three stages:[14]

(a) identification of costs directly allocated to sites;

(b) allocation of direct resources needed for water treatment that could not be directly allocated to sites; and

(c) allocation of the treatment element of general and support expenditure (ie indirect cost).

27.   Table 3 sets out these costs.

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[12]Section H.4.1.2 of Bristol Water SoC.
[13]Ofwat allowed for all direct costs.
[14][✄]

TABLE 3 **Direct and indirect costs for Purton and Littleton works**

£ million

	Allocated direct costs	Unallocated direct R&T* costs	Indirect costs	Total costs
Purton	2.08	0.79	1.93	4.80
Littleton	0.31	0.12	0.29	0.72
Total	2.39	0.91	2.22	5.52

*Source:* Bristol Water PR09 Special Factor Submission, p5. (See Annex 134 to Bristol Water's SoC.)

*Resource and treatment.

28. The direct unallocated costs were estimated at £0.91 million and indirect costs were estimated at £2.22 million. These were the special factors claimed by Bristol Water.

29. In response to Bristol Water's special factor claim, Ofwat allowed all direct costs associated with the two sites, but only 50 per cent of the indirect costs. Ofwat argued that there was no evidence that indirect costs would increase as a result of increases in direct costs.

30. In support of its claim that indirect costs increased with the complexity of treatment, Bristol Water presented a statistical relationship between indirect costs and direct water resource treatment costs using industry level data from Ofwat's model. This is shown in Figure 1.

FIGURE 1

Relationship between direct (horizontal axis) and indirect (vertical axis) cost

Variation of 'on costs' with treatment difficulty
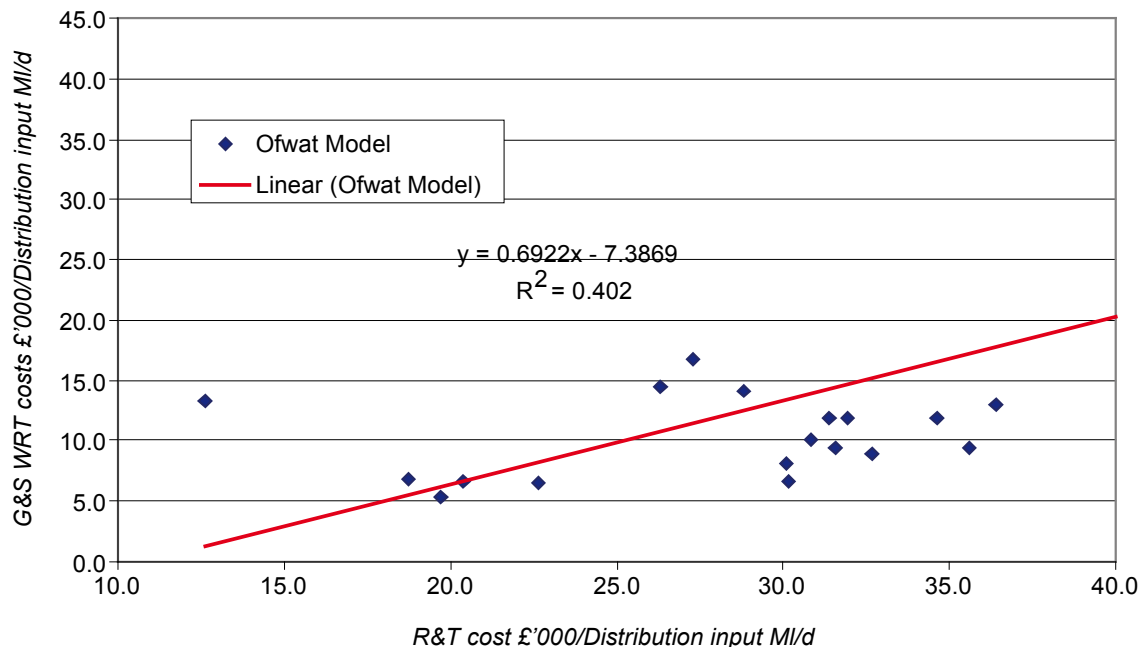
Source: Bristol Water SoC, p304.

31. According to Bristol Water, this evidence suggested that indirect costs increased in proportion to direct costs, and that the rate of increase (as given by the slope

estimate of 0.69) was close to Bristol Water's estimate from its own costs that indirect costs were 67 per cent of direct costs.[15]

Treatment complexity

32.   More generally, Bristol Water argued that Ofwat's resources and treatment model failed to predict that more complex works incurred additional costs.[16] Ofwat's model related the reported resource and treatment expenditure scaled by winter population to the fraction of source input from ground water sources and the number of water sources treated by each water company.

33.   Bristol Water developed an alternative model for resource and treatment that apparently took into account treatment complexity by adding an additional variable to Ofwat's model, namely the proportion of distribution from works in bands W3 and W4.[17] Table 4 presents the predictions for resource and treatment expenditure from the two models over the period 2005 to 2009.

TABLE 4   **Expenditure on resource and treatment**

			£ million
	Ofwat model	Bristol Water model	Difference
2005/06	6.4	8.6	2.2
2006/07	7.4	9.5	2.1
2007/08	7.4	9.4	2.0
2008/09	7.7	10.1	2.4

Source: Bristol Water PR09 special factor submission, Annex 134 to SoC, p19.

34.   For 2008/09, the Bristol Water model predicted expenditure of £10.1 million, compared with £7.7 million predicted by the Ofwat model, a difference of £2.4 million.

Congestion

35.   According to Bristol Water, traffic congestion in Bristol was the second highest among UK urban areas. The congestion item was the smallest special factor claim amounting to £0.387 after a 10 per cent downward adjustment by Ofwat. It was not clear to us whether Bristol Water was actually contesting this and if so on what grounds.

One-sided regional wage adjustment

36.   As part of its modelling work, Ofwat made a one-sided regional wage adjustment only for the companies whose regional wages were above the England and Wales average. Bristol Water argued that Ofwat should also adjust for companies with lower than average wages as otherwise companies in low wage areas would be assessed as being more efficient then they really were.[18]

37.   According to Bristol Water, the PR09 frontier company, Yorkshire Water, had wages that were 10 per cent below Bristol Water's which itself was below the average.

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[15]Bristol Water's estimate of 67 per cent is based on the data from all its works and not only Purton and Littleton.
[16]Bristol Water SoC, paragraph 1166.
[17]W3 and W4 are two categories of water treatment type. An explanation of the different categories of water treatment is set out in Annex 2.
[18]Bristol Water SoC, paragraph 1156.

Bristol Water alleged that by failing to take this into account, Ofwat had under-estimated Bristol Water's efficiency by 5 per cent.

Ofwat's reliance on a single efficiency assessment technique

38. Ofwat's relative efficiency assessment relied on a single methodology, intra-industry benchmarking. According to Bristol Water, this was at odds with the practice of other UK regulators which typically employed several methodologies, including expert assessment, international benchmarks, inter-industry benchmark and top-down trend analysis. Bristol Water stated that Ofwat's relative comparisons were weakened by its narrow reliance on a single industry methodology in disregard of regulatory best practice.

39. Bristol Water also pointed out that within its chosen method, Ofwat limited itself to a single analytical technique, namely ordinary least squares. According to Bristol Water, Ofwat's attention was drawn to this weakness in its approach in the recommendations of the Independent Steering Group it appointed to review the PR04 price determination process. The Steering Committee concluded that:

> In view of the widespread industry dissatisfaction with Ofwat's efficiency methodology, and the large number of studies carried out in this area, we recommend instituting a joint industry review of efficiency studies and econometric approaches with the aim of developing a common industry approach for the 2009 review.[19]

40. According to Bristol Water, despite conducting this review Ofwat did not expand its methodological toolbox.[20]

Unsupported rate of efficiency improvement

41. As explained in paragraph 14 above, Ofwat assumed that by 2015 companies would be able to achieve 60 per cent of the available efficiency savings calculated in their efficiency assessment. Bristol Water argued that it was not clear how Ofwat arrived at this figure as this rate of catch-up was not based on the actual out-turn compared with the same efficiency assumption of 60 per cent at the PR04 period.

42. Specifically, Bristol Water pointed out that by 2008/09 only 2 out of 21 water companies—South East and South Staffordshire—outperformed the 60 per cent efficiency target set for them at PR04. Furthermore, one of the outperforming companies merged and might have benefited from possible merger efficiency that would not have been available to other companies.[21]

43. According to Bristol Water, this comparison of the catch-up efficiency target set at PR04 and the eventual out-turn was at odds with Ofwat's justification for retaining its 60 per cent catch-up target along the lines that 'the industry has equalled or bettered these assumptions (when used in combination with our catch-up targets) and we see no reason to move from them for the next price review'.[22]

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[19]'Report into the Conduct of the 2004 Ofwat Periodic Review', a report commissioned by Ofwat from the Independent Steering Group, August 2005.
[20]Bristol Water SoC, section H.4.1.4, paragraphs 1180–82.
[21]Bristol Water SoC, section H.4.1.3, paragraphs 1174–77.
[22]PR04 Methodology, paragraph 3.40, attached as Annex 135 to Bristol Water's SoC.

44.   Bristol Water also pointed out that a more detailed analysis showed that the discrepancy between the catch-up efficiency target set at PR04 and the eventual out-turn was particularly large for WoCs as opposed to WaSCs. In support of its claim, Bristol Water presented the results of a regression analysis which related the actual out-turn to the efficiency target set at PR04 separately for WoCs and WaSCs. The results of this analysis suggested that the correlation between the target and the out-turn was much smaller in the model for WoCs.[23]

45.   According to Bristol Water, this was because Ofwat's modelling did not take into account the beneficial scale and scope effects which were available to WaSCs. The WaSCs could achieve significant economies because they could spread central costs over both water and sewerage services. Furthermore, WoCs had significantly fewer staff than WaSCs, which provided a significant constraint in reducing costs (eg headcount) because of technological and organizational changes.[24]

Ofwat's econometric models' statistics and residuals

46.   Bristol Water expressed concerns about two of the four Ofwat econometric models: the water distribution model and the water resources and treatment model. Bristol Water pointed out that these two models had a low explanatory power and that their standard errors were large enough to raise doubts about the reliability of the results.[25]

47.   According to Bristol Water this raised questions as to whether the 10 per cent adjustment to the water efficiency model implemented by Ofwat (see paragraph 12 above) was sufficient to account for possible errors in the models or data. In support of this, Bristol Water referred to a review of Ofwat's methodology by Professor John Cubbin, which suggested that only about 40 per cent of the water service residuals in Ofwat's models could be attributed to efficiency as opposed to random noise, uncertainty and omitted explanatory factors.[26]

Continuing efficiency challenge

48.   The evidence used by Ofwat to estimate a continuing efficiency improvement factor (frontier shift) is described in paragraphs 16 to 19 above. According to Bristol Water, it remained unclear how this evidence led Ofwat to its determination of a continuing efficiency factor of 0.25 per cent. Following DD09, Bristol Water requested clarification of Ofwat's supporting analysis for its continuing efficiency estimation. According to Bristol Water, Ofwat refused to provide detailed analysis, stating that:[27]

> We have arrived at our decision on the scope for continuing efficiency by making a series of judgements informed by the work carried out by our external consultants and by the industry consultants and our update of this work to take account of current economic circumstances. This analysis was used to inform our advice on the scope for continuing efficiency that we presented to our Board which made the final decision on the scope for continuing efficiency. We will not be sharing the detailed analysis supporting our policy with companies.

[23]Bristol Water SoC, section H.4.1.5, paragraphs 1187 & 1188.
[24]Bristol Water SoC, paragraph 1191.
[25]Bristol Water SoC, paragraph 1194.
[26][✂]
[27]See Bristol Water SoC, paragraph 1200 [✂].

49.   Bristol Water submitted that this lack of transparency was not consistent with good regulatory practice.

50.   According to Bristol Water, there was an internal inconsistency in Ofwat's efficiency calculations. Bristol Water suggested that the analysis based on Ofwat's PR04 methodology showed that Ofwat's estimate of 0.25 per cent annual continuing efficiency challenge was not consistent with the recommendations of its consultants and its own catch-up efficiency results (see Annex 3 for further detail).

51.   Bristol Water also argued that any productivity gains achieved by the water industry would be more than offset by an increase in input prices that disproportionately affected the water and sewerage industry compared with the general economy (ie input price inflation above RPI). Bristol Water's own estimate of continuing efficiency (ie frontier shift) and the underlying assumptions used to produce this estimate are presented in Table 5.

TABLE 5   **Bristol Water's calculation of continuing efficiency challenge**

per cent

(1)	(2)	(3)	(4)	(5)	(6)
				Real	*Continuing*
Industry				*increase in*	*efficiency*
productivity	*Frontier*		*Input*	*input prices*	*estimate*
improvement	*shift**	*RPI*	*prices*	*(4)–(3)*	*(2)–(5)*
1.2	0.9	2.5	4	1.5	–0.6

Source: Bristol Water SoC, G.3.5, paragraphs 1033–35.

**Based on the work of Oxera for the ORR which estimates that 75 per cent of overall productivity improvement is due to frontier shift (ie 1.2% x 0.75 = 0.9%). In 'Network Rail's scope for efficiency gains in CP4'. Oxera, April 2008. Attached as Annex 127 to the Bristol Water SoC.

52.   Bristol Water's calculations yield a continuing efficiency estimate of –0.6 per cent, ie cost increases, not decreases as implied by positive efficiencies. Based on a review of its business process, Bristol Water identified a potential catch-up of 0.6 per cent. It argued that the two effects offset each other exactly, which suggested that there was no scope for cost savings during PR09.

53.   The underlying assumptions used by Bristol Water in its calculations, namely the estimates of the industry productivity improvement, RPI and water industry input prices, are taken from a report produced for Water UK by First Economics in June 2008.[28] A more detailed breakdown of First Economics' forecast of overall input price inflation for the water industry is presented in Table 6.

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[28]*The Rate of Frontier Shift Affecting Water Industry Costs,* First Economics, June 2008.

TABLE 6 **Forecast annual rate of input price inflation for the water industry**

per cent

	Share of 2007/08 expenditure	Forecast growth
Labour	0.5	4.25
Equipment	0.1	5
Chemicals	0.025	4.25
Power	0.125	4
Rates	0.1	2.50
EA charges	0.05	2.50
Bad debt	0.05	2.50
Other	0.05	3.93
Weighted average		3.93

Source: The Rate of Frontier Shift Affecting Water Industry Costs, First Economics, June 2008, Table 5.7, p34.

54. First Economics forecast the combination of a 4.25 per cent a year wage inflation assumption and 3.6 per cent a year increase in the cost of other inputs, yielding the overall increase in costs of just fewer than 4 per cent.

55. Bristol Water pointed out that First Economics' forecast was in line with the forecast for other regulated sectors. According to Bristol Water, the CAA, the CC, Ofgem and the ORR had all accepted that above-RPI input cost pressures would offset any productivity gains expected from the regulated sectors over and above the rate of productivity growth in the economy.[29]

CC's assessment

Relative efficiency

Ofwat's econometrics and catch-up rate

56. The purpose of our analysis was to assess whether Ofwat's econometric models provided a reasonable means of estimating inefficiency levels. We obtained additional material from Ofwat which enabled us to look more closely at the econometrics Ofwat used to benchmark the efficiency of water companies, including the data underlying the models. We used the material to look at company efficiency rankings and the relationship between estimates of inefficiency for a given company over time. We were also interested in the actual catch-up rates achieved by the water companies.

57. We would expect to see some persistence in the relative rankings of companies in the short term, although we recognize that some 'leap-frogging' might occur, particularly for companies with similar levels of efficiency. If the estimates are reasonable proxies for inefficiency, we would also expect to see the greatest level of reductions in inefficiency occurring for those companies which were estimated as less efficient to begin with. Finally, while we recognize the importance of setting demanding efficiency targets for the regulated water monopolies, we would be concerned if we observed companies persistently failing to achieve these targets.

58. In our work we used annual data compiled for us by Ofwat from the June returns to estimate Ofwat's cost models on an annual basis from 1992 to 2008. We then calculated residuals for each company by subtracting predicted opex from actual opex. We adjusted these residuals by 10 per cent in line with Ofwat's correction for modelling

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[29]Bristol Water SoC, section G.3.5, paragraphs 1033–1035.

error and then selected a 'frontier' company for each year by finding the company with the lowest residual (expressed as a percentage of its predicted opex). We calculated each company's efficiency with respect to the frontier company in each year, and allocated companies to efficiency bands A to E in line with Ofwat's methodology.

59.   Both Ofwat and Bristol Water argued that we should have adjusted our efficiency estimates for special factors and applied other data adjustments made by Ofwat. Ofwat also pointed out that we used the current suite of water service models and ran historic data through those models. It told us that its models were the product of continual development since before the 1994 periodic review and that, with the exception of the business activities model, the current models had different variables from those used at PR94. In its response to our provisional findings, Ofwat presented evidence which showed that two out of four of the models from its current suite are not statistically robust in all years.

60.   We recognize the limitations of our analysis and interpret our results with caution. Due to the limitations, we do not present numerical estimates but instead look at general patterns in the data which, in our view, should not be affected in a major way by the issues mentioned in the comments made by the parties. We also consider our analysis in combination with additional evidence provided to us by Ofwat which takes into account special factor adjustments, as well as a number of other adjustments made to the data by Ofwat. To cross-check our findings, we also assessed the efficiency of water companies using the econometric approach applied by Ofgem to benchmark electricity and gas networks.

61.   We started by estimating Ofwat's models for every year in our sample. We then identified a 'frontier' company in each year and that company's efficiency ranking in the previous year.[30] The results of this analysis are presented in Table 7.

TABLE 7   **'Frontier' companies and their ranking in the previous year**

| Year	Frontier company	Rank in previous year
1992	A	
1993	A	1
1994	A	1
1995	B	2
1996	A	2
1997	A	1
1998	B	2
1999	B	1
2000	B	1
2001	B	1
2002	B	1
2003	B	1
2004	C	2
2005	C	1
2006	C	1
2007	C	1
2008	D	4

Source: Ofwat data, CC calculations.

62.   When a company becomes the frontier company in a particular year, it typically does so from a ranking close behind the previous year's frontier company. There is also a degree of persistence in the ranking of the benchmark companies with each frontier company remaining so for several years.

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[30]As explained in paragraph 11, the frontier company may not be selected by Ofwat as a benchmark for other companies if it does not comply with Ofwat's benchmarking criteria.

63. Next, we looked at the relationship between our estimates of inefficiency in each year and estimates of inefficiency in the previous year. Figure 2 shows this relationship broken down by efficiency band in the previous period and compares this observed relationship with the target relationship. If companies were reducing the inefficiency gap by 60 per cent every five years, we would see an annual inefficiency reduction of approximately 17 per cent.[31] This would imply that inefficiency in any given year should be 83 per cent or less of inefficiency in the previous period. This target relationship is given by the red line in Figure 2.

FIGURE 2

Relationship between current and lagged inefficiency
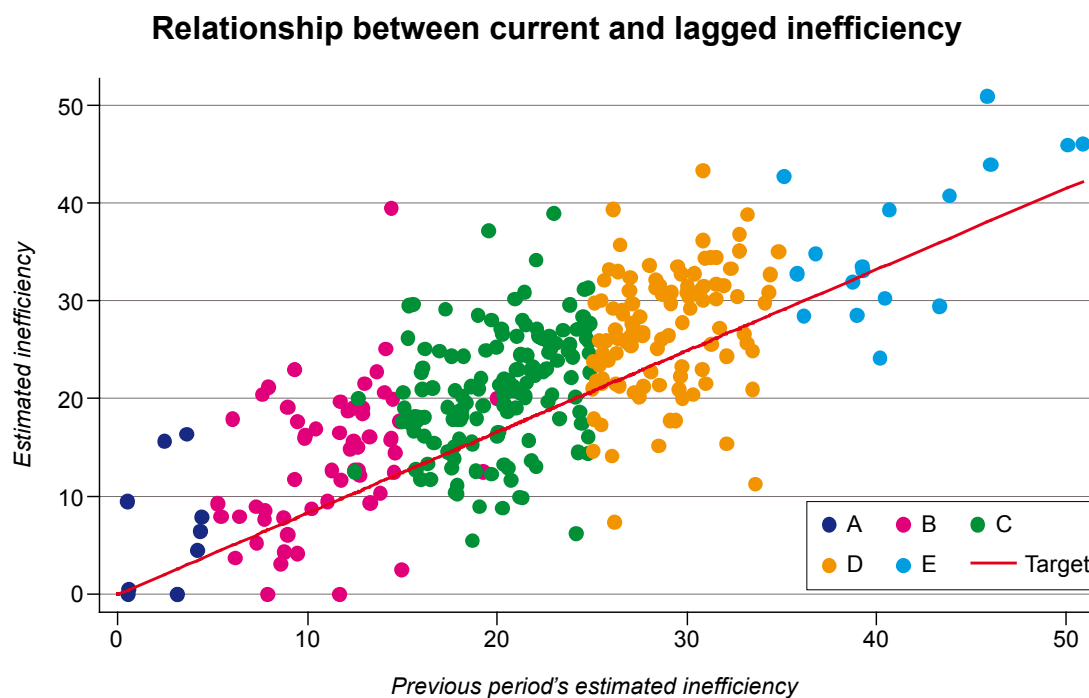
Source: CC calculations based on data provided by Ofwat (Ofwat emails to CC of 8, 26 and 27 April 2010).

64. Fewer than one-third of observations lie on or below this line, suggesting that the majority of companies do not meet the catch-up efficiency targets.

65. Ofwat pointed out that looking at annual inefficiency reductions is likely to be mis-leading in that companies rarely deliver efficiencies in a smooth profile due to a combination of initiatives resulting in step changes and timing differences in planned expenditures.[32] In its response to our provisional findings, Ofwat also pointed out that we used the frontier company to calculate the efficiency gap of the other companies, which is often different from the benchmark company selected by Ofwat (see para-graph 11 above). As a result, the efficiency targets in our analysis are more demand-ing than the actual targets set by Ofwat and so the pattern observed in Figure 2 above should not be interpreted as evidence that water companies are not meeting Ofwat's efficiency targets.

66. Ofwat told us of the results of research which was described in the UKWIR 2008 report on the application of time series analysis to relative efficiency assessment.[33] This research was carried out by consultants Reckon LLP. Ofwat pointed out that the

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[31]Calculated $(1-0.6)^{(1/5)}-1$.
[32][✂]
[33]UKWIR, *Application of Time Series Analysis to Relative Efficiency Assessment*, 08/RG/04/3,ISBN 1 84057 487 9 , 252 pp, £500.

findings from this report implied that the industry had on average met the 60 per cent target. We have considered the analysis in this report and how it relates to our results. We noted that Reckon used the fully adjusted data and employed sophisticated time series methods. We therefore place more weight on their findings than on our own analysis described in paragraphs 63 and 64.

67.   We also emphasize that the main justification for having the 60 per cent catch-up rate over a five-year period is that there is noise in Ofwat's efficiency estimates. If it were not for this noise, a 100 per cent catch-up over a five-year period would not be an unreasonable target, especially for opex expenditure. This is an important point in our view. Companies can hardly afford such delay in eliminating inefficiencies in a competitive market and, in our view, it would not be appropriate to provide such protection through regulation. We therefore considered that, on balance, taking into account our analysis and the findings from the UKWIR study, and being mindful of the need to maintain an appropriate efficiency incentive, there is no justification to lower the 60 per cent catch-up target.

68.   We discussed with Ofgem the methods it used during its Distribution Price Control Review 5 (DPCR5) to estimate inefficiency and determine appropriate catch-up rates to this frontier. Ofgem appears to use similar econometric models to those used by Ofwat, although Ofgem uses four years of panel data for each determination instead of the one year of cross-sectional data used by Ofwat. The main difference in Ofgem's approach, however, is that it sets the efficiency frontier at the upper quartile or upper third of the difference between actual and predicted opex.[34]

69.   This is to reflect the fact that Ofgem considers a certain amount of its inefficiency estimates to be noise rather than actual inefficiency. The degree of noise varies from one model to another and the frontier is set lower for models where Ofgem had less confidence in the data. Another key difference between the Ofwat and Ofgem approach is in the method used to adjust opex for differences in regional wages. Ofgem uses ONS data on wages and BCIS data[35] on contractor costs to construct separate regional wage indices for direct labour costs and contract wages. Labour costs are then normalized using the appropriate index. This means that areas with wage costs both above and below national averages will be adjusted.

70.   Once it has determined the frontier, Ofgem sets a catch-up rate of 100 per cent to the frontier. Electricity companies have been largely successful in meeting these targets until the most recent review period, where a number of special factors, including a significant increase in capex causing increases in indirect costs and real input price increases, meant that targets were not met. Ofgem assumed a 1:3 relationship between indirect costs and capex as part of DPCR5.

71.   We looked at the impact of adopting Ofgem's approach to determining the benchmark company frontier on the efficiency challenge for Bristol Water. We used the dataset which had been adjusted fully by Ofwat for its analysis (ie including adjustments for atypicals, special factors, pension and capex/opex interaction).[36] In line with Ofgem's approach, we did not adjust residuals before determining distance to the frontier in the way Ofwat does. We then calculated the efficiency challenge for Bristol Water as 100 per cent of the difference between residuals and the benchmark based on the average between the upper quartile and the upper third for residuals.

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[34]Ofgem based the efficiency frontier for network operating costs on the upper third and for indirect costs on the upper quartile.
[35]Building Cost Information Services.
[36]We initially carried out this analysis using unadjusted data. Following comments from Ofwat and Bristol Water, we used the adjusted data.

72. This produced an efficiency challenge of 1.38 per cent a year when we used all companies in Ofwat's sample, and an estimate of 0.73 per cent when we excluded the three most efficient companies which were deemed by Ofwat not to be a suitable choice for a benchmark company. We note that Ofwat's own efficiency challenge to Bristol Water of 0.92 per cent a year lies within these bounds.
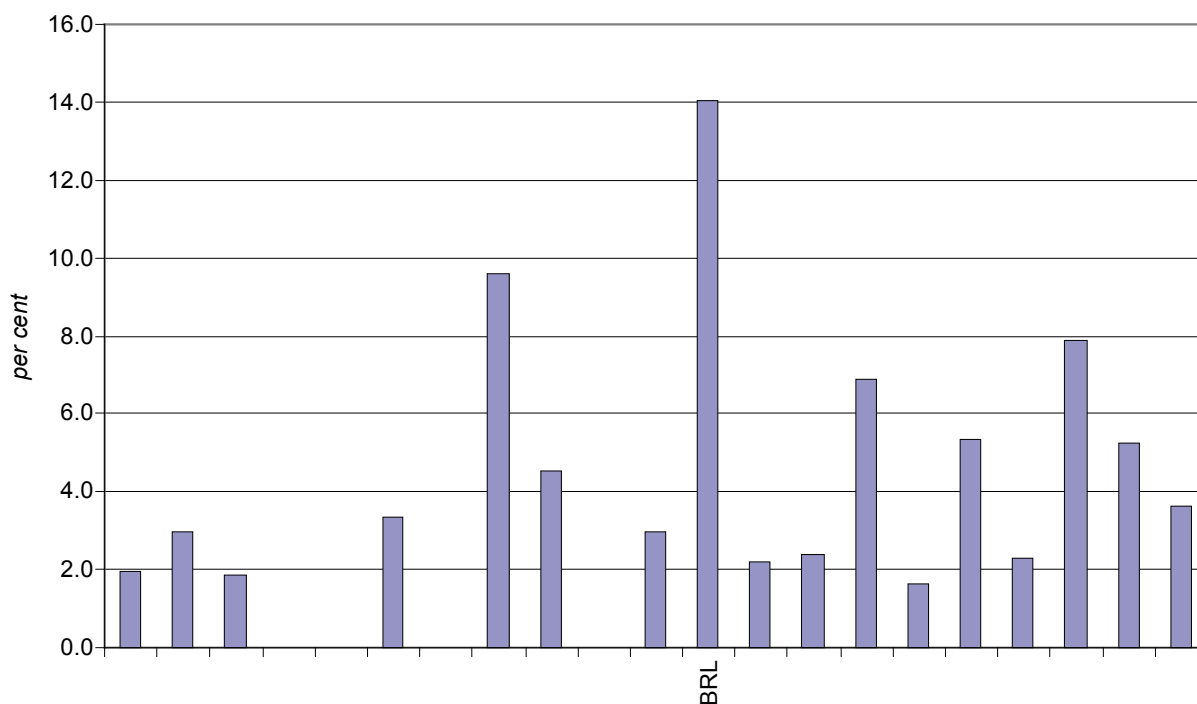
Special factors

73. Ofwat allowed Bristol Water special factors totalling 14 per cent of the modelled operating expenditure. This is in excess of Ofwat's own threshold of 10 per cent (as explained in paragraph 9 above). As no other company was allowed more than the 10 per cent limit, Bristol Water argued that this was a recognition on the part of Ofwat of the importance of these special factors for Bristol Water. Ofwat, on the other hand, pointed out that it did not believe that it would have been appropriate to have made an even higher allowance on the basis of the evidence presented in Bristol Water's claims.

74. We first considered how the size of Bristol Water's special factor allowance relative to the modelled opex expenditure compared to other companies. This is illustrated in Figure 3 which plots each company's special factor claim as the proportion of the modelled operating expenditure.

FIGURE 3

Special factor allowance as a percentage of modelled opex

Source: CC calculations based on data provided by Ofwat.

75. Bristol Water's special factor adjustment of 14 per cent of the modelled opex is an outlier; the average special factor is 3.2 per cent with all but two companies submitting claims relative to the modelled expenditure less than half that of Bristol Water. If Ofwat allowed Bristol Water's claim in full, this would increase the special factor adjustment to 23 per cent of the modelled opex.

76.   We first looked at Bristol Water's claim for treatment complexity which concerns Ofwat's resources and treatment model (see paragraph 32 above). Bristol Water submitted an alternative model which it claimed 'exhibited superior explanatory power to Ofwat's model for each of the years examined (2004–09)'. This model takes into account treatment complexity by adding an additional variable to Ofwat's model, namely the proportion of distribution from works in bands W3 and W4 (see paragraph 33 above). Bristol Water argued that we should rely on its model rather than Ofwat's model.

77.   However, when we compared the explanatory power of the two models, we found very little to distinguish them. In fact, for 2008/09 Ofwat's model has a somewhat higher explanatory power, as measured by 'R squared', than Bristol Water's model. We also found that Bristol Water's model suffered from the heteroskedasticity problem[37] which may be a symptom of functional form or omitted variable mis-specification.

78.   Bristol Water told us that the explanatory variables in Ofwat's model were highly correlated and that it was not good practice to use highly correlated explanatory values and so this reduced confidence in Ofwat's models prediction.[38] We disagree with this argument. In general, multicollinearity does not reduce the predictive power of the model as a whole; it only affects calculations regarding individual predictors. In any case, even if Bristol Water were right, this would still fall well short of demonstrating that its model has 'a superior explanatory power'.

79.   We also think that there is some force in Ofwat's argument that Bristol Water's model focuses only on the treatment element of the resources and treatment costs and that as such it may not be an appropriate tool for modelling this element of opex expenditure. We attempted to augment Ofwat's model by adding a variable from Bristol Water's model which measures the proportion of distribution input from W3 and W4 works (see paragraph 33 above) and which, according to Bristol Water, is the key driver of treatment costs. We found that this variable was not statistically significant when added to Ofwat's model.

80.   We next looked at Bristol Water's claim that it should be allowed to claim more than 50 per cent of indirect costs on account of treatment complexity at Purton and Littleton plants (see paragraph 25 above). Again we were not convinced by the evidence presented by Bristol Water. We examined more closely the data submitted by Bristol Water (see paragraph 30 and Figure 1 above) in support of its claim that indirect costs increase with treatment complexity at a rate of 69 per cent of the increase in direct costs. We found that this result is overly sensitive to the presence of an outlier which was not visible in Figure 1 because the X axis was truncated in Bristol Water's submission at the value of 40. The complete dataset is shown in Figure 4.
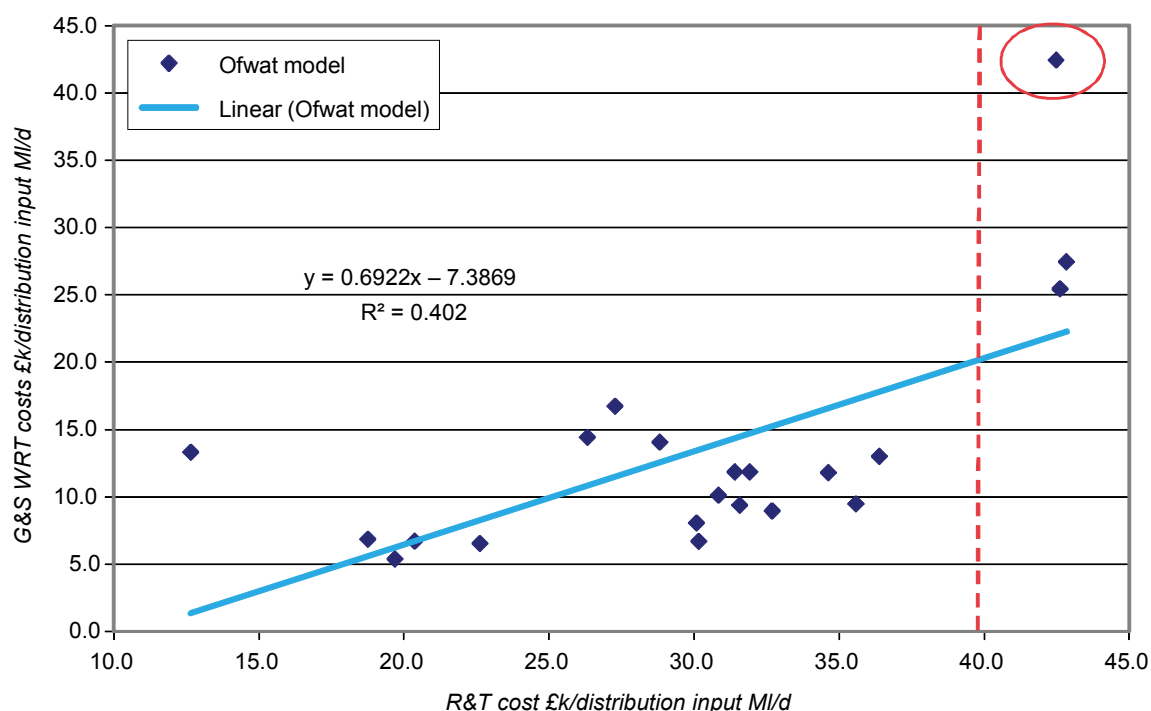
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[37]This means that the error term does not have a constant variance.
[38][✂]

FIGURE 4

**Relationship between direct (horizontal axis) and
indirect (vertical axis) cost: expansion of Figure 1**

Variation of 'on costs' with treatment difficulty

Source: Data provided by Bristol Water (Bristol Water email to CC of 22 March 2010).

81. When we excluded from the regression the outlier which is not visible in Figure 1, and which is highlighted in Figure 4 above, the parameter estimate reduced from 0.69 to 0.45. This result suggests that indirect costs increase with treatment complexity at a rate of 45 per cent of the increase in direct costs which is in line with Ofwat's allowance.

82. We then re-estimated Bristol Water's model using a robust regression method which minimizes the impact of outliers and obtained the results set out in Table 8.[39]

TABLE 8 **Variation of indirect costs as proportion of direct costs**

Explanatory variables	Parameter estimate	P-value
Constant	5.250	0.189
Treatment complexity	0.178	0.178

Source: CC calculations based on Bristol Water and Ofwat data.

83. We note that the parameter estimate is now much smaller and no longer statistically significant even at a 10 per cent significance level.

84. Finally, we looked at the issue of the congestion allowance. This is a relatively minor item which concerns Ofwat's making a 10 per cent downward adjustment on the claim of £0.43 million made by Bristol Water. We agree with Ofwat that congestion

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[39]We used the rreg routine in STATA.

costs will be driven by a range of factors including changes in the average speed data or mileage assumptions. We have seen no evidence from Bristol Water as to how these have been factored into its calculations. Consequently, we rejected this claim.

Regional wage adjustment

85. We have also considered the related issue of one-sided regional wage adjustment which was brought to our attention by Bristol Water (see paragraph 36 above). Bristol Water pointed out that Ofwat made a one-sided regional wage adjustment only for the companies whose regional wages were above the England and Wales average. It suggested that we ought to investigate the impact of this adjustment on its relative efficiency as set out in Bristol Water's SoC.[40] We spoke to Ofwat about this issue. Ofwat told us that for operating expenditure it used a frontier-based approach for efficiency and in line with this it used a single-sided adjustment for regional salary adjustments. For cost base it used a two-sided adjustment for regional costs which was consistent with its approach of using a typical level of efficiency (median) for capital expenditure. Ofwat also told us that it undertook sensitivity analysis to test the impact of two-way regional salary adjustments on Bristol Water's efficiency assessment and that this did not impact on the relative efficiency assessment of Bristol Water.

86. In order to investigate this issue in detail we would need data on employment costs for all companies in Ofwat's sample. This data was not available to us.[41] Instead we requested the data underlying the sensitivity analysis which Ofwat carried out in order to test the impact of adopting a two-way regional salary adjustment. We have examined Ofwat's analysis and we agree that this has no impact on the overall results—Bristol Water would still remain an Upper B.

Multiple efficiency assessment techniques

87. Bristol Water suggested that we should consider the use of multiple efficiency assessment techniques employed by some other regulators and to comment on whether Ofwat should consider adopting these techniques, or whether other regulators are needlessly adopting a variety of methods.[42] Our task in this appeal with respect to opex efficiency was to assess Ofwat's methodology and its estimates of the efficiency challenge for Bristol Water. We have done this by carefully considering the evidence that was put to us by the parties, and by carrying out additional analyses to test the robustness of Ofwat's figures. The latter included a cross-check of Ofwat's results using the methodology applied by Ofgem.

Oxera report and additional analysis carried out by Bristol Water

88. We received an independent submission from Oxera in relation to Ofwat's econometric modelling approach.[43] Oxera used a different approach from Ofwat to estimate relative efficiency of water companies.[44] In its response to our provisional findings,

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[40] [✂]
[41] Ofwat told us that it did not collect total employment costs as part of the June return process. It queried only those companies that had higher than average regional salaries in order to establish their exact employment expenditures. This is why it was unable to provide us with employment costs for all companies in the sample.
[42] [✂]
[43] Bristol Water's efficiency. An assessment of relative operating expenditure efficiency for water services. Submitted to the CC by Oxera on 9 April 2010.
[44] The main differences are the use of panel data and the stochastic frontier analysis (SFA) instead of corrected ordinary least squares.

Bristol Water said that we dismissed the Oxera submission without justification. It asserted that Oxera's report demonstrated that Ofwat's modelling almost certainly overstated Bristol Water's relative inefficiency.[45]

89. We disagree with Bristol Water's interpretation of the findings from the Oxera report. Oxera and Ofwat use different models and datasets. It is therefore not surprising that they produce different efficiency estimates. The important point is that the results from Oxera's analysis place Bristol in Upper Band B[46] which is consistent with Ofwat's Final Determination and would result in the same efficiency challenge as in Ofwat's determination. This is acknowledged explicitly by Oxera in its report:[47] 'The analysis presented here suggests that Bristol Water should be placed in Upper Band B, and is consistent with Ofwat's assessment in the Final Determinations. The model results in a range of inefficiency estimates of 5.8–8.8%, depending on the distributional assumptions used in the SFA model.'

90. In its response to our provisional findings, Bristol Water repeated the stochastic frontier analysis from the Oxera report with two adjustments to the data:[48]

    (a) a two-sided regional wage adjustment; and

    (b) a dummy variable indicating whether a company is a WoC or WaSC.

91. Using the adjusted data, Bristol Water produced two estimates of inefficiency: 3.9 per cent and 5.2 per cent. Bristol Water argued that this provided further evidence that Ofwat's assessment of relative inefficiency for Bristol Water was too high and that Bristol Water should be reclassified to Lower Band A.[49]

92. We disagree. First, we note that one of Bristol Water's estimates (3.9 per cent) places Bristol Water in Upper Band A, but that the other estimate (5.2 per cent) places it in Upper Band B which is consistent with Ofwat's assessment. More importantly, two of the other pieces of evidence available to us, namely our analysis using Ofgem's approach and the analysis carried out by Oxera, both suggest that Bristol Water should be placed in Upper Band B, which is consistent with Ofwat's assessment. The available evidence is set out in Table 9.

TABLE 9 **Summary of evidence on relative efficiency of Bristol Water**

Evidence	Efficiency banding
Ofwat's final determination analysis	Upper B
CC's analysis using Ofgem's approach*	Upper B
Oxera's analysis using SFA and panel data	Upper B
Bristol Water's analysis using SFA and panel data	Lower A & Upper B

Source: CC analysis.

*See paragraphs 68 to 72 above.

93. It is apparent that the majority of the evidence available to us suggests that Bristol Water should be classified in Upper Band B.

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[45]Bristol Water response to our provisional findings, Section 5 Opex Efficiency, paragraph 11.
[46]Ofwat's efficiency challenge to each company is based on the mid-point of each half band in which the company concerned is placed rather than on its efficiency estimates.
[47]'Bristol Water's efficiency. An assessment of relative operating expenditure efficiency for water services', Part 5, p16.
[48][✂]
[49]Bristol Water response to our provisional findings, paragraph 26.

94.   Furthermore, we note that Ofwat has raised a number of concerns over the quality of Bristol Water's analysis. We share Ofwat's concern over two particular issues it identified. One issue relates to the robustness of the regional salaries adjustment made by Bristol Water, and the other issue is about the use of the W3/W4 variable to account for water treatment complexity.

95.   On the issue of the regional salary adjustments, Ofwat provided us with the comparison between Bristol Water's estimates of employment costs and the actual employment costs which Ofwat obtained from five companies for which data was available to Ofwat. This shows that Bristol Water calculated much higher estimated total employment costs than the companies submitted (from 11 to 54 per cent higher depending on the company in question). This suggests that the salary adjustments made by Bristol Water are, in all likelihood, too large which, in our view, raises a question over its efficiency estimates.

96.   Our concerns about the use of the W3/W4 treatment variable are articulated in paragraphs 76 to 79 above in the context of our assessment of Bristol Water's special factor adjustment. We also agree with the additional point made by Ofwat[50] that there may be some double counting between the use of the W3/W4 treatment variable and the adjustment for special factors where these relate to treatment complexity, as is the case for Bristol Water.

97.   Overall, having considered all the evidence available to us, we endorse Ofwat's assessment of Bristol Water as being in Upper Band B.

Continuing efficiency

98.   We based our assessment of continuing efficiency on the approach that has been used by UK regulators in recent price reviews. Applying this approach to Ofwat's framework, the continuing efficiency challenge reflects productivity improvements that would be expected of the most efficient firms in the industry after factoring in the expected real input price inflation.

99.   In what follows, we first focus on productivity analysis and then consider input price inflation.

Productivity improvements

100.   We started by looking at recent trends in productivity growth (as measured by the year-on-year change in output per hour) using the ONS electricity, gas and water supply index. We compared these trends with productivity growth in manufacturing industries and the overall economy. The results are presented in Figure 5.

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[50] [✂]

FIGURE 5

Productivity growth by sector
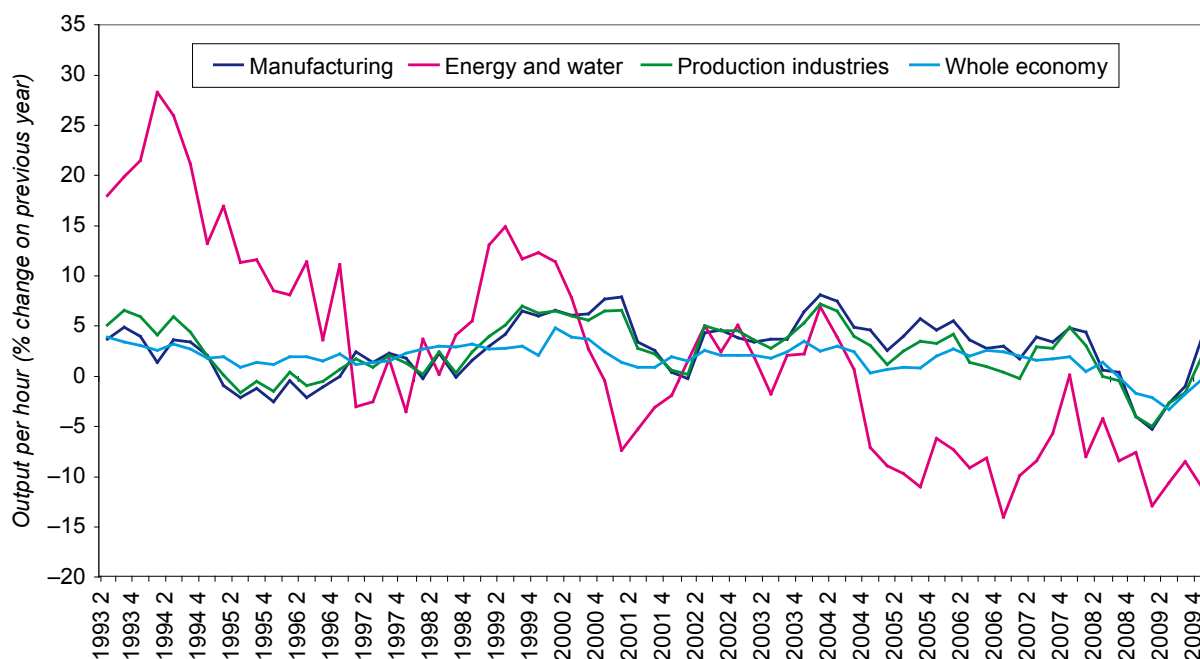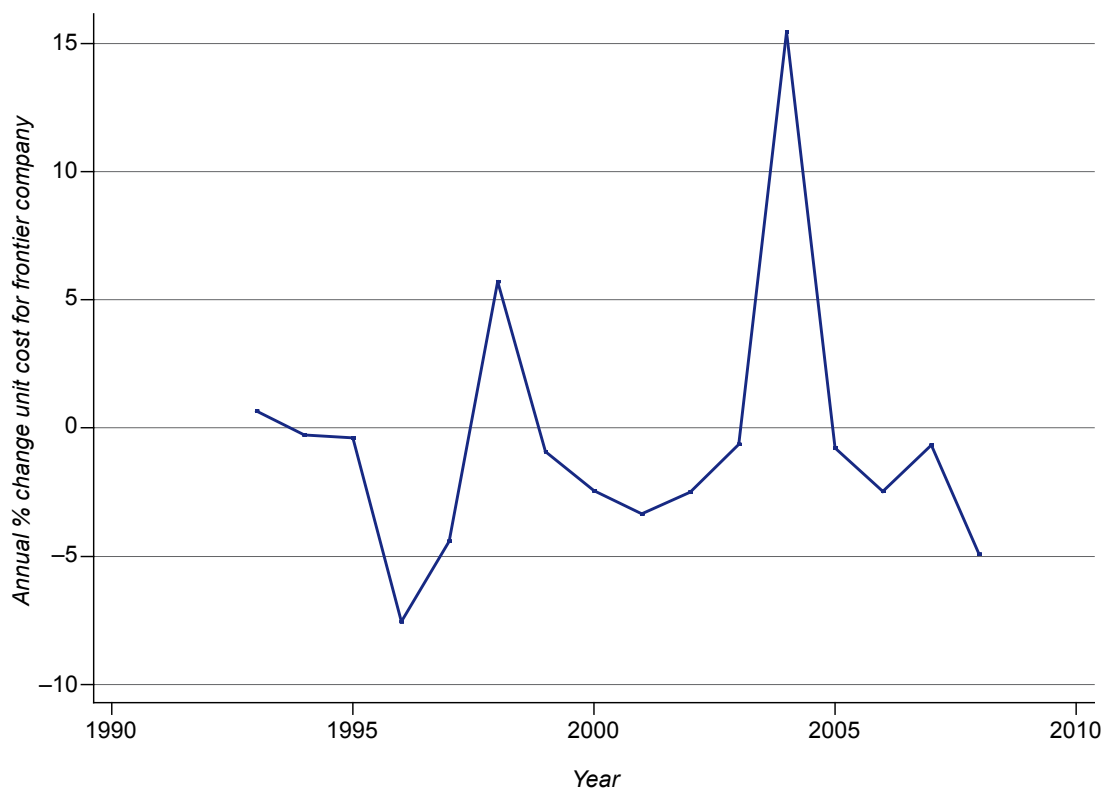

Source: CC calculation based on the ONS data.

101.   The figure shows a general decline in productivity growth in water and energy from very high levels in the early 1990s to negative growth from 2005 onwards. There is no clear relationship between productivity growth in the water and energy sector and productivity growth in the other sectors of the economy considered below.

102.   Ofwat cautioned against using this data to assess the scope for productivity improvements in the water industry. It pointed out that the water industry only made up a small percentage of the ONS electricity, gas and water supply index. Ofwat also told us that this data was affected significantly by the impact of the large quality programmes that had been carried out in these sectors since privatization. There were similar arguments in a study carried out by First Economics for Water UK.[51] We accept these arguments and do not rely on this evidence.

103.   We have also considered the unit cost reductions achieved by frontier companies between successive review periods. We used two measures of unit cost: one dividing total deflated opex by winter population and the other by delivered water volumes. The two measures gave broadly similar results.

104.   Figure 6 illustrates the movements in unit costs obtained using the first measure (dividing by winter population). It shows that in most years unit cost reductions have been achieved by the frontier company, although at a diminishing rate over the period. The increases in unit cost in 1998 and 2004 reflect in part a change in the identity of the frontier company (ie last period's frontier company is no longer at the frontier because its costs increased) but also a general increase in unit costs for which we cannot find an obvious explanation. The change in unit costs achieved by the actual frontier company was –4.1 per cent in 1994 and 1.7 per cent in 2004. Overall we consider the historic performance of the frontier to provide some support

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[51]'The Rate of Frontier Shift Affecting Water Industry Costs', First Economics, June 2008 (p23).

for the scope for further efficiency improvements at the frontier, although these are likely to be lower than they have been in the past.

FIGURE 6

Percentage change in unit costs for 'frontier'

Source: CC calculation based on the ONS data.

105.   We next considered the evidence presented in two reports produced by First Economics on the rate of frontier shift affecting water industry costs. The first report was produced in June 2008 for Water UK and was used by Bristol Water in its SoC as a basis for its estimates of continuing efficiency. In this report, First Economics identified industries that it considered to be the best comparators for different components of a water and sewage opex. It then used the historic total factor productivity (TFP) rates achieved by those industries to set an overall comparator for the water opex. This method yielded an estimate of the productivity improvement for water opex of 0.83 per cent a year.

106.   First Economics also recognized that labour productivity typically increased faster than TFP as companies over time replaced labour with capital. It factored this effect into the calculations of a productivity performance target by assuming a 0.5 per cent a year productivity improvement over and above TFP growth as a result of capital substitution. This assumption was taken from the ORR's 2008 determination for Network Rail and it corresponds to the marginal rate of capital substitution in the UK economy as a whole. This adjustment resulted in an overall estimate of productivity improvement of 1.33 per cent a year. Ofwat told us that it used the same figure as a starting point in its analysis of continuing efficiency.

107. The second report by First Economics in April 2010 revisited the issue of frontier shift affecting the water industry. On the basis of its assessment of the EU KLEMS[52] dataset which comprised growth and productivity accounts for 36 sectors, sub-sectors and sub-sub-sectors of the UK economy for the period 1970 to 2007, First Economics concluded that 1 per cent a year was a reasonable benchmark for all network industries in the UK. First Economics also pointed out that there had been a convergence in recent price reviews of the productivity growth rate targets around a point estimate of around 1 per cent a year.[53]

108. We also considered the approach used by Ofgem in the most recent price review to set a target for productivity growth for Distribution Network Operators (DNOs). Ofgem told us that it had set a target for productivity growth of 1 per cent for the most recent price review. It used a range of evidence to arrive at the assumption for ongoing efficiency. The first was a TFP analysis, which looked at recent productivity improvements in a basket of industries it considered comparable to electricity distribution. The second method was to compare the results of this analysis with companies' own projections of likely cost reductions contained in their business plans and work carried out by the DNOs' consultants.

109. On the basis of the evidence reviewed above, in our provisional findings we assumed a productivity improvement of 0.9 per cent a year over PR09.[54] This was marginally lower than the 1 per cent figure which appeared to be the consensus view. This downward adjustment reflected our view of the balance between two offsetting factors. On the one hand, we agreed with Ofwat that the scale of the industry capital investment programme, which at £22 billion is higher than in any other previous five-year period, presented an opportunity for continuing efficiency improvements for the water sector. On the other hand, we recognized that some of the forecasts of productivity improvements described in the text above are based in part on historic averages that incorporate the catch-up element of improvement in productivity which needs to be netted out from our estimate.

110. In response to our provisional findings, Ofwat argued that our assessment of productivity growth of 0.9 per cent a year was too low for the following main reasons:[55]

    (a) The network industries' regulatory decisions convergence on 1 per cent assessment were net of the catch-up effect (ie there was no need to make the adjustment described in paragraph 109 above).

    (b) The water industry had areas that were significantly different from other network industries and these areas were likely to drive higher productivity growth.

    (c) There was no evidence of declining productivity growth over time in the EU KLEMS dataset that underlined the industry calculation.

111. Ofwat also told us that, if it were to repeat the assessment of productivity, it would now consider a value of approximately 1.4 per cent a year in the light of the most recent information.

112. On the first of Ofwat's points, we were aware that the 1 per cent productivity target set by Ofgem (as stated in paragraph 108 above) is net of the catch-up effect. In our

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[52]This dataset draws on national accounts to provide sector-level data on inputs and outputs across EU member states, Japan and the USA.
[53]This is based on determinations by Ofgem, ORR and PPP Arbiter.
[54]As shown in Table 5, Bristol Water also assumed a 0.9 per cent increase in the productivity associated with continuing efficiency.
[55]Ofwat comments on the CC's provisional findings, paragraphs 6.12.4–7.

provisional findings (see paragraph 109 above), we made a general point that to the extent to which the forecasts of productivity improvements are often based on historic averages, they may incorporate an element of catch-up as well as frontier shift.

113. We have not received any concrete evidence from Ofwat on the second of its points that would lead us to adopt the 1.4 per cent productivity growth target suggested by Ofwat. In relation to the third of Ofwat's points, we can clarify that our view of productivity is not influenced by the perception that productivity has decreased over time as suggested by Ofwat in paragraph 6.10.3 of its response to our provisional findings.

Input price inflation

114. We have carried out a bottom-up analysis of input price inflation for a notional water company rather than basing it on actual data from Bristol Water. This is because the continuing efficiency target applies to the water industry as a whole and not only to Bristol Water. For the purpose of our analysis, we used an input mix based on information provided by Ofwat. This is presented in Table 10.[56]

TABLE 10 **Breakdown of opex**

Input	% of opex
Labour	59
Equipment	12
Chemicals	3
Rates	12
Bad debt	6
EA charges	6
Other	6

Source: Ofwat.

115. It can be seen that the biggest cost item is wages with a share of 59 per cent, followed by equipment and rates each with a share of 12 per cent. Other items account individually for less than 10 per cent of the total input cost.

116. We have considered whether for the purpose of our analysis we could rely on the assumptions about changes in input prices used by the parties and their consultants, namely First Economics and Reckon. Having carefully examined the most recent data from the ONS, we came to a view that we needed an updated set of assumptions. This is because some of the key assumptions, notably about wages and RPI, used by the parties are based on historic averages which do not correspond to current trends observed in the data, and to more recent macroeconomic forecasts.[57] While we were reasonably comfortable in assuming that both RPI and wages would return to their historic trend growth rates by the end of PR09 period, we were not convinced that we ought to rely on those trends to predict the real price effect for all the years in PR09.

117. One of the trends which was apparent when we looked at the most recently available data from the ONS, and which has potentially important implications for the forecast of input price inflation, was that the gap between RPI-measured inflation and wages
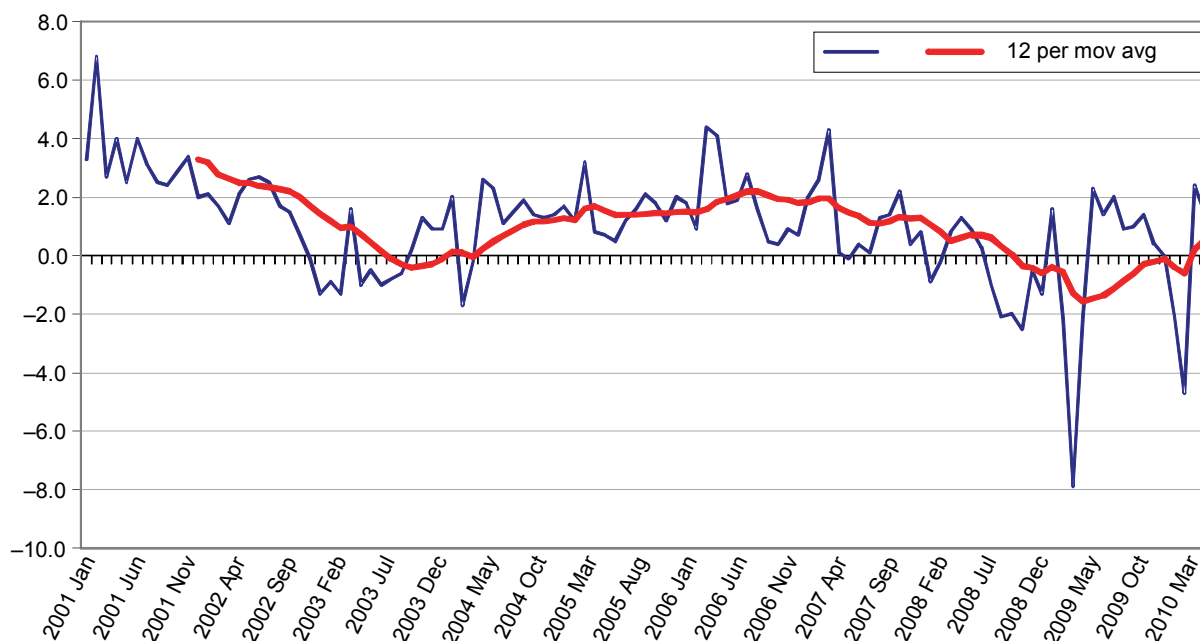
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[56] [✂]
[57] We could obtain data only for certain items.

growth[58] has narrowed since the start of the recent recession. This is illustrated in Figure 7.

FIGURE 7

Difference between private sector wages growth and RPI

Source: CC calculations based on ONS data.

118.　We note the following about Figure 7:

　　(a) Up to July 2008 private sector wages grew at a faster rate than RPI by about 1.4 per cent on average.

　　(b) Thereafter the trend has reversed, with RPI growing at a faster rate than private sector wages on average.

　　(c) In February and March 2010, which are the latest months for which data was available to us, private sector wages grew at a faster rate than RPI. However, there is an element of a bounce-back in private sector wages growth from the year before when the wages contracted by 7.9 per cent in February and 2.5 per cent in March.

119.　We take this evidence as supporting our argument that we should not base our forecasts on long-term historic averages alone. Where possible, our approach was to make separate forecasts of RPI and input prices for every year of the price review in order to reflect the change in economic conditions as the economy recovers from the recession. Although there are differing views among the forecasters about the path of the recovery, we felt that the safest approach was for us to assume a convergence of our forecasts of wages and RPI to long-term historical averages by the end of the price review period.

120.　Our assumptions are set out below in more detail.

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[58]Based on ONS Private Sector Average Weekly Earnings (AWE) series (including bonuses). This series has replaced the Average Earnings Indicator (AEI) as the lead measure of short-term changes in earnings from January 2010.

RPI

121. Our forecasts for RPI-measured inflation are based on the average of independent forecasts in the February issue of *Forecasts for the UK Economy*, compiled by HM Treasury.[59] This provided us with the forecasts of RPI to 2014. For 2015 we assumed that RPI will increase at a rate of 2.5 per cent. This corresponds approximately to the 2 per cent CPI target given by the Government to the Bank of England. We note that most forecasters adopt a similar assumption of convergence to the Bank of England inflation target rate when forecasting over a long horizon. Since these forecasts are for calendar years, we weighted them to produce financial year forecasts.[60]

Labour costs

122. Our forecasts of labour costs were based on private sector wage inflation (see footnote to paragraph 117 above). The data from the ONS shows that private sector earnings (as measured by the AWE index) increased in 2009/10 by 1 per cent, which is 0.5 per cent above the rate of RPI over the same period.[61] For 2010 and 2011, we used the average of independent forecasts from the February issue of Forecasts for the UK Economy.[62] The Treasury does not collect earnings forecasts beyond a two-year horizon. For the remainder of the period, we assumed a gradual return to the historical trend growth rate based on the 4.3 per cent average over the period 2001 to 2007 (ie before the recent recession).[63]

Equipment and Chemicals

123. For these two cost components we had historic data from the ONS but not the forecasts.[64] We assumed that their prices will converge gradually from the current levels to the historical averages for the period 2000 to 2007 (ie before the recent recession[65]).

Bad debt, Environmental charges and Other

124. We did not have historic data for these cost components. We assumed that they will increase over the price period in line with the RPI-measured inflation. Both Ofwat and First Economics made similar assumptions.

125. In response to our provisional findings, Bristol Water argued that our forecasts of RPE were extreme and were inconsistent with the available evidence. It argued that we ought to:

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[59]Table M3.
[60]The weights were calculated using the number of months from two consecutive calendar years in each financial year. For example, the forecasts for 2010/11 are calculated by giving the forecast for 2010 and 2011 the weights of 0.75 and 0.25 respectively.
[61]Based on the ONS measure of total weekly earnings including bonuses and arrears.
[62]Tables 5 and 8.
[63]Our preference was to use the average for the period 2000–2007, but the AWE data is available only from 2001. As in the case of the RPI figures, the wages forecast for calendar years were weighted to produce financial year forecasts.
[64]We used the ONS Producer Price Indices for Machinery and Equipment and for Chemicals, Chemical Products and Man-made Fibres). These indices measure change in the prices of goods produced by UK manufacturers.
[65]Since the historical averages for the period 2000–2007 are lower than the recent growth rates, we have also tested the impact of using the averages for the period 2000–2009. This did not have any impact on the forecasts presented in Table 11.

(a) include a forecast output price inflation for skilled labour, increasing at a rate that is 1.5 per cent above the rate for general labour;[66]

(b) include an inflation forecast for power equivalent to a 4 per cent a year increase in price;[67] and

(c) increase our forecasts of price inflation for machinery and equipment to 4.5 per cent a year for every year of PR09.[68]

126. Our forecast of input price inflation for labour is based on an economy-wide index which reflects wages of all sections of the labour force, including specialist labour. We have seen no evidence from Bristol Water that would lead us to conclude that that index is inappropriate for water industry opex. Indeed we note that neither Ofwat nor First Economics allowed for specialist labour in their forecasts of input price inflation for base opex.[69] We also note that the figures proposed by Bristol Water, namely a 4 per cent increase in wages this year accelerating to 4.4 per cent in 2011/12, do not appear credible given the short- to medium-term economic outlook.

127. We asked Ofwat about whether we should allow for power costs in our forecasts of RPE. Ofwat told us that it included an increase in future power costs for some companies (including Bristol Water) separately in price limits from the continuing efficiency calculation. Specifically, Ofwat included an uplift to power costs equivalent to a real unit price of £52/MWh for the whole AMP5 which is well above current electricity prices. This being the case, we see no justification for making a separate allowance for power costs in our forecasts of RPE. Furthermore, we think that there is some force in the argument put forward by Ofwat that RPI largely provides protection for power inflation due to the similar make-up of the RPI basket and water industry opex costs and the second order effect in other product inflation.

128. We have looked again at our forecasts of input price inflation for chemicals and equipment in light of the comments made by Bristol Water in response to our provisional findings. As explained in paragraph 123 above, for these two cost components, we assumed that their prices will converge gradually from the current levels to the historical averages for the period 2000 to 2007 (ie before the recent recession). The most recently available data (up to and including June 2010) shows that the price inflation for equipment, which is the bigger of the two items, remains below our forecasts whereas for chemicals it is increasing ahead of our forecasts. Since the two changes, if implemented, would have an offsetting impact on our overall forecast of RPE we saw no compelling reasons to depart from our forecasts in provisional findings.

129. Our forecasts of RPE are presented in Table 11 together with our assumption about the expected productivity improvement and the resulting efficiency challenge.

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[66]Bristol Water response to our provisional findings, paragraph 65.
[67]Ibid, paragraph 77.
[68]Ibid, Table 3.
[69]First Economics June 2008 Report, Table 4.5.

TABLE 11 **CC forecasts of changes in opex inputs**

Input	% of opex	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	PR09
Labour	59	1.0	2.5	2.9	3.4	3.8	4.3	
Equipment	12	3.3	2.9	2.6	2.2	1.8	1.5	
Chemicals	3	2.7	2.5	2.4	2.2	2.0	1.8	
Rates	12	0.5	3.1	2.7	2.9	3.1	2.8	
Bad debt	6	0.5	3.1	2.7	2.9	3.1	2.8	
EA charges	6	0.5	3.1	2.7	2.9	3.1	2.8	
Other	6	0.5	3.1	2.7	2.9	3.1	2.8	
W average		1.2	2.8	2.9	3.2	3.5	3.6	**2.9**
RPI		0.5	3.1	2.7	2.9	3.1	2.8	**2.5**
RPE		0.7	–0.2	0.3	0.3	0.4	0.8	**0.4**
Productivity growth								**0.9**
Efficiency challenge								**0.5**

Source: CC calculation based on ONS data.

Note: The RPE numbers do not always correspond exactly to the difference between the weighted averages and the RPI due to rounding.

130. We forecast an RPE of 0.4 per cent a year (last column in Table 11) which is the difference between the forecast average growth of input prices of 2.9 per cent a year and the forecasts of RPI of 2.5 per cent a year. We then subtract the RPE from our productivity assumption of 0.9 per cent a year and this gives us our estimate of the continuing efficiency challenge of 0.5 per cent a year. This is higher than the figure used by Ofwat (0.25 per cent) but is lower than Ofwat's higher estimate (see paragraph 133).

131. We have also assessed the effect of the RPE for the years 2008/09 through to 2014/15 as suggested by Bristol Water using the same methodology we employed to derive the forecasts presented in Table 11.[70] This resulted in a marginally higher efficiency challenger of 0.6 per cent a year.

132. Bristol Water argued strongly that in recent price reviews regulators other than Ofwat had all made zero, near zero or positive frontier shift assumptions. Bristol Water asserted that taking a different view would be at odds with regulatory precedent. We do not think that regulatory precedent is necessarily helpful in forecasting inflation and wages growth in the current changing economic climate.

133. Ofwat told us that it arrived at its continuing efficiency assumption of 0.25 per cent a year by adjusting downward a higher estimate of 0.62 per cent a year which followed from its productivity and RPE assumptions.[71] Ofwat felt that this was appropriate for the following reasons:

- It was concerned that there might be an element of double counting in its estimate of the frontier productivity shift.

- It wanted to leave potential for companies to outperform the target (Ofwat's 'carrot and stick' approach).

- There was a degree of uncertainty associated with some of the components in its calculations.

134. On the first of these points, we note that we have already lowered our estimate of productivity outperformance along the lines explained in paragraph 109. We see some merit in the second and the third points. For this reason, and being mindful of

[70][✂]
[71][✂]

other recent determinations, we have lowered our estimate (but by less than Ofwat) from 0.5 to 0.25 per cent a year, the same final figure as Ofwat.

Relative operating efficiency bands

Water and sewerage companies

	Water	Sewerage
Anglian	A lower	B upper
Dŵr Cymru	C lower	C upper
Northumbrian	B upper	C upper
Severn Trent	B upper	A lower
South West	B lower	B lower
Southern	A upper	B upper
Thames	B upper	A upper
United Utilities	B upper	C upper
Wessex	B upper	A upper
Yorkshire	A upper	A lower

Water only companies

Bournemouth & W Hampshire	B upper
Bristol	**B upper**
Cambridge	C upper
Dee Valley	B upper
Portsmouth	A upper
South East	A lower
South Staffs	A upper
Sutton & East Surrey	A lower
Veolia Central	C lower
Veolia East	B upper
Veolia Southeast	C upper

Source: Ofwat final determination, Table 38, p108.

Categories of water treatment

The categories of treatment types are:

- Works providing simple disinfection only (eg marginal chlorination).

- W1: Simple disinfection plus simple physical treatment only (eg filtration and disinfection).

- W2: Single stage complex physical or chemical treatment (eg super chlorination, flocculation or biofiltration), but excluding processes in W4.

- W3: More than one stage of complex treatment but excluding processes in W4.

- W4: Nitrate or pesticide removal. This category is intended to capture processes with very high operating costs.

Bristol Water critique of opex efficiency calculations

1.   In order to demonstrate that there is an internal inconsistency in Ofwat's efficiency calculations, Bristol Water made the use of the following expression:[72]

     Overall scope for improvement in the industry =

     Continuing efficiency + scope for catch-up in the industry   (1)

    From this, the continuing efficiency can be expressed as the difference between the overall scope for improvement in the industry and the catch-up:

     Continuing efficiency = Overall scope for improvement in the industry –
     scope for catch-up in the industry   (2)

2.   According to Bristol Water, a study by Ofwat's own consultants forecast that there would be no scope for improvement in the industry over PR09 concluding that 'productivity growth will be cancelled out by above-RPI increase in input prices'.[73] Therefore the value of the first term on the right-hand side of equation (2) is 0 per cent.

3.   Although Ofwat did not publish the overall catch-up efficiency figure for the water services industry as a whole (the second term in equation (2)), Bristol Water estimated it using each company's relative efficiency bandings, the associated efficiency targets and the operating expenditure totals. According to Bristol Water, this calculation yields an estimate of the aggregate catch-up of around 1 per cent a year.

4.   Inserting these two figures in (2) yields an estimate of the continuing efficiency challenge of –1 per cent. According to Bristol Water, this calculation illustrates that Ofwat's requirement for Bristol to reduce costs due to efficiency by 0.25 per cent a year is not consistent with the recommendation of its own consultants and its own catch-up analysis.

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[72]Bristol Water SoC, section H.4.1.8.
[73]Reckon: PR09 Efficiency Studies, paragraph 8 (Annex 126 to Bristol Water's SoC).

Corporation tax

Introduction

1. Bristol Water referred to the 'possibility of future changes to the company tax regime in the UK, and the probability that due to these changes it would pay significantly higher taxes during the PR09 period'.[1]

2. It submitted that 'these potential increases in tax are too large for the company to be reasonably expected to absorb, and that, therefore, there should be a two-way Notified Item to take account of the changes in taxation'.[2]

3. There are two specific potential changes which Bristol Water believed might have the effect of increasing the company's tax liabilities significantly. These are:

    (a) the impact of a change in accounting convention from UK Generally Accepted Accounting Practice (UK GAAP) to International Financial Reporting Standards (IFRS); and

    (b) wider reform of corporation tax.

    We consider each of these items below.

The impact of a change from UK GAAP to IFRS

Bristol Water's position[3]

4. This issue relates to renewals accounting. Renewals accounting determines whether maintenance expenditure should be capitalized or expensed. Under Bristol Water's application of UK GAAP, renewals accounting is used. This means that all infra-structure maintenance expenditure is capitalized within the statutory accounts. Renewals accounting then recognizes the steady state of the infrastructure asset and therefore allows the IRC to be deducted from the net book value as depreciation. Upon application of (or UK GAAP convergence with) IFRS, Bristol Water expects that maintenance expenditure will be capitalized where it is material to the asset in question, can be measured reliably, and will probably result in future economic bene-fits flowing to the entity. Bristol Water said that its auditors had set the materiality threshold at the lower of '£250,000 for each asset identified or 1% of MEAV'.[4]

5. According to Bristol Water, in 2004 HM Revenue and Customs (HMRC) confirmed that water companies continuing to apply renewals accounting under UK GAAP would be allowed to continue to receive relief for the IRC in the year of recognition.[5] In other words, all IRC expenditure recognized in a particular year would be counted as an expense for tax purposes. When an infrastructure maintenance cost is counted as an expense for accounting purposes, the company can claim tax relief on it

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[1]SoC, paragraph 1241.
[2]SoC, paragraph 1242.
[3]SoC, paragraphs 1241–1271.
[4]Modern Equivalent Asset Value: this is the measure used by Bristol Water to record the values of assets in its accounts. It is defined as the value of an asset similar to the asset being valued and having the equivalent productive capacity, which could be built using modern materials, techniques, and design.
[5]SoC, paragraph 1246.

immediately, whereas if the item is capitalized the relief occurs over a number of years, depending on the asset life and depreciation profile. Companies therefore usually seek to classify expenditure as an expense rather than capital.

6. Bristol Water noted that the Accounting Standards Board was currently consulting on requiring all but the very smallest entities to prepare their accounts under IFRS rather than UK GAAP.[6] In the consultation paper, the proposed date of change (1 January 2012) would affect Bristol Water's accounts from 2012/13 onwards.

7. Bristol Water believed that under IFRS (or under future UK GAAP that has been modified to converge with IFRS) it would no longer be able to use renewals accounting for its IRC.[7] This would lead to less favourable tax treatment and a higher corporation tax charge. The higher charge is estimated to be £[✂] million in 2012/13 (if the move to IFRS is implemented then), £[✂] million in 2013/14 and £[✂] million in 2014/15.[8]

8. Bristol Water considered that the potential impact of this increased taxation was too large for the company to be expected to absorb, and so requested that an NI be put in place.

Ofwat's position[9]

9. Ofwat addressed this issue in its final determination. It noted that half of the water companies had expressed concern, and most of these had asked for an NI to be put in place. It also noted that the move to IFRS was not final and that two companies had moved to IFRS during the PR04 period but had not asked for an interim determination.

10. Ofwat decided neither to make any assumptions on IFRS adoption nor to grant an NI. Its reasoning was that

> Although it is possible that additional tax may arise because of changes to accounting standards, this will be heavily influenced by each company's choice of accounting policies. Companies can therefore take steps to manage the tax implications of such a change.

> In addition, the tax impact of the accounting changes may not be wholly adverse. Expenditure for which companies do not currently receive any tax relief may attract a deduction for tax purposes under the new accounting rules.[10]

11. In further evidence, Ofwat told us that the overall tax effect of the adoption of IFRS was directly dependent on a company's choice of depreciation policies. It noted that the two companies which currently reported under IFRS were projected to receive different proportions (67 per cent and 96 per cent) of IRE as a deduction in the year of spend. It also said that Bristol Water's projections of the impact of the change were based on accounting policies set by its wider corporate group. Finally, it said that it believed that approximately £53 million of Bristol Water's capital enhancement expenditure, which currently did not attract tax relief, might do so under IFRS.

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[6]SoC, paragraph 1254.
[7]SoC, paragraph 1260.
[8]Bristol Water FBP, Part B7, Section 6.2, p39.
[9]Final determination, pp141&142.
[10]Ofwat final determination, p142.

12. In its final determination, Ofwat noted that the water companies had put forward an alternative basis for treatment of infrastructure charges to HMRC, but that HMRC had not concluded on the industry's proposal.[11] Bristol Water told us that this related to infrastructure charges on new properties and was not relevant to this issue.[12]

13. In its Response to Bristol Water's SoC,[13] Ofwat reiterated the points above. It made two further points. First, that although Bristol Water implied that it was its auditors that set its accounting policies on capitalization, in fact it was the Directors who were responsible for setting these policies. It also responded to Bristol Water's alternative to an NI—a Tax Trigger Mechanism as used by Ofgem—by pointing out that Ofgem's Tax Trigger Mechanism excluded the impact of accounting policies, although Bristol Water subsequently said that the latest Tax Trigger Mechanism would, in principle, take the IFRS issue into account.[14]

Bristol Water's reply to Ofwat's response

14. In its reply to Ofwat's response,[15] Bristol Water pointed out that its accounting policies must be acceptable to its auditors. It accepted that there was uncertainty over the likelihood and timing of the introduction of IFRS, but that there was a 'reasonable probability' that the change would occur.

Responses to provisional findings

15. Ofwat concurred with our provisional finding. Bristol Water said that there was no scope for negotiation with HMRC, and produced an email from HMRC in support of its position.[16] It said that the risk of changes to business tax were not borne by shareholders of non-regulated businesses, and that if the CC were to assume otherwise then it would need to set out the impact of this assumption on its ERP estimate.

Wider reform of corporation tax

Bristol Water's position

16. Bristol Water stated that 'whatever the result of the general election there will be changes made to the tax regime and that these will, given the current economic circumstances, result in an increase in the overall level of taxation'.[17]

17. In its FBP, Bristol Water highlighted proposals by the Conservative Party to reduce capital allowances and corporation tax if elected. Bristol Water estimated that the effect of these changes would be to increase its tax liability by up to £1.7 million a year.

18. Bristol Water argued that tax changes were not a normal business risk for it, because water companies were more affected by changes to capital allowances than other sectors, and because companies in competitive market sectors were able to increase prices to absorb tax increases. It recommended that Ofwat put an NI in place to transfer the risk of corporation tax changes to customers.

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[11][✂]
[12][✂]
[13]Ofwat response to Bristol Water SoC, pp82&83.
[14][✂]
[15]Bristol Water reply to Ofwat's response, paragraphs 308–310.
[16]Bristol Water response to provisional findings, Annex 22.
[17]SoC, paragraph 1262.

Ofwat's position

19.   In its final determination, Ofwat said:

> A number of companies have highlighted the impact of any wider reform of corporation tax as an issue in their plans and representations. They have particular concerns about the impact on the sector of the abolition of capital allowances. We have considered this issue and it is not clear to us whether any changes are likely or how they might take effect within this price review period. Furthermore, such changes affect all sectors. We consider this is part of normal business risk and we have not made any allowance for this in our final price limits or included it as a notified item.[18]

This was reiterated in its response to Bristol Water's SoC.[19]

Responses to provisional findings

20.   Ofwat concurred with our provisional finding. Bristol Water said that an NI was no longer required given the announcement of the new Government's corporation tax plans in the June 2010 Budget.

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[18]Final determination, p142.
[19]Ofwat response to Bristol Water SoC, p83.

Depreciation

Introduction

1.　This appendix covers two issues raised by Bristol Water regarding the depreciation charge allowed by Ofwat for its above-ground assets. The first relates to the change in depreciation arising from a revaluation of assets, and the second relates to an adjustment made by Ofwat as a result of its overall check on the appropriateness of Bristol Water's depreciation.

Change in depreciation arising from asset revaluation

2.　As part of the PR09 process, Ofwat required the water companies to revalue their above-ground assets on a Modern Equivalent Asset Value (MEAV) basis. MEAV is defined as the value of an asset similar to the asset being valued and having the equivalent productive capacity, which could be built using modern materials, techniques, and design. Replacement cost is the basis used to estimate the cost of constructing a modern equivalent asset, and this replacement cost is usually depreciated to reflect the shorter remaining life of the asset that is being valued.[1] If the real cost of an asset has risen since it was acquired, then its MEAV will be higher than its historic cost (assuming equivalent depreciation). However, in many cases the MEAV will be lower as improvements in technology and efficiency over time have made replacing such assets cheaper.

3.　Ofwat said that it expected that the revaluation would cause a reduction in asset values. This would also reduce the Current Cost Depreciation (CCD) charge, for which Ofwat makes an allowance when calculating a company's revenue requirement.

4.　However, for FD09, about half of companies reported an increase in depreciation as a result of the revaluation. Ofwat noted in FD09 that 'A number of companies have been unable to explain [the increase in depreciation] fully in their business plans … Companies have also attributed the increase to assets that were 'undervalued' at previous reviews or omitted entirely. Companies have not consistently carried out revaluations or made the linkage with the current cost depreciation'.[2] Ofwat was also concerned about the use of COPI to uplift costs, and the assessment of remaining asset lives.

5.　In FD09, Ofwat made specific adjustments to CCD for seven companies (including Bristol Water). For other companies, no increase in CCD arising from the MEA revaluation was allowed.

6.　Ofwat had a number of concerns with Bristol Water's revaluation.[3] These fall into three categories:

　　(a) Specific items: Ofwat referred to Bristol Water's use of a higher number of variable speed pumps in the revaluation than its current configuration, and also to

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[1]Adapted from the definition in Ofwat's glossary, www.ofwat.gov.uk/pricereview/gud_pro_pr09glossary.pdf.
[2]FD09, p116.
[3][✂]

the MEAV of its computers being based on current equivalents with higher specification rather than those of similar specification.

(b) *Methodology and Assumptions:* Specifically, Ofwat questioned Bristol Water's assumption that changes in gross value should be allocated to pre-1998 assets and to assets which were not fully depreciated. It said that this led to an upward bias in CCD.

(c) *Index assumption*: Ofwat was concerned by the use of COPI.

7.   Ofwat allowed only half of Bristol Water's 6.2 per cent increase in CCD. This was consistent with its position for the draft determination. This reduced the CCD allowance for Bristol Water by £2.5 million over the PR09 period.

Bristol Water's position

8.   In its SoC, Bristol Water stated that it 'undertook the revaluation exercise with care and in accordance with the Company guidance information requirements… [it] has provided Ofwat with the information needed to answer the questions it raised. The revaluation process was subject to rigorous audit by the Reporter'.[4]

9.   Bristol Water stated that Ofwat's residual concerns were unfounded and did not appear to be reasonable; that Bristol Water dealt with Ofwat's concerns through correspondence between draft determination and final determination stages; that the 50 per cent reduction was arbitrary; and that the outcome set out in FD09 was not transparent.[5]

10.   Bristol Water's SoC outlined the revaluation process and cited the Reporter's view that she was 'able to confirm her confidence in Bristol Water's approach, which she considered to be suitable … She considered the approach regarding selection of the modern equivalent asset to be in line with Regulatory Accounting Guideline 1.04 and she was satisfied it was robust and appropriate'.[6]

11.   Bristol Water also cited the Reporter's report on the FBP, which provided comfort on Bristol Water's approach to fully depreciated assets[7] and the consistent application of its described process for calculating CCD.[8]

Ofwat's response to Bristol Water's SoC

12.   In its response to the SoC, Ofwat restated its approach.[9] It expected depreciation charges to fall as a result of the revaluation, reflecting capital efficiencies that had occurred in the ten years since the previous revaluation. It noted that Bristol Water was one of seven companies for which an increase in CCD was allowed (after adjustments) and that there were companies which had proposed increases but had not had any allowed as they were unable to provide sufficient justification.

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[4]Bristol Water SoC, paragraph 1274.
[5]Bristol Water SoC, paragraph 1275.
[6]Bristol Water SoC, paragraph 1280.
[7][✂]
[8][✂]
[9]Ofwat's response to Bristol Water SoC, pp32–36.

13. Ofwat noted that the revaluation exercise involved significant judgements and assumptions, and that Bristol Water assigned a very low confidence grading to the accuracy of its revised asset values.[10]

14. Ofwat said that it took Bristol Water's responses from the correspondence between draft determination and final determination into account, but remained concerned that Bristol Water's assets might be overvalued, and that Bristol Water's assumptions led to an upward bias in CCD.

15. Ofwat mentioned two specific issues. First, Bristol Water did not apportion enough of the revaluation to assets which had been purchased before 1998 and had been fully depreciated but were still in use. Second, at 31 March 2008 COPI was at a historic high over RPI, 'largely due' to the effect of the private housing component of COPI, which was not relevant to the water industry.[11]

16. Ofwat responded to Bristol Water's view that the adjustment was arbitrary by pointing out that, unlike for most companies, Ofwat was unable to apply specific targeted adjustments for Bristol Water based on the information it received. Its adjustment included £0.9 million[12] in respect of Bristol Water's choice of COPI as an inflation index, and £1.6 million for the other items. It pointed out that this £2.5 million repre-sented less than 5 per cent of CCD, which it suggested was a small adjustment given Bristol Water's lack of confidence in the results of its revaluation.[13]

Responses to provisional findings

17. Bristol Water said that the CC had incorrectly interpreted the B4 confidence grade, saying that it related to engineering condition and not revaluation.[14] Ofwat said that Bristol Water's statement was misleading, as the confidence grade was applied to assets in a table which concerned the MEA revaluation.[15]

18. Bristol Water also said that the adjustment made by Ofwat had not been made on an objective basis, and was made only because depreciation had increased.[16] Ofwat strongly refuted this, saying that the assessment was in accordance with its guide-lines and carried out on an objective basis.[17]

19. Ofwat reiterated its point that using COPI in the MEA revaluation disincentivized companies from providing up-to-date revaluations. It also said that, as a result of the CC's adjustment, CCD projections would be indexed by COPI until 31 March 2008 and RPI thereafter.

Overall check on depreciation

20. Over the long term, for a given set of assets, the total depreciation charge should approximate to the total maintenance expenditure required to maintain the service-ability of the assets. Ofwat also carried out a check on the appropriateness of companies' depreciation charges by comparing CCD with non-infrastructure capital

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[10]The grade was B4, corresponding to an accuracy of +/– 25 per cent.
[11]Ofwat response to Bristol Water SoC, paragraph 4.3.8.
[12]Ofwat originally took this figure to be £1.4 million, but subsequently agreed with Bristol Water that the correct figure was £0.9 million.
[13]Ofwat response to Bristol Water SoC, paragraph 4.3.10.
[14]Bristol Water response to provisional findings, Section 8, paragraph 18.
[15]Ofwat final submission, paragraph 8.3.
[16]Bristol Water response to provisional findings, Section 8, paragraph 19.
[17]Ofwat final submission, paragraph 8.4.1.

maintenance expenditure over the period 1997/98 to 2024/25. It expected companies to be able to explain the differences, and made adjustments if CCD (excluding differences which could be explained) was more than 5 per cent greater than maintenance expenditure.

21.   In its FD09, Ofwat was not satisfied that all of these differences could be adequately explained. It made downward adjustments to CCD for eight companies, including Bristol Water.

22.   In its FBP, Bristol Water said that the difference between CCD and maintenance expenditure was because of four factors: CCD on assets not replaced by 2025; atypical levels of non-infrastructure maintenance expenditure; one scheme which was actually enhancement expenditure; and expenditure on Rocks Lane reservoir.[18] Ofwat accepted three of these, but did not accept that the expenditure on Rocks Lane reservoir (and associated CCD) was valid. Ofwat said that this was consistent with the approach it took at PR04.

23.   After these adjustments, Ofwat found that the difference between projected CCD and non-infrastructure maintenance expenditure fell outside its 5 per cent tolerance limit. It therefore applied a downward adjustment of £1.6 million to allowed CCD, spread over the PR09 period.

Bristol Water's position

24.   In its SoC,[19] Bristol Water stated that Ofwat's overall approach to the depreciation cross-check was fundamentally flawed because it used the level of maintenance expenditure that Ofwat was proposing rather than the expenditure set out in the FBP. Bristol Water also stated that a situation where CCD was higher than maintenance expenditure was likely to be a strong indication that the latter was insufficient. It cited the CC's price control redeterminations in 2000, in which we found that K should be set on the basis of CCD rather than maintenance expenditure, even if this meant a higher value.[20]

25.   Bristol Water also noted two inconsistencies in Ofwat's calculations:

(a) There was some double counting in the cross-check. This was because although Ofwat reduced CCD by 50 per cent of the difference between the pre- and post-revaluation amounts (ie the reduction set out in paragraph 7), it applied a smaller reduction (therefore making the CCD figure higher) when comparing it with maintenance expenditure. Bristol Water said that a reduction totalling £6.392 million over the period 2009–2025 should have been made, and that Ofwat had only made a reduction of £2.294 million.

(b) The use of estimated CCD based on information in the June returns, when actual CCD information is available in the same returns.[21]

26.   Bristol Water stated that if these inconsistencies were corrected, the difference between CCD and maintenance expenditure would fall to less than 5 per cent, removing the requirement for the £1.6 million adjustment outlined in paragraph 23.

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[18][✂]
[19]Bristol Water SoC, paragraphs 1290–1299.
[20]Bristol Water SoC, paragraph 1295.
[21]Bristol Water SoC, paragraph 1291.

Ofwat's response to Bristol Water's SoC

27.   Ofwat pointed out that it used the comparison of CCD and maintenance expenditure as a check on the reasonableness of the CCD charge and not, as Bristol Water contended, as a mechanism for matching asset costs with usage over time. It noted that Bristol Water did not raise any issues with the retention of this approach for PR09, and also that no adjustment was made to CCD where companies could adequately explain the difference between it and maintenance expenditure.[22]

28.   It also responded to Bristol Water's point—that a higher level of CCD compared with maintenance expenditure indicated that the latter was insufficient—by pointing out that there were a number of reasons why CCD might be higher, and that Bristol Water had provided one reason as part of its FBP commentary.[23]

29.   Ofwat rejected the two inconsistencies cited by Bristol Water. Regarding the first, it said that the CCD figure used for the revenue requirement used a different base year (2008) to the CCD figure used in the cross-check (1998). It adjusted CCD on the 1998 asset base by the same proportion as the adjustment it applied to the 2008 position.

30.   On the second alleged inconsistency, Ofwat said that 'For the final determination we compared the CCD calculated by the financial model to that reported in BRL's June returns and we are satisfied that it is consistent. We did not attempt to make adjustments to correct for any inconsistencies in the information reported by BRL in its June return'.[24] It subsequently told us that it did not expect there to be a material difference between the estimated and actual data in the June returns and noted that the actual figures used by Bristol Water in Table 33 of its June return relied on a degree of estimation.[25]

Bristol Water's reply to Ofwat's response

31.   Bristol Water did not agree[26] that it was reasonable to expect that asset values and depreciation charges would fall as a result of the revaluation. It stated that for some groups of assets, the increase in real input costs had outweighed the relatively low level of technological advance, leading to higher MEA values. It also said that Ofwat's contention[27] regarding Bristol Water's application of the revaluation to assets with a remaining life was incorrect.

32.   With respect to the use of COPI, Bristol Water considered it to be an inherent risk that was well understood by the water industry and that it would be poor regulatory practice for Ofwat to distance itself from 'the result of an application of a clearly articulated and well understood calculation process on the basis of the result obtained at a particular point in time'.[28]

33.   Bristol Water stated that the uncertainty in the revaluation did not translate into an equivalent uncertainty in the depreciation charge, because 'a significant fraction' of

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[22]Ofwat response to Bristol Water SoC, paragraph 4.4.4.
[23]Ofwat response to Bristol Water SoC, paragraph 4.4.5.
[24]Ofwat response to Bristol Water SoC, p36.
[25][✂]
[26]Bristol Water reply to Ofwat's response, pp31&32.
[27]The contention is that applying the majority of increase in value to assets with a remaining life leads to an upward bias in depreciation. Ofwat response to Bristol Water SoC, paragraph B.4.3.7.
[28]Bristol Water reply to Ofwat's response, p32.

the depreciation charge relates to short-life assets for which the costs were known with a high degree of precision.[29]

34. Bristol Water also said that there were no inconsistencies in its June return, and that use of the correct figure would lead to no adjustment to depreciation being required.

Further Ofwat evidence

35. In a further submission,[30] Ofwat said that Bristol Water's FBP applied the same confidence grade to each asset category, irrespective of whether they contained long-life or short-life assets. It drew our attention to the Reporter's statement that the B4 confidence grade was appropriate.

36. Ofwat also said that for some asset groups,[31] Bristol Water was one of only six or seven companies that reported an overall rise in value as a result of the revaluation.

37. On the issue of the appropriate inflation index, Ofwat said that for the financial model it had intended to use the infrastructure output price index (IOPI), but after receiving evidence on its suitability, it opted to use COPI for the final determination. The MEA revaluation exercise does not feed directly into the financial model. Ofwat noted that COPI had been running at a much higher rate than RPI owing to the private housing component of the former, and that this created a perverse incentive for companies not to provide up-to-date valuations. It therefore chose RPI in order to guard against this perverse incentive.

Discussion between the CC, Bristol Water and Ofwat

38. We discussed with the parties a number of areas of difference in relation to depreci-ation. Their views were as follows:

(a) Bristol Water agreed that the correct net figure for Ofwat's reduction of the CCD allowance was £2.5 million, as set out in Ofwat's 11 May response to the CC's draft working paper;

(b) Ofwat agreed that the correct figure for the impact of using COPI over the PR09 period was £0.8 million, as set out in Bristol Water's 11 May response to the CC's draft working paper;

(c) the difference arising from different allocations of the CCD adjustment to pre- and post-1998 assets was not resolved; and

(d) Bristol Water agreed that if the adjustment to CCD brought it within the 5 per cent threshold then the value of the depreciation adjustment to be reversed should be £1.6 million, as set out in Ofwat's FD09 Bristol Water supplementary report.[32] Ofwat said that even if Bristol Water's proposed adjustment to CCD in the cross-check was used, a depreciation adjustment of £1.4 million would still be necessary.

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[29]Bristol Water reply to Ofwat's response, p32, paragraph 120.
[30][✄]
[31]Pumping stations and Management and General.
[32]p73.

Responses to provisional findings

39.   Ofwat disagreed with our provisional finding that the relationship between the re-valuation challenge and the overall check on depreciation was unclear. It said that the cross-check assessed whether CCD was appropriate given the level of capital expenditure. It also disagreed with our view that the tolerance threshold of 5 per cent was arbitrary, saying that it was based on the price setting materiality level.[33]

40.   Regarding the allocation of depreciation between pre- and post-1998 assets, Ofwat noted that Bristol Water had not introduced these figures during the determination and had not explained how it had derived these figures.[34]

41.   In response to questions from us, Bristol Water provided further evidence on the depreciation allocation, showing the split between revaluation and re-lifing of assets, analysing the split across asset classes, and explaining trends in the depreciation profiles. Bristol Water said that Ofwat had not asked for its figures during the redetermination process.

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[33]Ofwat response to provisional findings, paragraphs 7.4.2 & 7.4.3.
[34]Ofwat response to provisional findings, paragraphs 7.5.2.

Cost of capital

Introduction

1.   This appendix sets out the detail of our approach to assessing Bristol Water's cost of capital for the period 2010/11 to 2014/15. We set out our approach and then consider each of the elements of the cost of capital.

General approach

2.   Our approach is to base Bristol Water's price cap on the revenue required by Bristol Water to cover its efficiently-incurred costs, including a return on its RCV. We consider that its return on RCV should be equal to Bristol Water's expected cost of capital. A return below the cost of capital would not be consistent with our WIA91 section 2(2A)(c) duty to secure that the company is able to finance the proper carrying out of its functions. A return above the cost of capital would not be consistent with our WIA91 section 2(2A)(a) duty to further the consumer objective since consumers would pay higher prices than if the company's return was equal to the cost of capital. In calculating return, the relevant costs are those projected for an efficiently managed company and may be above or below those actually incurred: they may be above actual costs where the company benefits from positive incentives (as a result of being more efficient than the benchmark) and below actual costs where the company is less efficient than the benchmark.[1]

3.   There are two initial issues:

   (a) Which company's cost of capital is relevant—that of the regulated (appointed) company or its ultimate holding company?

   (b) Which time period is relevant—the period for which we are determining the price cap (2010/11 to 2014/15) or the longer term?

Relevant company

4.   Bristol Water is a subsidiary of Agbar, and is ultimately controlled by Suez Environnement. However, under the existing regulatory regime for water, Bristol Water, like other water companies, is treated as a 'ring-fenced' company.[2] In particular, Bristol Water is required at all times to conduct its regulated business as if it were substantially a free-standing business and a separate public limited company. Bristol Water is also required to use all reasonable endeavours to ensure that it maintains at all times an investment grade issuer credit rating.[3]

5.   We are therefore concerned with the cost of capital of Bristol Water as a stand-alone 'ring-fenced' company.

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[1]Additionally, efficiency incentives may relate to an earlier period—for example, the Overall Performance Adjustment relates to performance in the previous five-year period; and CIS adjustments relate to capex planning which was mostly carried out prior to the start of the period.
[2]This is set out in section 6A of the licence.
[3]This also applies to any associated company as issuer of corporate debt on its behalf.

Relevant period

6.   We are calculating the required return over the period 2010/11 to 2014/15 and we think it is the expected cost of capital in that period that is relevant. Long-run averages are relevant only to the extent that they affect the cost of capital in that period. They may do so for two main reasons:

  (a) Regulated companies finance long-life assets in part through the issue of fixed-rate debt with long maturity and the cost of existing fixed-rate (embedded) debt is affected by interest rates at the time the debt was issued.

  (b) Asset prices and/or yields may have a tendency to revert to a longer-run mean value and, if so, past levels are relevant to estimating the expected level over the relevant period.

7.   It is sometimes suggested that regulators should seek explicitly to set required return equal to some concept of long-term average cost of capital rather than for the specific price-cap period. It seems to us that this would not be consistent with our duties in this reference. Setting required return below the expected cost of capital for the period would not be consistent with the section 2(2A)(c) duty to secure that the company can finance the proper carrying out of its functions. Equally, setting required return above the expected cost of capital in the relevant period would not seem consistent with the consumer objective under section 2(2A)(a).

Weighted average cost of capital

8.   The cost of capital is a weighted average of two components:

  (a) the cost of debt (c_d); and

  (b) the cost of equity (c_e), which is the return required to induce the marginal investor to purchase shares in the business.

  The return required by the marginal investor will depend on other aspects of price-cap setting, for example projections of opex. If, for example, the opex projections are relatively conservative and consequently the market expects the company to outperform, the marginal investor's required return will be lower and hence the cost of equity lower. In setting K, we make central projections of opex and other elements in the price control (which we interpret as expected values). Consequently, we can estimate the cost of capital without considering effects from opex or other elements.

9.   The weightings (gearing or g) reflect the relative importance of each type of financing in the company's capital structure:

$$\text{Equation 1:}^4 \ WACC = c_d.g + c_e.(1–g)$$

10.   Both Ofwat and Bristol Water calculate required return as the sum of the cost of capital and projected Corporation Tax payment (where the projected tax payment is calculated within a financial model). We use the same approach. This is shown in equation 2:

$$\text{Equation 2: } (Required\ return/RCV) = WACC + (Tax/RCV)$$

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[4]As stated here, the weighted average cost of capital (WACC) includes no corporate tax adjustment: this is sometimes known as the 'vanilla WACC'. As we do not use any alternative definitions in this appendix, we simply refer to it as the 'WACC' (rather than the 'vanilla WACC').

11.	At the most general level, there are three potential approaches to estimating the WACC:

(a) direct estimation of the company's cost of capital;

(b) direct estimation of the cost of capital of comparator companies; and

(c) model-based estimation of the company's cost of capital, either based on data for the company itself or comparators or both.

Direct estimation

12.	Payments on existing fixed-rate (embedded) debt are a known quantity, and the cost of floating-rate and new fixed-rate debt can be estimated from existing yields together with expected trends in interest rates.

13.	The cost of equity is much more difficult to estimate directly, even for a quoted company where the marginal shareholders' current valuation (the market price of its shares) is known. This is because the marginal shareholders' expected future return (in the form of dividends and other payments) from holding the shares is not observable[5] and, under the type of incentive regulation applied in the UK to water and other utilities, very difficult to estimate directly. In the USA, many utilities are still subject to cost of service regulation, and the cost of equity is more often estimated directly (by calculating the rate of return that equates the current value of a stock to the present value of its future stream of dividends). In any event, Bristol Water is not a quoted company and there is no current market information on the value of its equity.[6]

Direct estimation for comparator companies

14.	Data for comparator companies may be useful for two reasons. First, it may be available where there is no data for the company concerned. Second, even where there is individual company data, comparator company data may be relevant to assessing the costs that an efficient company would incur (in regard to the cost of capital as well as other areas of the price control, such as opex).

15.	Current equity valuations are available for a small number of quoted companies, for which a regulated UK WaSC represents a large part of their business.[7] Bristol Water's adviser, NERA, used analysts' forecasts of dividend growth to derive an estimate of the expected returns on equity and hence the cost of equity for WaSCs (see paragraphs 139 to 143). In considering the relevance of such evidence to Bristol Water, it is necessary to consider also differences between Bristol Water and WaSCs.

16.	Additionally, evidence on whether the regulator's current cost of capital is adequate (given other elements of price-cap setting) can be obtained by comparing a quoted company's implied market value of regulatory assets with its RCV. This is known as its market to assets ratio (MAR) and is discussed further in paragraphs 144 to 149.

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[5]The expected future return also depends on future regulatory decisions.
[6]There is some limited market information for Bristol Water's irredeemable preference shares (£12.5 million paying 8.75 per cent).
[7]These are Northumbrian (89 per cent), Pennon (South West Water, 74 per cent), Severn Trent (97 per cent) and United Utilities (95 per cent). Figures in brackets are estimates of the percentage of enterprise value accounted for by the regulated water and sewerage business (see Table 9). One WoC (Dee Valley, 100 per cent) is also still quoted, though its shares may not be traded frequently.

Model-based estimation

17. The advantage of model-based estimation is that it can provide additional relevant data (although necessarily based on assumptions about the working of capital markets). Given the availability of direct data on the cost of debt, model-based estimation is only relevant to the cost of equity. The main model used by Ofwat and Bristol Water is the capital asset pricing model (CAPM).[8] An extension of the CAPM, known as the Fama French three-factor model (referred to as the three-factor model in the rest of this appendix), is discussed in the context of the small company premium (see paragraph 123*(c)*).

18. The CAPM relates the cost of equity to the risk-free rate (r_f), the expected return on the market portfolio (r_m), and a firm-specific measure of investors' exposure to systematic risk (beta or β):

Equation 3: Cost of equity: $c_e = r_f + \beta \,.\, (r_m - r_f)$

Estimates of r_f, r_m and beta are required to estimate the cost of capital via the CAPM.

19. In our 2007 report on Heathrow and Gatwick,[9] we looked at alternatives to the CAPM and found that:

   (a) CAPM remains the tool with the strongest theoretical underpinnings;

   (b) it is not at all clear from the academic literature that other models have better predictive power, particularly when applied to UK companies; and

   (c) none of the alternative models helps to overcome the problems that CAPM has in dealing with limited market data.

20. We believe that these points remain valid. Hence, we also continue to believe that although the CAPM has its limitations, it is the most robust way for a regulator to measure the returns required by shareholders. Moreover, we have placed considerable weight on the CAPM in previous regulatory inquiries and we see benefits in consistency.

21. Our thinking is therefore that our projected cost of equity will be based primarily on our estimates of four parameters: g, r_f, r_m and beta. These parameters can change as a result of movements in financial markets, whilst at the same time there is continuing work by financial and academic analysts on new data and on the reinterpretation of existing data. In addition, there can be considerable uncertainty over the appropriate level for some inputs. All these factors suggest to us that we should not approach the cost of capital calculation mechanistically, but will need to exercise a degree of judgement when selecting our parameters, and similarly in evaluating the outcomes and reaching our conclusions.

Approach for different-sized companies

22. The cost of capital may vary according to the size of company. Ofwat's approach involves setting the same cost of capital for each company in three size categories.

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[8]Bristol Water's advisers, NERA, also used the Dividend Growth Model to estimate WaSCs' cost of equity (see paragraphs 139–143)—we regard this as a method of direct estimation of comparators' cost of equity.
[9]*BAA Ltd: a report on the economic regulation of the London airport companies (Heathrow Airport Ltd and Gatwick Airport Ltd*, CC, presented to the CAA on 28 September 2007.

Ofwat's approach is therefore based on comparative rather than individual company data. Ofwat has three size categories:

(a) large, including all the WaSCs;

(b) larger WoCs (South East Water, Veolia Central); and

(c) other smaller WoCs (including Bristol Water).

Ofwat sets a higher cost of capital for smaller companies. Thus Ofwat sets a higher cost of capital for Bristol Water than the two larger WoCs and the WaSCs.

23.   Ofwat's approach to cost of capital differs from its approach to other elements of required revenue (such as opex and capex) in that it allows higher costs for smaller companies. Our understanding of Ofwat's reasoning is that the special merger regime for water companies preserves small companies because of their value as additional comparators in assessing opex and capex, and it is therefore necessary to include any higher cost of capital in estimating required revenue. We accept this in principle as a reason for including a higher cost of capital for smaller companies,[10] and we consider the empirical issue of whether small companies' cost of equity is in fact higher in paragraphs 121 to 138 below.

Ofwat and Bristol Water's estimated cost of capital

Before discussing the components of the WACC, we set out Ofwat's and Bristol Water's projected cost of capital for Bristol Water (see Table 1). Ofwat told us that it judged the cost of equity to be 7.1 per cent based on all the evidence available to it, and it then presented this as an aggregation of components underlying the CAPM.

TABLE 1   **Projected real cost of capital for 2010/11 to 2014/15**

	per cent	
	Ofwat WoC*	Bristol Water
Gearing	52.5	60.0
Cost of debt	4.0	4.3
WACC (vanilla WACC)	5.5	6.7
Cost of equity		
Risk-free rate	2.0	2.5
Equity risk premium ($r_m - r_f$)	5.4	5.4
Equity beta†	0.94	1.06
Small company equity premium	0.0	2.2
Cost of equity	7.1	10.4

Source: Ofwat final determination document and Bristol Water's SoC to the CC.

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*Water-only company (including Bristol Water).
†In this table the difference in gearing tends to exaggerate the difference in beta—see discussion in cost of equity section below.

24.   A comparison of the elements of the WACC is not necessarily straightforward to interpret, as Ofwat's cost of equity, and hence its WACC, was based on overall judgement rather than necessarily on the elements shown in the table. A comparison is also not entirely straightforward because of the difference in gearing. This may affect the WACC in two ways:

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[10]Although Ofwat does not use the smallest companies as benchmarks (see Appendix K), they are still of value as additional comparators, for example because they increase the robustness of Ofwat's comparisons.

(a) Higher gearing increases the riskiness of both debt and equity and therefore increases the cost of both debt and equity. The effect on the WACC is at least partially offset because a higher weighting is attached to cheaper debt and a lower weighting is attached to more expensive equity.

(b) In principle, higher gearing reduces tax payments as higher gearing implies more debt and hence higher interest payments, and interest is tax deductible (this is known as the debt tax shield). However, both Ofwat[11] and Bristol Water calculate tax payments from a financial model that projects forward from the company's current actual gearing level, which (at about 69 per cent) is higher[12] than the level of gearing assumed in calculating the WACC (see Table 1). Thus, our under-standing is that, under Ofwat's and Bristol Water's modelling, a higher gearing in the WACC is not associated with lower projected tax payments (because tax payments are projected on the basis of a different gearing level that is not affected by the gearing in the WACC).

25. Table 1 shows that Bristol Water's assumed WACC is 1.2 per cent higher than Ofwat's. We have sought to estimate how much of this is accounted for by each of the elements of the cost of capital on the WACC (see Annex 1).[13] Our calculations suggest that the 1.2 per cent difference between Bristol Water's and Ofwat's WACCs can be analysed as follows (in each case, Bristol Water's assumption contributes to a higher WACC):

(a) small company equity premium (SCEP) (including any higher systematic risk of a smaller water company)—0.7 per cent;

(b) risk-free rate (RFR)—0.2 per cent;

(c) cost of debt—0.1 per cent;[14]

(d) equity beta (of a large water company)—0.1 per cent; and

(e) gearing—0.1 per cent.[15]

26. As we are redetermining Bristol Water's price cap, we are not limited to considering only the differences between Ofwat and Bristol Water.

Gearing

27. In this section, we consider the gearing in the WACC (g in equation 1).

Ofwat

28. Ofwat said that it had assumed a level of gearing appropriate for the industry and which was consistent with its assumptions in its previous review. It assumed gearing

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[11]FD09 section 5.7.
[12]The gearing at the start of the period in Ofwat's final determination and Bristol Water's SoC was about 75 per cent, though subsequently Bristol Water advised us that its actual gearing was only 70.5 per cent (68.6 per cent excluding preference shares).
[13]Here, and elsewhere in this appendix, in assessing changes in gearing we have had to make assumptions about Bristol Water's debt beta. We have assumed levels of zero and 0.1, but results do not tend to be sensitive to the level of debt beta. In the light of this, we did not carry out work to assess the level of Bristol Water's debt beta.
[14]As discussed further in Annex 1, we have not allowed for any effect of gearing on the cost of debt. Any such effect is likely to be small but would reduce the contribution of differences in the cost of debt and increase the contribution of differences in gearing.
[15]See previous footnote.

of 57.5 per cent for WaSCs and 52.5 per cent for WoCs including Bristol Water. Taking into account the rating agencies' approach (which tended to involve more conservative target ratios for WoCs—see Appendix O), Ofwat assumed a lower level of gearing for smaller companies as it considered that they might have higher exposure to specific risks.

Bristol Water

29. In its SoC, Bristol Water projected gearing levels of about 75 per cent, but Bristol Water said that, in calculating the WACC, it had assumed gearing of 60 per cent to be consistent with NERA's analysis (which covered all water companies). In its report, NERA concluded on an optimal capital structure of 60 per cent gearing, which NERA found to be consistent with an A– credit rating. (NERA's analysis suggested that the tax-adjusted WACC was slightly lower for 60 per cent gearing and A– credit rating, than for 68 per cent gearing and BBB+ credit rating.)

CC discussion

30. Different levels of gearing may be associated with different levels of WACC and, in principle, an optimal level of gearing might be estimated by attempting to balance the different effects (including the risks and costs of any financial distress that might be associated with higher gearing). Our analysis (see Annex 2) suggests that, after taking account of the tax effect, the WACC is not sensitive to the level of gearing, but we need to take care that our assumed gearing in calculating the WACC is consistent with other aspects of regulation, in particular with the company maintaining an investment grade credit rating (this is discussed further in Appendix O on finance-ability).

31. In our financial modelling, we initially used Bristol Water's current level of gearing (70 per cent). However, at this level of gearing, we considered that there were some doubts about financeability, so we reduced the gearing in the cost of capital calcu-lation and in the financial model until we considered that we had a robust set of projections (we discuss this further in Appendix O). This resulted in an average gearing of 60 per cent, which we have used in our estimates of the cost of capital.

32. We also considered whether we would increase the assumed gearing if initial projec-tions had shown headroom in the company's financial ratios. Our thinking is that we are reluctant to increase gearing above the level that the company has chosen for two reasons. First, while a level of gearing above the company's actual gearing may lead to a lower WACC, the effect does not seem likely to be large (see Annex 2). Second, there may be longer-run benefits to consumers of lower gearing in the form of greater financial resilience. In the present case, as already noted, our projections do not suggest headroom in the financial ratios.

33. We consider that it is for companies, their shareholders and management to deter-mine the most efficient financing structure (including gearing level) to meet their circumstances. Any assumptions we make in calculating the WACC or in financial modelling are purely for the purpose of setting the company's price cap and should not be interpreted as reflecting any views on whether or not it is efficiently financed.

34. As regards the impact of gearing on tax payments, our view is that we should project tax payments on a basis that is consistent with our projected WACC, including the gearing assumption in the WACC. As shown in equation 2, the projection of tax payments is an integral part of the computation of required revenue and of the price cap.

35. Ofwat said that its approach to the calculation of tax payments was intended to reduce companies' incentive to increase their gearing. It believed that assuming tax consistent with notional gearing would be an invitation to companies to gear up further, which it regarded as undesirable. However, we need to make sure that the company can earn its cost of capital under our assumed gearing and this requires there to be consistency between gearing in the WACC and in the tax modelling.[16] As discussed in Section 10 of our determination and Appendix O, we consider financing a matter for companies and, given our approach to financeability, do not consider that our approach constitutes an invitation to Bristol Water to gear up further to the detriment of customers. Two quoted WaSCs also expressed concern about incentive to gear up. We note that the quoted companies tend to have lower gearing and that there are information advantages from several companies continuing to be quoted, in particular stock market data is an important input into the calculation of the equity beta. We accept that Ofwat may wish to avoid any increased incentive for these companies to be taken private, although this is not a concern that is relevant to Bristol Water. In this context, we consider that it may be possible for Ofwat to adopt a more transparent approach to deterring this.

Cost of debt

36. Annex 3 sets out background information on Bristol Water's debt.

37. Table 2 summarizes the parties' assumptions on the cost of debt.

TABLE 2 **Parties' assumptions on the cost of debt**

			per cent
	Existing debt	New debt	All debt
Ofwat's assumed cost of debt			
WaSC cost of debt	3.4	4.2	3.6
Small company premium	0.4	0.4	0.4
Bristol Water's cost of debt	3.8	4.6	4.0
Bristol Water's assumed cost of debt			
Cost of debt	Around 4	Over 4.5	At least 4.25

Source: Ofwat FD09 and Bristol Water SoC.

Ofwat

38. Ofwat assumed that Bristol Water's real cost of debt was 4.0 per cent, reflecting a WaSC debt cost of 3.6 per cent and a small company premium of 0.4 per cent. Ofwat said that its WaSC debt cost drew on direct observations from companies' existing debt portfolios and forward projections: it had factored into its assessment the mix of existing debt that would remain in place over 2010–15, together with the new financing and refinancing requirement. Ofwat said that its forward-looking cost of debt ensured that efficiently financed companies, with efficient treasury management, were able to maintain a balanced portfolio of debt. It said that it had set the cost of debt at a level that allowed companies to meet transaction costs, commitment fees

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[16]If the company reduces gearing to the notional level, it will incur higher tax payments than assumed in financial modelling, and its required return will be greater than assumed in financial modelling. Moreover, even if the company were able to continue with its higher gearing, its (vanilla) WACC will tend to be higher than assumed in financial modelling (see Annex 2) and its required return will consequently also be higher than assumed in financial modelling.

and costs associated with the maintenance of an appropriate level of liquidity, which it calculated to be 0.2 per cent on the cost of debt overall.

39. Ofwat also said that it had incorporated a small company cost of debt premium because WoCs had more limited access to debt finance. Ofwat noted that only the two largest WoCs (of which Bristol Water was not one) had been able to issue conventional bonds directly into the market (rather than on a pooled basis). In its FD09, Ofwat also noted that low-cost European Investment Bank debt was currently not available for direct issuance to WoCs (because of constraints on minimum levels of lending) and that market difficulties might mean that more innovative financial arrangements (such as Artesian finance[17] which had involved monoline insurers) was not currently available and was unlikely to be available in the near future. Ofwat said that in the light of these factors it had included a 0.4 per cent debt premium for Bristol Water and all other WoCs except the two largest.

Bristol Water

40. Bristol Water said that the cost of debt used in the WACC should be based on the actual cost of its debt and the latest forecast for its future cost of debt.

41. Bristol Water said that historically the real cost of its debt had been approximately 4.0 per cent and that this value lay between its cost of debt at the time it had sub-mitted its FBP and that observed at 31 March 2009.

42. Bristol Water said that it expected spreads over gilts on new debt to be 2.0 to 2.5 per cent (subject to its having satisfactory financial projections consistent with a shadow credit rating of Baa1). It also said that it expected costs of issuing new debt to be an additional 0.10 to 0.15 per cent. In the light of this, Bristol Water expected its real cost of new debt to be at least 4.5 per cent.

43. Bristol Water also said that market conditions remained extremely volatile and there might be significant changes in the cost of debt over the course of the price control. It stated that the cost of debt would not return to pre-credit crunch levels for the fore-seeable future according to the banks and financial institutions it had contacted.

44. In its response to our provisional findings and on our financial modelling, Bristol Water pointed out that its effective cost of borrowing was higher because its borrow-ing covenants required it to maintain a minimum cash balance of around one month's operational cash flow. Bristol Water said the minimum cash balance that should be targeted was around £15 million.

Previous CC inquiries

45. In recent airports regulatory inquiries,[18] the CC indicated that it would normally factor a company's existing fixed-rate debt costs into its calculation of the cost of debt. Similarly, in the 2000 Mid Kent Water inquiry, the CC included the additional cost of fixed-rate debt (the position at that time was that existing fixed-rate debt tended to be more expensive than new debt—the opposite of the current position for Bristol Water (see Table 2)). The CC has therefore calculated the cost of debt as a weighted

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[17]Artesian finance is insurance-backed debt issued by Artesian Finance plc. Through the issue of insurance-backed debt, a borrower is able to take advantage of the insurer's better credit rating to borrow at lower rates than it would be able to in its own right.
[18]*BAA Ltd* (2007 report on Heathrow and Gatwick, op cit) and *Stansted Airport Limited, Q5 price control review*, CC, presented to the CAA on 23 October 2008.

average of the cost of existing debt and the cost of new debt (with the amount of new debt depending on the assumed level of gearing).

CC discussion

46.   We consider that there are three elements to the cost of debt:

   (a) the cost of existing fixed-rate (embedded) debt;[19]

   (b) the cost of existing and new floating-rate debt (which depends on short term interest rates during the price control period, as well as the relevant spread over Government debt); and

   (c) the cost of new fixed-rate debt (which depends on interest rates for this duration and type of debt at the time of issue, as well as the relevant spread over Government debt).

   Each of these three elements should be weighted according to its projected importance in the company's overall debt during the projection period. Among the points we considered was whether the relative importance of floating and new fixed-rate debt should depend on longer-run costs as well as which was expected to be cheapest during the price-cap period. For instance, during a period of low interest rates, floating-rate debt might be expected to be cheaper than longer-dated new fixed-rate debt, but it may nevertheless be reasonable to issue longer-dated fixed-rate debt if short- and longer-run interest rates are expected to increase (and hence there is a cost to delaying issue of fixed-rate debt).

47.   There are two approaches to the cost of existing fixed-rate debt:

   (a) Ofwat sets a single rate for all companies of a particular size. This has the advantage of giving companies a strong incentive to reduce the cost of their debt. However, one of the main factors affecting the cost of fixed-rate debt is the time it was taken out, and interest rates fluctuate over time. As debt issuance may be affected by company-specific factors (for instance, the timing of capex) and the cost of fixed-rate debt is affected by unpredictable changes in interest rates, there may be a danger of this approach penalizing companies that need to borrow at times of high interest rates. It might prove unsustainable if such companies are unable to finance their functions, or in order to avoid this, it might require head-room over and above the actual average to the detriment of consumers.

   (b) Bristol Water proposed using its actual cost of debt. If used as a general approach, this would give companies weaker incentives to reduce their cost of debt, particularly towards the end of price-cap periods, but would avoid the issues mentioned in *(a)*.

   In its approach to the cost of debt, therefore, Ofwat seems to take no account of specific company circumstances (other than company size). We note that this is in contrast to other areas of price controls (opex and capex), where Ofwat has developed approaches that combine incentives for cost reduction with taking into account differences in company circumstances (of which timing of debt issue may be regarded as an example).

[19]This is relevant except to the extent that it matures prior to the end of the price-cap period.

48.   We estimate the real cost of Bristol Water's existing debt at 3.53 per cent (see Annex 3). If we add issuing costs for a company of Bristol Water's size (which we estimate to be about 0.1 per cent) and allow for minimum cash balances of about £10 million (about 0.2 per cent),[20] we arrive at 3.83 per cent, which is very close to Ofwat's projected cost of existing debt of 3.8 per cent (see Table 2). In this case, therefore, the approach to existing fixed-rate debt makes little difference to the WACC.

49.   The amount of floating and new fixed-rate debt in our projections will depend on our assumed gearing and on whether it is feasible for a company of Bristol Water's size to issue new debt. Ofwat noted that smaller companies had rarely issued debt other than through pooled vehicles such as Artesian, which were no longer available. However, Bristol Water told us that limited indications from banks suggested that it might be able to issue a fixed-rate conventional bond at a spread of around 2 to 2.5 per cent above gilts and index-linked debt at a spread of around 2.5 per cent. The feasibility of a bond issue may also depend on the amount Bristol Water wished to borrow—it was suggested to us that this needed to be substantial to make an issue worthwhile.

50.   Bristol Water has a modest amount of floating rate bank debt (see Annex 3). Currently short-term interest rates are very low (see Figure 1 below)[21] and the cost of Bristol Water's floating-rate debt is consequently also low. However, we would expect short-term interest rates to increase through the price-cap period. Forward gilt rates (see Figure 1) suggest a current market expectation of an average increase of about 2.5 per cent in nominal rates (from 0.5 per cent to an average of about 3 per cent over the next five years).

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[20]If, as we assume, net debt is 60 per cent of RCV, a minimum cash balance of £10 million represents about 5 per cent of Bristol Water's net debt. Assuming a margin of 4 per cent between the rate Bristol Water has to pay on its debt and the rate it obtains on cash deposits, this adds 0.2 per cent (5 per cent of 4 per cent) to the cost expressed as a percentage of net debt.
[21]This is likely to reflect both the very low current Bank Rate (0.5 per cent) and the Bank of England's programme of asset purchases.

FIGURE 1

Forward yield curve, 2010
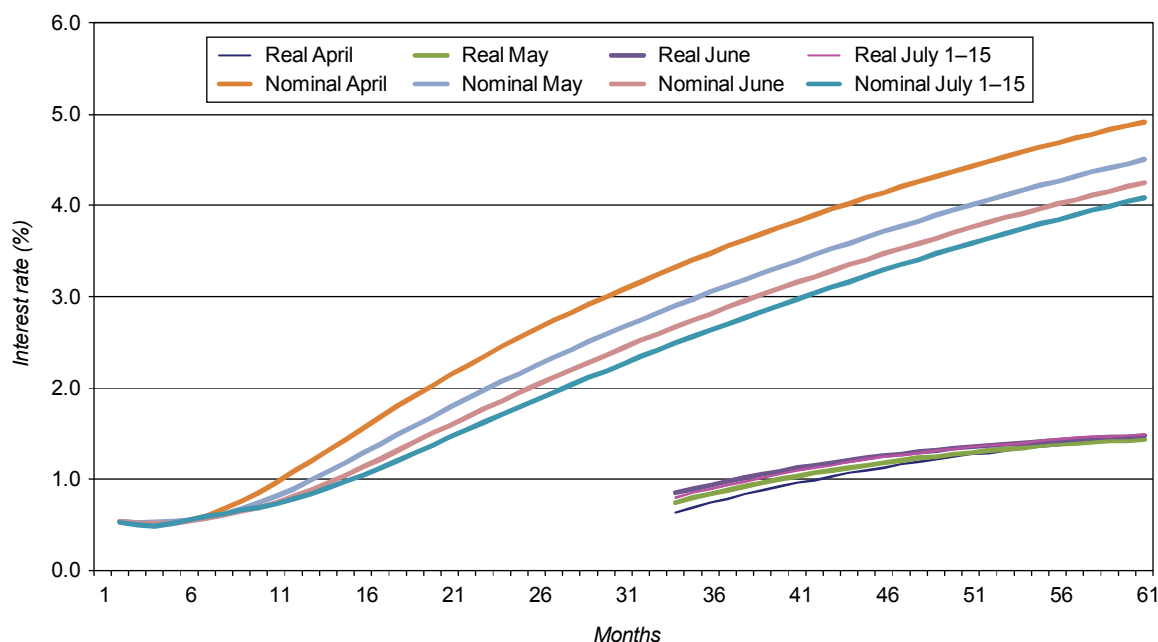
Source: Bank of England.
Note: The forward yield curve shows the future spot interest rate implied by the current yield curve.

51.   Our approach to estimating the cost of new debt was to examine market data for publicly traded bonds and recent new issues and compare this benchmark data to the indications of pricing that Bristol Water supplied in its SoC (see Annex 4). We also held discussions with investment banks and credit ratings agencies to discuss recent debt issues and financial market conditions.

52.   We observed that credit spreads on publicly traded bonds have reduced since the first half of 2009. Redemption yields on water company nominal debt with maturity of ten years or more are currently in the region of 5.3 to 5.4 per cent, reflecting spreads over gilts of about 110 to 120 basis points (bps). We concluded that the market data showed that credit spreads have returned to levels that are similar to those previously experienced in late 2007, but slightly higher than in the 2005 to 2007 period. To perform our assessment of credit benchmarks, we placed greater emphasis on the bond market data in the second half of 2009 and year to date 2010 than in the first half of 2009, as we felt that this was likely to be more representative of conditions that will prevail during the price control period.

53.   New issuance activity in the bond market from the beginning of 2009 to April 2010 was strong, with approximately £9 billion of new debt raised by utility companies, of which approximately £3 billion was issued by water companies. To assess the potential cost of new debt for Bristol Water, we focused on benchmark data for new issues by water companies and other utility companies in the ratings category BBB+ and BBB, and also considered A– rated bonds. The new issues of nominal debt by utility companies rated BBB+ or BBB were priced at spreads in the range of 110 bps to 355 bps over gilts, with the most recent issues being priced at the lower end of this range. In the index-linked debt market, new issuance by utility companies has been at spreads in the range 155 bps to –190 bps over index-linked gilts.

54.   We concluded that the cost of new debt for Bristol Water would be higher than that of the BBB+ and BBB rated WaSCs, particularly due to Bristol Water's small size rela-

tive to WaSCs and other utilities, and the negative outlook for its current credit rating (Baa1/BBB+). The market data indicated that recent new debt has priced at tighter spreads to the indications that Bristol Water set out in its SoC (200–250 bps premium over gilts for issuing nominal debt in the form of bonds, 250 bps premium over gilts for index-linked bonds, and spreads of 175–250 bps over LIBOR for bank debt of three- to five-year maturity).

55.   Our point estimates are 200 bps over gilts for nominal debt and 220 bps over index-linked gilts for index-linked debt. In addition to these spreads, we estimate that an additional 10 bps should be added to reflect would-be cover issuance costs and fees. These spreads need to be combined with our estimates for gilt yields to calculate the total cost of debt. As discussed below, the current yield curves for longer-dated gilts (both nominal and index linked) do not suggest an expectation of an increase in yields during the price control period. For maturities of 15 years and over, both nominal and index-linked yield curves are fairly flat at 4.5 and 1.0 per cent respectively (see Figures 2 and 3 below). Based on these gilt yields,[22] spreads, issue costs and cash costs (see paragraph 48) together with our assumed RPI inflation of 2.9 per cent over the relevant period, we estimate an average real cost for new longer-dated debt of 4.0 per cent for nominal debt and 3.5 per cent for index-linked (see Table 3). As there was some doubt about whether Bristol Water could issue new index-linked debt, we assumed a cost for new debt of 4.0 per cent.

TABLE 3 **Summary of CC assumptions on the cost of new debt**

per cent

	Nominal	Index-linked
Benchmark gilt yield	4.7*	1.0
Spread	<u>2.0</u>	<u>2.2</u>
Implied coupon	6.7	3.2
RPI inflation rate	<u>2.9</u>	
Real interest rate†	3.7	3.2
Issue fees	0.1	0.1
Cash cost‡	<u>0.2</u>	<u>0.2</u>
Total	4.0	3.5

Source: CC calculations.

*See footnote to paragraph 55.
†Calculated as (1coupon).(1+inflation)–1.
‡See paragraph 48.

56.   We also considered that Bristol Water might borrow through banks rather than issuing new debt. Bristol Water told us that there were difficulties in obtaining financing through bank debt as banks now had tight rules about the level of exposure to individual companies and this meant that bank finance had to be obtained from a syndicate of banks presenting some difficulty and additional costs. Nevertheless, given relatively low forward rates (see Figure 1), we considered that additional bank debt would be unlikely to be at a real cost of more than 4.0 per cent.

57.   We therefore take the real cost of existing debt to be 3.8 per cent and project a real cost of new debt of 4.0 per cent. On this basis, we project a weighted average real cost of debt of 3.9 per cent for the period.

[22]When we initially carried out the analysis, the most recent data (for March and April 2010) suggested that the nominal yield curve flattened out at about 4.7 per cent. Subsequently longer-term gilt yields declined modestly so the curve flattens out at about 4.5 per cent, but we did not alter our assumption in calculating the cost of Bristol Water's debt.

Cost of equity

58.   Under the CAPM, the cost of equity depends on the RFR, the ERP (that is the difference between the market return and the RFR, $(r_m - r_f)$ in equation 3) and the value of beta. We consider each of these in turn before turning to the issue of any premium relevant to Bristol Water because of its small size.

59.   In considering the components of the cost of equity, it should be borne in mind that, in its final determination, Ofwat said that it considered it most relevant to focus on the overall cost of debt and cost of equity (although Ofwat did also state the component parts of the cost of equity). Ofwat went on to say that its final determination cost of equity was at the high end of its consultants' (Europe Economics (EE)) range before 'mark-up' for adverse economic conditions (3.5 to 7.2 per cent),[23] but it was necessary to allow the industry to maintain access to finance in difficult economic times. Ofwat said that it took into account general expectations that current economic conditions would continue in the early part of 2010–15 and the need to ensure that the cost of equity is sufficient to both keep equity in the sector and attract new equity.

Risk-free rate used to calculate the cost of equity

Ofwat

60.   Ofwat said that its assumed RFR of 2 per cent was below the 2.8 per cent it had assumed at the last price review; and that it was well above the current spot rates for index-linked gilts, but was consistent with the view that the RFR was expected to increase in the medium term. Ofwat said that its view was also consistent with the ten-year long-run historic UK index-linked gilts of five- and ten-year maturity and consistent with recent regulatory determinations.

Bristol Water

61.   Bristol Water assumed an RFR of 2.5 per cent based on NERA's analysis. NERA's reports included a lengthy discussion of different methods of estimating the RFR but relied principally on estimates from the swaps market. NERA's most recent document stated that its analysis showed that an unbiased estimate of the RFR, based on swap rates, was roughly 0.5 per cent higher than the estimate in Ofwat's draft determin- ation based on index-linked gilt data.

62.   Bristol Water also noted that research published recently by Barclays Capital sug- gested that the yield on long-term UK gilts may double by 2020 as a result of both the scale of UK government bond issue and the effect of demographic trends in the UK on savings patterns.[24] Bristol Water also said that its discussions with the banking sector had highlighted the following concerns: macroeconomic uncertainties around economic recovery, sovereign debt and deficit levels, ratings and reversal of quantitative easing; rates and gilt yields being expected to increase; sovereign contagion and foreign exchange risk (Greece and certain other Euro countries); and the introduction of new regulation being likely to materially impact banks' and insurers' ('Solvency II') capital positions, reducing appetite for lower-quality credit and longer-term debt.

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[23]EE's updated report is dated 22 October 2009.
[24]Barclays Capital, 'Equity Gilt Study 2010', 11 February 2010, p12.

Previous CC inquiries

63.   Since 2000, the CC has taken the view that long-dated index-linked gilt yields are in principle the most suitable basis for estimating the RFR applicable to the cost of equity. The CC has, however, considered that long-dated index-linked gilt yields have been affected by distortions (associated, for example, with pension fund dynamics) and that these need to be corrected in estimating the RFR applicable to the cost of equity. The CC has reached a judgement about the RFR on the basis of medium- and shorter-dated index-linked gilt yields.

64.   At the time of the Stansted report, index-linked gilt yields were mostly yielding below 2 per cent. The CC concluded that there was no mechanistic way of interpreting the data and that it was required to exercise a certain amount of judgement before selecting a precise value for the RFR. Its judgement was that the RFR in recent years had been approximately 2.0 per cent, and that this was an appropriate assumption to use for 2009/10 to 2013/14.

Summary of evidence

65.   We continue to regard index-linked gilt yields as in principle the most suitable source for estimating the RFR, since index-linked gilts have negligible default and inflation risk. Long maturities appear most relevant to the RFR in the cost of equity since equities also have long (indefinite) maturity. Figure 2 shows the index-linked yield curve for recent periods. For maturities of 15 years and more, the current index-linked yield curve is roughly flat at 1 per cent—there is not a great deal of difference between the current yield curves and those derived by averaging yields over the last one and five years. Shorter-dated yields have fallen significantly over the last five years, reflecting action by the authorities to address the credit crunch and recession, and are currently very low.

FIGURE 2

Index-linked yield curve (spot)
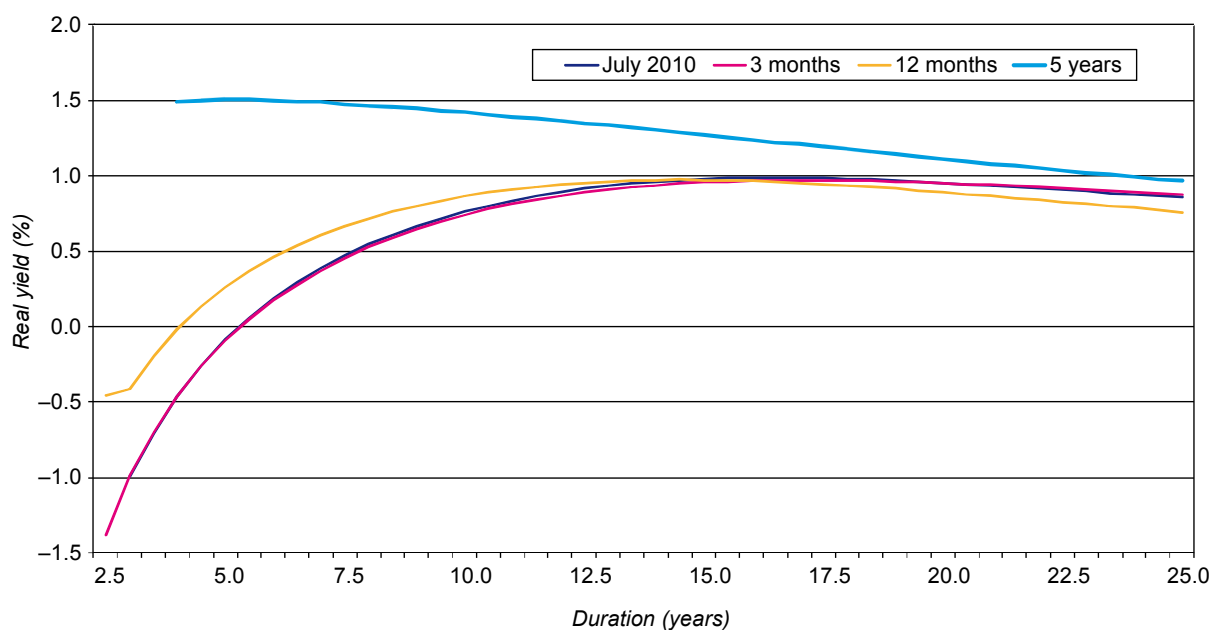
Source: Bank of England.
Note: The four lines show average yields for July 1–15 2010, and the last three months, 12 months and five years respectively.

66.   Nominal gilts also have negligible default risk, but are subject to inflation risk. Nominal gilt yields can be used to estimate a real RFR if assumptions are made about expected inflation and any inflation risk premium. Figure 3 shows nominal gilt yields on a similar basis to Figure 2. For maturities of 15 years and more, the current nominal gilt yield is roughly flat at about 4.5 per cent.

FIGURE 3

Nominal yield curve (spot)
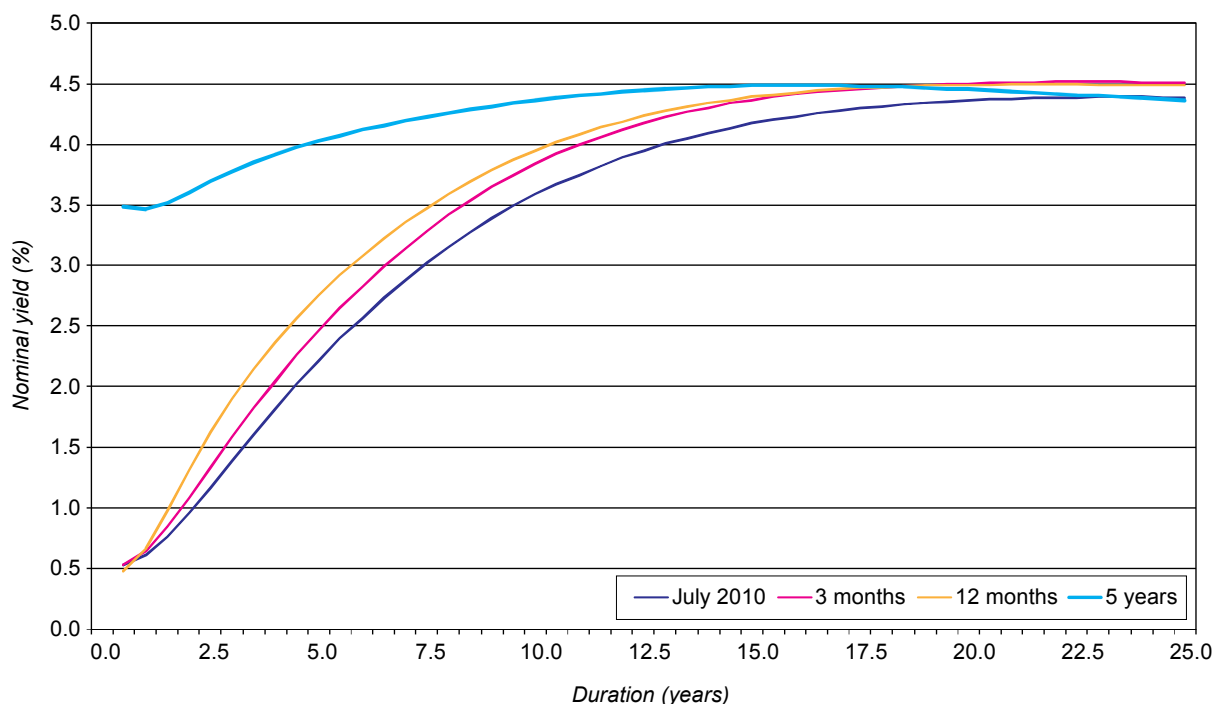

Note: The four lines show average yields for July 1–15 2010 and the last three months, 12 months and five years respectively.
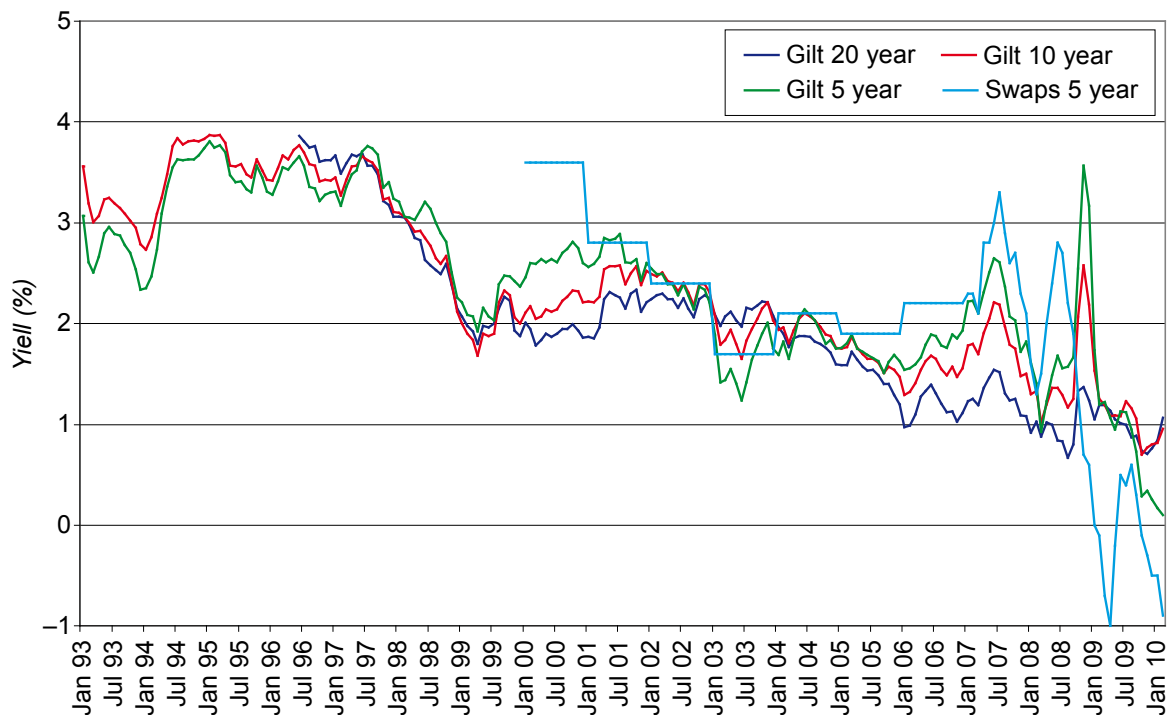*Source:* Bank of England.

67. Longer-term trends in index-linked gilt yields are shown in Figure 4. Yields on 20-year index-linked gilts have been fairly constant at around 1 per cent over the last five years. Yields on ten-year index-linked gilts have fluctuated between 1 and 2 per cent over the last five years (apart from a spike of 2.58 per cent in November 2008) but five-year index-linked gilt yields have fluctuated more. Figure 4 also shows trends in NERA's estimates of the RFR, derived by subtracting a credit risk premium[25] and expected RPI inflation from the nominal swap rate. NERA told us that its estimated average RFR for the last ten years was 2.0 per cent (the averages for 5-, 10- and 20-year index-linked gilts were 1.9, 1.8 and 1.6 per cent respectively).

[25]NERA's estimate of the credit risk premium is based on credit default swap (CDS) premiums, which have increased since the financial crisis of 2008. NERA said that it thought CDS premiums since the 2008 financial crisis were likely to overstate the implicit default risk in swaps (because CDS premiums reflected credit risks over five years whereas a shorter period might be appropriate for swaps CDS premiums reflected credit risks of individual institutions which would not be perfectly correlated and the data since summer 2007 suggested a decoupling of CDS premiums and credit risk inherent in swaps). Hence NERA thought that its estimate was likely to understate the true swap-based RFR.

FIGURE 4

**Index-linked gilt yields and NERA's swaps-based estimate of RFR**

Source: Bank of England and NERA.

68.   Figure 5 shows longer-term trends in nominal gilt yields. The 20-year nominal gilt yield has been fairly constant at about 4.5 per cent over the last five years. The ten-year nominal gilt yield has been more variable but has also averaged about 4.5 per cent over the last five years.

FIGURE 5

Nominal gilt yields and NERA's swaps-based estimate of RFR
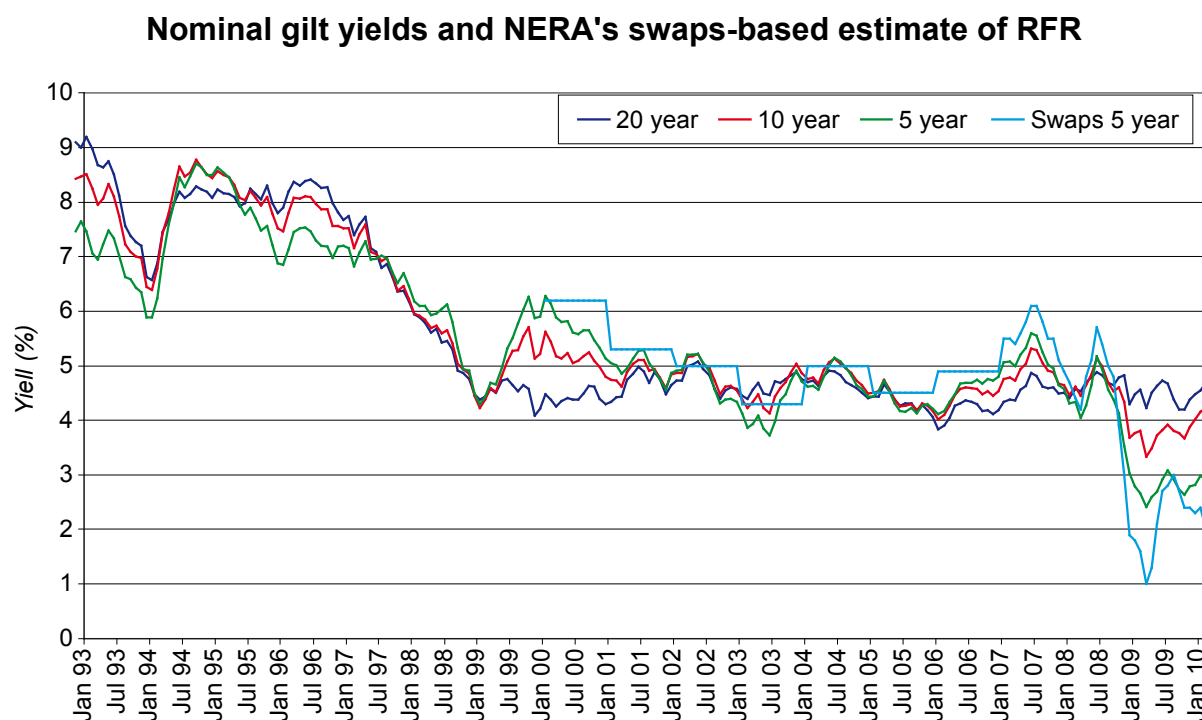
Source: Bank of England and NERA.

CC discussion

69. We continue to regard index-linked gilts as in principle the most appropriate source for estimating the RFR in the cost of equity. In previous reports in the last ten years, the CC has paid less attention to longer-dated yields because of distortions and more attention to shorter-dated index-linked yields. At present, shorter-dated index-linked yields are affected by action by the authorities to address the credit crunch and recession and are less relevant to estimating the RFR.

70. Nevertheless, we continue to see merit in the argument that distortions (associated, for example, with pension fund dynamics) continue to affect longer-dated index-linked yields. For example, Bank of America Merrill Lynch (BAML) told us that its institutional investor clients on average thought the long-term equilibrium ten-year UK government real yield was 1.96 per cent (based on 35 responses to a BAML Global inflation-linked survey, 9 April 2010).

71. On the other hand, our expectation would have been that such distortions would be temporary and would have started to unwind by now and it is therefore surprising that long-dated index-linked yields have remained constant at about 1 per cent for more than five years. The prolonged period of low yields may suggest that long-run rather than temporary factors are at work. We therefore now see some grounds for assuming a lower RFR, more in line with actual long-dated index-linked yields.

72. Bristol Water suggested that we should consider a number of other measures in addition to UK index-linked yields—Bristol Water suggested deflated UK gilt yields, deflated international government bond yields and deflated swap rates adjusted for inter-bank credit risk. We have looked at the first and last of these (see Figure 5 above) and they are within a similar range to index-linked gilt rates if one allows for RPI inflation of 2.5 to 3.0 per cent. As regards deflated international government bond yields, we consider that these are likely to reflect government credit ratings and

we are not aware of evidence that real yields are currently higher than 2 per cent. Bristol Water also suggested that the banking sector believed that yields would increase, implying higher RFRs in the future than are currently observable in the government bond markets. On this point, we agree that the RFR may be higher than current gilt yields, which are negative at the short end of the maturity curve.

73. Our view therefore is that a range of 1 to 2 per cent for the real RFR is reasonable. We note that the lower end of this range is well above current short-term real interest rates (which are negative) and would remain above short-term real interest rates during 2010/11 to 2014/15 even if short-term real interest rates increased above the levels implied by current forward rates. We have not seen evidence supporting an RFR higher than 2 per cent, as, for example, proposed by Bristol Water.

Equity market return and risk premium

74. The expected market return is the return that investors require for investing in equities. The ERP $(r_m - r_f)$ is the part of this return that compensates them for the additional risk associated with investing in equities, rather than in risk-free assets.

Ofwat

75. Ofwat said that its ERP of 5.4 per cent was above the figure it had used in 2004 and was at the high end of the range proposed by EE before 'mark-up' for the current adverse economic situation. This pre-mark-up range was based on Dimson Marsh and Staunton (DMS) series data for the long-term ERP. It reflected Ofwat's view that it should assume a high ERP given the economic conditions within which the cost of capital is set. Ofwat also said that its ERP was at the top of the historical range, although recent analysis suggested an expectation that the future long-run risk premium would be less than the historical average.

76. Ofwat referred to the study carried out for it by EE. In its final (October 2009) report, EE said that the appropriate range from which plausible regulatory judgements might be formed was 4.2 to 5.4 per cent and it recommended 5.0 per cent for the ERP in a non-crisis period (based on DMS historical analysis). However, EE went on to rec-ommend a higher ERP of 6.0 per cent for 'the current crisis period' which it thought would continue into the regulatory period (but would not last for the whole of the regulatory period).

Bristol Water

77. Bristol Water said that it believed an ERP of 5.4 per cent was an appropriate input into its cost of equity, citing NERA's analyses of January and August 2009.[26] NERA based its figure of 5.4 per cent principally on DMS's historical data on the arithmetic mean UK premium of equity returns over bonds. NERA also referred to forward-looking estimates of the ERP having increased dramatically from around 5 per cent to above 7 per cent.

Previous CC inquiries

78. In the Stansted regulatory report, the CC derived an ERP of 3 to 5 per cent by subtracting its RFR of 2 per cent from a market return of 5 to 7 per cent. The CC

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[26]Bristol Water SoC, paragraphs 1357–1360.

effectively took a figure from near the top of this range because it considered that the consequences of setting too low a figure for the cost of capital (lack of investment) were worse than the consequences of setting too high a figure (higher charges). The implied figure for the market return would be 6.6 per cent and for the ERP 4.6 per cent.[27]

79. In the earlier Heathrow and Gatwick regulatory report, the CC similarly assumed a market return of 5 to 7 per cent (with an RFR of 2.5 per cent and ERP of 2.5 to 4.5 per cent). The CC also effectively took a figure from near the top of the range, for similar reasons to those given in the Stansted report.

Summary of evidence

80. There are two main approaches to estimating the market return and the ERP: historical data reflecting actual returns over time; and forward-looking data relating to investors' current expectations of returns. We start by considering historical data.

Historical approach

81. The motivation for the historical approach is that expected returns remain constant over time and hence that average realized returns reflect the expected return.

82. The simplest approach is to calculate the arithmetic average of historical returns. It is appropriate to take an average of annual returns if there is a constant underlying return and the return in each year is independent of that in other years (see Annex 5). Since annual returns have been highly variable, this approach requires looking at a long run of historical data. Table 4 shows average returns over the last 110 years. It is usual to quote figures for the average of one-year returns but investors in the equity market usually expect to invest in the market for longer than a year. We therefore show average returns for some longer holding periods as well, using a number of different estimators which are discussed in Annex 5. The holding periods shown in Table 4 are those for which data is available for more estimators.

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[27]Because the chosen WACC (7.1 per cent) was 81 per cent of the way up the range for the WACC.

TABLE 4 **Real returns, 1900 to 2009**

per cent

	Return on equity				ERP‡			
	Simple*	Overlapping†	Blume §	JKM§	Simple*	Overlapping†	Blume §	JKM §
UK market, DMS data								
1-year holding period	7.2	7.2	7.2	7.2	6.0	6.0	6.0	6.0
2-year holding period	6.6	7.0	7.2	7.2	5.3	5.7	6.0	5.9
5-year holding period	7.0	7.0	7.1	7.0	5.8	5.5	5.9	5.8
10-11 year holding period¶	6.8	7.0	7.0	6.7	5.2	5.5	5.8	5.5
22-year holding period	5.9	6.8	6.8	6.1	5.0	5.7	5.6	4.9
UK market, Barclays data								
1-year holding period	7.0	7.0	7.0	7.0	5.8			
2-year holding period	6.3	6.7	7.0	6.9	5.1	5.4	5.8	5.7
5-year holding period	6.8	6.6	7.0	6.8	5.6	5.1	5.7	5.6
10-11 year holding period¶	6.5	6.5	6.8	6.5	5.0	5.0	5.6	5.3
22-year holding period	5.6	6.3	6.6	5.8	4.6	5.2	5.4	4.7
World market, DMS data								
1-year holding period	6.9				5.9			
2-year holding period			6.9	6.8			5.9	5.8
5-year holding period			6.8	6.7			5.8	5.7
10-year holding period	7.5		6.8	6.5	6.1		5.8	5.5
22-year holding period			6.6	5.9			5.6	5.0

Source: CC calculations based on *Credit Suisse Global Investment Sourcebook 2010*, written by Dimson, Marsh and Staunton (DMS) and Barclays Equity Gilt Study.

*The mean is calculated from the formula $(\sum(R_{t+h}/R_t)/(110\text{-}h))^{1/h}$ where h is holding period, R_t is value of returns index at the end of year t and the expression is summed for (110/h) values of t for which non-overlapping data is available.
†The mean is calculated from the formula $(\sum(R_{t+h}/R_t)/(110\text{-}h))^{1/h}$ where h is holding period, R_t is value of returns index at the end of year t and the expression is summed for (110–h+1) values of t for which overlapping data is available.
‡ ERP is calculated relative to Treasury bills.
§The Blume unbiased estimator is a weighted average of arithmetic and geometric mean and the JKM (Jacquier, Kane and Marcus) small sample efficient estimator is calculated from the estimated mean and variance of lognormal returns, see Annex 5.
¶Average of 10- and 11-year holding periods.
Note: Returns for holding periods greater than one year are expressed as annual equivalent returns.

83. The data in Table 4 suggests an average market return of around 6 to 7 per cent (for both world and UK markets). In order to calculate the historical ERP, it is necessary to subtract the historical RFR from the historical market return. Index-linked gilts have not been available for the full 110-year period and it is usual to use the return on Treasury Bills as a proxy for the RFR. However, it is doubtful that Treasury Bills have been free of inflation risk (for example, rates were negative from 1970 to 1979 when inflation was high). The data in Table 4 suggests an average ERP over Treasury Bills of about 5 to 6 per cent.[28] The standard error around these historical estimates is substantial, implying a 95 per cent confidence interval of around 3 to 11 per cent for the market return and around 3 to 9 per cent for the ERP.

84. An alternative procedure, suggested by Fama and French, is to estimate the under-lying return from the sum of average dividend yield and the average rate of dividend growth.[29] Using the full run of historical data for the UK, this suggests an underlying return of 5.5 per cent[30] and an ERP over Treasury Bills of 4.4 per cent (using Barclays data which prior to 1962 comprises fewer companies than DMS but shows broadly similar (albeit slightly lower) results for average returns).

[28]ERPs are sometimes calculated relative to long-dated gilt yields, rather than Treasury Bills. As gilts are subject to additional risks compared with Treasury Bills (greater inflation risk and also price volatility risk), we have not shown ERPs relative to gilts.
[29]Fama, E F and French, K R, 'The Equity Premium', *Journal of Finance*, April 2002.
[30]This results from average dividend yield of 4.5 per cent and dividend growth of 1 per cent a year (Barclays data).

85. Fama and French's work for the USA provided evidence of a fall in expected returns over time, with expected returns being lower since 1950 than before 1950. Many other papers have reported similar findings, though the issue remains controversial.[31] The statistical evidence for the UK is less extensive[32] but, as illustrated in Figure 6, the current dividend yield (about 3.5 per cent) is below the historical average (4.5 per cent). Unless future dividend growth is higher than in the past, this would suggest that expected returns are about 1 per cent lower than the past average, implying a market return of about 4.5 per cent and an ERP over Treasury Bills of 3.4 per cent (using Barclays data).[33]

FIGURE 6

Dividend yield for UK market (Barclays data)
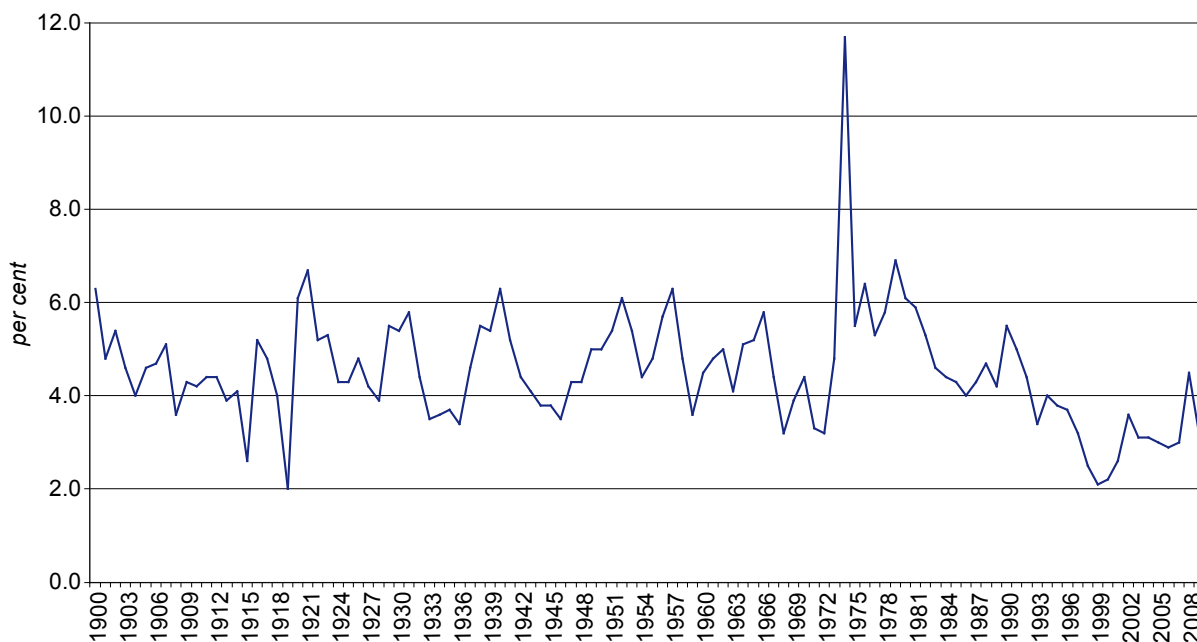
Source: Barclays Equity Gilt Study.

Forward-looking approaches

86. Noting that dividend yields are lower than in the past, DMS inferred that, for the world index, a forward-looking risk premium (over Treasury Bills) would be 4.5 to 5 per cent. Given a difference of 1 per cent between average return and ERP (see Table 4), this implies an expected return of 5.5 to 6 per cent.[34]

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[31]Bristol Water quoted a paper (Welch and Goyal, 'A comprehensive look at the empirical performance of equity premium prediction', *Review of Financial Studies*, 2008) which did not find robust evidence that forecasts of the ERP based on dividend yields were better at predicting future returns than the assumption of a constant ERP. The issue of the *Review of Financial Studies* in which this paper appeared included other papers suggesting the evidence suggested the ERP was predictable , for example: Campbell, J and Thompson, S: 'Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?' and Cochrane, J: 'The Dog That Did Not Bark: A Defense of Return Predictability'.
[32]Two papers that did find evidence of a reduction in the expected market return or ERP for the UK (albeit at different times) are Buranavityawut, N, M C Freeman and N Freeman (2006), 'Has the equity premium been low for 40 years?', *North American Journal of Economics and Finance*, 17, pp191–205; and Vivian, A, 'The UK equity premium, 1901-2004', *Journal of Business and Financial Accounting*, 2007. The first paper suggests that the expected equity premium may have fallen in the 1960s in the UK and other countries, while the second paper suggests that there was a permanent decline in the UK market dividend-price ratio during the early 1990s.
[33]These figures do not take into account payments to shareholders other than dividends, for example share repurchases.
[34]*Credit Suisse Global Investment Sourcebook 2010*, section 2.6.

87.   A commonly used approach is to project dividends using analysts' forecasts (which extend out by four or five years) and a longer-term dividend growth rate. The expected return is then the discount rate at which the present value of future dividends is equal to the current market price. A limitation of this approach is that it is necessary to make an assumption about future long-term growth of dividends (which has a major effect on the calculation since dividends beyond year 4 or 5 account for a large part of present value at plausible discount rates).

88.   Figure 7 shows estimates of ERP using this methodology published recently in an article in the *Bank of England Quarterly Bulletin*. These estimates are based on the assumption that the future long-term growth in dividends per share is equal to an estimate of the potential growth of the economy—however, the authors of the article note that this choice of future long-term growth rate is essentially arbitrary.[35] The estimates in Figure 7 suggest that the expected ERP has fluctuated around 4 per cent. We have attempted to calculate the expected market return implied by these estimates of the ERP: this appears to have fluctuated around 6.5 per cent, but since the credit crunch declined markedly (up to February 2010).

FIGURE 7

Estimated ERP and approximate implied real market return
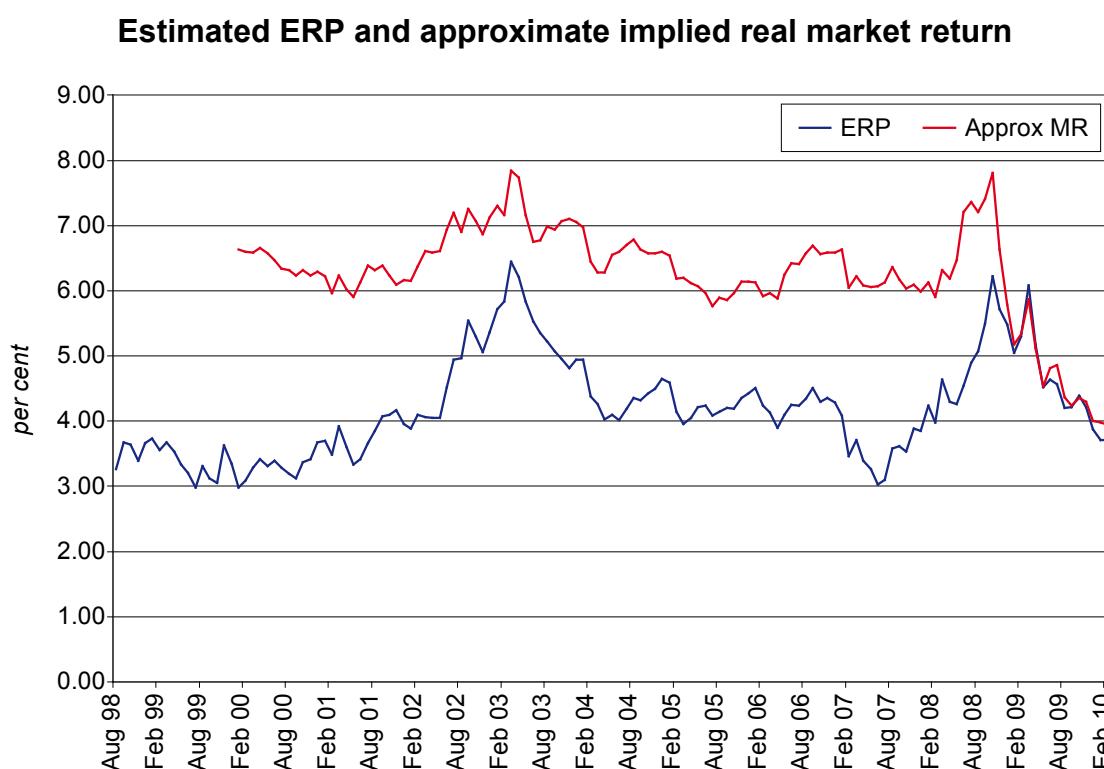
Source: Mika Inkinen, Marco Stringa and Kyriaki Voutsinou: 'Interpreting equity price movements since the start of the financial crisis', *Bank of England Quarterly Bulletin*, 2010 Q1.

89.   We agree with the authors of the *Bank of England Quarterly Bulletin* article that it is essentially arbitrary to assume future long-run growth in dividends per share equal to potential economic growth. Indeed, we see both theoretical and empirical reasons for expecting long-run growth in dividends per share to be less than potential economic growth.

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[35]Mika Inkinen, Marco Stringa and Kyriaki Voutsinou: *Interpreting equity price movements since the start of the financial crisis*, Bank of England Quarterly Bulleting, 2010 Q1.

(a) In steady state growth with constant profit[36] and payout ratios, total profits and dividend payments would increase at a similar rate to the whole economy—but the number of shares would increase unless there were no new equity issues and hence growth in dividends per share would be lower than growth in total dividends, profits and the economy.

(b) The historical growth rate in real dividends for the UK from the DMS data is only 0.6 per cent[37] and around zero using the Barclays data[38]—this is significantly less than real UK economic growth over the same period (1900–2009) of 1.9 per cent.[39] Even for shorter periods it remains the case that growth in dividends per share has been significantly less than economic growth Since 1950, growth in dividends per share has been 1.1 per cent compared with 2.4 per cent for GDP growth, while since 1980, growth in dividends per share has been 1.6 per cent compared to 2.3 per cent for GDP growth.[40]

Bearing in mind these points and also that analysts' forecasts may be subject to upward bias,[41] we regard the approximate 6.5 per cent market return suggested by Figure 7 as an upper estimate.

90. In comments on our provisional findings, NERA on behalf of Water UK (NERA) said that its most recent forward-looking estimates of the market return showed a range of 6.5 to 8.8 per cent.[42] However, NERA's figures simply add assumed long-run dividend growth of 2.3 per cent to 4.5 per cent to a current forecast of dividends—unlike the estimates quoted in the *Bank of England Quarterly Bulletin* article, NERA's time series figures do not take account of how analysts' medium-term forecasts vary over time. The lower end of NERA's range for long-run dividend growth is based on assumed GDP growth and the upper end is based on analysts' 2008 medium-term dividend growth forecasts. The upper end of this range seems to us to be unreasonable as we see no justification for projecting analysts' medium-term forecasts (which may be subject to upward bias) into the indefinite future, and furthermore analysts' forecasts may change over time. For the reason set out in the previous paragraph, we regard even the lower end of NERA's range (which projects dividends using expected GDP growth) as an upper estimate of the forward-looking ERP.

91. Another possible source for forward-looking estimates of the market return is surveys of investors, market participants and academics. However, the results of such surveys tend to depend on the identity of the respondents. In this report we have preferred to consider the underlying data on which survey respondents presumably base their views.

CC discussion

92. The interpretation of the evidence on market returns remains subject to considerable uncertainty. We consider that 7 per cent is an upper limit for the expected market return. This is the approximate historical average realized return for short holding

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[36]In this subparagraph, profits means profits after tax and interest.
[37]DMS Table 11.
[38]For the Barclays data, we calculated a trend growth rate in real dividends over 1900 to 2009 of 0.2 per cent from a regression of real dividends on time (the Barclays data showed a very sharp decline in real dividends up to 1915 and the geometric mean growth in dividends for 1900 to 2009 was minus 0.2 per cent).
[39]Lawrence H. Officer and Samuel H. Williamson, 'Annualized Growth Rate and Graphs of Various Historical Economic Series', MeasuringWorth.Com, January 2008. See: www.measuringworth.com/growth/.
[40]These figures are calculated using the Barclays dividends data and ONS data for GDP.
[41]A large literature suggests there may be a tendency for analysts' forecasts to overreact to changes and on average to be too optimistic, for example, W F M DeBondt and R H Thaler (1990), 'Do Security Analysts Overreact?', *American Economic Review* 80, pp52–57.
[42]Cost of Capital Issues in the CC's provisional findings for the Bristol Water reference: NERA Report for Water UK, p16.

periods, but the evidence reviewed above and in Annex 5 suggests both that the best estimate of the expected historical return could have been lower than this (to the extent that holding periods are longer) and that the current expected return may be lower than the average expected historical return. In the context of setting a cost of capital for Bristol Water, we are less concerned with a lower limit to the expected market return (since we would wish to avoid Bristol Water's cost of capital being too low), but in this context we consider 5 per cent a reasonable lower figure.[43]

93. We noted above that returns for index-linked gilts were not available for the full historical period and the Treasury Bill rate may not be a true RFR. This means that it is not valid to add ERPs based on Treasury Bills to our RFR based on underlying longer-dated index-linked gilt yields. We therefore prefer to derive the ERP by subtracting the RFR from the expected market return. A further reason for using this approach with historical data is that, historically, the market return has tended to be less volatile than the ERP (as measured, for example, by the ratio of standard deviation to mean) and there is some evidence of the ERP being negatively correlated with Treasury Bill rates.

94. With the forward-looking approach, a forward-looking RFR is relevant and hence by assumption is the same as the RFR in the cost of capital. Consistency between the two is ensured by calculating the ERP by subtracting the RFR from the expected market return, as suggested in the previous paragraph.

95. Bristol Water said that standard practice was to estimate the ERP first, and then add on a real or nominal RFR to derive a real or nominal expected market return.[44] Under this approach, we estimate the ERP at 4 to 6 per cent (historical estimates suggest 4 to 6 per cent, see paragraphs 83 to 85, and forward-looking estimates about 4 per cent, see paragraphs 89 to 91). However, we would need to use an RFR that was consistent with the calculation of the ERP, that is a Treasury Bill rate. The current real return on Treasury Bills is –2.5 per cent (assuming inflation of 3 per cent) and a forecast for the price-cap period (based on the forward gilt yield curve—see Figure 1) would be no more than zero (with a similar inflation assumption). Under this approach, we would therefore have an RFR of about zero per cent and an ERP of 4 to 6 per cent. However, we do not favour this approach as we consider that it is more likely to lead to error since the RFR defined in this way is likely to be more volatile than the market return. Consequently, although Bristol Water favoured the constant ERP approach, we think it would lead to a lower cost of capital for the period 2010/11 to 2014/15, but potentially a higher cost of capital in future if the RFR increased significantly.

96. Ofwat said that it was sympathetic to the view that the correct way to think about the CAPM was by starting with estimates of the market return and RFR. However, Ofwat thought that the ERP was the variable with the clearer economic (as opposed to empirical) interpretation, in terms of tastes for risk. We do not think this implies that the ERP is more stable than the market return, and indeed Ofwat did not suggest that it was. Ofwat added that its view was that, although the total market return might be

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[43]Figures lower than 5 per cent may well be appropriate in other contexts, for example providing advice to equity investors on the lower end of the range of expected returns before costs. In this context, we note that the Financial Services Authority (FSA) requires UK financial advisers to project nominal returns (before costs and personal tax) using rates of 5, 7 and 9 per cent. Assuming RPI of 2.7 per cent (based on the Bank of England's CPI target of 2.0 per cent plus the historical difference between RPI and CPI), this implies real returns of 2.2, 4.2 and 6.1 per cent. These projection rates apply where the investments have a high proportion (including 100 per cent) of equity—lower rates may be relevant for investments with a significant proportion of bonds or cash.
[44]Bristol Water drew our attention to finance textbooks such as Brealey et al, *Corporate Finance*, which recommended estimating the ERP first. Brealey et al, referring to nominal annual returns, state that the market return is not likely to be stable over time. However, we have considered real rather than nominal returns and the evidence tends to suggest that on this basis market returns are more stable than the ERP.

more stable than either the RFR or the ERP, that did not mean that the market return should be regarded as invariant. We did not mean to suggest that the market return is invariant—we are looking at forward-looking as well as historical data.

97. Our provisional finding was that a range of 5 to 7 per cent for the market return was appropriate, similar to the range used in our 2007 and 2008 airports reports. From this, we derived a lower figure for the ERP of 4 per cent (5 per cent market return less 1 per cent RFR) and a higher figure of 5 per cent (7 per cent market return less 2 per cent RFR).

98. Bristol Water and NERA pointed out that, if we associated our lower market return assumption with our higher RFR or vice versa, our assumptions could lead to an ERP as low as 3 per cent and one as high as 6 per cent. However, as our range for the market return remains 5 to 7 per cent, the resulting wider range for the ERP would not materially affect the range for Bristol Water's WACC as we would be associating the lower ERP (3 per cent) with the higher RFR (2 per cent) and the higher ERP (6 per cent) with the lower RFR (1 per cent). Indeed, since we calculate that Bristol Water's equity beta is somewhat less than one (see Table 11), the only effect of the wider range for the ERP would be slightly to reduce the lower end of the range for our WACC—with a beta of less than one there is no effect at all on the upper end of the range for our WACC.[45] As our purpose is the practical one of estimating Bristol Water's cost of capital, we continue to associate the lower market return (5 per cent) with the lower RFR (1 per cent) and the higher market return (7 per cent) with the higher RFR (2 per cent).

99. Bristol Water also said that our range for the ERP of 4.0 to 5.0 per cent ignored the substantial volume of research, both on historical returns and on the impact of the credit crisis, which suggested that the ERP was in excess of 5.0 per cent. Bristol Water added that, in its view, the data we had cited appeared to suggest an ERP of 3.5 to 6.5 per cent, figures which Bristol Water considered had been adopted by Ofgem and Ofwat and properly reflected the impact of the credit crunch.[46] We believe we have thoroughly reviewed the evidence and justified our judgement of a range for the market return of 5 to 7 per cent. As regards the credit crunch, it is important to take into account any downward effect on the RFR as well as any upward effect on the risk premium. We do not consider that the evidence reviewed above suggests any departure from our 5 to 7 per cent market return.

100. We therefore confirm, for our determination, our provisional findings of a range of 5 to 7 per cent for the market return, and implied range of 4 to 5 per cent for the ERP.

Beta

101. Beta is a factor in the CAPM reflecting the risk of a particular asset or portfolio of assets relative to the market as a whole.

102. Within a CAPM framework, changes in gearing affect equity betas. Hence, it is necessary to adjust for gearing differences in order to make comparisons between equity betas (for example, by calculating the asset beta, ie the beta at zero gearing). Our analysis takes this into account.

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[45]This is because, with a beta of less than one, the WACC with RFR of 1 per cent and ERP of 6 per cent will always be lower than the WACC with RFR of 2 per cent and ERP of 5 per cent.
[46]Bristol Water's comments on provisional findings, section 2 paragraph 98.

Ofwat

103. Ofwat said that its equity beta of 0.9 for WaSCs derived from an asset beta of 0.4. Ofwat considered that its assumptions were at the high end of EE's beta observations, but reflected the fact that it was setting price limits at a time of market uncertainty. It also noted that its assumed equity beta was lower than the equity beta of 1.0 implied in its 2004 determinations.

104. Ofwat assumed the same equity beta for WoCs even though its gearing level for WoCs was lower than for WaSCs. Ofwat acknowledged that this implied a higher WACC for WoCs because, under a CAPM approach, lower gearing implied a lower equity beta. Our calculations (see Table 5) suggest that, under a CAPM approach, Ofwat's WaSC equity beta of 0.94 implies an equity beta of 0.85 to 0.86 at Ofwat's assumed gearing level for WoCs (52.5 per cent).

TABLE 5 **Comparison of Ofwat's and Bristol Water's equity beta under different assumptions***

	Ofwat WaSC	Bristol Water†
Assumed in final determination or SoC	0.94	1.06
For different gearing levels assuming debt beta of zero		
Zero gearing (asset beta)	0.40	0.42
52.5% (Ofwat WoC notional gearing)	0.85	0.89
57.5% (Ofwat WoC notional gearing)	0.94	1.00
60% gearing (Bristol Water assumption in WACC)	1.00	1.06
For different gearing levels assuming debt beta of 0.1		
Zero gearing (asset beta)	0.46	0.48
52.5% (Ofwat WoC notional gearing)	0.86	0.91
57.5% (Ofwat WoC notional gearing)	0.94	1.00
60% gearing (Bristol Water assumption in WACC)	1.00	1.06

Source: CC calculations.

*Calculations use 'Miller' formula (that states: asset beta = (equity beta) x (1-g)+(debt beta) x g.
†Bristol Water's beta figure excludes small company impact on and is therefore comparable with Ofwat's WaSC beta.

105. In this section we focus on the WaSC beta—the issue of whether WoCs have higher systematic risk (and hence higher beta for a given level of gearing) than WaSCs is considered in the next section on the SCEP.

Bristol Water

106. Bristol Water said that NERA had concluded that WaSCs' asset betas were in the range 0.35 to 0.45. Based on NERA's analysis, Bristol Water believed that an equity beta for WaSCs in the range 0.88 to 1.13 was appropriate as an input into setting its required cost of equity. Bristol Water said that it had selected a value of 1.06 for the equity beta to be consistent with its assumed cost of equity of 10.4 per cent (together with its other assumptions).

Parties' estimates of beta

107. Ofwat and Bristol Water based their beta assumptions on work carried out by EE and NERA that estimated the equity betas from data on historical returns of quoted water companies.[47] Similar work has also been carried out by Price Waterhouse Coopers

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[47]Beta is defined as the covariance between returns on an asset and returns on the market portfolio, divided by the variance of returns on the market portfolio, and can be estimated from historical data on returns.

(PwC) for Ofgem as part of Ofgem's work on the 2010/11 to 2014/15 price cap for electricity distribution companies (DPCR 5).[48] As already noted, equity beta depends on gearing, but even after adjusting to a similar gearing basis, a company's estimated beta can vary for a number of reasons, including:

(a) Differences in the estimation period and in the frequency of returns data used for estimation. Daily, weekly, or monthly data may be used. EE used mainly daily data as it considered that this was likely to have the smallest standard errors. NERA and PwC estimated betas using daily, weekly and monthly data: NERA preferred daily data as it was more statistically robust (providing the share's trading frequency was sufficient) but PwC preferred monthly betas as they tended to be more stable and therefore more reliable for use in the context of a regulatory determination where prices were set over a five-year period.

(b) Whether the data is adjusted for any tendency of true betas to converge to be closer to the market value of one than are estimated betas. EE did not make any adjustment as it considered the Blume adjustment[49] to be arbitrary and inappropriate, while Bayesian adjustment may not make much difference. NERA quoted only Blume-adjusted betas and PwC quoted both unadjusted and Blume-adjusted betas, but preferred the adjusted betas.

(c) The assumption made about debt beta in adjusting for gearing. NERA found no evidence that the debt beta for water was greater than zero and therefore assumed a debt beta of zero. EE and PwC calculated asset betas assuming debt betas of both zero and 0.1.

108.   Table 6 shows the resulting estimates of water companies' asset betas.

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[48]www.ofgem.gov.uk/Networks/ElecDist/PriceCntrls/DPCR5/Documents1/Financial%20Issues%20-%20Ofgem%20Cost%20of%20Capital%20-%20FINAL%20-%20011209.pdf.
[49]The Blume-adjusted beta is a weighted average of raw beta and 1, where the weight on the raw beta is 0.67.

TABLE 6 **Estimates of water companies' asset betas**

	Pennon	Severn Trent	United Utilities	Northumbrian	Kelda*	Period
Assuming debt beta of 0						
Short-term estimates based on daily data						
EE†	0.20	0.27	0.30	0.21		2 yrs to Aug 09
NERA‡	0.34	0.36	0.43			1 yr to Nov 08
NERA pre-cc‡	0.45	0.50	0.43		0.55	1 yr to Jul 07
PwC unadj§	0.24	0.25	0.25		0.32	2 yrs to May 09
PwC adj	0.32	0.30	0.30		0.40	2 yrs to May 09
Short-term estimates based on weekly data						
NERA‡	0.27	0.32	0.39			1 yr to Nov 08
NERA pre-cc‡	0.67	0.49	0.44		0.61	1 yr to Jul 07
PwC unadj§	0.35	0.31	0.29		0.36	3 yrs to May 09
PwC adj§	0.39	0.34	0.33		0.42	3 yrs to May 09
Longer-term estimates						
NERA daily¶	0.32	0.40	0.44	0.29	0.37	Up to 3/12/08
NERA wkly¶	0.32	0.40	0.45	0.32	0.42	Up to 3/12/08
NERA mthly¶	0.37	0.44	0.47	0.31	0.45	Up to 3/12/08
PwC unadj#	0.25	0.16	0.20		0.25	5 yrs to May 09
PwC adj#	0.33	0.24	0.26		0.35	5 yrs to May 09
Assuming debt beta of 0.1						
Short-term estimates based on daily data						
EE†	0.28	0.30	0.38	0.28		2 yrs to Aug 09
PwC unadj§	0.29	0.31	0.31		0.37	2 yrs to May 09
PwC adj§	0.35	0.34	0.34		0.43	2 yrs to May 09
Short-term estimates based on weekly data						
PwC unadj§	0.40	0.37	0.35		0.41	3 yrs to May 09
PwC adj§	0.42	0.38	0.37		0.45	3 yrs to May 09
Longer-term estimates						
PwC unadj#	0.31	0.22	0.26		0.30	5 yrs to May 09
PwC adj#	0.36	0.28	0.30		0.38	5 yrs to May 09

Source: EE, NERA and PwC (reports dated October 2009, January 2009 and December 2009 respectively).

*Kelda was delisted in February 2008. NERA uses data up to announcement of the takeover (21/11/07).

†EE's betas are not Blume adjusted for convergence to 1. EE also shows beta of 0.10 (0.15) assuming a debt beta of zero (0.1).

‡NERA quotes most recent figures and for a period before the credit crunch. NERA's betas are adjusted using the Blume adjustment for convergence to 1. NERA excludes Northumbrian and Dee Valley from its short-term estimates on grounds of illiquidity.

§PwC shows both unadjusted and Bloom-adjusted betas but expresses a preference for the adjusted betas.

¶NERA uses data from 1990 or 1991 and excludes price control periods which it finds have a negative effect on beta (its Northumbrian data starts May 2003). Its betas are adjusted using the Blume adjustment for convergence to 1. NERA also gives figures for Anglian (up to Oct 2006): daily and weekly estimated beta is 0.25 and monthly estimated beta 0.33.

#PwC calculates monthly betas, both unadjusted and Bloom-adjusted betas but expresses a preference for the adjusted betas.

109. The consultants' recommendations were:

  (a) EE suggested that water companies' asset beta seemed to stay within the range from 0.10 to 0.40.

  (b) NERA concluded that water companies' asset beta lay in the range 0.35 to 0.45.

  (c) PwC recommended a range of 0.31 to 0.38. (Although this recommendation related to electricity distribution companies, it was based on evidence relating to National Grid and four water companies.)

Previous CC inquiries

110. The most recent price-cap-setting inquiries covered airports, which are likely to have different risk characteristics to water companies. However, the Heathrow and Gatwick airports inquiry did include a comparison of asset betas, shown in Figure 8 below. Water companies would be included in utilities for which an asset beta of 0.3 to 0.45 is shown.

FIGURE 8

Risk spectrum (asset beta)
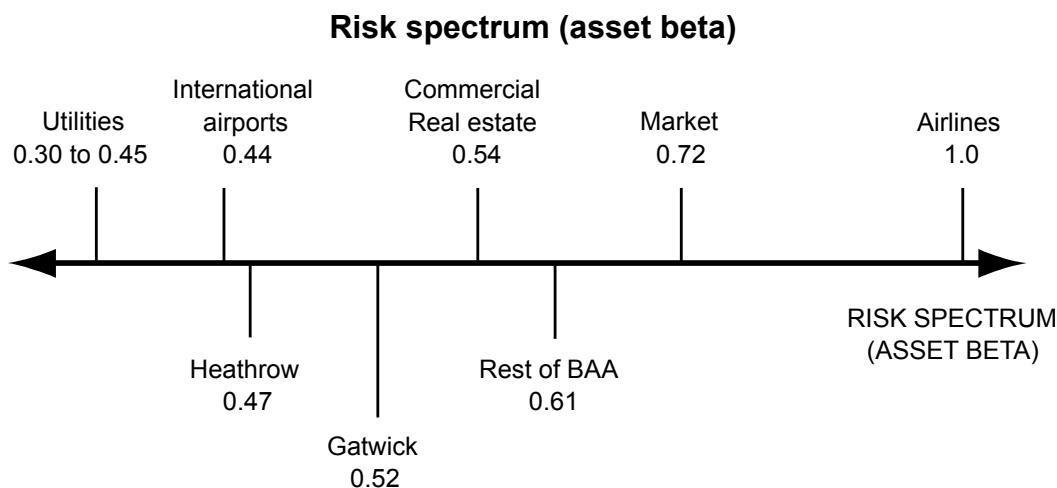
Source: CC analysis in Heathrow and Gatwick regulatory report (2007).

111. The CC's last comparable water inquiries were ten years ago, when the CC assumed an asset beta of 0.5 (this partly reflected evidence from the early 1990s of asset betas well above those of the late 1990s and subsequently).

CC estimates of beta

112. Annex 6 sets out our estimates of equity and asset beta for quoted WaSCs using daily data. For the last 24 months, we estimate an unadjusted asset beta for a WaSC portfolio of 0.27 to 0.36 assuming a debt beta of 0.1, and 0.21 to 0.31 assuming a debt beta of zero. Although there is some evidence of fluctuation over time, our estimates of individual WaSC betas, and over a longer period, are mostly within this range, as are most of the unadjusted betas estimated by others (see Table 6).

CC discussion

113. Measured asset betas for water companies are low, reflecting the relatively low risk of the underlying regulated business—this also means that water companies tend to be regarded as 'defensive' investments.

114. Historical observations of beta measure water companies' existing systematic risk characteristics. From the start of the new regulatory period (April 2010), a new correction mechanism will offset the impact of volume risk for tariff customers.[50] If measured tariff volume fluctuates with the economic cycle, this could reduce water companies' systematic risk compared with the period over which beta has been estimated. We considered whether there could be a case for suggesting that beta will

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[50]Adjustments will be rolled up and made in the subsequent five-year period.

be lower than in the past. However, Bristol Water suggested that tariff volume fluctuations were associated mainly with the climate rather than the economic cycle. Water companies would continue to be exposed to cyclical effects through large user volume (which was outside the revenue correction mechanism) and bad debt provision (which was particularly significant for water companies since they were unable to cut off domestic customers who failed to pay their bills). Moreover, electricity and gas transmission and distribution companies already benefited from revenue correction (since they had revenue, rather than price, caps) and were often thought to have systematic risk not dissimilar to water companies. Bristol Water also suggested that recent beta estimates might already reflect the expectation of the introduction of the revenue correction mechanism. We concluded that there was no strong case for thinking beta would be lower than in the past and consequently that we could estimate beta from historical data.

115. Ofwat said that its assumptions were at the high end of EE's beta observations. We note that in fact the top end of EE's range of observations for individual companies was 0.38 and, as this was derived assuming a debt beta of 0.1, it implied an equity beta of 0.76 (for 57.5 per cent gearing and assuming debt beta of 0.1) rather than Ofwat's figure of 0.94. In one sense therefore Ofwat's assumed equity beta of 0.94 at 57.5 per cent gearing is above the top end of EE's range. However, Ofwat's beta is consistent with the middle of NERA's asset beta range of 0.35 to 0.45, which was derived assuming zero debt beta and incorporated a Blume adjustment.

116. Bristol Water's assumed beta is above Ofwat's. However, after correcting for differences in gearing, there is relatively little difference between the two (see Table 4). We calculate that using Bristol Water's beta assumption instead of Ofwat's would increase Ofwat's WACC by 0.1 per cent.

117. On the three matters set out in paragraph 107, our views are:

(a) We agree with NERA that estimates based on daily data are to be preferred for frequently-traded shares as they are more statistically robust.

(b) We do not consider that the evidence suggests that water companies' betas converge to one (nor would one necessarily expect this for regulated companies); hence we do not consider that raw betas estimated from daily data should be subject to Blume or Bayesian adjustment.

(c) We have adopted debt beta assumptions of 0.1 and zero (the debt beta assumption makes little difference to estimated cost of capital as long as the gearing in the WACC is not too different from the gearing of the WaSCs for which equity beta was estimated).

118. In response to our provisional findings, Bristol Water and NERA suggested that we had used an unsuitable period for estimating beta and had failed to follow standard practice in adjusting raw betas. We do not accept these points:

(a) We consider that our estimate of beta for the two years to March 2010 is supported by analysis for a longer period. Annex 6 shows that we obtain broadly similar results for a longer ten-year period. If anything, beta for earlier years is slightly lower than for the two years to March 2010 (see Figure 9 in Annex 6).

(b) The longer period data in Annex 6 also shows that water company betas do not tend to converge to one. Hence, we see no justification for applying the Blume adjustment (which assumes betas do converge to 1) to water company betas. As regards a Bayesian or Vasicek adjustment, we accept such an adjustment could

be appropriate if we were estimating the beta for one of the four quoted companies (as such an adjustment would combine information on that specific water company's beta with information on other water companies' betas). However, this is not what we are doing. We are estimating a beta for a portfolio of water companies to apply to an unquoted water company (Bristol Water) and, in such circumstances, we see no role for a Bayesian or Vasicek adjustment.

119.   We therefore use our estimates of asset beta set out in paragraph 113: 0.27 to 0.36 assuming a debt beta of 0.1, and 0.21 to 0.31 assuming a debt beta of zero.

Small company equity premium

120.   WoCs, through NERA, argued that their cost of equity was higher than that of the WaSCs. Their main arguments were:

(a) Investors in WoCs incurred higher trading costs than investors in WaSCs and required a compensating 'illiquidity premium'.

(b) WoCs had proportionately smaller profits (higher operational gearing) and hence were more exposed to risks, including systematic risks, than WaSCs; hence they had higher systematic risk and a higher cost of equity.

On the second point, our understanding is that higher operational gearing results from differences in characteristics between WoCs and WaSCs (in particular, from WoCs not providing a capital-intensive sewerage service and some tending to have lower RCV for historical reasons) rather than from WoCs' small size in itself. Nevertheless, we discuss it in this section.

Ofwat

121.   Ofwat did not include an explicit SCEP in its final determination. It made the following main points in response to companies' arguments for a SCEP:

(a) In regard to illiquidity in trading of equity in smaller companies, Ofwat said in its PR09 methodology document that it would require compelling evidence that this continued to be relevant as all WoCs except Dee Valley Water were unlisted or listed as part of much larger groups. In its final determination document, Ofwat said that it found the arguments in respect of illiquidity in trading costs to be less robust or clear (than in relation to cost of debt where Ofwat allowed extra costs for small companies). Ofwat stated that it was more relevant to consider the cost of equity for the small companies in respect of their exposure to systematic risks as this was consistent with the CAPM approach.

(b) In relation to the argument that WoCs had higher systematic risk due to higher operational gearing, Ofwat said that it did not consider the evidence presented was sufficient to conclude that a different systematic risk approach was required for WoCs compared with WaSCs. Ofwat referred in particular to the fact that in future water companies faced little revenue risk due to an ex-post revenue correction mechanism covering tariff users.[51] Ofwat also referred to EE's analysis which did not find any statistical evidence of betas for WoCs being higher than betas for WaSCs.

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[51]This is intended to encourage companies to support water efficiency and will make an NPV neutral adjustment to companies' required revenue in 2015/16–2019/20 for differences between actual and projected tariff revenue for 2010/11–2014/15.

122. Ofwat assumed a lower level of gearing for small companies, due to the impact of higher specific risks on financeability but did not recalculate the equity beta for the lower systematic risk due to lower gearing. In its final determination, Ofwat acknowledged this point as it said that its cost of equity for the WoCs was higher than it might otherwise have been under a CAPM approach at 52.5 per cent gearing, as Ofwat had not adjusted the equity beta. In its response to Bristol Water's SoC, Ofwat went further, saying that its final determination implied a SCEP of 0.5 per cent.

Bristol Water

123. Bristol Water argued in its SoC for a 2.2 per cent SCEP as proposed by NERA. Bristol Water's main arguments were:

(a) The costs hypothetically incurred by shareholders if Bristol Water had been quoted were still relevant because Bristol Water was regulated as a stand-alone company and the cost of capital should not be influenced by ownership structures.[52] Bristol Water's SoC included a SCEP of 0.7 per cent for illiquidity costs, based on NERA's figures relating to higher bid-ask spreads and costs associated with the price impact of larger trades for a company in Bristol Water's size band.[53]

(b) Bristol Water had higher systematic risk due to higher operational gearing.[54] NERA's analysis suggested that WoCs had a higher proportion of opex to revenue compared with the WaSCs. Since water company opex tended not to vary with volume, the argument was that this implied less of a margin for dealing with cyclical fluctuations and hence higher systematic risk (effectively higher operational gearing). Bristol Water's SoC included a SCEP of 1.5 per cent for higher systematic risks, based on NERA's financial modelling which suggested that a 30 per cent increase in beta was required to increase the cost of capital sufficiently to offset the higher systematic risk (see Table 7).

TABLE 7 **NERA's estimated small company premium attributable to operational gearing**

	WaSC	WoC*
Return as % of revenue without SCEP (%)	31.1	22.2
Required return with SCEP as % of revenue (%)	31.1	23.9
Beta adjustment factor†		1.30
Estimated beta	0.96	1.25
Estimated SCEP (%)		1.5
Estimated cost of equity (C_E) (%)§	7.7	9.2

Source: NERA (March 2009) simulations for 2010/11 to 2014/15 with a NERA financial model. NERA assumes RFR of 2.5 per cent, ERP of 5.4 per cent and WASC beta of 0.96.

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*NERA divides WoCs into four bands. The figures here are for Band 3 (Bristol Water and South Staffs).
†This is found by solving the equation C_E(WaSC)+SCEP = RFR+beta* x beta adjustment factor) x ERP.
§Cost of equity before small company liquidity premium. In this exercise (March 2009), NERA assumed WaSC beta of 0.96 which is slightly below Bristol Water's proposed WaSC beta of 1.06

(c) Academic evidence showed a size premium for small firms and such a premium was used in commercial valuations and disputes.[55] (In regard to the academic evidence, NERA's analysis did not fully support this point as NERA said that the

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[52]Bristol Water SoC, sections J.2.1.4 and K.6.1.
[53]NERA also estimated additional costs associated with trading unlisted companies at 0.3 per cent a year for Bristol Water based on a 6.4-year holding period.
[54]Bristol Water SoC, sections J.2.1.4 and K.6.1.
[55]Bristol Water SoC, sections K.6.1.4 and K.6.1.5.

results of the three-factor model[56] were highly dependent on the data period that was examined and the construction of the portfolios.)

(d) Ofwat's failure to include a SCEP was a departure from regulatory precedent.[57]

124. Bristol Water also said that we had accepted (see paragraphs 4 and 5) that it was required at all times to conduct its regulated business as if it were substantially a free-standing business and a separate public limited company. Bristol Water added that, as the vast majority of plcs were quoted, it should be treated as a quoted company; that, as a plc, it could become quoted again if it needed to raise finance; that it had quoted preference shares and debentures, involving hundreds of holders with rights ahead of the ordinary shares; and that it was required to comply with the Stock Exchange rules.

CC discussion

Illiquidity costs

125. Most of the evidence related to higher costs incurred by investors in smaller quoted companies. We do not consider that treating Bristol Water as a stand-alone plc means we should assume its ordinary shares are quoted. We noted that only about 20 per cent of plcs were quoted on the Stock Exchange.[58] Moreover we have not seen evidence that Bristol Water is likely to return to quoted status in the relevant period. Indeed, the fact that only one out of 11 WoCs[59] is now quoted may be a result of there being high costs associated with being quoted, and is also a reason for not expecting Bristol Water to return to quoted status.

126. Nevertheless, given that we are treating Bristol Water as a stand-alone company, it would be appropriate to take into account the relative costs of investing in smaller companies. We consider that there may be higher costs associated with investing in unquoted smaller companies than in larger ones, but these are likely to be relatively small.[60]

Systematic risk

127. EE did not find evidence of WoCs having higher beta than WaSCs. Based on NERA's analysis, Bristol Water argued that listed WoCs had been so illiquid that it was difficult to derive a statistically robust measure for them. We looked at the evidence for Dee Valley and Bristol Water itself prior to its delisting: we found that Dee Valley was too illiquid to generate any useful estimates; that this was not obviously the case for Bristol Water; but that its estimated monthly equity beta was higher than that for a portfolio of WaSCs—since Bristol Water's gearing was broadly similar to that of the WaSCs, this would be consistent with Bristol Water having higher systematic risk than the WaSCs. However, we did not consider that our estimates of Bristol Water's equity beta were sufficiently robust to use to estimate its cost of capital.

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[56]The three-factor model relates returns to company size and the book value of assets as well as beta.
[57]Bristol Water SoC, section K.6.1.1.
[58]We calculate that, out of 10,541 plcs, there are 2,135 UK listed companies on UK exchanges (main market and AIM).
[59]Three of the 11 are under Veolia's ownership.
[60]Unquoted water companies are bought and sold from time to time, and the transaction costs (such as legal and advisory fees) associated with purchase and sale may be higher as a percentage of implied equity for smaller companies. We consider that the relevant additional costs would be relatively small as unquoted water companies are bought and sold infrequently.

128. Bristol Water argued that we should draw inferences about beta from NERA's analysis of the underlying systematic risks, rather than from statistical evidence. We now address this point. NERA's argument is that WoCs have a lower ratio of required return to revenue than WaSCs, are more exposed to short-run cyclical profit fluctuations and hence have higher systematic risk. Ofwat's projections for 2010/11 to 2014/15 support the argument that WoCs in general and Bristol Water in particular have a higher ratio of opex and a lower ratio of return to revenue than the WaSCs (see Table 8).

TABLE 8 **Breakdown of revenue for WaSCs, WoCs and Bristol Water**

			£ million
	WaSCs	WoCs	Bristol Water
Average annual projections for 2010/11 to 2014/15			
RCV	48,409	2,771	317
Return on capital	2,428	145	17
Revenue	8,831	771	96
Adjusted revenue*	8,831	765	95
Opex	3,331	371	45
Tax	269	19	2
Depreciation	2,803	236	31
Adjusted return on capital	2,428	139	16
			per cent
As percentage of adjusted revenue			
Opex	38	49	48
Tax	3	2	2
Depreciation	32	31	33
Adjusted return on capital	27	18	17

Source: CC calculations based on Ofwat final determination.

*Return on capital and revenue for WoCs and Bristol Water are reduced by difference between average projected return and average WaSC return as percentage of RCV.

129. NERA's approach to estimating the effect of higher operational gearing is complex and it seems to us that a simpler approach would be just to increase asset beta for the lower proportion of Bristol Water's revenue than of WaSCs' revenue accounted for by operating cash flow (return and depreciation)—based on Table 8, this suggests increasing asset beta by 18 per cent.[61] This, however, assumes that cyclical profit fluctuations are the only source of systematic risk and would overstate the effect if there are other sources of systematic risk, such as regulatory risk.

130. Bristol Water also argued that its systematic risks were higher than those of WaSCs because of its larger capex relative to revenue. However, we did not see evidence that the risks associated with capex were positively correlated with market risks—for example, if capex prices are positively correlated with the economic cycle, the resulting effect on water companies' cash flow would be negatively correlated with the market.[62] Therefore, we do not consider that any additional adjustment is appropriate.

[61]The rationale for our calculation is that asset value is equal to the present value of future cash flows; that the proportion of revenue for the next five years not accounted for by projected opex and tax (that is, return and depreciation over the next five years) is about 50 per cent for Bristol Water compared with 59 per cent for WaSCs; that the ratio of revenue to unexposed asset value is consequently 18 per cent (=(100/50/(100/59)–1) greater for Bristol Water than for WaSCs; and hence that the asset beta for Bristol Water is likely to be 18 per cent greater.
[62]We also note that the impact on market value of fluctuations in capex costs is reduced because it is actual capex which affects RCV beyond the end of the period, albeit any such effect is partially offset by the CIS efficiency incentive.

Academic evidence and market valuations

131. We do not consider that there is robust UK empirical evidence of small firms being more risky and hence having a higher cost of capital (NERA, the WoCs' adviser, accepted that its analysis provided no guidance on the right small company premium value to be used for regulatory purposes).

132. Moreover, even if there were such evidence, we consider that it would not necessarily be right to infer from this that WoCs were higher risk than WaSCs since WoCs would not necessarily share any (unknown) general characteristics of small firms that increase their cost of capital due to higher risk. In this context, we consider it particularly relevant that WoCs are regulated with an RCV and consequently are unlikely to be difficult to value, in contrast to other smaller companies.

133. As regards market valuations, we did not see evidence of WoCs being valued lower relative to RCV than WaSCs. During 2006, two WoCs (South East and Bristol Water itself) were acquired at enterprise values about 35 to 40 per cent above RCV compared with two WaSCs (Thames and Anglian) being acquired at 20 to 25 per cent above RCV. We would not infer too much from these examples but consider that they are of illustrative value. We also note that the apparent higher valuation of the WoCs exceeds the aggregate small company premium that Ofwat included in PR04 (its most recent determination at the time of these transactions).[63]

Precedents

134. Bristol Water said that Ofwat had departed from its previous policy of allowing a SCEP and that at the previous review (PR04) most WoCs were already unquoted. However, Ofwat has explained the reasons for its current policy. We are not seeking to reassess Ofwat's PR04 policy but at that time most WoCs had been unquoted for a relatively short time and Ofwat's reasoning may have been to retain the illiquidity SCEP as a cautious policy. Bristol Water said that Ofwat's changed policy had created uncertainty and ran the risk of not being transparent: we do not agree as we consider that the reasons for Ofwat's change in approach were clear.

135. Bristol Water pointed out that the CC had allowed a SCEP in its 2000 determinations for two WoCs. However, in 2000 the CC allowed a SCEP due to extra trading costs associated with quoted companies and we have noted above that these are not relevant to Bristol Water.

136. Bristol Water also argued that a company's size had been acknowledged as an important determinant of the cost of capital by other regulators including the ORR in its reviews of Railtrack (2000) and Network Rail (2003), the CAA in its review of NATS (2004) and Postcomm in its review of Royal Mail (2006). The first three of these regulatory decisions provide support for the argument (which we accept) that a higher ratio of opex to revenue increases systematic risk and hence the cost of equity. None of these regulatory decisions supports the argument that small size in itself increases the cost of equity. Indeed, the CAA decision mentioned includes an explicit decision not to include a small company premium in the cost of equity.[64]

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[63]The total post-tax small company premium (including on cost of debt and equity) in Ofwat's final 2004 determinations was 0.3 per cent for South East and 0.6 per cent for Bristol Water, representing 6 per cent and 12 per cent respectively of the post-tax WACC for WaSCs.
[64]The CAA's reasons were that NATS (En Route) plc (NERL) holds equity from large corporate entities and is a monopoly provider of UK air navigation services; and that NERL is also significantly larger (in terms of regulatory capital value) than other UK regulated companies to which regulators have applied a small company risk premium.

CC view

137.   We consider that the arguments for a higher cost of equity due to small size in itself are weak. We accept that unquoted water companies are bought and sold from time to time and that the transaction costs involved would be higher for WoCs. We consider that the impact on cost of equity would be small. However, we see merit in the argument that WoCs, including Bristol Water, have higher systematic risk than the WaSCs and therefore increase Bristol Water's asset beta by 18 per cent (see paragraph 129). We noted in paragraph 129 that this was likely to overestimate the relevant effect, and we consider that the overestimate of this aspect should offset our not allowing explicitly for the transaction costs involved in buying and selling smaller companies.

Issuance costs

138.   As described in paragraphs 56 and 57, we make an uplift to the cost of new debt to factor in issuance costs and fees. We have not made a similar uplift to the cost of equity (or an allowance in opex) to cover equity issuance costs, because we consider that it is for the company to determine the most efficient method of raising finance during the price control period. As discussed in Appendix O, we consider that there are options available to the company that do not involve issuing new equity and consequently the amount and timing of equity issuance (if any) is uncertain.

Dividend growth-based estimates of quoted water companies' cost of equity

139.   NERA estimated the cost of equity from the discount rate that yielded a present value of future dividends equal to the current share price of the four quoted water companies. NERA used brokers' dividend forecasts to estimate water companies' dividends per share over the next four years, and assumed that growth in dividends per share beyond four years was similar to long-run GDP growth. NERA described these estimates as its dividend growth model (DGM) analysis.

140.   In commenting on Ofwat's draft determinations, NERA said that Ofwat's assumed cost of equity of 7.1 per cent was not consistent with NERA's DGM market data, which showed a cost of equity of 7.9 to 10.5 per cent for April 2009 and an average of 7.7 per cent for the period from January 2007 to April 2009.[65]

141.   We asked NERA to update its DGM calculations. The updated calculations for February 2010 show an estimated cost of equity based on the average for the four quoted water companies of 6.5 per cent at assumed 60 per cent gearing (see Table 9). We estimate that this implies a cost of equity of 6.3 per cent at Ofwat's assumed gearing of 57.5 per cent—this is below Ofwat's assumed WaSC cost of capital of 7.1 per cent. NERA said that the decline in the estimated cost of equity was attributable to increases in the companies' share price (which NERA said may be attributable to reduced regulatory uncertainty following Ofwat's final determination and some stabilization of general stock market conditions) and to revisions to estimates of the water companies' debt. NERA also told us that, after extending the period up to February 2010, its longer-run estimate was reduced from 7.7 to 7.4 per cent at assumed 60 per cent gearing.

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[65]NERA, *Ofwat's PR09 Draft Determinations: A review of the financial assumptions*, August 2009.

TABLE 9 **NERA's assessment of DGM-derived cost of equity (Feb 2010)**

	Share price 8 Feb 2010 pence	Real dividend per share forecast (pence)*			
		2010	*2011*	*2012*	*2013*
United Utilities	508.36	31.73	32.29	27.67	27.20
Severn Trent	1083.10	65.88	66.27	57.17	56.71
Pennon	503.49	19.70	20.62	20.91	21.44
Northumbrian	272.29	12.42	12.33	12.51	12.76

per cent

		Cost of equity at			
	Future dividend per share growth†	*Actual gearing*	*Actual gearing*	*60% gearing‡*	*57.5% gearing‡*
United Utilities	2.4	64	7.5	7.0	6.7
Severn Trent	2.4	66	7.4	6.6	6.3
Pennon	2.4	58	6.4	6.6	6.3
Northumbrian	2.4	66	6.8	6.1	5.8
Average			7.0	6.5	6.3

Source: NERA and CC calculations.

*NERA sourced dividend forecasts from Bloomberg and adjusted to a real basis using average annual inflation forecasts sourced from HM Treasury publications.
† Based on Consensus Economics' forecasts of long-run real UK GDP growth.
‡Uses NERA assumptions for RFR (2.5%) and ERP (5.4%), and Miller formula (asset beta = (equity beta) x (1-g)+(debt beta) x g) with debt beta of zero.

142. A limitation of using dividend forecasts to estimate the cost of equity is that explicit forecasts cover only a short period and future dividend per share growth is uncertain. It is necessary to make an assumption about longer-run dividend per share growth and it is this assumption rather than the forecasts that accounts for the bulk (about 80 per cent in NERA's estimates) of the present value of future dividends. NERA assumed that water companies' future real dividends per share grow at a rate equal to long-run UK GDP growth. If the assumed rate of growth is reduced to zero, the average implied cost of equity at 60 per cent gearing reduces from 6.5 to 4.6 per cent.

143. In response to our provisional findings, NERA said that 2 per cent was a reasonable lower bound for dividend growth, implying a DGM-based cost of equity for WaSCs of at least 6.3 per cent. In NERA's view, analyst projections, long-run real GDP growth and projected real water company RCV growth all suggested growth in dividends per share of at least 2 per cent. We do not agree. Analyst projections are only relevant to the medium term and may be subject to upward bias, while GDP growth is likely to be an upward biased measure of long-run dividend per share growth (see paragraph 90). As regards RCV growth, it is not obvious that high RCV growth implies high expected dividend per share growth—investors might instead anticipate low dividend per share growth due to a greater need for companies to retain earnings to fund the growth in RCV. We therefore continue to regard the DGM evidence as consistent with a wide range of figures for the cost of WaSCs' equity, including figures below 6.3 per cent.

Market to asset ratios

144. We now turn to analysis based on comparing the market value of the regulated assets with the value of the RCV. Other things being equal, if a regulated company earns exactly the cost of capital on its RCV, and is expected to continue doing so, its enterprise value (market capitalization of quoted company less market value of any

non-regulated business of the quoted company plus value of debt) should be equal to its RCV, representing a market to asset ratio (MAR) of one.

145. It is sometimes suggested that MARs are difficult to interpret because water companies' market capitalization depends on all aspects of the regulator's determination, not just the WACC. However, we noted above (see paragraph 8) that the marginal investor's required return depends on other aspects of the determination, and that consequently the cost of equity and the WACC also depend on the other aspects. For example, an expectation of outperformance reduces the required cost of equity and hence the WACC. For this reason, we do not see this as necessarily a problem with MARs.

146. However, MARs depend on market expectations of future regulatory settlements. This means that, ahead of a regulatory determination, MARs are heavily influenced by the market's expectations of what the regulator will do—hence, even if Bristol Water were still quoted, it would be difficult to interpret its MAR because it would depend on the market's expectation of our decision. This difficulty is, however, much less for the four quoted water companies as they have accepted Ofwat's final determination. Nonetheless, expectations of future regulatory settlements may still affect market capitalization. For example, if the regulator sets an allowed rate of return above the market's current view of the cost of capital, the market may expect this to continue at future regulatory settlements or it may expect future allowed rates of return to be in line with the future cost of capital. In both cases, the MAR would be above 100 per cent but, without knowing the market's view of future regulatory settlements, MARs cannot be used to infer accurately the market's current view of the cost of capital.

147. For the reason given in the previous paragraph, we regard MARs as giving evidence on whether the regulator's current cost of capital is above or below the market's current view. Figure 9 and Table 10 suggest that the MARs for all four quoted water companies have been above 1 since Ofwat's final determination. This is supportive of the view that WaSCs' cost of capital is not above Ofwat's assumption. Bristol Water suggested that the result we observed may be driven by an expectation of outperformance against opex or capex but we did not see evidence of this, and we noted that many of Bristol Water's own submissions suggested that Ofwat had allowed insufficient opex and capex rather than the opposite. NERA suggested that we should look also at the period between Ofwat's draft and final determinations. We consider that this period is less relevant since share prices were affected by uncertainty about whether Ofwat's final determination would differ from its draft determination.

FIGURE 9

MARs for quoted water companies since April 2009
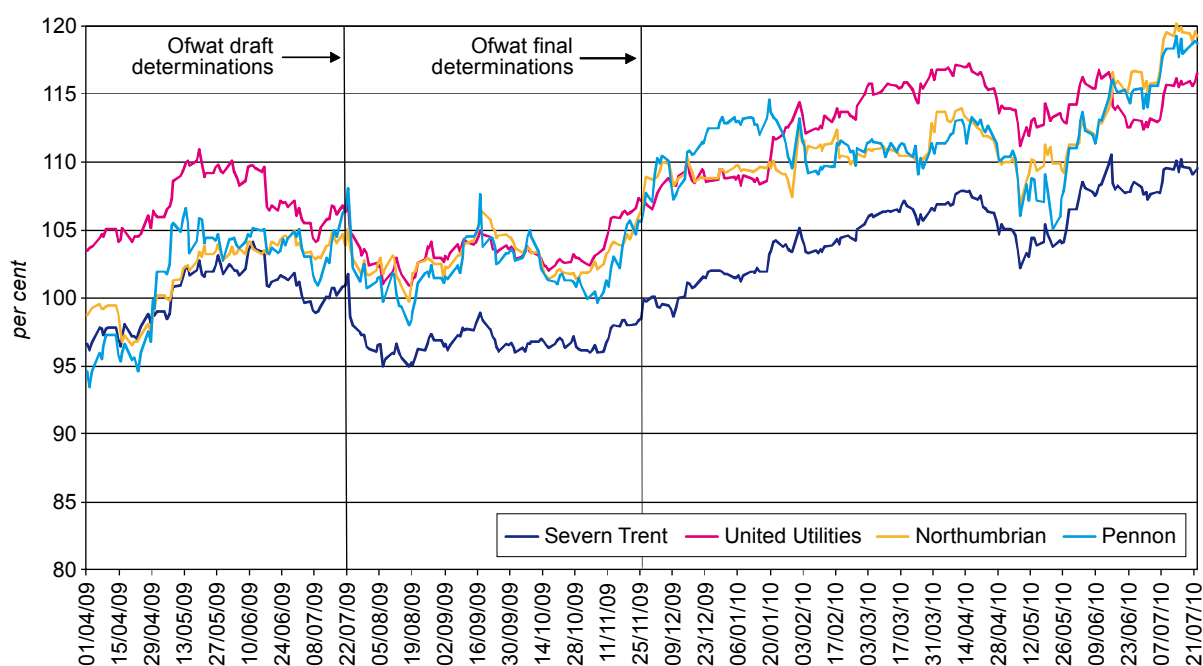
Source: CC calculations (see Table 10).*

*For dates between the end of March 2009 and 2010, net debt was interpolated and the estimated value of non-regulated business shown in Table 10 was used.

TABLE 10 **Estimated MARs at March 2010**

	Severn Trent	United Utilities	Northumbrian	Pennon
Share price (p)*	1182.5	539.8	283.4	532.2
Fully diluted shares outstanding (m)	236.6	681.5	518.6	352.0
Market capitalization (£m)	2,797	3,679	1,470	1,874
Net debt (£m)	3,949	5,175	2,258†	1,895
Estimated value non-regulated business (£m) †	213	428	389	1,016
Enterprise value of regulated business (£m)‡	6,534	8,426	3,339	2,753
RCV (£m)§	6,168	7,376	2,974	2,456
Implied MAR (%)	106	114	112	112

Source: CC calculations based on data from Datastream, Ofwat, companies' annual reports and brokers' reports.

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*Average share price from 1 January to 22 July 2010.
†Average of available brokers' reports.
‡Market capitalization plus net debt less estimated value of non-regulated business.
§Ofwat figure for RCV on 1 April (after AMP 5 opening adjustments).

148. MARs rely mainly on a comparison of two relatively 'solid' numbers: the enterprise value of the regulated business and its RCV. Nevertheless, MARs still need to be interpreted with caution:

(a) Share prices are volatile and currently there are figures available for only about eight months since Ofwat's final determination.

(b) The value of any non-regulated business, which has to be deducted in calculating the enterprise value of the regulated business, is based on brokers' estimates and may not accurately reflect the market view. In the case of three of the four quoted companies, the non-regulated business is quite small relative to the regulated business (5 per cent or less in the cases of Severn Trent and United Utilities

and 12 per cent for Northumbrian) and the consequent uncertainty does not seem likely to be very great. In the case of the other company (Pennon), the estimated value of the non-regulated business is about 35 per cent of the regulated business: consequently its MAR is more difficult to interpret.

149.   In its comments on our provisional findings, Bristol Water suggested that there was a margin of error of 20 per cent in analysts' valuations. We note that applying this range to the value of the non-regulated businesses in Table 10 would suggest a range of 109 to 113 per cent for the MAR. Bristol Water also suggested that trends in MARs were associated with general market movements. We recognize that MARS may be affected by short-term market movements (although the relatively low asset betas of the WaSCs (see Annex 6) imply that any effect would be modest). However, the average MAR over a period of time is still a useful check, among a number of others, on the cost of capital. In our view, the evidence on MARS does not contradict our view that our WACC is appropriate. We also note that MARs increased during 2010 (see Figure 9) despite a weak market.

Estimated cost of capital

150.   The main points of our thinking on the cost of capital are:

(a) We consider that the gearing assumed in the WACC should be consistent with the gearing used to assess financial ratios and calculate tax.

(b) The assumed level of gearing should generate financial ratios consistent with the company maintaining investment grade issuer shadow status—on a cautious basis, we have chosen a lower initial level of gearing (60 per cent) than Bristol Water's existing 69 per cent in order that our projections are consistent with Bristol Water maintaining investment grade issuer shadow status.

(c) Our estimate of Bristol Water's existing cost of debt is 3.8 per cent and of its new debt is 4.0 per cent, giving an overall average cost of debt of 3.9 per cent.

(d) As regards the cost of equity:

   (i)   Current index-linked yields are about 1 per cent—as they may still be affected by market distortions we consider that a range of 1 to 2 per cent for the RFR is appropriate.

   (ii)   A reasonable range for the market return is 5 to 7 per cent, implying an ERP of 4 to 5 per cent.

   (iii)   We estimate WaSCs' asset beta to be in the range 0.27 to 0.36. We accept that Bristol Water has higher systematic risk than the WaSCs. After allowing for this, we estimate Bristol Water's asset beta to be 0.32 to 0.43 and hence its equity beta (at 60 per cent gearing) to be 0.64 to 0.92.

151.   Based on these assumptions (and a debt beta of 0.1), our estimated cost of capital is 3.8 to 5.0 per cent—see Table 11.[66]

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[66]With a debt beta of zero, some of the individual numbers are changed but the range remains the same.

TABLE 11 **Estimated cost of capital for Bristol Water**

	CC low	CC high
Gearing (%)	60	60
Cost of debt (pre-tax) (%)	3.9	3.9
Cost of equity (post-tax) (%)	3.6	6.6
WACC (%)	3.8	5.0
Cost of equity calculation		
RFR (%)	1.0	2.0
ERP (%)	4.0	5.0
Equity beta	0.64	0.92
Small company premium (%)	0.0	0.0
Cost of equity (post-tax) (%)	3.6	6.6
Asset beta calculations		
Debt beta assumption	0.10	0.10
Asset beta	0.32	0.43

Source: CC calculations.

152. We consider that there are some useful additional cross-checks that can be carried out:

   (a) Our range for the (post-tax) cost of equity at 60 per cent gearing of 3.6 to 6.6 per cent for Bristol Water compares to our estimated (pre-tax) cost of new debt of 4.0 per cent in total (and 3.7 per cent before fees and cash costs). While our cost of equity follows from our estimates of beta under the CAPM, we noted above that the CAPM needed to be interpreted flexibly and it seems implausible that the cost of equity is below the cost of debt, as implied by the lower end of our range.

   (b) Our CAPM-based assumptions for the cost of equity imply a range of 7 to 12 per cent for a thin equity structure, say with 85 per cent gearing. The indications we have received are that investors in such a structure would require a rate of return on equity around the top end of this range, which would again suggest that the lower end of our range is not very plausible.

   (c) The lower end of our range for the cost of equity is below a DGM estimate assuming zero real dividend per share growth (about 4.6 per cent). Again this does not seem very plausible.

   (d) We found an average MAR of about 111 per cent (see paragraphs 144 to 149): if differences between market and regulatory value were entirely attributable to differences in the WACC, this would suggest that the WACC was between about 10 and 33 per cent below Ofwat's figure for 2010/11 to 2014/15 (5.1 per cent for WaSCs and 5.5 per cent for WoCs of Bristol's size) depending on whether the market assumes that the difference between the true WACC and the regulatory WACC continues indefinitely or ceases at the end of the current regulatory period (2014/15). The upper end of our range for Bristol Water's cost of capital is 9 per cent below Ofwat's figure for Bristol Water, which again appears in line with the market data, but the lower end of our range is 31 per cent below Ofwat's figure which would only be in line with the market data if one particular assumption was made about market expectations. As against this, however, other aspects of our determination (in particular the treatment of tax, pensions and of foreseeable increases in opex) are likely to mean that simple differences between our and Ofwat's WACC do not translate into differences in market value.

   These cross-checks suggest that the upper end of our range is plausible, but moving towards the lower end of the range risks setting the cost of capital too low.

153.   The first of our cross-checks generated a substantial amount of comment in response to our provisional findings, mainly suggesting that the difference between the upper end of our range for the cost of equity and our cost of debt was too small and that we needed to increase the upper end of our range for the cost of equity (6.6 per cent). We did not agree for the following reasons.

(a) Bristol Water suggested that we should compare our implied ungeared WaSC cost of equity (which would be 2.1 to 3.8) per cent with our cost of debt. We note, however, that an ungeared WaSC cost of equity should be compared with an ungeared WaSC cost of debt, which would be lower than our estimated cost of debt for Bristol Water. We believe such a comparison suggests a similar conclusion to that reached above—that the lower end of our cost of equity range risks setting the cost of capital too low, but the upper end of our range is reasonable.

(b) Although a number of parties suggested that the difference between the upper end of our range for the cost of equity and our cost of debt was too small, the only market evidence supporting this suggestion was provided by NERA, which said that the difference between the cost of equity and the cost of debt could be inferred from CDS data.[67] We were not persuaded by NERA's evidence since it was unclear why the difference between the cost of equity and debt for regulated companies should be constrained to be not less than the difference between NERA's two CDS indices—specifically, we do not accept that the default risk for sub-investment grade companies provides an estimate of the equity risk for regulated companies.

(c) Debt is deductible for corporation tax but equity is not. Consequently, equity is more expensive at the margin—even at a tax rate of 24 per cent, an adjusted 'pre-tax' cost of equity is 32 per cent higher than the post-tax cost of equity we use to calculate the WACC (see paragraph 10).[68]

(d) Even if it were the case (which we do not accept) that our whole range for the cost of equity was inconsistent with our cost of debt, one possible implication would be that our range for the cost of equity was wrong (as assumed by most of those commenting) but another possible implication would be that our cost of debt was wrong. We would not rule out the latter possibility: Annex 4 shows that water companies have borrowed at well below our assumed cost of debt of 4 per cent (for example, South East Water this year issued 31-year index-linked debt at 2.5 per cent before fees). Overall, our conclusion remains that both the upper end of our range for the cost of equity and our cost of debt are plausible.

(e) Our comparison between the cost of equity and the cost of debt is only intended as one of a number of cross-checks and should not be considered to the exclusion of all the other data. For example, a comparison between our estimate of the cost of capital and previous recommendations and decisions of other regulators (see paragraphs 159 to 165) should focus on the level of the WACC and its components, not on the ratio between the cost of equity and the cost of debt.

154.   In response to our provisional findings, Bristol Water and NERA also appeared to suggest that the WACC should be determined by rating agencies' calculation of

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[67]NERA said that the difference between the cost of equity and debt was less than the difference between the CDS premium of the Europe iTraxx, which NERA said tracked bond spreads on investment grade rated bonds, and the CDS premium of the Crossover iTraxx index, which NERA said represented the required compensation for bearing default risk associated with sub-investment grade companies (rated no higher than BBB-, negative watch).
[68]A progressive reduction in corporation tax payments to 24 per cent in 2014/15 was announced in the June 2010 budget. The implied ratio of pre-tax to post-tax cost of equity is $1/(1–0.24) = 1.32$.

adjusted interest cover ratios (AICR). Bristol Water stated that 'financeability issues' implied the CC's provisional cost of capital was insufficient and that the very low cost of capital assumed by the CC was the fundamental cause of financeability issues.[69] NERA stated that, if the level of AICR observed as necessary for an A–/A3 rating could not be achieved at a consistent level of gearing for an A–/A3 rating, it seemed likely that the allowed rate of return and in particular the cost of equity had been set too low. We discuss financeability in Appendix O. We accept that a financeability assessment can be a useful cross-check as well as a way of choosing the level of gearing for the WACC. However, since the adjusted interest cover ratio itself depends on gearing, the implication of these comments appears to be that a company should be able to determine its own WACC by choosing a high level of gearing that leads to an adverse ratio. We do not agree, as we consider that the WACC should be estimated from the data we have set out above.

155. During the period of our inquiry, we noted some continuing volatility in international financial markets, associated especially with concerns about the indebtedness of Greece and some other Euro area countries. The impact on UK markets did not appear large: gilt yields did not change much, nor did yields on investment grade bonds of regulated UK utilities; as regards equity markets, there was some decline, especially during the middle of our inquiry, in the value of UK stock market indices, although not in the share prices of regulated water utilities. There was also continuing press comment on the implications of the UK Government's large budget deficit and the June 2010 Budget. We took these continuing uncertainties into account, in particular that any resumption of liquidity constraints in the UK inter-bank market could affect Bristol Water's cost of borrowing from banks. More generally, however, the direction of impact on the cost of capital of regulated utilities did not seem very clear, since increased economic uncertainty may make investing in regulated utilities more attractive compared with investing in other companies.

156. In the light of these cross-checks and taking into account the continuing uncertainty in financial markets, we estimate a WACC at the top end of our range, ie 5.0 per cent.

157. Our cost of capital is nevertheless lower than that of Ofwat and that of Bristol Water—see Table 12:

   (a) Our cost of capital is below Ofwat's mainly because we based our equity beta on estimates of beta for quoted WaSCs (although we did also allow for Bristol Water having higher systematic risk than the WaSCs) whereas we understand Ofwat to have made a judgement about the cost of equity and then worked backwards to derive the implied equity beta. Our cost of capital is also lower than Ofwat's because our ERP is below that of Ofwat—our figure reflects our review of the evidence (see paragraphs 80 to 100).

   (b) Our cost of capital is below Bristol Water's for the same two reasons and also because we have not included an explicit SCEP and because we have projected a lower cost of debt and lower RFR.

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[69]Bristol Water's comments on provisional findings, section 1, paragraphs 19, 20 & 46.

TABLE 12 **Estimated cost of capital for Bristol Water**

	CC range	CC projected	Ofwat original	Ofwat regeared*	Bristol Water
Gearing (%)	60	60	52.5	60	60
Cost of debt (pre-tax) (%)	3.9	3.9	4.0	4.0	4.3
Cost of equity (post-tax) (%)	3.6–6.6	6.6	7.1	7.9*	10.4
WACC (vanilla WACC) (%)	3.8–5.0	5.0	5.5	5.5*	6.7
Cost of equity calculation					
RFR (%)	1.0–2.0	2.0	2.0	2.0	2.5
ERP (%)	4.0–5.0	5.0	5.4	5.4	5.4
Equity beta	0.64–0.92	0.92	0.94	1.10*	1.06†
SCEP (%)	0.0	0.0	0.0	0.0	2.2†
Cost of equity (post-tax) (%)	3.6–6.6	6.6	7.1	7.9*	10.4

Source: CC calculations.

*The Ofwat equity beta, cost of equity and WACC are adjusted to 60 per cent gearing for comparability with CC and Bristol Water estimates.
†The quoted equity beta for Bristol Water is not strictly comparable with CC figures since its SCEP includes an allowance (1.5 per cent) for higher systematic risk compared with WaSCs. If, for consistency with CC and Ofwat figures, this is instead added to the equity beta figure, equity beta would increase to 1.33 and the SCEP reduce to 0.7 per cent.

158. In considering the impact of WACC on required return and hence on K, it is nec-
essary also to take into account the treatment of tax. Unlike Ofwat and Bristol Water,
we have adopted a consistent treatment of tax in the WACC and in the financial
projections, which recognizes that lower gearing reduces the (vanilla) WACC but
increases tax payments. In practice, our treatment of tax to a considerable extent
offsets our lower WACC, as illustrated in Table 13. We have also included an adjust-
ment so that the return on Bristol Water's RCV is equal to our WACC (see Table 13
and Annex 7).

TABLE 13 **Estimated WACC, tax and required return as percentage of average RCV***

			per cent
	CC	Ofwat	Bristol Water
WACC	5.0	5.5	6.7
Adjustment†‡	–0.1		
Tax†	0.9	0.6	1.0
Required return including tax†§	5.8	6.1	7.7

Source: CC calculations.

*Average of opening and closing RCV.
†Simple average of annual figures for 2010/11 to 2014/15.
‡The financial model calculates required return (and hence required revenue) on the basis of a rate of return on the average of the RCV at start and end years (described as the accounting rate of return (ARR)). As discussed in Annex 7, the ARR is not necessarily equal to the WACC and we adjust to remove this effect so that Bristol Water earns returns equal to the WACC.
§Before CIS and other adjustments.

Comparison with previous regulatory decisions

159. In response to our provisional findings, Bristol Water and NERA said that our cost of
capital was inconsistent with regulatory precedent. We accept that consistency with
previous decisions is a relevant consideration and that any significant changes
should be satisfactorily explained and well justified.

160. Table 14 shows a comparison with the WACCs recommended in the CC's most
recent regulatory reports on Heathrow and Gatwick (2007) and Stansted airports
(2008). Our cost of debt for Bristol Water is slightly higher than the CC's recom-
mended cost of debt for the airports, reflecting mainly additional costs that Bristol

Water faces as a small company. Our cost of equity for Bristol Water is lower than the CC's recommended cost of equity for the airports, reflecting the lower risk that water companies face compared with airports. As discussed earlier in this appendix, our assumed market return of 5 to 7 per cent is the same as the CC assumed in the airports inquiries.

TABLE 14 **Comparison of Bristol Water WACC with recent CC reports**

	Bristol Water	Heathrow	Gatwick	Stansted
	Jun 10	Oct 07	Oct 07	Oct 08
Gearing (%)	60	60	60	50
Cost of debt (pre-tax) (%)	3.9	3.6	3.6	3.4–3.7
Cost of equity (post-tax) (%)	3.6–6.6	4.8–7.7	5.0–8.4	5.0–8.2
WACC range* (%)	3.8–5.0	4.0–5.2	4.1–5.5	4.2–6.0†
WACC figure chosen* (%)	5.0	5.1	5.3	5.6†
Cost of equity calculation				
Risk free rate (%)	1.0–2.0	2.5	2.5	2.0
Equity risk premium (%)	4.0–5.0	2.5–4.5	2.5–4.5	3.0–5.0
Market return (%)	5.0–7.0	5.0–7.0	5.0–7.0	5.0–7.0
Asset beta	0.32–0.43	0.42–0.52	0.46–0.58	0.55–0.67
Equity beta	0.64–0.92	0.90–1.15	1.00–1.30	1.00–1.24

Source: CC calculations.

*We have calculated vanilla WACC consistent with pre-tax WACCs shown in the CC airports reports.
†At 60 per cent gearing, the WACC range would be 4.3 to 6.1 per cent and the WACC figure chosen would be 5.7 per cent (using the Miller adjustment).

161.   Table 15 shows a comparison of our WACC for Bristol Water with the WACCs in our previous water redeterminations in 2000. Table 15 does not show a range as the 2000 redeterminations did not give a range, only the chosen figures. The market return of 7 per cent has not changed, but we have estimated a lower WACC due to a lower cost of debt, lower asset beta and absence of SCEP. The lower cost of debt is due to declines in interest rates in the last ten years. The lower asset beta reflects a decline in water company betas and that, as discussed above, in 2000 the CC attached weight to earlier data showing higher betas. As discussed above, the CC included a SCEP in 2000 due to the higher costs of trading shares in small quoted companies—both of the companies covered by the 2000 reports were quoted at the time, but Bristol Water is currently not quoted and we have not seen evidence that it will return to quoted status.

TABLE 15 **Comparison of Bristol Water WACC with CC 2000 water reports**

	Bristol Water	Mid Kent	Sutton & East Surrey
	Jun 10	Sep 00	Sep 00
Gearing (%)	60	35	25
Cost of debt (pre-tax) (%)	3.9	5.0	4.5
Cost of equity (post-tax) (%)	6.6	7.0	6.6
WACC (%)	5.0*	6.3	6.1
Cost of equity calculation			
Risk free rate (%)	2.0	3.0	3.0
Equity risk premium (%)	5.0	4.0	4.0
Market return (%)	7.0	7.0	7.0
Asset beta	0.43	0.5	0.5
Equity beta	0.92	0.7	0.7
Small company premium (%)		1.0	1.0
Cost of equity (post-tax) (%)	6.6	7.0	6.6

Source: CC calculations.

*At 35 per cent gearing, the Bristol Water WACC would be 4.6 per cent and at 25 per cent gearing it would be 4.5 per cent (using the Miller adjustment).

162. We conclude that the differences between our WACC and the WACC found in previous CC decisions arise because of business differences between regulated companies and because capital market conditions change over time. The differences do not suggest any inconsistency with previous CC decisions in terms of approach. Rather they arise due to the need to take case-specific factors into account and to use up-to-date data.

163. The decisions of sectoral regulators are subject to redetermination by ourselves and are less relevant as precedent than our own previous decisions. Nevertheless we also compared our estimated WACC for Bristol Water with recent findings of sectoral regulators (see Table 16). In order to facilitate the comparison we have adjusted the CC cost of capital to the same gearing as that of the sectoral regulator and shown an approximate implied cost of capital for a larger regulated company such as a WaSC. As discussed above, our chosen WACC is about 0.5 per cent below that of Ofwat at this review. Table 16 shows that our implied WACC for a larger regulated company is also slightly (0.2 per cent) lower than that of Ofgem for electricity distribution companies.[70] In both cases, however, our consistent treatment of tax offsets at least to some extent the lower WACC for companies with gearing above the level assumed in the WACC calculation. Table 16 also shows that our implied WACC for a larger regulated company is below that recently proposed by the CAA for air traffic control principally because our equity beta is lower,[71] reflecting the lower risk for water companies.

164. We note that our range for the market return (5 to 7 per cent) and implied range for the ERP (3 to 5 per cent) imply a central figure lower than the figure used by the sectoral regulators but that the effect of this is reduced because, in computing Bristol Water's WACC, we have used a figure at the top of our range (7 per cent for the market return and 5 per cent for the implied ERP). We also note, however, that a 2007 review of FSA projection rates recommended a range of 4.75 to 6 per cent for the market return and 3 to 4 per cent for the ERP, which is lower than our range.[72]

[70]Ofgem DPCR5 Final Proposals, December 2009.
[71]NATS (En Route) plc CAA price control proposals (2011-2014), May 2010.
[72]*Rates of return for FSA prescribed projections*, Report of PricewaterhouseCoopers and peer reviewers' comments, FSA, December 2007.

165.   The basis of our estimates of WACC has been set out fully in detail in this appendix, and consequently provides a full explanation of any differences from estimates of the cost of capital used by sectoral regulators.

TABLE 16   **Comparison of WACC used in CC determination with WACCs used in regulators' recent decisions**

	CC Bristol Water	CC vs Ofwat		CC vs Ofwat WaSC		CC vs Ofgem DPCR5		CC vs CAA NATS	
		CC Bristol Water*	Ofwat Bristol Water	CC notional WaSC*	Ofwat WaSC	CC notional WaSC*	Ofgem	CC notional WaSC	CAA NATS
	Jun-10	*Jun-10*	*Nov-09*		*Nov-09*		*Dec-09*		*May-10*
Gearing (%)	60	52.5	52.5	57.5	57.5	65	65	60	60
Cost of debt (pre-tax) (%)	3.9	3.9	4.0	3.6†	3.6	3.6†	3.6	3.6†	3.6
Cost of equity (post-tax) (%)	6.6	6.6	7.1	5.6	7.1	6.2	6.7	5.8	9.2
WACC (%)	5.0	4.9	5.5	4.4	5.1	4.5	4.7	4.5	5.8
Difference (%)			−0.6		−0.7		−0.2		−1.4
Comment		*CC has lower beta and market return, partially offset by different tax treatment*		*CC has lower beta and market return partially offset by different tax treatment*		*WACCs broadly similar allowing for different tax treatment*		*CC has lower beta (due to lower risk) and slightly lower market return*	
Cost of equity calculation									
Risk-free rate (%)	2.0	2.0	2.0	2.0	2.0	2.0	NA‡	2.0	1.75
Equity risk premium (%)	5.0	5.0	5.4	5.0	5.4	5.0	NA‡	5.0	5.5
Market return (%)	7.0	7.0	7.4	7.0	7.4	7.0	NA‡	7.0	7.25
Equity beta	0.92	0.79	0.94	0.72	0.94	0.85	NA‡	0.75	1.35
Cost of equity (post-tax) (%)	6.6	5.9	7.1	5.6	7.1	6.2	6.7	5.8	9.2

Source: CC calculations.

*Different gearing level assumed for purpose of comparison. It is assumed that the change in gearing does not affect the cost of debt but does affect equity beta via the Miller formula.
†For the purposes of this table we have assumed a CC cost of debt of 3.6 per cent for WaSCs.
‡Unclear from decision.

Contribution of different components to the difference between Ofwat's and Bristol Water's projected cost of capital

1. In this annex, we calculate the contribution of different components to the difference between Ofwat's and Bristol Water's projected cost of capital. As shown in Table 1 in the main text of this appendix, Ofwat's projected WACC was 5.5 per cent and Bristol Water's was 6.7 per cent. Bristol Water assumes higher gearing than Ofwat: our calculations take into account the impact of gearing on beta and the cost of equity but we do not attempt to quantify any impact of higher gearing on the cost of debt.[1]

The first step was to present the two WACC computations on the same basis. Bristol Water split its cost of equity into that applicable to a large water company and a SCEP attributable to Bristol Water, whereas Ofwat just showed the cost of equity applicable to WoCs of Bristol Water's size. However, in its response to Bristol Water's SoC, Ofwat accepted the principle of such a split and that its implied SCEP was 0.5 per cent (see paragraph 122). In order to facilitate the decomposition of differences, we therefore restated Ofwat's calculation using a separate SCEP. Table 1 shows our resulting restatement of Ofwat's cost of capital (we have assumed debt beta figures of zero and 0.1, although this does not make much difference to the implied SCEP).

TABLE 1 **Ofwat cost of capital restated to show WaSC beta and SCEP**

| | Ofwat | Ofwat figures for Bristol Water | | |
| | | | Restated with debt | Restated with debt |
	WaSC	Original	beta of 0.0	beta of 0.1
Gearing (%)	57.5	52.5	52.5	52.5
Cost of debt (pre-tax) (%)		4.0	4.0	4.0
Cost of equity (post-tax) (%)		7.1	7.1	7.1
WACC (%)		5.5	5.5	5.5
Cost of equity calculation				
Debt beta assumption			0.00	0.10
WaSC asset beta*			0.40	0.46
WoC asset beta*			0.45	0.50
RFR (%)	2.0	2.0	2.0	2.0
ERP (%)	5.4	5.4	5.4	5.4
Equity beta*	0.94	0.94	0.84†	0.86†
Small company equity premium (%)‡		0.0	0.5	0.5
Cost of equity (post-tax) (%)	7.1	7.1	7.1	7.1

Source: CC calculations.

*Asset beta and equity beta are calculated using Miller formula (asset beta = (equity beta) x (1-g)+(debt beta) x g).
†WaSC equity beta at gearing of 52.5 per cent.
‡Figure which gives Ofwat's 7.1 per cent cost of equity using formula (cost of equity = RFR + ERP x (WaSC equity beta) + SCEP).

In order to facilitate comparisons, we then recalculated Bristol Water's cost of equity assuming Ofwat's gearing and vice versa (see Table 2). We did the calculations with debt beta assumptions of zero and 0.1 (we only show in Table 2 the calculations using Ofwat's gearing of 52.5 per cent and debt beta of zero and Bristol Water's

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[1]Any such effect would most likely be small but, as higher gearing increases the riskiness and hence the cost of debt, it would reduce slightly the contribution of differences in the cost of debt and increase the contribution of the difference in gearing.

gearing of 60 per cent and debt beta of 0.1—the two other permutations show similar results).

TABLE 2 **Regeared projected real cost of equity for 2010/11 to 2014/15**

	Gearing of 52.5% and debt beta of 0.0		Gearing of 60% and debt beta of 0.1	
	Ofwat	Bristol Water	Ofwat	Bristol Water
Gearing (%)	52.5	52.5	60.0	60.0
Cost of debt (pre-tax) (%)	4.0	4.3	4.0	4.3
Cost of equity (post-tax) (%)	7.1	9.3	7.8	10.4
WACC (%)	5.5	6.6	5.5	6.7
Cost of equity calculation				
Debt beta assumption	0.00	0.00	0.10	0.10
WaSC asset beta	0.40	0.42	0.46	0.48
Risk-free rate (%)	2.0	2.5	2.0	2.5
Equity risk premium (%)	5.4	5.4	5.4	5.4
WaSC equity beta	0.84	0.89	1.00	1.06
Small company equity premium* (%)	0.5	2.0	0.5	2.2
Cost of equity (post-tax) (%)	7.1	9.3	7.8	10.4

Source: CC calculations.

Finally, we used Table 2 to estimate the contribution of differences in the individual components of the cost of capital to the overall difference in WACC. This is shown in Table 3.

TABLE 3 **Contribution of different elements to differences (Bristol Water less Ofwat) in WACC**

			per cent
	Gearing of 52.5% and debt beta of 0.1	Gearing of 60% and debt beta of 0.0	Average result
Gearing*			0.1
Cost of debt (pre-tax)	0.1	0.2	0.1
Cost of equity (post-tax)	1.0	1.0	1.0
WACC			1.2
Components of cost of equity			
RFR	0.2	0.2	0.2
ERP	0.0	0.0	0.0
WaSC equity beta	0.1	0.1	0.1
Small company equity premium*	0.7	0.7	0.7

Source: CC calculations.

*Average difference between WACCs attributable to gearing.

2.   This analysis suggests that Bristol Water's assumed gearing of 60 per cent leads to a slightly higher WACC than Ofwat's assumed gearing of 52.5 per cent. Since even Bristol Water's assumed gearing is below the actual gearing of most water companies, this is surprising. It occurs because the parties' approach to financial modelling means that no account is taken of the effect of higher gearing in reducing tax payments (see paragraph 24*(b)* in the main text of this appendix).

Impact of gearing on WACC

1. We have considered the impact of gearing on WACC using illustrative assumptions about the cost of debt and equity. We sought to take account of the debt tax shield, whereby higher gearing leads to higher interest payments and hence lower tax payments by calculating a pre-tax WACC as well as the simple 'vanilla' WACC that is a simple average of the cost of debt and equity:

$$Pre\text{-}tax\ WACC = c_d.g + c_e.(1\text{-}g)/(1\text{-}t)$$

   where t is the effective tax rate, which must be paid on equity returns, as well as on pure profits.

2. We assume that the cost of equity and debt increase but tax payments reduce as gearing increases. Our assumption on the cost of equity is that it is determined by the CAPM and that gearing affects equity beta and hence the cost of equity through the Miller formula—these assumptions appear relatively uncontroversial as they are common to most regulatory calculations of WACC and were used by the advisers to both Ofwat and Bristol Water. Our assumption on the cost of debt was that higher gearing resulted in new debt being issued at a higher spread over gilts—to give effect to this assumption, we assumed five tranches of debt with different spreads over gilts. We believe that this gives a reasonable representation of how the cost of debt might increase with higher gearing (even though in practice there may not be as many as five tranches of debt). Our results are not particularly sensitive to the precise assumptions on the cost of debt.

FIGURE 1

Variation of pre-tax WACC with gearing
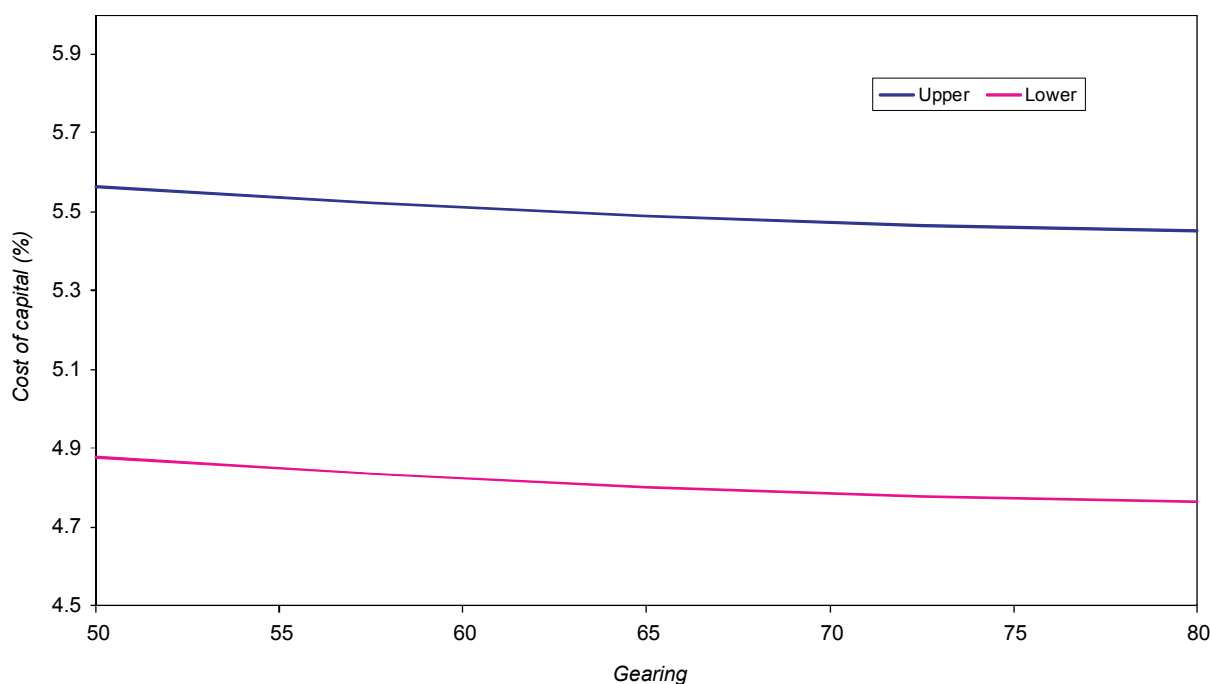
Source: CC calculations.

3.   Table 1 sets out our assumptions. We assume asset beta of 0.32 (lower) and 0.43 (upper) and a cost of BBB+ rated debt of 4.0 per cent. Figure 1 shows our results: pre-tax WAVCC declines as gearing increases but the decline is very gradual.

TABLE 1 **Calculations of pre-tax WACC**

General assumptions (WoC)

Real RFR (%)	2.00	
ERP (%)	5.00	
Asset beta	0.43	
Base gearing (%)	50.00	
Base real yield on new debt (%)	3.8	CC figure of 4.0% for new debt less 0.2% to get to A rating
Effective tax rate at base gearing (%)	20.0	
Marginal tax rate (%)	28.0	
Percentage of index-linked debt (%)	50.0	
Inflation rate (%)	2.50	
Base nominal coupon (%)	5.10	
Debt risk ratio	0.67	This is the ratio of expected default loss to total of expected default loss and debt risk premium (so figure of 1 implies debt beta of zero)

Debt assumptions

	1	2	3	4	5
Debt tranche	1	2	3	4	5
Rating	A	A–	BBB+	BBB	BBB–
Yield (%)	3.80	3.90	4.00	4.20	4.40
Debt/RCV (%)	50.0	7.5	7.5	7.5	7.5
Net liquidity premium (over RFR)* (%)	0.5	0.5	0.5	0.5	0.5
Expected default loss†	0.009	0.009	0.010	0.011	0.013
Debt beta‡	0.087	0.093	0.100	0.113	0.127

Calculations

Cumulative gearing (%)	50.0	57.5	65.0	72.5	80.0
Cumulative yield (%)	3.80	3.81	3.83	3.87	3.92
Cumulative debt beta	0.087	0.088	0.089	0.091	0.095
Equity proportion (%)	50.0	42.5	35.0	27.5	20.0
Equity beta§	0.773	0.893	1.063	1.322	1.771
Equity cost (%)	5.87	6.47	7.32	8.61	10.85
Vanilla WACC¶ (%)	4.83	4.94	5.05	5.18	5.31
Tax as % of RCV# (%)	0.73	0.59	0.44	0.29	0.14
Pre-tax WACC¶ (%)	5.57	5.53	5.49	5.47	5.45

Source: CC calculations.

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*The assumed RFR (relevant to cost of equity) already includes a liquidity premium relative to actual gilt yields so this measures the net additional liquidity premium on company debt relative to equity and could be positive or negative.
†Expected default loss is equal to total debt premium less net liquidity premium times debt risk ratio where total debt premium is yield less RFR.
‡Debt beta is total debt premium less net liquidity premium times debt risk ratio divided by ERP.
§Equity beta is calculated using the Miller formula: (asset beta = (equity beta)*(1-g)+(debt beta)*g).
¶WACC is calculated conventionally using debt yield rather than expected debt return (=yield less expected default loss).
#Tax declines as interest payments increase.

Bristol Water's debt

1.   This annex sets out background information in relation to:

    (a) Bristol Water's historical cost of debt;

    (b) indicative costs of new debt issuance by Bristol Water;

    (c) benchmark data for bond issuance in the water sector; and

    (d) benchmark data for the investment grade credit market.

Bristol Water's historical cost of debt

2.   Based on the audited financial statements dated 31 March 2009, Bristol Water's gearing (net debt / RCV) was 76 per cent of RCV.[1] The total debt was £222.4 million. Bristol Water had cash and short-term investments of £20.6 million.

3.   When Agbar acquired Bristol Water in 2006, the equity value was £168.7 million. The acquisition multiple was 1.4 x RCV. There is no market information for the current value of equity for Bristol Water because it is privately held.

4.   Bristol Water's existing balance sheet contains a variety of instruments, including long-term structured bonds (the Artesian monoline wrapped bond), bank debt, debentures, finance leases. The terms of each of the different forms of debt vary (eg seniority, maturity, cost, nominal/index-linked, security).

5.   The key parameters of the debt and related financial instruments at Bristol Water are summarized in Table 1 below. In summary, of the £220 million total debt at 31 March 2009:

    (a) £165 million is structured through the 30-year Artesian Finance vehicles (74 per cent of total debt, 62 per cent of RCV), of which 65 per cent is index-linked debt, and 35 per cent is nominal.

    (b) £35 million was secured bank debt (16 per cent of total, 13 per cent of RCV), of which £10 million was fixed rate with a 2017 maturity, and £15 million was variable rate with maturities in 2012 and 2017.

    (c) £16 million was finance leases (7 per cent of total) with terms ending in 2013 and 2021.

    (d) The remaining £7 million (3 per cent of total) comprised irredeemable debentures, interest rate swaps and unamortized premiums on loans.

6.   Approximately 81 per cent of Bristol Water's existing debt was issued at fixed rates (including £165 million Artesian debt and £10 million of bank loans).

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[1]Net debt (excluding preference shares): £201.8 million, RCV: £265.4 million. Other measures of gearing, including Debt/Book Value of Equity and Debt/Market Value of Equity are not examined, as it is not currently water industry practice to examine these ratios. Pension deficit is not included in debt.

Table 1 summarizes the total debt of Bristol Water based on the 31 March 2009 balance sheet, and in the June 2009 return.

TABLE 1 **Summary of Bristol Water debt**

£ million

Description	Maturity	31 March 2009 balance sheet	June 2009 return
Artesian fixed-rate debt	2032	57.50	57.50
Artesian index-linked debt	2032	107.02	107.02
Fixed-rate bank debt	2017	10.00	10.00
Floating-rate bank debt	2012/2017	25.00	25.00
Finance leases	2013/2021	15.60	13.45
Debentures	Irredeemable	1.60	1.57
Total		216.72	214.54
Interest rate swap		1.20	1.2
Unamortized premiums on Artesian Finance		4.40	4.4
Total including swap and premium		222.32	220.14
Cash		–20.60	
Net debt		201.72	

Source: Bristol Water Annual Report and Accounts 2009, Schedule 19a, Bristol Water June 2009 Return.

Table 2 sets out the cash interest rate for Bristol Water based on the 31 March 2009 total debt. The cash interest is stated in nominal terms, and adjusted by a 2.5 per cent inflation rate to estimate the real cash interest rate.

TABLE 2 **Estimated cash interest cost of debt for Bristol Water**

Cost of debt	Principal	Cash interest Nominal	Inflation	Cost of debt Real
	£m	%	%	%
Fixed-rate debt				
Artesian fixed-rate debt	[✂]	[✂]	[✂]	[✂]
Fixed-rate bank debt	[✂]	[✂]	[✂]	[✂]
Debentures	[✂]	[✂]	[✂]	[✂]
Artesian index-linked debt	[✂]	[✂]	[✂]	[✂]
Total fixed-rate debt	[✂]			[✂]
Floating rate debt				
Floating-rate bank debt	[✂]	[✂]	[✂]	[✂]
Floating-rate finance leases	[✂]	[✂]	[✂]	[✂]
Total all debt	214.54	4.248		3.0

Source: Bristol Water; Schedule 19a, Bristol Water June 2009 Return.

7. The calculation in Table 2 indicates that Bristol Water's real cost of fixed-rate debt was 3.5 per cent. The nominal cash interest cost of its fixed- and floating-rate debt was 4.24 per cent in 2009. Based on an inflation assumption of 2.5 per cent, this equates to a 3 per cent real cost of debt. The cost of debt for index-linked debt is based on the cash interest coupon—this excludes the indexation of the principal.

Data relevant to the cost of new debt

1.   This annex sets out background information in relation to:

   (a) Bristol Water's estimate of the cost of new debt issuance;

   (b) benchmark data for bond issuance in the water sector; and

   (c) benchmark data for the investment grade credit market.

Bristol Water's estimate of cost of new debt issuance

2.   Bristol Water set out a number of indicators for the cost of raising new debt in the SoC, including:

   (a) A fixed-rate bond issue would be 2.0 to 2.5 per cent spread above RFR for a fixed-rate bond issue assuming financial projections consistent with a Baa1 shadow credit rating, and excluding issuance costs.[1] Supporting evidence from an investment bank indicated that the range of these spreads depended on the tenor (period to maturity from issue) of the bonds; with seven- to ten-year debt bring priced at 200–225 bps, 20-year debt priced at 190–215 bps and 30-year debt priced at 175–200 bps.

   (b) An index-linked bond would cost 2.5 per cent above the RFR plus costs.[2]

3.   Three-year bank debt bank quotes were of LIBOR plus 175–200 bps plus arrangement fees of 75–100 bps, and five-year bank debt costing 225–250 plus fees of 100–125 bps; Bristol Water told us on 11 May 2010 that it considered that these estimates remained valid.

Benchmark data for bond issuance in the water sector

4.   The next section of this annex examines the bond market to identify the market indicators for cost of debt for water companies. The WaSCs have accessed the corporate bond market on a regular basis. The issuance and pricing trend data for water company bonds represents a relevant source of evidence for the cost of debt.

Recent bond financing in the water sector

5.   Figure 1 shows an estimate of the aggregate value of water company debt issued between 2001 and March 2010. New issuance in 2009 was higher than in the prior three years. Over £3 billion was raised by various companies, including: Anglian Water, Pennon, Severn Trent, South East Water, Southern Water, United Utilities Water and Yorkshire Water. The majority of debt is issued as nominal debt, with fixed or floating interest rates. Water companies have also issued index-linked debt, particularly in the periods 2001/03, 2006/07 and 2009/10.

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[1]SoC, paragraph 1374.
[2]Ibid.

FIGURE 1

Aggregate value of water company debt
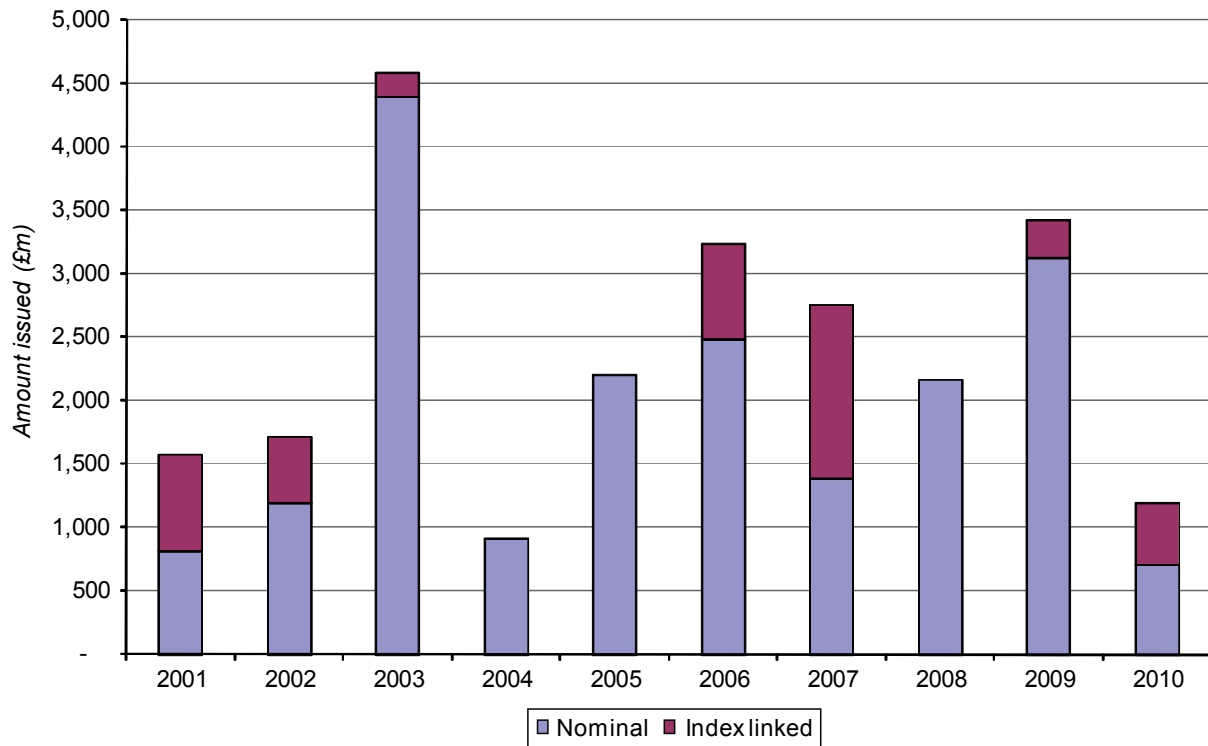
Source: Datastream.

6. The pricing of the new issuance by utility companies is summarized in Tables 1 and 2. This indicates that several water companies have issued bonds in 2009 and 2010.

TABLE 1 **Select recent nominal fixed-rate debt issuance by utilities***

Pricing date	Issuer	Amount £m	Moody's rating at issue	S&P rating at issue	Type	Coupon %	Tenor (yr)	Issued at gilts+
06/01/09	National Grid Electric	350	A3	A–	Fix/New	7.375	22	320
09/01/09	**United Utilities Water**	**50**	**A3**	**A-**	**Fix/Tap**	**6.125**	**7**	**275**
13/01/09	**Severn Trent**	**400**	**A2**	**A**	**Fix/New**	**6.000**	**9**	**285**
23/01/09	SSE	700	A2	A	Fix/New	5.750	5	290
28/01/09	National Grid	400	Baa1	BBB+	Fix/New	6.125	5	335
11/02/09	**United Utilities Water**	**75**	**A3**	**A–**	**Fix/Tap**	**6.125**	**7**	**205**
23/02/09	**Southern Water**	**300**	**A3**	**A–**	**Fix/New**	**6.125**	**10**	**265**
18/03/09	**United Utilities Water**	**200**	**A3**	**A–**	**Fix/New**	**5.750**	**13**	**240**
24/03/09	**United Utilities Water**	**75**	**A3**	**BBB+**	**Fix/Tap**	**5.750**	**13**	**240**
05/06/09	**United Utilities Water**	**100**	**A3**	**A–**	**Fix/Tap**	**5.750**	**13**	**190**
17/06/09	**United Utilities Water**	**50**	**A3**	**A–**	**Fix/Tap**	**6.125**	**7**	**175**
24/06/09	Northern Gas Networks	200	Baa1	BBB+	Fix/New	5.875	10	220
03/07/09	Wales & West Utilities	250	Baa1	NR	Fix/New	6.250	12	245
10/07/09	Energy NW Finance	200	Baa1	BBB+	Fix/New	6.125	12	240
10/07/09	Energy NW Capital	300	NR	BBB	Fix/New	6.750	6	375
14/07/09	**Yorkshire Water**	**275**	**A3**	**A–**	**Class A /New**	**6.000**	**10**	**230**
14/07/09	**Yorkshire Water**	**200**	**A3**	**A–**	**Class A /New**	**6.375**	**30**	**200**
18/09/09	Scottish & Southern Energy	500	A2	A-	Fix/New	5.000	9	155
21/10/09	Southern Gas Networks	300	Baa1	BBB	Fix/New	5.125	9	170
28/10/09	Phoenix Natural Gas	275	Baa2	BBB+	Fix/New	5.500	8	250
06/11/09	EdF Networks (SPN)	300	A3	A	Fix/New	6.125	22	175
06/11/09	EdF Networks (LPN)	300	A2	A	Fix/New	5.125	7	175
06/11/09	EdF Networks (EPN)	350	A2	A	Fix/New	6.000	27	165
25/11/09	Wales & West Utilities	200	Baa1	NR	Fix/New	5.125	7	215
09/03/10	Northern Gas Networks	200	Baa1	BBB+	Fix/New	5.625	30	110
16/03/10	Western Power Distn (Wales)	200	Baa1	BBB+	Fix/New	5.750	30	115
16/03/10	Western Power Distn (West)	200	Baa1	BBB+	Fix/New	5.750	30	115
25/03/10	Wales & West Utilities	300	NR	A–	Class A/New	5.750	20	130
25/03/10	Wales & West Utilities	115	NR	BBB	Class B/New	6.750	9	310
16/04/10	**Yorkshire Water**	**100**	**A3**	**A–**	**Class A /Tap**	**6.375**	**29**	**100**
16/04/10	**Yorkshire Water**	**450**	**Baa3**	**BBB**	**Class B/New**	**6.000**	**7**	**275**

Source: Bank of America Merrill Lynch.

*Water companies denoted in bold.

TABLE 2 **Select recent index-linked debt issuance by utilities**

Pricing date	Issuer	Amount £m	Moody's rating at issue	S&P rating at issue	Type	Coupon %	Tenor (yr)	Issued at gilts+
14/07/09	**Yorkshire Water**	**175**	**A3**	**A–**	**IL/New**	**2.718**	**30**	**200**
16/07/09	**United Utilities Water**	**70**	**A3**	**A–**	**IL/New**	**2.400**	**30**	**155**
29/07/09	National Grid Electric	25	A3	A–	IL/New	2.486	30	160
28/09/09	**Thames Water**	**55**	**A3**	**BBB+**	**IL/New**	**2.091**	**33**	**155**
21/10/09	Scotland Gas Networks	125	Baa1	BBB	IL/New	2.317	30	175
04/02/10	**South East Water**	**130**	**Baa2**	**BBB**	**IL/New**	**2.533**	**31**	**190**
19/03/10	**Welsh Water**	**140**	**A3**	**A–**	**IL/New**	**1.859**	**38**	**125**
25/03/10	Wales & West Utilities	100	NR	A–	IL/New	2.496	25	170
16/04/10	**Yorkshire Water**	**85**	**A3**	**A–**	**Class A /Tap**	**2.718**	**30**	**135**
29/04/10	**Anglian Water Services**	**130**	**A3**	**A–**	**Class A/New**	**2.262**	**35**	**155**

Source: Bank of America Merrill Lynch.

*Water companies denoted in bold.

7. The data refers to 31 new debt issues, totalling £7.9 billion in proceeds, by water and other utility companies between 2009 and 2010, of which 12 were by WaSCs but none was by WoCs. Based on this data, we observed 12 transactions with Baa1/ BBB+ to BBB ratings priced since 2009, with an average spread of 220 bps and a range from 110–335 bps with a range of maturities. The average for A– debt during the period was 210 bps.

8. The data indicated a tightening of the spreads between 2009 and 2010 reflecting improved market conditions and investor confidence, with the most recent three senior debt issues pricing at the lowest end of the range observed, in the range of 110–115 bps. The data also indicated that BBB and BBB+ bonds with tenors below ten years had higher spreads (average 269 bps, based on five bonds) compared with bonds with tenors of ten or more years (average 184 bps, based on seven bonds). In recent months there were two issues of subordinated debt with BBB ratings that priced alongside senior debt from the same issuers. The Yorkshire Water subordinated debt was priced at a 275 bps spread (175 bps wider than the senior debt) and for Wales & West Utilities the spread was 310 bps (a differential over the senior debt of 180 bps).

9. We concluded that these benchmarks supported our point estimate of a spread of 200 bps for new nominal debt issuance. This point estimate is about 15 bps above the average spread for BBB+ and BBB debt with maturity of at least ten years (184 bps), and about 85 bps above the spreads on the BBB+ and BBB senior debt issues (115 bps) since the beginning of 2010. The point estimate is 20 bps lower than the average for the entire sample of BBB+ and BBB senior debt, reflecting the improvement in market conditions between 2009 and 2010. The point estimate also takes into account that the benchmark data is not fully determinative given that various features of Bristol Water, including its status as a small WoC without a track record of recent bond issuance (apart from via the Artesian monoline wrapped structures), the negative outlook on its Baa1/BBB+ credit rating would ultimately be reflected in the issuance spread, and the possibility that a bond issue by Bristol Water sized in the range of £100–£150 million would be at the lower end of a feasible bond issuance.

10. In the index-linked debt market, we observed ten bond issues in 2009 and 2010 with an aggregate value of just over £1 billion issued. The market for index-linked debt is therefore significantly smaller than that for nominal debt, but recent transactions indicate that the market is open for new issuance by utility companies. Seven of the bonds were issued with A– credit ratings, and three had BBB or BBB+ ratings.

11. The average spread for index-linked debt in the BBB and BBB+ ratings band was 173 bps, with a range of 155–190 bps, the highest spread in this range being that attributed to the South East Water index-linked bond, a £130 million bond with a 31-year maturity and a coupon of 2.533 per cent. South East Water's RCV is approximately three times larger WoC than Bristol Water, it has a higher level of gearing (net debt/RCV of 84 per cent[3] in 2008/09) and its Baa2/BBB credit rating is one notch lower than that of Bristol Water. We concluded that the South East Water index-linked bond represented an appropriate benchmark to estimate the cost of index-linked debt for Bristol Water.

12. We also compared the spreads for index-linked debt with those of nominal debt for the bond issued of Yorkshire Water and Wales & West Utilities in 2010. This indicated a wider spread of 35–40 bps over the relevant gilts. However, we also noted that this relationship did not hold for Yorkshire Water's bonds in July 2009, which indicated index-linked bonds priced with a tighter spread over gilts compared with nominal debt. We concluded that it would be appropriate to estimate that index-linked debt would require wider spread over gilts than would be the case for nominal debt.

13. For Bristol Water, we estimated a spread of 220 bps for index-linked debt. This is 30 bps wider than that achieved by South East Water in its February 2010 bond

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[3]Ofwat, *Financial performance and expenditure of the water companies in England and Wales 2008–09.*

issue, and consistent with our point estimate of 200 bps for nominal debt plus an additional 20 bps to reflect potentially lower liquidity in the index-linked bond market.

Debt market conditions

14.   Table 3 shows a sample of fixed-rate nominal debt issued by water companies for which we were able to obtain trading data from *Datastream,* totalling just under £10 billion in issued value of debt. We note that this data could be further refined to include more recent issues, and more directly match bonds with benchmarks of equivalent maturity.

15.   The list has been divided into maturities (5–10 year, and 10 years +) and ratings (A– and BBB+), with summaries of the range of indicative spreads and redemption yields. The indicative spreads have been calculated using the iBoxx sterling gilt index for 5–10 years and 10+ years to match approximately with the maturities of the bonds, using trading data from 1 January 2010 to 29 March 2010 to calculate the redemption yield and spreads. The average spread for A– rated debt is 106 bps (redemption yield 5.3 per cent), and for BBB+ the average spreads is 121 bps (redemption yield 5.4 per cent).

16.   It should be noted that the majority of the public market bonds have been issued by the larger WaSCs, the exception being South East Water's BBB-rated £200 million bond. Pricing data is available for the debentures issued by a number of WoCs, including Bristol Water, Cambridge Water and South East Water, but these instruments are not rated, have small issuance values, and are very thinly traded so this data has been excluded from the analysis. Pricing data is also available for the Artesian Finance fixed-rate wrapped bond in which Bristol Water has participated. This currently has a credit rating of AAA with negative outlook. We concluded that the Artesian Finance instruments did not represent a reliable benchmark because there is no current market appetite for new issuance using this structure.

TABLE 3 **Recent spreads for issued water company bonds (nominal debt)**

| Issuer	Amount issued £m	Moody's rating	S&P rating	Indicative spread*	Redemption yield
Maturity: 5–10 years					
SOUTHERN WATER SERV 2009 6 1/8% 31/03/19	300	A3	A–	1.51	5.17
ANGLIAN WATER 2005 5 1/4% 30/10/15	250	A3	A–	0.69	4.35
ANGLIAN WATER 2008 6 1/4% 27/06/16	500	A3	A–	0.21	3.87
UNITED UTILITIES 2003 5 3/8% 14/05/18	150	A3	BBB+	1.41	5.06
UNITED UTILITIES 2008 6 1/8% 29/12/15	425	A3	BBB+	0.74	4.40
THAMES WATER UTILS. 2006 4.9% 30/06/15 S	200	A3	BBB+	0.77	4.42
SEVERN TRENT UTILIT 2008 5 1/4% 11/03/16	700	A3	BBB+	0.03	3.69
SEVERN TRENT UTILIT 2009 6% 22/01/18	400	A3	BBB+	1.37	5.03
SOUTH EAST WATER 2004 5.6577% 30/09/19	200	Baa2	BBB	1.93	5.58
UNITED UTILITIES 2003 4.55% 19/06/18 S	250	Baa1	BBB–	1.86	5.52
Maturity: 10+ years					
ARTESIAN FINANCE 2003 6% 30/09/33 S	346	Aa3	AAA/negative	1.54	6.05
YORKSHIRE WATER 2009 6.375% 19/08/39	200	A3	A	1.05	5.53
YORKSHIRE WATER 2009 6.454% 28/05/27	135	A3	A	1.04	5.53
YORKSHIRE WATER 2009 6.5876% 21/02/23	211	A3	A	1.04	5.52
YORKSHIRE WATER 2009 6.6011% 17/04/31	255	A3	A	1.04	5.52
SOUTHERN WATER SER. 2006 4 1/2% 31/03/52	200	A3	A	1.14	5.62
ANGLIAN WATER 1998 6 7/8% 21/08/23	200	A3	A	1.22	5.70
ANGLIAN WATER 2002 5.837% 30/07/22 A1	250	A3	A	1.06	5.54
ANGLIAN WATER 2002 6.293% 30/07/30 A5	246	A3	A	1.19	5.68
YORKSHIRE WATER 2003 5 3/8% 21/02/23	200	A3	BBB+	1.14	5.62
UNITED UTILITIES 2002 5 5/8% 20/12/27	300	A3	BBB+	1.04	5.52
UNITED UTILITIES 2005 5% 28/02/35	200	A3	BBB+	1.12	5.60
UNITED UTILITIES 2009 5 3/4% 25/03/22	375	A3	BBB+	1.03	5.51
THAMES WATER 1998 6 3/4% 16/11/28	330	A3	BBB+	1.22	5.70
THAMES WATER CAYMAN 2008 7.241% 09/04/58	400	A3	BBB+	2.00	6.48
THAMES WATER UTILS. 2000 6 1/2% 09/02/32	200	A3	BBB+	1.23	5.71
THAMES WATER UTILS. 2005 5.05% 30/06/20	200	A3	BBB+	1.74	6.22
THAMES WATER UTILS. 2006 5 1/8% 28/09/37	600	A3	BBB+	1.27	5.75
WESSEX WATER 2003 5 3/4% 14/10/33	350	A3	BBB+	1.09	5.58
WESSEX WATER 2005 5 3/8% 10/03/28	200	A3	BBB+	1.04	5.52
SEVERN TRENT 1999 6 1/4% 07/06/29	425	A3	BBB+	1.04	5.53
SEVERN TRENT 1999 6 1/8% 26/02/24	300	NA	BBB+	1.10	5.59
Average A– and above	*3,093*			*1.06*	*5.34*
Average BBB+ and below	*6,405*			*1.21*	*5.40*
Total	*9,498*				

Source: Datastream. Spreads calculated for 1 January 2010 to 29 March 2010.

*Spread over gilts (5–10 years and over 10 years).

17.   Figure 2 shows how the spreads for the 10+ year maturity water bonds have evolved over time since 2007. This indicates that spreads widened to around 300 bps at the end of 2008 to early 2009, and have subsequently tightened to spreads in the region of 100–150 bps, similar to those at the end of 2007 and early in 2008.

FIGURE 2

**Spreads on nominal water company debt, 2007–2010***
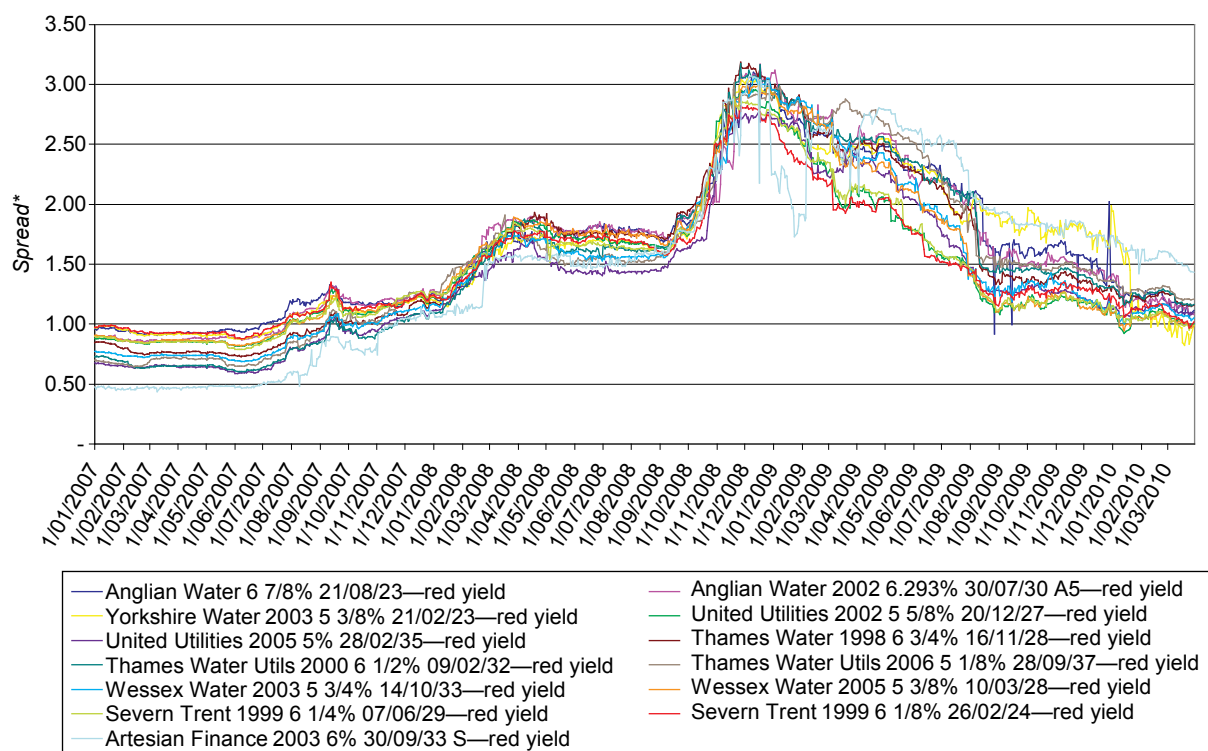
Source: Datastream.
*Spread: Redemption yield over iBoxx Sterling 10+ years Gilts index.

Investment grade debt

18. The credit spreads for investment grade debt serves as a cross-check on the nominal water company bonds. There are number of providers of bond price indices. We have examined the spreads for A and BBB-rated corporate debt based on a widely used index, iBoxx.

19. Figure 3 shows how the spreads have evolved over since 1996, including the widening of spreads during the period 2008/09 and the reversion of these spreads closer to the long-term average since the second half of 2009.

FIGURE 3

Investment grade bond index spreads, 1998–2010 year to date
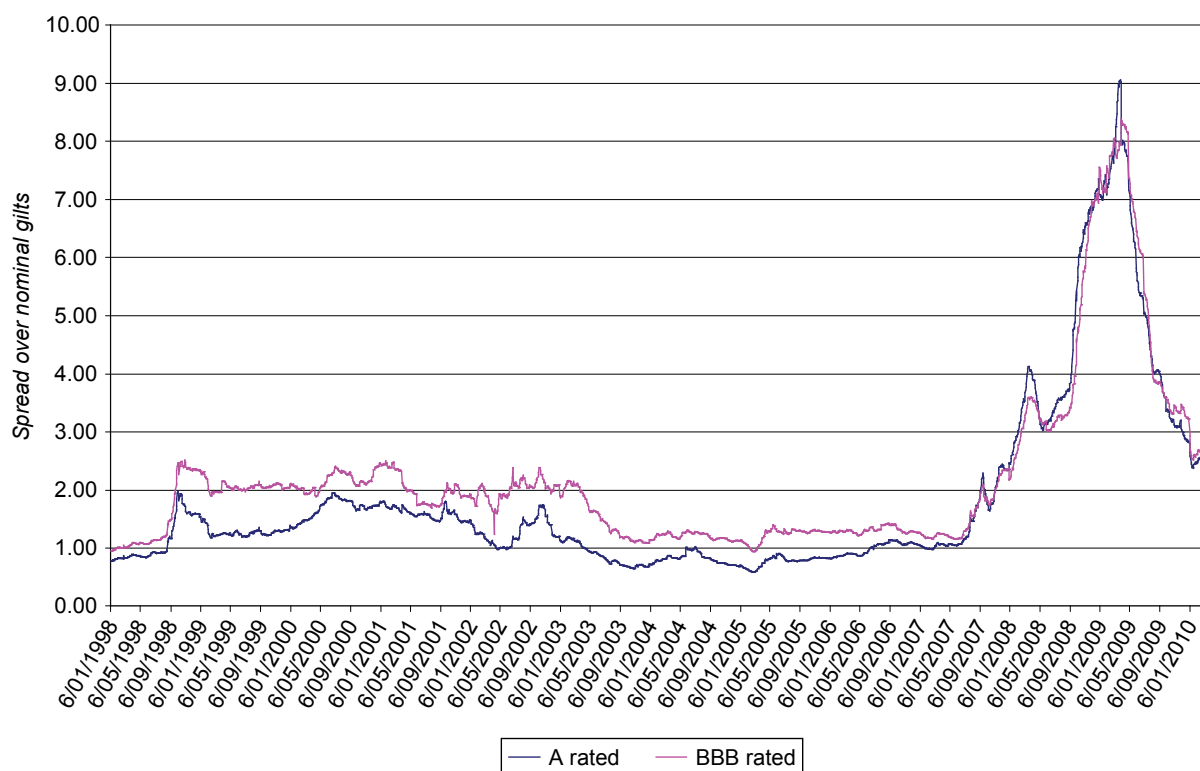
Source: Datastream.

20.   Table 4 shows the average spread for each year since 1998, the complete time series available for this index. This shows that the average spread over gilts for A-rated bonds between 1998 and 2010 is around 120 bps and for BBB-rated bonds the average spread is around 215 bps. The index includes a broad range of corporate and financial issuers. The spreads appear somewhat wider than for water companies, reflective of the systematic and unsystematic risk inherent in the issuers.

TABLE 4 **Investment grade bond index spreads, 1998–2010 year to date**

per cent

	7–10 year maturity		All maturities	
	A	BBB	A	BBB
1998*	1.13	1.47	1.07	1.31
1999	1.27	2.06	1.33	1.78
2000	1.67	2.15	1.79	2.18
2001	1.60	2.02	1.62	2.08
2002	1.27	1.99	1.25	1.96
2003	0.87	1.53	1.06	1.65
2004	0.81	1.20	0.92	1.31
2005	0.77	1.22	0.85	1.26
2006	0.99	1.31	1.03	1.36
2007	1.45	1.53	1.41	1.60
2008	4.26	3.91	3.30	3.62
2009	5.40	5.57	3.68	5.03
2010 YTD†	2.42	2.69	1.88	2.41
All periods	**1.81**	**2.18**	**1.61**	**2.10**
1998–2007	1.18	1.65	1.23	1.65

Source: iBoxx corporate issuers.

*Since 6 January 1998.
†Until 29 March 2010.

21.   The redemption yield (nominal) of the iBoxx indices is presented in Table 5 below. This indicates that the nominal yield on A-rated debt is currently 6.4 to 6.6 per cent, and for BBB-rated debt it is 6.8 to 7.0 per cent. It should be noted that the redemption yield does not reflect changes in the gilt yield, so it is more appropriate to consider long-term trends for spreads rather than for redemption yields. The redemption yields on water company debt are currently in the region of 5.3 to 5.4 per cent, some 60–120 bps tighter than indicated by the wider indices of corporate bonds.

TABLE 5 **Investment grade redemption yields, 2010 year to date**

per cent

	7–10 year maturity		All maturities	
	A	BBB	A	BBB
2010 YTD *	6.34	6.60	6.00	6.53

Source: iBoxx corporate issuers.

*Until 29 March 2010.

Approach to measuring historical returns of a market index

1. Under the assumptions that expected returns are constant over time, and that returns in each period are independent of each other, the arithmetic average of realized returns is an unbiased measure of the constant expected return. A simple approach to measuring historical returns is therefore to calculate an arithmetic average of historical returns. Two issues in doing so are the variability in returns and the length of the relevant period.

2. Market returns are highly variable but (under the assumption that there is a constant expected return) the consequent uncertainty about the true expected return can be reduced by taking a long historical period. The longest available period for the UK is 110 years. Even for this length of period, there is substantial variability in returns (given an assumption of rational investors with a constant expected return, variability in returns would result from uncertainty about future dividend and other payouts from holding equity[1]). If we take one year as the relevant period, a 95 per cent confidence interval for a constant expected return would be 3.4 to 11.0 per cent (based on DMS figures for the UK shown in Table 4 of the main text) or 3.2 to 10.7 per cent (based on Barclays figures for the UK shown in Table 4 of the main text).[2]

3. The length of the relevant period is a more complex issue. The relevant period would seem to be the period for which investors expect to be invested in the market (we describe this as the holding period). It seems very unlikely that this is as short as one year. Because of their price variability, equities are usually regarded as a long-term investment. The FSA, for instance, advises consumers that 'it is important to stress that you need to be looking to the medium to long term when investing in shares—at least five years but preferably longer'.[3]

4. Blume has shown that, if the holding period is longer than one year, the arithmetic mean of one year returns is an upwards biased measure of the true expected return (assuming that returns are independently and identically distributed around the true expected return).[4] Blume suggested a number of unbiased measures if the holding period is longer than one year. Assuming a holding period of h years, expressed as equivalent annual returns, these included:

   (a) The arithmetic mean of returns for all non-overlapping periods of h years.[5] We describe this as the 'simple' estimator of the average return for a holding period of h years. The DMS and Barclays data cover 110 years and if we wish to use all of this data we are limited to values of h which are factors of 110: that is 2, 5, 10, 11, 22 and 55. However, the number of non-overlapping observations drops off rapidly as the holding period increases—there are only 11 observations for a holding period of 10 years and two for a holding period of 55 years.

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[1]A large economic literature considers the issue of whether volatility in equity prices, and hence returns, is excessive compared with plausible future fluctuations in payouts.
[2]The standard deviation of annual returns is about 20 per cent; hence with a sample size of 110, the confidence interval is about 3.8 per cent either side of the mean.
[3]www.moneymadeclear.org.uk/products/investments/types/asset_classes/shares.html.
[4]Blume, M, 'Unbiased estimators of long-run expected rates of return', *Journal of the American Statistical Association*, 1979.
[5]The mean is calculated from the formula $(\sum(R_{t+h}/R_t)/(110-h))^{1/h}$ where h is holding period, R_t is value of returns index at the end of year t and the expression is summed for (110/h) values of t for which non-overlapping data is available.

(b) The arithmetic mean of returns for all overlapping periods of h years. [6]This greatly increases the number of observations (the data gives 101 such observations for a 10-year holding period): intuitively, we might expect accuracy to be increased by extending the observations even though these observations are not independent of each other, but Blume's simulations tended to suggest that the overlapping mean tends to be a less efficient estimator than the non-overlapping mean.

(c) A weighted average of the arithmetic and geometric means[7] where the weight on the arithmetic mean is (110–h)/(t–1) and the weight on the geometric mean (h–1)/(t–1) where t is the length of time for which we have data. We describe this as the Blume estimator. For a holding period of one year, this is the arithmetic mean which, as noted above, is unbiased for a holding period of one year; and for a holding period equal to t (110 years for our data), this is equal to the geometric mean which is an unbiased estimator for this length of holding period (albeit one based on a single observation of the expected return over 110 years).

5. Jacquier, Kane and Marcus[8] (JKM) extended Blume's work under the assumption that returns were lognormally distributed.[9] JKM proposed a general class of estimators of annualized returns taking the form: $e^{(m + 0.5vk)}$ where m is the arithmetic mean and v is the variance of annual returns; and k is a parameter depending on h and t. In particular, JKM proposed:

(a) an unbiased estimator, where k = (1–h/t); and

(b) a further estimator, where k = (1–3h/t). JKM show that this minimizes the difference between the estimate and the true value in small samples (is small sample efficient), even though it is not unbiased.[10] This is useful because our sample of independent observations becomes small as h increases.

6. Figures 1 and 2 show values of these estimators for holding periods of up to 30 years for DMS and Barclays data respectively.

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[6]The mean is calculated from the formula $(\sum(R_{t+h}/R_t)/(110-h))^{1/h}$ where h is holding period, R_t is value of returns index at the end of year t and the expression is summed for (110–h+1) values of t for which overlapping data is available.
[7]The geometric mean of annual return indices is equal to the compound annual growth rate in returns over the period.
[8]Jacquier, E, Kane, A and Marcus, A J, 'Optimal estimation of the risk premium for the long run and asset allocation: a case of compounded estimation risk', *Journal of Financial Econometrics*, 2005.
[9]Blume assumed that returns were normally distributed, implying that the return index can take a negative value; the lognormal assumption avoids this implication and is more analytically tractable.
[10]JKM show that this estimator minimizes the squared deviation of the estimator from the true value (mean square error).
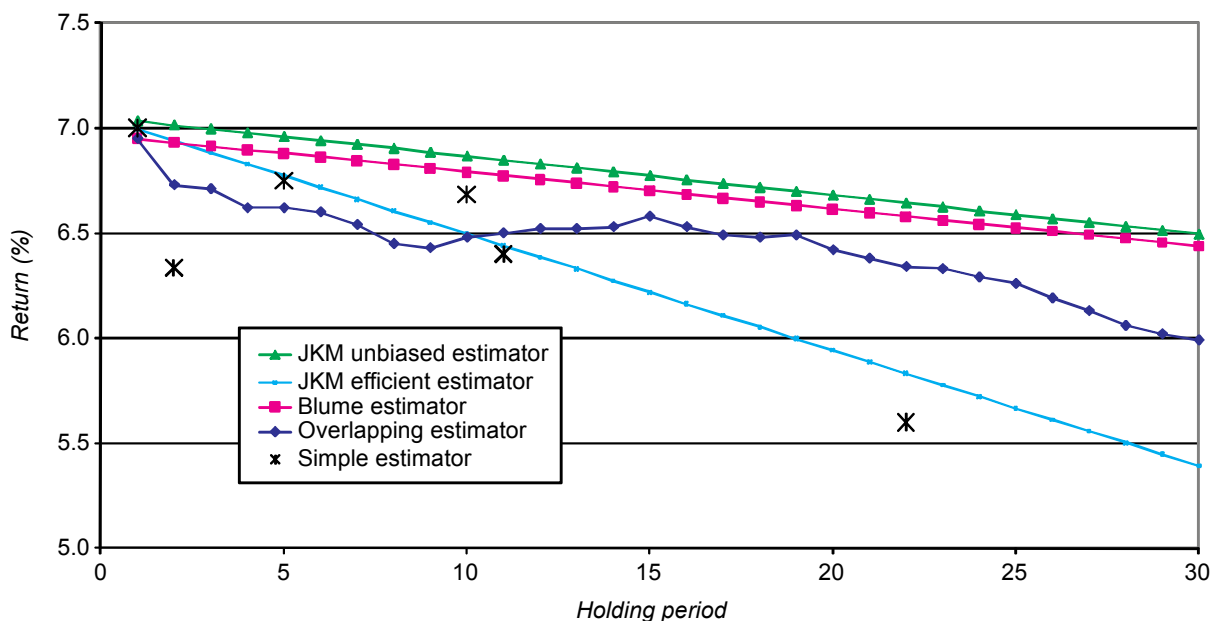
FIGURE 1

Mean return on UK market for different holding periods (DMS data)
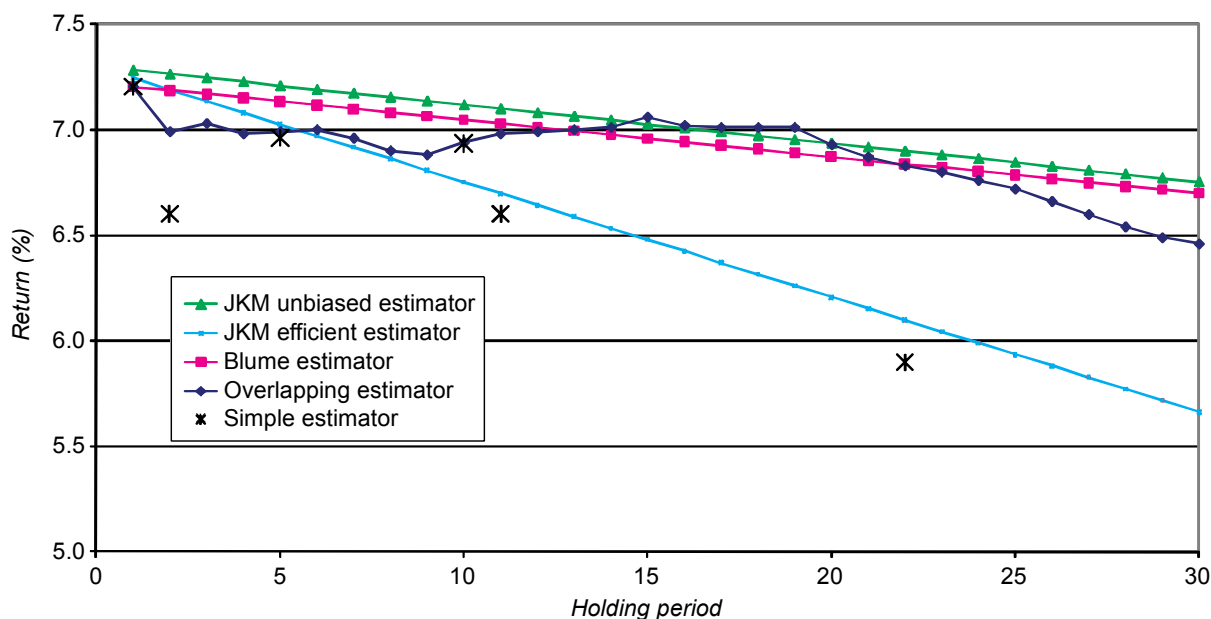
Source: CC calculations based on DMS data.

FIGURE 2

Mean return on UK market for different holding periods (Barclays data)

Source: CC calculations based on Barclays data.

7. It seems likely that different investors have different holding periods, and so it is desirable to look at a range of holding periods. For holding periods of 2 to 30 years, the mean return on the UK market is around 6 to 7 per cent. The estimated equity return declines as the holding period increases, most noticeably for JKM's small sample efficient estimator which declines below 6 per cent for holding periods longer than about 20 years. The Blume estimator and the unbiased JKM estimator are very

similar and in Table 4 in the main text of this appendix we only show the Blume estimator. In that table, we also show similarly derived estimates of the ERP. The simple estimator fluctuates depending on the pattern of autocorrelation in returns—in particular, average returns for a holding period of two years are about 0.6 per cent less than for a one-year holding period, reflecting a number of periods when large negative returns were followed by large positive returns (1919/20, 1931/32, 1973/75, 2008/09).

8. An alternative approach to estimating expected returns can be made under the assumption that the dividend-price ratio (dividend yield) is stationary. Under this assumption, the expected return can be estimated as the sum of the average dividend yield and the average annual dividend growth rate. Academic literature using this approach includes Fama and French (2002)[11] for the USA, and Vivian[12] and Gregory[13] for the UK. We report UK estimates using Barclays data for the period to 2009 in the main text (dividends for the DMS dataset are currently not available to us).

9. The dividend yield approach tends to lead to a lower estimate of the market return (5.5 per cent) than the total return approach (7.0 per cent for a one-year holding period using the same data). Part of this can be explained by dividend growth being less volatile than equity price index growth.[14] Fama and French (2002) suggest that the effect is approximately half the difference between the variance of the two growth rates. On this basis, the lower volatility of dividend growth explains about half the 1.5 per cent difference between estimated market return under the dividend yield approach (5.5 per cent) and the total return approach for a one-year holding period (7.0 per cent using Barclays data).

10. A main motivation for the dividend yield approach in the academic literature is to estimate the expected market return and ERP for shorter time periods (neither the market return nor the ERP might be constant for the full 110 years of the DMS and Barclays data). Fama and French (2002) found that the evidence suggested that the high US average return for 1951 to 2000 was due to a decline in expected returns that produced unexpectedly large capital gains. There is evidence of a similar but smaller effect for the UK (see Table 2). This appears to explain the remaining difference between the two approaches (the part not accounted for by the lower volatility of dividend than capital growth—see previous paragraph).

TABLE 2 **Average market returns, 1901 to 2009**

			per cent
	1901–1950	*1951–2009*	*Total period*
Total return approach*	4.3	9.1	7.0
Dividend yield approach	5.1	5.8	5.5

Source: CC calculations based on Barclays Equity Gilt Study.

*One-year holding period.

[11]Fama, E F and French, K R, 'The Equity Premium', *Journal of Finance*, April 2002.
[12]Vivian, A, 'The UK Equity Premium: 1901–2004', *Journal of Business Finance and Accounting*, 2007.
[13]Gregory, A, *How Low is the UK Equity Premium?* XFi Centre for Finance and Investment, Exeter Business School Working Paper, 2007.
[14]Under the dividend yield approach, the mean return is the sum of mean dividend yield and mean dividend growth. Under the total return approach with a one-year holding period, the mean return is approximately the sum of mean dividend yield and mean equity price index growth (since total return is approximately equal to the dividend yield plus equity price index growth). Hence the difference between the two is approximately the difference between average dividend growth and average equity price index growth.

CC estimates of beta

Analysis of equity betas for March 2008 to March 2010

1.   We estimated the CAPM equity beta using the most recent daily data available from Datastream, for each of the following water utility companies: United Utilities, Severn Trent, Pennon and Northumbrian. We used daily total return indices for each company and on the FTSE All Share Index as a proxy for the market portfolio, for the time period ranging from 21/3/2008 to 22/3/2010. We excluded from our dataset those days for which there was no trade.

2.   We defined daily returns on a particular stock as the following:

$$R_t = \ln(r_t) - \ln(r_{t-1}) \text{ where } r_t \text{ is the daily total return index.} \qquad (1)$$

3.   A summary of the basic statistics is shown in the following table.

TABLE 1   **Summary of basic statistics**

Variable	Mean	Std dev	Min	Max
lr_nwgri	−0.000286	0.018581	−0.086197	0.111155
lr_pnnri	−0.000259	0.019868	−0.092684	0.082457
lr_uuri	−0.000119	0.018239	−0.078314	0.108099
lr_svtri	−0.000057	0.019739	−0.075557	0.151717
lr_ftse	0.000209	0.018238	−0.087098	0.088106

Source: CC calculations.

where lr indicates daily log return computed as by equation (1) and nwgri = Northrumbrian, pnnri = Pennon, uuri = United Utilities, svtri = Severn Trent and ftse = FTSE All Share index.

4.   We analyse the data and we find no missing observations, and all variables seem to show significant variability over the considered time period. In the following table we show the correlation figures between the above variables.

TABLE 2   **Correlations**

Variable	lr_nwgri	lr_pnnri	lr_uuri	lr_svtri	lr_ftse
lr_nwgri	1				
lr_pnnri	0.6194	1			
lr_uuri	0.5755	0.6879	1		
lr_svtri	0.6107	0.752	0.8296	1	
lr_ftse	0.4692	0.4882	0.6118	0.5496	1

Source: CC calculations.

5.   As noted, Northumbrian and Pennon returns seem to be less linearly correlated with the return on the ftse market portfolio.

6.   We plot the FTSE All Share Index against time and we get the following.
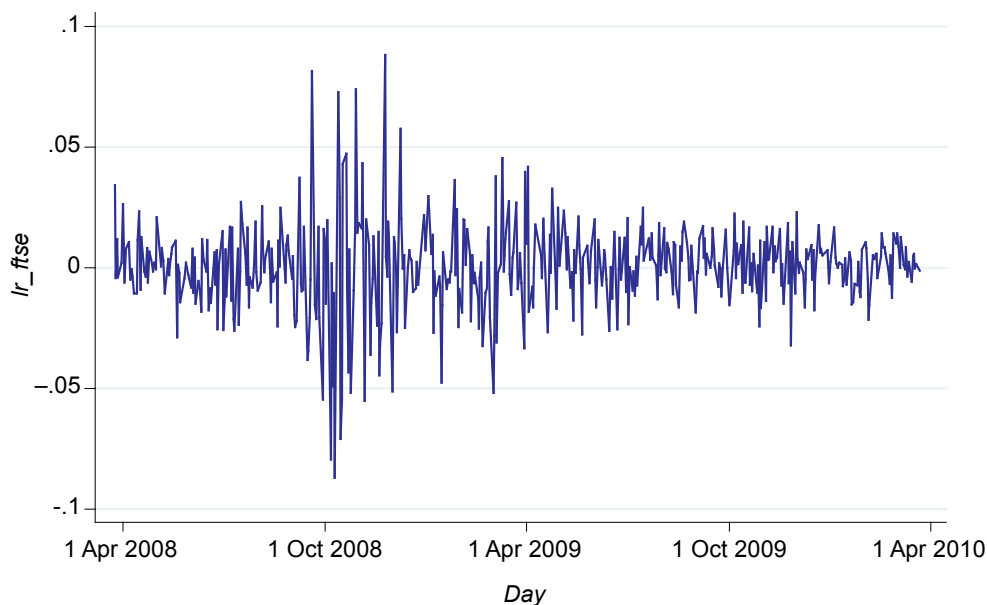
FIGURE 1

FTSE all share total return index
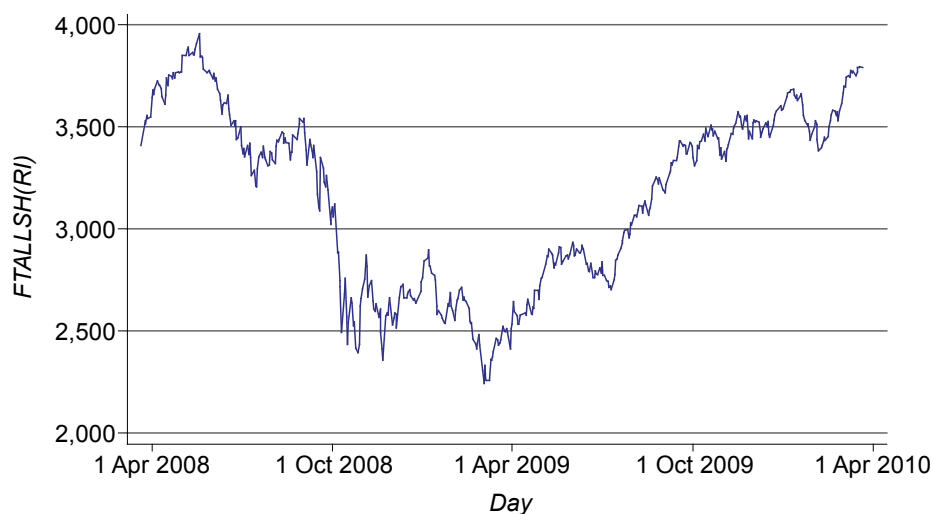
Source: CC calculations.

7. We see a sharp fall in the FTSE associated with the 'credit crunch' starting on 11/8/2008, and a period of recovery of the index starting on 10/3/2009.

8. We also plot lr_ftse against time and we get the following chart.

FIGURE 2

Daily FTSE returns

Source: CC calculations.

9. We observe a period of market return volatility approximately between 8/9/2008 and 1/5/2009. Similar plots for the log returns of the different water companies reveal a similar pattern of volatility during the same period, with major differences among companies in terms of intensity and duration in the observed volatility in their returns.

Company-specific raw betas

10.   For each company we assumed the following empirical model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2}$$

where R_{it} is the daily return of company i at day t, R_{mt} is the return on the FTSE market portfolio at day t, and ε_{it} is an error term exhibiting heteroskedasticity and autocorrelation.

11.   We estimated the econometric model (2) by OLS and compute the Newey-West standard errors to control for heteroskedasticity and autocorrelation in the error term. The results are the following.

TABLE 3 **OLS raw beta**

	β ols	95% condf interval	
UU	0.61 *0.053*	0.51	0.72
SVRN	0.60 *0.071*	0.46	0.73
PNN	0.53 *0.056*	0.42	0.63
NTH	0.48 *0.049*	0.38	0.58
Average	0.56		

Source: CC calculations.

12.   The common econometric results are the following:

- All betas are significant at a 5 per cent significance, and the constant term is not statistically significant. In addition, reported standard errors seem to be small.

- R^2 range from 0.22 to 0.37.

- In all regressions we do not reject the null hypothesis that the model has no omitted variables (RESET test).

- We perform econometric tests searching for statistical evidence of heteroskedasticity and autocorrelation. Results highly depend on the company under consideration. For instance, the OLS regressions for United Utilities and Severn Trent do not show statistical evidence for autocorrelation but there is for heteroskedasticity.[1] In this case, the variability of the residuals seems to increase with the return on the FTSE market portfolio. On the other hand, there is statistical evidence of autocorrelation in the OLS regression for Pennon, and there is no statistical evidence for either problem in the regression for Northumbrian.

13.   We performed a rolling windows estimation using econometric model (2) to estimate a rolling beta. The time window chosen is six months, and the results for each water company are the following.

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[1]We perform the Breusch-Pagan test for heteroskedasticity, and the Breusch-Godfrey test for autocorrelation for different lags of the residual.(We generally considered lags 1 to 4.)
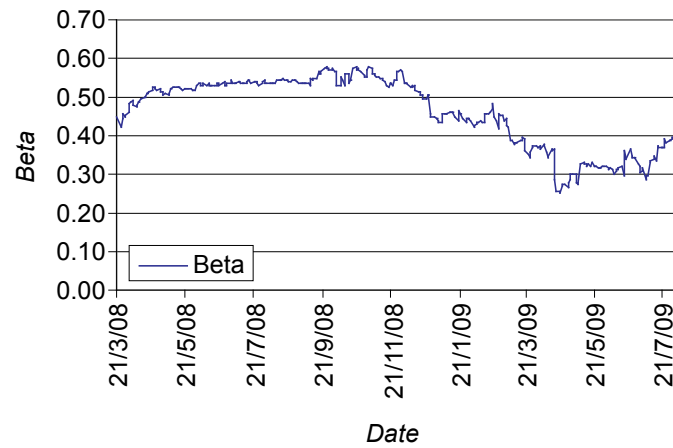
FIGURE 3a

Rolling beta United Utilities
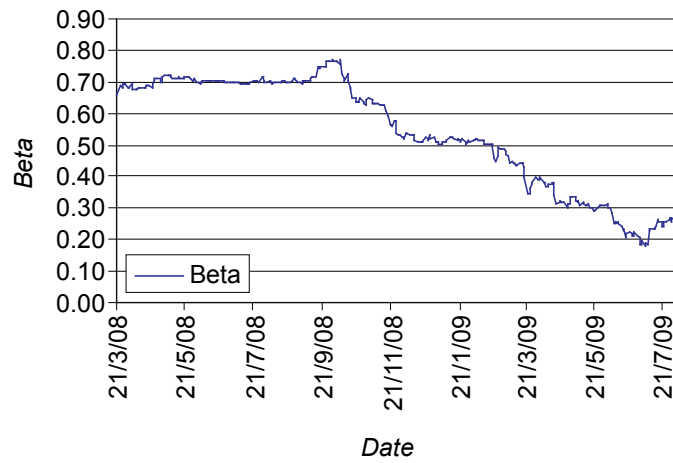
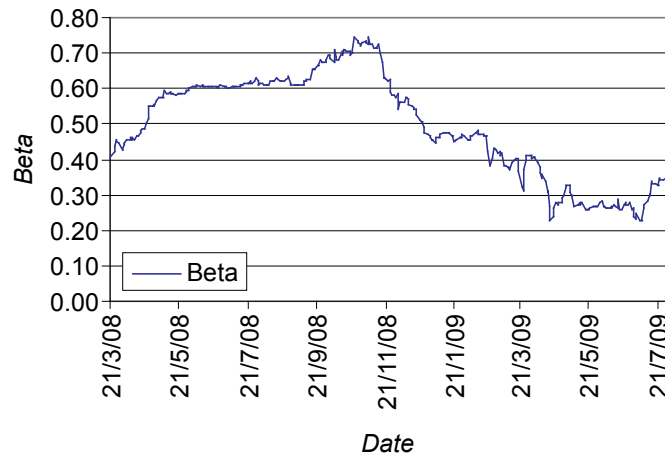
Source: CC calculations.

FIGURE 3b

Rolling beta Northumbrian
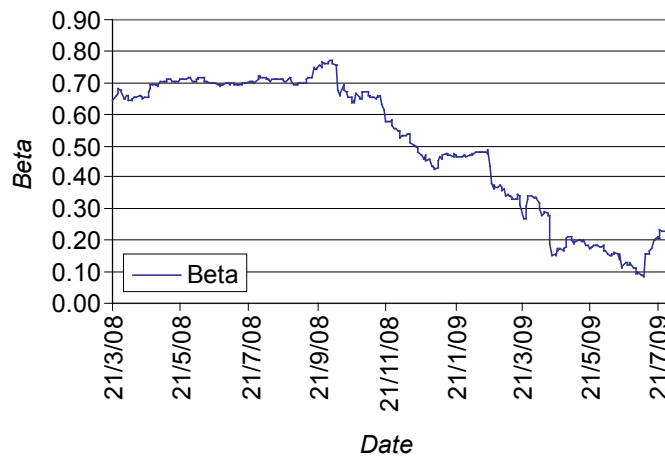

Source: CC calculations.

FIGURE 3c

Rolling beta Pennon

Source: CC calculations.

FIGURE 3d

Rolling beta Severn Trent

Source: CC calculations.

14.   The average rolling betas for econometric model (2) are shown in the following table.

TABLE 4   **Company-specific rolling betas**

	UU	SVRN	PNN	NTH	Average
βols rolling	0.54	0.50	0.49	0.46	0.50

Source: CC calculations.

15.   The rolling betas decline from late 2008: this may be associated with market volatility at the time of the credit crunch.

The portfolio approach to the calculation of raw beta

16.   We estimated a raw beta for the water industry by reference to an industry portfolio, where each water company stock is weighted by the value of the company's market capitalization at each date. The formula for the return at date t on this water industry portfolio has been computed in the following way:

$$r_{wt} = \sum_{i=1}^{4} \alpha_{it} r_{it} \;\; \text{where} \;\; \alpha_{it} = \frac{market\; capitalization\; firm\; i\; at\; date\; t}{\sum_{i=1}^{4} market\; capitalization\; firm\; i\; at\; date\; t}$$

So the return on the industry portfolio is the following:

$$R_{wt} = \ln(r_{wt}) - \ln(r_{wt-1}) \tag{3}$$

where r_{it} is the daily total return index. The econometric model that we estimate is the following:

$$R_{wt} = \alpha_w + \beta_w R_{mt} + \varepsilon_{wt} \tag{4}$$

where ε_{wt} is an error term exhibiting heteroskedasticity and autocorrelation.

17.   We estimated model (4) by OLS and compute the Newey-West standard errors. We get the following results.

TABLE 5   **OLS raw beta for water ind port**

|	βw	95% condf interval	
Rw	0.58 *0.055*	0.48	0.69

Source: CC calculations.

- As noted, raw beta is significant at a 5 per cent significance level.

- R^2 is 0.3489.

- The OLS regression does not show statistical evidence of autocorrelation, but we clearly reject the hypothesis of no heteroskedasticity.[2] We provide a scatter plot of the residuals against the FTSE market return.

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[2]See the footnote to paragraph 12 in this annex for an explanation of the tests applied.

FIGURE 4

Scatter plot of residuals from portfolio regression
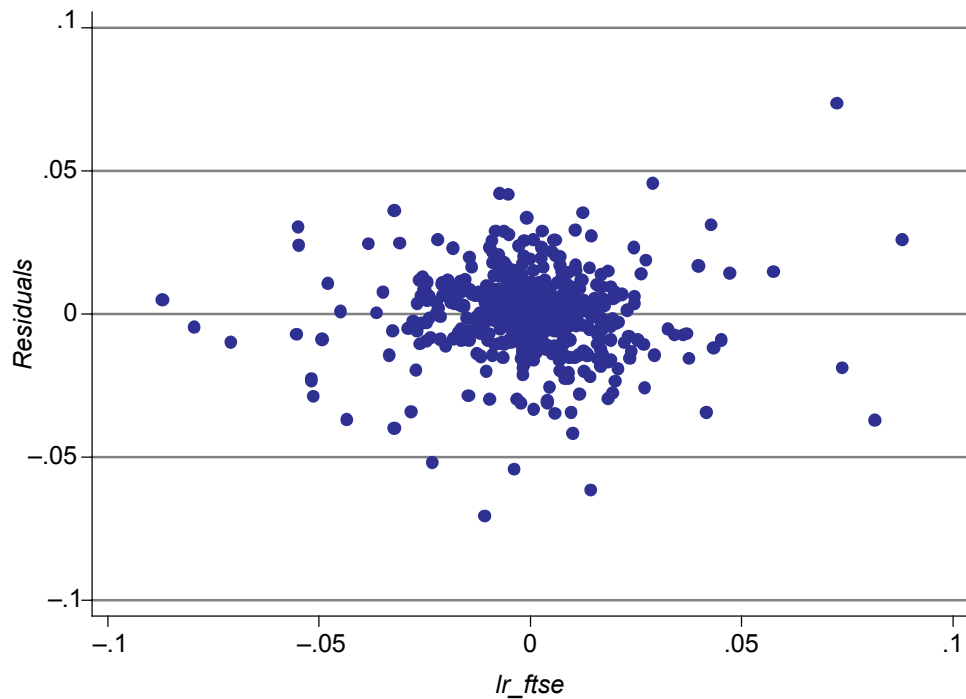
Source: CC calculations.

18. Results seemed to indicate that variance heterogeneity is a function of the FTSE market return.

   • We do not reject the null hypothesis that the model has no omitted variables (RESET test).

19. We performed a rolling windows estimation using econometric model (4) to estimate a rolling beta, and we compute the Newey-West standard errors. The time window chosen is six months, and the results for rolling β_W are the following.

FIGURE 5

Rolling beta water industry portfolio
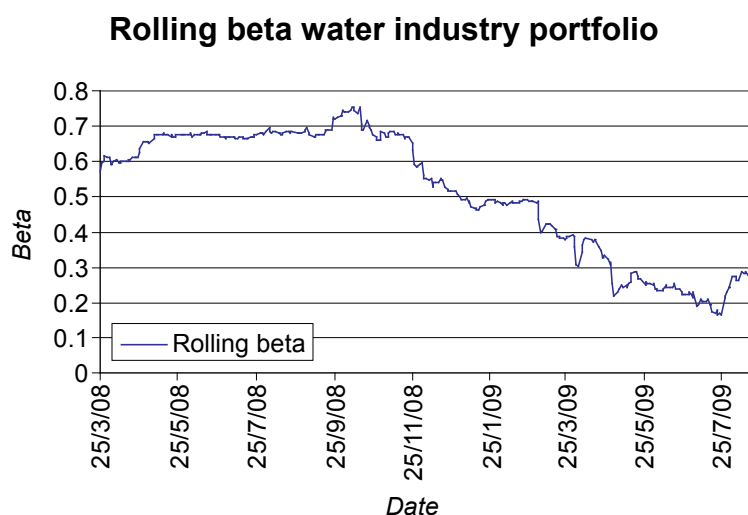
Source: CC calculations.

20. The average rolling over the period considered is $\beta_W = 0.512$. As with the individual company betas, beta declines from late 2008.

Analysis of equity betas for longer time period

21. We increased the time period of the sample used to estimate company-specific and portfolio raw beta. We used additional data in the following way:

   - For United Utilities, Severn Trent and Pennon, we considered a time period sample between 3/4/2000 and 11/5/2010.

   - For Northumbrian, we considered a time period sample between 22/5/2003 to 11/5/2010.

   - Additional data for FTSE All Share Index that covers the above two periods.

22. We computed daily returns as in equation (1). A summary of basic statistics and linear correlations are presented below.

TABLE 6 **Summary of basic statistics**

Variable	Mean	Std dev	Min	Max
lr_nwgri	–0.000286	0.018581	–0.086197	0.111155
lr_pnnri	–0.000259	0.019868	–0.092684	0.082457
lr_uuri	–0.000119	0.018239	–0.078314	0.108099
lr_svrtri	–0.000057	0.019739	–0.075557	0.151717
lr_ftse	0.000209	0.018238	–0.087098	0.088106

Source: CC calculations.

TABLE 7 **Correlations**

Variable	rl_uuri	rl_svtri	rl_pnnri	rl_ftse
lr_uuri	1			
lr_svtri	0.586	1		
lr_pnnri	0.4295	0.4953	1	
lr_ftse	0.4989	0.4114	0.3021	1
lr_nwgri	.	.	.	0.417

Source: CC calculations.

23.   We present time plots for the FTSE All Share Total Returns Index and lr_ftse.
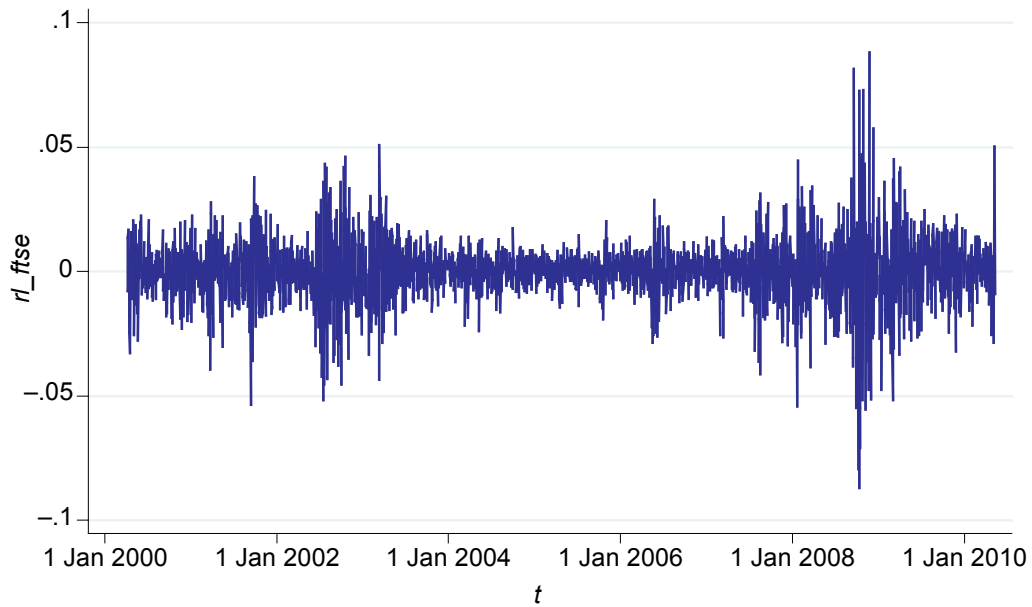
FIGURE 6a

FTSE all share total returns index

Source: CC calculations.

FTSE daily returns

Source: CC calculations.

24. We can see that during 2003 and 2008 there was a sharp decrease in the FTSE All Share Index, which in turn was coupled with an increase in volatility on the returns on the FTSE during the same time periods.

25. Plotting log returns on specific companies against time shows a common pattern among the considered companies. Returns are generally more volatile up to 2003, and tend to be less volatile between 2004 and 2008. We provide an example for United Utilities.

FIGURE 7

United Utilities daily returns
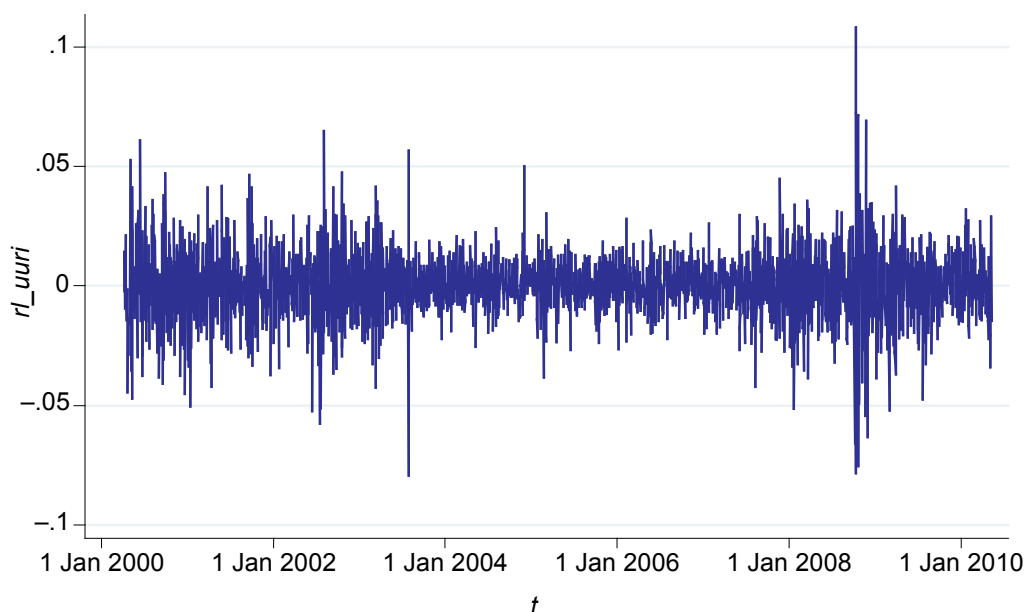
Source: CC calculations.

Company-specific raw betas

26. We estimate the econometric model (2) by OLS and compute the Newey-West standard errors to control for heteroskedasticity and autocorrelation in the error term. The results are the following.

TABLE 8 **Company raw betas**

	β ols	95% condf interval	
UU	0.561 *0.028*	0.51	0.62
SVRN	0.499 *0.034*	0.43	0.57
PNN	0.385 *0.033*	0.32	0.45
NTH	0.547 *0.038*	0.47	0.62
Average	0.498		

Source: CC calculations.

27. The common econometric results are the following:

- All estimated raw betas are significantly different from zero at a 5 per cent level. The standard errors are small, R^2 varies from 0.25 for UU and 0.091 for Pennon and the individual regressions are globally significant.

- For each regression, there are approximately 90 observations for which the dependent variable equals to zero.

- In general, there are various degrees of statistical evidence for autocorrelation, heteroskedasticity or omitted variables problems in the company-specific regressions.

28. We performed a rolling windows estimation using econometric model (2) to estimate a rolling beta. The time window chosen is one year (255 obs), and the results for each water company are the following.

FIGURE 8a

Rolling beta United Utilities
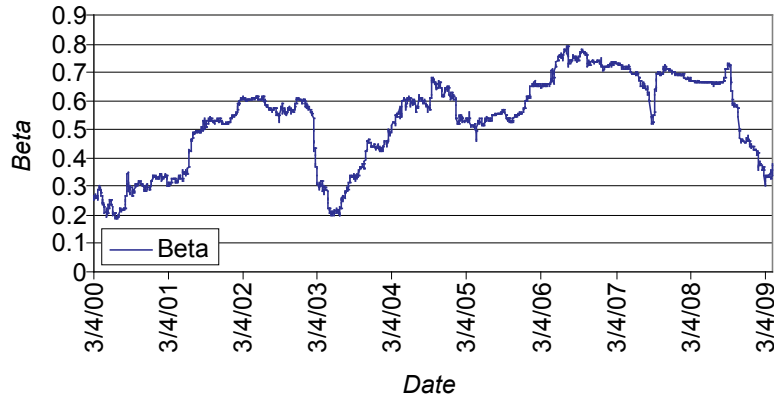
Source: CC calculations.

FIGURE 8b

Rolling beta Severn Trent
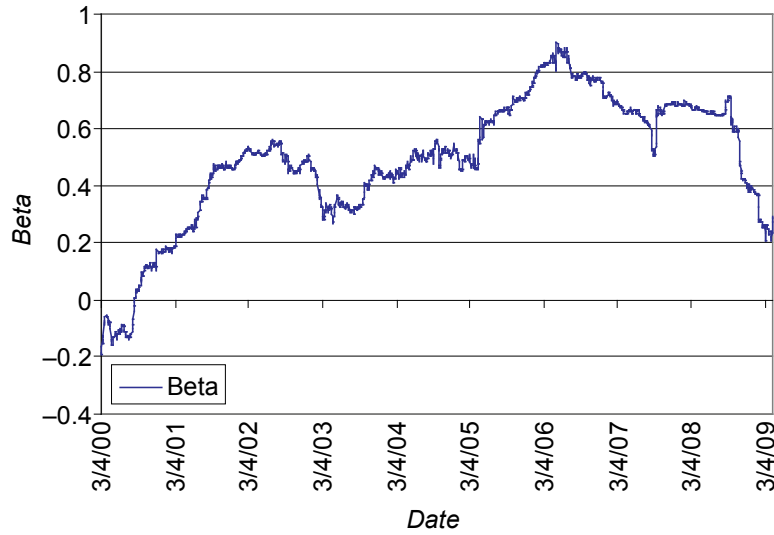
Source: CC calculations.

FIGURE 8c

Rolling beta Pennon
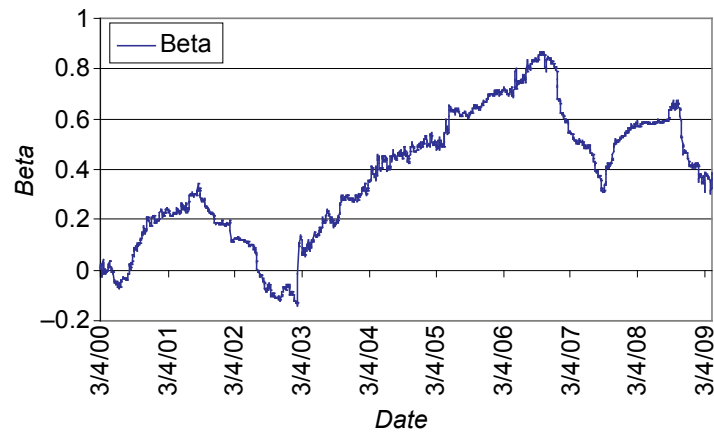
Source: CC calculations.

FIGURE 8d

Rolling beta Northumbrian
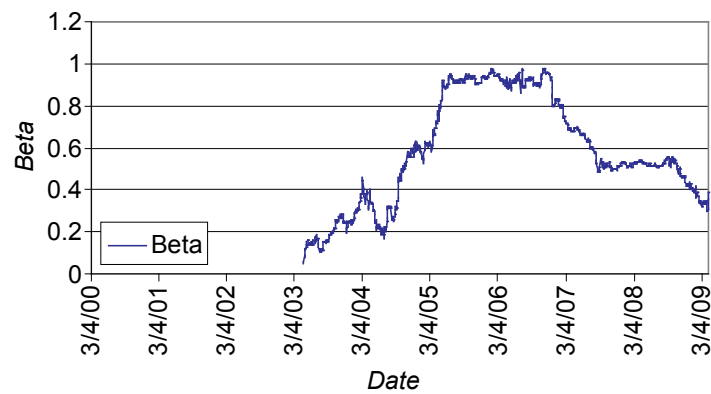
Source: CC calculations.

29. There is evidence of fluctuations in beta over time.

The portfolio raw beta

30. We estimated model (4) by OLS and compute the Newey-West standard errors. We get the following results.

TABLE 9 **Beta industry portfolio**

β ols	95% cond interval	
0.507	0.45	0.56
0.027		

Source: CC calculations.

31. The econometric results are the following:

- The estimated raw beta is significantly different from zero at a 5 per cent level. The standard error is small, R^2 equals 0.2433 and the regression is globally significant.

- There are no observations with a return 0 to the industry portfolio.

- There is statistical evidence of autocorrelation, heteroskedasticity and omitted variables problems.

32. We performed a rolling windows estimation using econometric model (4) to estimate a rolling beta, and we compute the Newey-West standard errors. The time window chosen is one year (255 observations), and the results for rolling β_W are the following.

FIGURE 9

Rolling beta portfolio industry
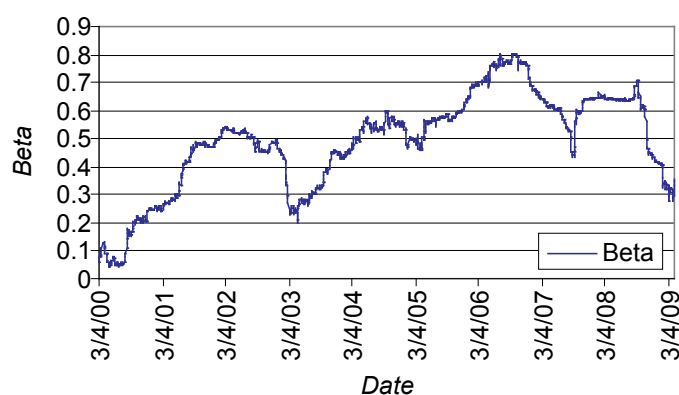
Source: CC calculations

33. The average rolling beta over the period considered is $\beta_W = 0.489$. There is evidence of fluctuations of beta over time.

Asset betas

34. To calculate the asset betas, we used net debt figures at 31 March of each year from the company's annual reports available at their websites, and Datastream figures on price and number of shares for each company. If data for 31 March was not available, either because it was a weekend or bank holiday, then data for the next trading day was used. (Data for 31 March 2010 was used from Table 10 in the main text of this appendix.

35. Asset betas for the most recent 24 months are presented in the following table.

TABLE 10 **Asset betas using the most recent 24-month data**

	β ols			β rolling		
	Raw	*Asset, βD=0*	*Asset, βD=0.1*	*Raw*	*Asset, βD=0*	*Asset, βD=0.1*
UU	0.61	0.29	0.34	0.54	0.26	0.31
SVT	0.6	0.25	0.31	0.5	0.21	0.27
PNN	0.53	0.25	0.3	0.49	0.23	0.28
NWG	0.48	0.18	0.24	0.46	0.17	0.24
Average	0.56	0.24	0.31	0.50	0.22	0.28
Portfolio	0.58	0.27	0.26	0.51	0.23	0.28
Cond interval	0.48	0.21	0.27			
	0.69	0.31	0.36			

Source: CC calculations.

36. The time average gearing figures from 2008 to 2010 have been used to calculate the above asset beta figures of the individual water companies. Regarding the figures to calculate the industry portfolio asset beta, a time average of market value capitalization weighted gearing averages is used. Gearing figures at 31 March for each year are used.

37. Asset betas using data from April 2000 (3/4/2000 to 11/5/2010) are presented in the following table.

TABLE 11 **Asset betas using data up to April 2000**

	β ols			β rolling		
	Raw	*Asset, βD=0*	*Asset, βD=0.1*	*Raw*	*Asset, βD=0*	*Asset, βD=0.1*
UU	0.561	0.29	0.34	0.533	0.27	0.32
SVT	0.499	0.26	0.31	0.489	0.26	0.3
PNN	0.385	0.17	0.22	0.376	0.16	0.22
NWG	0.547	0.22	0.28	0.584	0.23	0.29
Average	0.498	0.24	0.29	0.496	0.23	0.28
Portfolio	0.507	0.26	0.31	0.489	0.25	0.3
Cond interval	*0.453*	0.23	0.28			
	0.561	0.28	0.33			

Source: CC calculations.

38. The time average gearing figures from 2000 to 2010 have been used to calculate the above asset beta figures of the individual water companies. Regarding the figures to calculate the industry portfolio asset beta, a time average of market value capitalization weighted gearing averages is used. Gearing figures at 31 March for each year are used.

Cost of capital and rate of return

1.   Our approach is to set Bristol Water's return on its RCV equal to its cost of capital. A consistent method of calculating rate of return is to calculate the internal rate of return (IRR) on cash flows (this is equivalent to setting the net present value (NPV) of cash flows to zero with the cost of capital used as the discount rate in the calculation of NPV). Sometimes rate of return is calculated as operating profit divided by the average of opening and closing capital: this is known as the accounting rate of return (ARR). However, the ARR is not necessarily equal to the IRR.[1]

2.   We are using the Ofwat financial model which uses ARRs as an input. As illustrated in Table 1, which shows Ofwat's calculation of the required return, the resulting IRR (5.65 per cent) is higher than the assumed ARR (5.50 per cent). In Table 1 it is assumed that cash flows accrue in the middle of the year, but the result is not sensitive to the date at which cash flows accrue. Any differences in the timing of revenue and costs are taken account of through working capital in RCV.

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[1]This issue is discussed in Appendix 8.6 to our 2000 reports on Sutton and East Surrey Water and Mid Kent Water (paragraphs 3 & 4 and 12–15).

TABLE 1 **Ofwat's calculation of required return**

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	
Calculation of required return							
Opening RCV		[✂]	[✂]	[✂]	[✂]	[✂]	
Capex*		[✂]	[✂]	[✂]	[✂]	[✂]	
Depreciation		[✂]	[✂]	[✂]	[✂]	[✂]	
Infrastructure renewals charge		[✂]	[✂]	[✂]	[✂]	[✂]	
Grants and other adjustments		[✂]	[✂]	[✂]	[✂]	[✂]	
Closing RCV	264.4	[✂]	[✂]	[✂]	[✂]	[✂]	
Average RCV†		[✂]	[✂]	[✂]	[✂]	[✂]	
ARR (5.5%)		[✂]	[✂]	[✂]	[✂]	[✂]	
Required return		[✂]	[✂]	[✂]	[✂]	[✂]	
Calculation of required revenue							
Opex		[✂]	[✂]	[✂]	[✂]	[✂]	
Depreciation		[✂]	[✂]	[✂]	[✂]	[✂]	
Infrastructure renewals charge		[✂]	[✂]	[✂]	[✂]	[✂]	
Tax		[✂]	[✂]	[✂]	[✂]	[✂]	
Required return		[✂]	[✂]	[✂]	[✂]	[✂]	
Required revenue‡		[✂]	[✂]	[✂]	[✂]	[✂]	
Period cash flows	*31/03/2010*	*30/09/2010*	*30/09/2011*	*30/09/2012*	*30/09/2013*	*30/09/2014*	*31/03/2015*
Starting RCV	−264.4						
Cash flows§		[✂]	[✂]	[✂]	[✂]	[✂]	
Closing RCV							342.6
Total	−264.4	[✂]	[✂]	[✂]	[✂]	[✂]	342.6
IRR	5.65%						

Source: CC calculations.

*Capex on infrastructure renewals (net of grants) and other capex (gross of grants).
†Average of opening and closing RCV.
‡Required revenue is before adjustment for CIS, OPA etc.
§Cash flow is (required return) + (depreciation + IRC) – (capex net of grants).

3.   As we consider that Bristol Water should earn an IRR equal to its cost of capital, we made a simple adjustment to the ARR at the provisional findings stage. The adjustment is:

$$ARR = WACC/(1+0.5 \times WACC)$$

4.   Table 2 illustrates that this adjustment generates an IRR very close to the cost of capital (which was 5.5 per cent in Ofwat's final determination).

TABLE 2 **Adjusted calculation of required return**

£ million

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	
Calculation of required return							
Opening RCV		[✂]	[✂]	[✂]	[✂]	[✂]	
Capex*		[✂]	[✂]	[✂]	[✂]	[✂]	
Depreciation		[✂]	[✂]	[✂]	[✂]	[✂]	
Infrastructure renewals charge		[✂]	[✂]	[✂]	[✂]	[✂]	
Grants and other adjustments		[✂]	[✂]	[✂]	[✂]	[✂]	
Closing RCV	264.4	[✂]	[✂]	[✂]	[✂]	[✂]	
Average RCV†		[✂]	[✂]	[✂]	[✂]	[✂]	
ARR (%)		[✂]	[✂]	[✂]	[✂]	[✂]	
Required return		[✂]	[✂]	[✂]	[✂]	[✂]	
Calculation of required revenue							
Opex		[✂]	[✂]	[✂]	[✂]	[✂]	
Depreciation		[✂]	[✂]	[✂]	[✂]	[✂]	
Infrastructure renewals charge		[✂]	[✂]	[✂]	[✂]	[✂]	
Tax		[✂]	[✂]	[✂]	[✂]	[✂]	
Required return		[✂]	[✂]	[✂]	[✂]	[✂]	
Required revenue‡		[✂]	[✂]	[✂]	[✂]	[✂]	
Period cash flows	*31/03/2010*	*30/09/2010*	*30/09/2011*	*30/09/2012*	*30/09/2013*	*30/09/2014*	*31/03/2015*
Starting RCV	−264.4						
Cash flows§		[✂]	[✂]	[✂]	[✂]	[✂]	
Closing RCV							342.6
Total	−264.4	[✂]	[✂]	[✂]	[✂]	[✂]	342.6
IRR	5.50%						

Source: CC calculations.

Note: For notes see Table 1.

5.   In its response to our provisional findings, Bristol Water suggested that the adjustment was erroneous as Bristol Water did not receive a return on the RCV at the year-end.[2] We do not agree with this point as the adjustment is not related to when Bristol Water receives a return on RCV. NERA suggested that the validity of the adjustment depended critically on the assumption that all interim cash flows could be reinvested immediately at the time they were received at the allowed WACC.[3] We do not see the significance of this point as water companies invest continuously in their capex programmes and, even if large one-off expenditures lead to some fluctuation in their gearing, this would not impact materially on the WACC (see Annex 2). We also note that we have allowed in the cost of debt for Bristol Water maintaining a positive cash balance (see paragraph 48).

6.   Consequently, we have maintained the adjustment in our final redetermination of K.

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[2]Bristol Water's comments on provisional findings, section H4.
[3]NERA comments on provisional findings, section 5.

Financeability

1. Ofwat stated that it described a reasonably efficient company as financeable if its revenues, profits and cash flows allowed it to raise finance on reasonable terms in the capital markets.[1] It carried out a financeability assessment to ensure that its financial projections for Bristol Water were comfortably within the investment grade range. Bristol Water stated that financeability related to the ability of Bristol Water to obtain finance on reasonable terms, and that 'in practice financeability means maintaining an investment grade credit rating'.[2]

2. We consider that the purpose of the financeability assessment is to provide a cross-check that Bristol Water can comply with its licence conditions, in particular maintaining an investment grade credit issuer status, based on our determination (including our decision on gearing and WACC). Financeability assessments involve reviewing financial ratios (other than the cost of capital) and comparing the projected level of those ratios implied by a given cost of capital with certain target levels. Where the assessment indicated that Bristol Water could reasonably attain the key financial targets, given the capex, opex and WACC decisions that we made, we viewed this as an indicator that those decisions were appropriate.

3. The following sections discuss in turn:

   (a) financial ratios to be targeted;

   (b) assumptions used in making projections of financial ratios, in particular regarding Bristol Water's gearing; and

   (c) what the regulator should do if there are concerns about financeability.

Target financial ratios

Ofwat approach

4. There are two aspects to targeting financial ratios:

   (a) the credit rating to be targeted; and

   (b) the ratios implied by that credit rating.

   The credit rating (and hence the ratios) to be targeted is usually above the minimum for investment grade status. One reason for this is that the projected ratios (to be compared with the targets) are central estimates, and there is a margin of uncertainty around these estimates.

5. In its FD09, Ofwat said that it had targeted financial ratios that were consistent with an A–/A3 credit rating, though Ofwat added that if one particular indicator (and in a small minority of cases, two key indicators for one rating agency) did not meet its required threshold, it ensured that the ratio met the criteria for a strong BBB+/Baa1 credit rating as a minimum. Ofwat said that its approach was consistent with a view

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[1]Ofwat FD09, section 5.6.
[2]Bristol Water SoC, paragraph 1333.

expressed to it that the capacity of investors to invest appeared to be less sensitive to the difference between high BBB and low A range ratings where utilities were concerned.

6.   Ofwat also set out (see Table 1 below) values of the key financial ratios against which it had considered price caps. It said that its ratios for WoCs were higher because the credit rating agencies required greater headroom in cash flows for WoCs to account for the impact of specific or asymmetric risks.

TABLE 1   **Ofwat's key financial ratios**

Ratio	WaSCs	WoCs
Cash interest cover (funds from operations: gross interest)*	About 3 times	About 3.5 times
Adjusted cash interest cover (funds from operations less capital charges: net interest)†	About 1.6 times	About 1.8 times
Funds from operations: debt‡	About 13%	About 17%
Retained cash flow: debt§	About 8%	About 10%
Gearing (net debt: regulatory capital value)¶	Below 65%	Below 60%

Source: Ofwat.

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*Net cash flow from operating activities minus tax paid minus change in working capital divided by total gross interest (total financing costs).
†Net cash flow from operating activities minus tax paid minus change in working capital minus current cost depreciation minus infrastructure renewal charges divided by net interest (total financing costs minus interest received).
‡Net cash flow from operating activities minus tax paid minus change in working capital minus interest paid divided by net debt.
§Net cash flow from operating activities minus tax paid minus change in working capital minus interest paid minus dividends paid divided by net debt.
¶Net debt excluding shareholder loan asset and preference shares.

7.   Ofwat said that it also considered dividend cover as a key ratio for equity investors, but it had not set a specific target level as it was for the companies to determine their own dividend policies. Ofwat added that it also considered accounting interest cover ratios on a historic and current cost basis and that its discussions with the credit rating agencies informed this approach.

8.   Ofwat stated that it had also tested its final determination package against some realistic downside scenarios to ensure that its cost of capital and the risk mitigation measures represented a balanced approach to risk given the uncertainties.

Bristol Water's approach

9.   In its SoC, Bristol Water focused on two Moody's ratios as shown in Table 2. Bristol Water said that credit rating agencies would base their views on a wide range of credit metrics and that Standard & Poor's (S&P) used alternative ratios to those preferred by Moody's, but Bristol Water considered that the use of the ratios in Table 2 gave a reasonable indication of the key financial ratios.

TABLE 2   **Key financial ratios assessed by Bristol Water in its SoC**

Ratio for Moody's A3 rating	
Net adjusted debt to RCV	[✂]
Adjusted cash interest cover (funds from operations less capital charges: net interest)	[✂]
Ratio for Moody's Baa1 rating	
Net adjusted debt to RCV	[✂]
Adjusted cash interest cover (funds from operations less capital charges: net interest)	[✂]

Source: Bristol Water SoC, Table 128.

10.   Bristol Water carried out Monte-Carlo modelling on its financial forecasts to assess the effect on the ratios shown in Table 2 and then made a judgement both about which rating (A3 or Baa1) needed to be targeted and whether it could be achieved based on gearing of about 75 per cent. It considered that it should target the lower Baa1 rating if there was lower variability in outcomes for the ratios, in particular adjusted cash interest cover (for example, if variability was reduced by an NI covering tax changes).

Bristol Water shadow credit rating

11.   This section provides background on how the Moody's rating methodology was applied to Bristol Water, and also examines the methodology that S&P adopts in relation to the treatment of index-linked debt.

12.   Bristol Water maintains a shadow (private) credit rating with Moody's and S&P. Bristol Water's issuer credit rating assigned by S&P[3] is BBB+ 'credit watch with negative implications'. Bristol Water's issuer credit rating assigned by Moody's is Baa1 negative.[4] We consider that the credit ratings assigned by Moody's and S&P are broadly equivalent. The methodologies that each credit ratings agency applies to reach its ratings decisions are different. We also note that the ratings agencies adopt a variety of quantitative and qualitative techniques to assign credit ratings. They do not use a mechanistic approach to assign credit ratings on the basis of an observed or predicted credit ratio in a particular year. It would therefore be inappropriate to place too much emphasis on the value of a particular credit ratio, particularly when considering forecast values based on financial estimates. Moody's publishes a credit ratings methodology for the water sector.[5] This sets out the relative weight it attaches to key factors, which are:

   (a) Regulatory Environment & Asset Ownership Model (40 per cent weight);

   (b) Operational Characteristics & Asset Risk (10 per cent weight);

   (c) Stability of Business Model & Financial Structure (10 per cent weight); and

   (d) key credit metrics (40 per cent weight).

13.   Moody's told us that a ratings committee set the rating, but that applying the rating methodology should provide an indication of Moody's rating within two rating notches of the actual rating. The framework was available to aid transparency, but was only indicative. The rating indicated by the methodology is based on the combination of all factors, ie companies that score very highly on regulatory environment (underpinning a low business risk profile) can sustain weaker financial metrics and still maintain a solid investment-grade rating. The target credit ratios that Moody's publishes are expressed in terms of a three-year historical average. In setting credit ratings, Moody's examined forward estimates for credit ratios based on management plans but it did not publish forecasts or estimates.

14.   Moody's also told us that the target gearing ratios for WoCs and WaSCs were the same, but that for a given credit rating, WoCs such as Bristol Water should demonstrate interest coverage ratios consistent with a credit rating one notch above that of a WaSC.

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[3] [✂]
[4] [✂]
[5] [✂]

15. The Moody's target ratios for WoCs are set out in Table 3, and these correspond with our target values for gearing and adjusted cash interest cover. This table also shows the S&P ratings categories that indicatively correspond with those of Moody's; however, we did not have access to S&P target values for its ratings bands. We have defined the adjusted cash interest cover ratio to exclude the indexation of debt, and set out target values for these ratios on the same basis. This is consistent with the approach that Moody's and Ofwat took. We discuss how S&P's methodology may differ below.

TABLE 3 **Moody's target ratios and indicative credit ratings for WoCs**

Moody's credit rating	Gearing (net debt / RCV) %	Adjusted cash interest cover*	S&P 'equivalent' credit rating
A2	50–60	Above 2.5	A
A3	60–68	1.8–2.5	A-
Baa1	68–75	1.6–1.8	BBB+
Baa2	75–85	1.4–1.6	BBB
Baa3	Above 85	Below 1.4	BBB-

Source: CC interpretation of Moody's ratings methodology.

*Funds from operations less capital charges: net cash interest. Net interest excludes indexation.
Note: Guideline ratios for stand-alone regulated businesses on a corporate basis.

16. In relation to the 'regulatory environment & asset ownership model', Moody's assigned the following to Bristol Water:[6] UK regulatory framework, [✂]; UK water companies, [✂]; tariff regime, [✂]; revenue risk, [✂]. In relation to 'operational characteristics and asset risk', Moody's assigned a [✂] rating to Bristol Water, in line with the water sector average. In relation to 'stability of business model and financial structure', Bristol Water scored [✂] on corporate activity, [✂] on attitude to increased leverage and [✂] on diversification. In relation to the 'key credit metrics', Moody's assigned a [✂] rating to Bristol Water, based on four credit ratios. Moody's placed particular emphasis on the interest coverage and the gearing ratios, which each receive a total weighting of 15 per cent in the ratings assessment. Moody's wrote to Bristol Water[7] to explain that:

> The maximum leverage and minimum interest coverage ratio that can be accommodated within Bristol Water's current ratings is aligned with the financial covenants under the Artesian[8] structure, ie up to [✂] of Net Debt to RCV and at least [✂] Adjusted Interest Cover (note however that our ratio definitions may be slightly different from the Artesian covenant calculation).

17. S&P published guidance[9] setting out that its derivation of cash interest cover based on funds from operations (FFO / debt) had been modified to include the indexation element of inflation-linked debt in interest expenses. S&P explained in this guidance that it introduced this methodology for inflation-linked debt to 'move away from an approach to analysis of FFO that could penalize issuers that fund themselves only with plain vanilla, or nominal interest-bearing, debt'. We noted that changes in inflation from year to year would affect the resulting ratio, particularly for companies with a significant proportion of index-linked debt, but might not necessarily result in a

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[6][✂]
[7][✂]
[8]Artesian finance is insurance-backed debt issued by Artesian Finance plc. Through the issue of insurance-backed debt, a borrower is able to take advantage of the insurer's better credit rating to borrow at lower rates than it would be able to in its own right.
[9]New Methodology for Inflation-linked debt does not have an immediate effect on UK regulated utilities. Standard & Poor's, 8 April 2009.

change to their credit ratings. Notwithstanding the possible differences in definition of credit ratios, Moody's and S&P have assigned equivalent credit ratings to Bristol Water. We have been consistent in our definition of adjusted cash interest cover and as regards the target values for this ratio and we do not consider that this alternative definition of the interest coverage ratio should lead us to a different target value for interest coverage.

Previous CC inquiries

18.	In the Airports inquiries, the CC targeted a BBB+ rating for Heathrow and Gatwick and an A– rating for Stansted. The financial ratios that the CC considered were broadly similar to those considered by Ofwat.[10]

CC target credit ratios

19.	As set out in Table 1 above, Ofwat performed its financeability assessment by targeting a number of financial indicators. Ofwat's target value for gearing was 'below 60 per cent' and for adjusted cash interest cover was 'about 1.8' (see Table 1), which we considered was consistent with the Moody's A3 indicative rating band (see Table 3). Based on our discussions with Moody's, we noted that an adjusted cash interest coverage ratio of 1.4 to 1.6x and a gearing of 68 to 75 per cent would be consistent with Baa1 rating for a WaSC, but that Moody's considers that a WoC should demonstrate interest coverage ratios consistent with a credit rating one notch higher (ie 1.6 to 1.8x, corresponding to A3 for a WoC) to achieve an equivalent rating. We therefore interpreted Bristol Water's target ratios (Table 2) as corresponding to a Moody's indicative credit rating of [✂] to [✂] for a WoC, [✂].

20.	We considered each of Ofwat's target values set out in Table 1 to be relevant to the financeability assessment and these are outputs from the financial model. However, we modified the target values for gearing and for adjusted cash interest cover due to our treatment of preference shares.[11] We performed our financeability assessment with respect to target credit rating of [✂] based on ratios of 68 to 75 per cent gearing, 1.6 to 1.8x adjusted cash interest cover and retained Ofwat's target values for a number of other credit ratios (see Table 4). We noted that if the financial model estimated adjusted cash interest cover ratios of 1.4 to 1.6x, this would be consistent with a Moody's credit rating of [✂]. We noted that this lower ratio was in line with the values that Moody's has communicated to Bristol Water as minimum values to maintain its existing shadow credit rating[12] and so would not by itself indicate a failure of the financeability assessment. We also considered lower gearing targets in the range of 60 to 68 per cent corresponding with a Moody's rating of [✂] (one notch higher) as lower gearing would lead to improved (ie higher) interest coverage multiples.

21.	We noted from discussions with credit ratings agencies that the calculation of various ratios forms part of a broader assessment to assign credit ratings and that these ratios are not applied mechanistically. Accordingly, we noted that a set of modelling assumptions that produced inferior ratios compared with the targets in one or more years might not necessarily indicate a concern in relation to financeability. For a small company such as Bristol Water, small variations (in either direction) in the

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[10]The CC considered some additional interest cover ratios but not the retained cash flow to debt ratio.
[11]In our financial model we included annual preference share dividends of £1.094 million as a cash outflow (8.75 per cent yield on £12.5 million). However, we modified the ratios to ensure that the dividend on preference shares was not treated as an interest expense for the calculation of the relevant ratios.
[12][✂]

absolute value (ie monetary amount) of various estimates can lead to significant differences in derived ratios, particularly in relation to adjusted cash interest cover, but this would not necessarily result in a change to an assigned credit rating. We compared the average values of credit ratios across the five-year forecast period to the target values for the ratios in Table 4 .

TABLE 4 **Target financial ratios**

	Target values
Key credit ratios	
Adjusted cash interest cover (funds from operations less capital charges: net interest)*	1.6–.8x
Gearing (net debt: regulatory capital value)†	68–75%
Other relevant credit ratios (Ofwat target values for A3/A– rating)	
Cash interest cover (funds from operations: gross interest)‡	Above 3.5
Funds from operations: debt §	Above 17%
Retained cash flow: debt¶	Above 10%

Source: Ofwat, CC.

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*Net cash flow from operating activities minus tax paid minus change in working capital minus current cost depreciation minus infrastructure renewal charges divided by net interest (total financing costs minus interest received).
†Net debt excluding shareholder loan asset and preference shares.
‡Net cash flow from operating activities minus tax paid minus change in working capital divided by total gross interest (total financing costs).
§Net cash flow from operating activities minus tax paid minus change in working capital minus interest paid divided by net debt.
¶Net cash flow from operating activities minus tax paid minus change in working capital minus interest paid minus dividends paid divided by net debt.

Assumptions for financeability assessment

22.   The projected levels of the financial ratios depend on the building blocks of the calculation of required revenue, ie opex, capex and cost of capital. The projected levels of these financial ratios also depend on a number of other assumptions, including capital structure. The parties' assumptions in these other areas are shown in Table 5.

TABLE 5 **Financeability assumptions**

	Ofwat	*Bristol Water SoC*
Initial gearing	Notional (52.5%) but tax computation is based on actual gearing	Actual (c75%)
Average gearing	54%	c76%
Interest rates on existing fixed rate debt	Notional (4.0% real)	Actual (4.0% real)
Initial % of debt that is index linked	Notional (33%)	Actual (48%)
New issuance of index linked debt	Yes (but not in early part of period)	Yes (additional £50m)
Dividends paid	Initial yield of 5% of notional equity and growth of 2.1% consistent with cost of equity	[✂]
Treatment of CIS adjustment	Excluded	Included

Source: Ofwat and Bristol Water.

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23.   The higher the gearing, the more risky a company's debt and the poorer its financial ratios (ie higher gearing also results in lower interest coverage ratios). A lower level of gearing will reduce the cost of debt and equity (since both are less risky) and the WACC, but will increase projected tax payments. The net effect is likely to be to

increase required revenue and hence prices, although any such effect is likely to be small (see Appendix N).

24. Financial ratios are also affected by the percentage of debt that is index linked. Index-linked debt involves lower interest payments (but a higher repayment) than conventional debt[13] and hence a higher percentage of index-linked debt is associated with less cash outflow and more favourable financial ratios. The starting point for our financeability assessment was Bristol Water's actual balance sheet at 31 March 2009, at which point approximately 60 per cent of net debt was index linked.[14] Our financial modelling assumptions assume no new index-linked debt issuance.

25. Financial ratios are also affected by dividend payments. The more cash that is paid out in dividends, the higher the debt and subsequent interest payments and the poorer the financial ratios. Ofwat regarded its assumptions (initial yield of 5 per cent and growth of 2.1 per cent) as consistent with its cost of equity (7.1 per cent) and the likely payout policy of a quoted company regarded as an income stock.[15] Bristol Water said that its plan resulted in RCV growth of about 9 per cent a year. Bristol Water added that its calculations suggested that, at this level of growth, maintaining constant gearing required that less than 2 per cent of net equity be retained in each year.[16] We assumed that Bristol Water pays annual cash dividends of £1.094 million in respect of its preference shares. In relation to ordinary share dividends, we have made assumptions of an annual cash dividend in proportion to Bristol Water's notional ordinary equity.[17] The specific assumptions for dividends are explained in paragraph 45 below in relation to the alternative scenarios for gearing.

26. In relation to CIS, Ofwat calculates financial ratios before applying performance and incentive adjustments (these cover adjustments for opex and capex outperformance, CIS and the overall performance adjustment). Consequently, Ofwat's financeability assessment is not affected by previous outperformance/underperformance or by its CIS. Bristol Water (supported by Portsmouth Water and South East Water[18]) suggested that the CIS adjustment should be applied before calculating financial ratios, as a financeability assessment should be based on expected future cash flows.[19]

27. Ofwat said that it was concerned with the financeability of an efficient company—the symmetrical nature of the CIS meant that companies which produced balanced and well-evidenced business cases would receive full recognition of this fact through the post-financeability application of the CIS reward. Ofwat also noted that if the adjustments were applied before the financeability assessment, they would not act as an incentive (as they were designed to do). On this latter point, we note that applying the CIS reward before the financeability assessment would tend to reduce, rather than eliminate, the incentive associated with the adjustment concerned. Only if a regulator uses the financeability assessment to determine the price cap would it completely eliminate the incentive concerned (we discuss the use of the financeability assessment below).

28. Nevertheless, we accept the logic of Ofwat's argument so that adjustments should be made after the financeability assessment to preserve incentives and that this is

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[13]As long as the RPI is increasing and real yields on index-linked and conventional debt are similar.
[14]Net debt £184.10 million, of which £109.97 million was index-linked debt.
[15]Ofwat's dividend assumptions are consistent with its cost of equity if investors expect future dividend growth (after 2014/15) also to be 2.1 per cent.
[16]Bristol Water SoC, paragraph 1504.
[17]Notional equity equals RCV minus net debt and preference shares.
[18]www.competition-commission.org.uk/inquiries/ref2010/bristol/third_party_submissions.htm.
[19]Bristol Water also said that, in its view, the assessment should not include future numbers in so far as they related to performance targets because it agreed that their incentive properties needed to be maintained.

consistent with the financing of an efficient company. Portsmouth Water suggested that a large element of the CIS adjustment related to items where Ofwat simply had a different view from the company of the evidence presented and hence any negative adjustment associated with this element was not due to inefficiency.[20] We consider that this is a point about CIS rather than financeability since if there is no element of inefficiency there should not be a negative adjustment at all.

29. Accordingly, we applied CIS and other adjustments after the financeability assessment, consistent with assessing the financeability of an efficient company, that is, one that is properly carrying out its functions.

Credit ratios based on Bristol Water's actual gearing

30. We first examined credit ratios under constant gearing, based on Bristol Water's actual gearing of 68.5 per cent,[21] financed through the issuance of £100 million new nominal fixed rate debt to match the timing of the forecast capital expenditure programme to maintain constant gearing, and assuming dividends equivalent to the assumption made by Ofwat.[22] Under this scenario, gearing, cash interest cover and debt payback (RCF/debt) were at or above target levels. However, debt payback (FFO/debt) and adjusted cash interest cover were below target. The five-year average of the adjusted cash interest cover ratio was 1.4, which was below the target value of 1.6 but consistent with a Baa2 Moody's rating. We next examined the credit ratios assuming that dividends were suspended. In this case, all the ratios were consistent with their target levels, with the exception of adjusted cash interest cover ratio, which was 1.5, which is below our target value. This is shown in Table 6 below. We also noted that if, additionally, we added in interest received on the loan Bristol Water has made to its parent (see paragraph 46), the ratios improve significantly—for example, average adjusted cash interest cover increases from 1.5 to 2.2 times.

TABLE 6 **Key financial ratios: actual gearing scenario (no dividends)**

	Target ratio	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Adjusted cash interest cover	1.6–1.8	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Net debt/RCV (%)	68–75	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cash interest cover (FFO)	3.5	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Debt payback (FFO/debt) (%)	17	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Debt payback (RCF/debt) (%)	10	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

Note: Before CIS ratio; excludes interest receivable on shareholder loan.

Action if initial projections suggest that there are doubts about financeability

31. In its SoC, Bristol Water suggested that there were a number of potential solutions[23] if, as suggested by our initial analysis above, initial projections suggested that there were doubts about financeability:

(a) change the initial gearing;

(b) increase the proportion of debt assumed to be index linked;

[20]Portsmouth Water submission, pp4&5:
   www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/submission_from_portsmouth_water.pdf.
[21]Net debt excluding preference shares / RCV, 31 March 2010.
[22]Dividend yield of 5 per cent on opening notional equity. Growth 2.1 per cent per year.
[23]SoC, paragraph 1489.

(c) raise equity/constrain dividends;

(d) constrain capital expenditure;

(e) increase prices during the next five years (with an offsetting adjustment in subsequent years); and

(f) increase prices during the next five years (without an offsetting adjustment in subsequent years).

32. Bristol Water said that the first five of these were not in customers' long- or short-term interests and the most appropriate method to address financeability was to provide the company with more revenue by increasing the price cap (without an offsetting adjustment in subsequent years).[24] We set out our views below on the relevance of each method.

Change the initial gearing

33. Under this approach, the company's initial gearing is reduced, the WACC is re-calculated using a lower level of gearing, and the financial projections are then rerun on the basis of the lower gearing and the revised WACC. This process continues until projections suggest that the company is financeable (or a minimum level of gearing is reached). This was broadly the approach to setting gearing used by the CC in the Airports inquiries (and in the two water reviews in 2000).[25]

Bristol Water's view

34. Bristol Water said that this approach effectively ignored the company's actual balance sheet and was not consistent with the duty on the regulator to secure that a company could finance its functions.

35. Bristol Water did not argue that its shareholders would not inject funds to reduce its gearing. Bristol Water did, however, suggest that forcing shareholders to inject funds would not be consistent with good regulatory practice. Comments from Portsmouth Water and South East Water echoed this. In its response to our provisional findings, Bristol Water further stated that it did not consider it realistic for us to assume new equity greater than around a third of existing equity.[26]

CC assessment: general considerations

36. Our view is that a company can finance its functions if it can pay the expected cost of its debt and provide its shareholders with an expected return at least equal to the return on comparable investments (ie those of comparable riskiness).

37. The key factors underlying whether a company can finance the proper carrying out of its functions are the WACC and the extent to which investors can expect future regulation to be consistent with the RCV (which might be described as the 'bankability' of the RCV). As long as the WACC covers both the expected cost of debt and shareholders expect to realize the future RCV if they sell their investments, shareholders

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[24]SoC, paragraph 1674, as clarified by letter to CC of 4 March 2010.
[25]In the Mid Kent inquiry, initial gearing was reduced below the regulated company's actual level, for which projections showed rapid deterioration in financial ratios.
[26]Bristol Waters response to provisional findings, Section 1, Financeability, paragraph 54.

can expect to earn a total return (taking into account both dividends and capital growth) equal to the expected cost of equity.[27]

38.   Our view is therefore that the proper carrying out of a company's functions is consistent with a wide range of assumptions about gearing. If the financeability assessment suggests that gearing needs to be altered significantly, then we would take this as an indicator that our inputs (in particular the WACC) may be incorrect. We consider that a significant change in gearing is one that is either not feasible, or cannot reasonably be achieved by the company. In assessing whether the change in gearing is significant, we recognize that a company will have a wide range of financing options available to it, not all of which will be known to us.

39.   The implication of Bristol Water's argument that a company's actual balance sheet figures should be used is that a company can increase its borrowing in order to pay out large amounts to its shareholders, then require the regulator to secure its financeability, for example via an uplift in the cost of capital, or by allowing higher prices. This has the effect that customers pay more to offset the increase in risk that the company itself has created through increased borrowing.

40.   Bristol Water also quoted a statement by the CC in its 2009 Interim Price Determination of Sutton and East Surrey Water's substantial effects claim ('the 2009 case') that WIA91 section 2(2A)(c) requires an assessment of the actual financial position of the company.[28] We do not think that this comparison assists Bristol Water's arguments. It is true that, in each case, we started by assessing the actual financial position of the company. However, we note that, in the 2009 case, the CC was considering a company's request for a discretionary interim determination to increase its prices for the remainder of the PR04 period to deal with a substantial adverse effect. By contrast, in the current case, we are obliged to redetermine the company's price cap for the whole of the PR09 period. Moreover, in the 2009 case, the CC did not see a case for an interim determination even on the basis of the company's actual financial position—the case would have been weaker had the CC varied the assumptions to assume a lower gearing level. Overall, the 2009 determination was not based on any finding that it would not be appropriate for the CC in other cases to make a critical evaluation of the level of gearing that should be assumed for the purposes of a financeability assessment.

41.   If such a financeability assessment produces low interest coverage ratios, this may indicate that a company's actual gearing is too high to maintain an investment grade credit rating at the same time as funding business expansion through debt and paying dividends to shareholders. This is possible during periods of strong RCV growth. This implies that growth may need to be financed other than through debt to enable the company to maintain its investment grade issuer credit rating during such an expansion phase. For example, shareholders might have to fund investment with equity (eg via a reduction in dividend or an equity injection). In all circumstances, the equity investor is rewarded by earning a return on the RCV via the cost of capital.

42.   If, hypothetically, the shareholders did not inject equity in such a situation, the company might start to experience financial distress to the detriment of consumers. However, we do not think that such a possibility is likely to arise in the present case: we have not seen any signs of financial distress at the current gearing. In any event, there are a number of possibilities that might in principle arise were the shareholders in a company to refuse to meet its ongoing financing requirements in circumstances

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[27]If net dividend payments are such that gearing stays constant, shareholders' capital growth will be equal to the growth in RCV.
[28]Bristol Water reply to Ofwat's response, p12, paragraph 44.

where those requirements could not prudently be met by increased debt. First, we note that, as Ofwat told us, a prudently managed company, placed in a position of financial distress by factors outside its control, could seek relief through the 'substantial effect' clause. Second, were a company to put itself into such a situation without being entitled to rely on this 'escape clause', Ofwat could protect consumers from the effects of financial distress by issuing an enforcement order requiring the company to take any necessary steps to comply with its licence conditions. Failure to comply with such an enforcement order would be a breach of the company's licence and, if sufficiently serious, could lead to the appointment of a special administrator. Third, in practice we consider that it would be more likely that, prior to any application for a special administration order, a market-led solution would emerge whereby the company would be taken over.[29]

43. We infer from these possibilities that the regulatory system is able to protect consumers from the effects of financial distress arising from companies' own decisions on financial structure. As noted, we do not think that any of these possibilities is likely to arise in the present case, given our overall assessment of the financial position of the company and the consequences of our determination for its ability to raise additional finance either in the form of debt or equity.

44. We consider therefore that in principle it is appropriate for us to consider scenarios with less debt and more equity, that is with lower gearing, than the company itself has chosen.

Bristol Water's gearing

45. We now consider evidence regarding changes in Bristol Water's gearing in recent years. We calculate that, over the period 2002/03 to 2008/09, Bristol Water's annual payments to shareholders averaged 22 per cent of implied regulatory equity and we noted that, if Bristol Water had made payments to its shareholders of 5 per cent of implied regulatory equity per year over this period, its March 2009 gearing would have been 44 per cent instead of 76 per cent (see Table 7).

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[29][✀]

TABLE 7 Bristol Water's implied regulatory equity and payments to its shareholders, 2002/03 to 2008/09

£ million

Years ended March

	2002	2003	2004	2005	2006	2007	2008	2009
Actual position								
RCV*	173.7	183.1	208.4	229.1	234.5	260.4	275.5	265.4
Net debt*†	71.5	74.8	140.4	140.8	166.2	176.3	196.6	201.8
Gearing (%)	41.2	40.9	67.4	61.5	70.9	67.7	71.4	76.0
Implied equity*‡	89.7	95.8	55.5	75.8	55.8	71.6	66.4	51.1
Ordinary dividends§		5.6	15.9	7.3	7.6	3.5	9.1	5.9
Return of capital¶		0.0	47.0	0.0	21.5	0.0	0.0	0.0
Total shareholder payments		5.6	62.9	7.3	29.1	3.5	9.1	5.9
—As % of implied equity (%)		6.2	65.6	13.2	38.4	6.3	12.7	8.9
Notional position if annual share-holder payments had been 5% of implied equity (with same RCV)#								
Net debt*†	71.5	73.7	81.2	81.0	82.8	95.0	112.3	117.0
Gearing (%)	41.2	40.2	39.0	35.3	35.3	36.5	40.8	44.1
Implied equity*‡	89.7	96.9	114.7	135.6	139.2	152.8	150.6	135.8
Total shareholder payments		4.5	4.8	5.7	6.8	6.9	7.6	7.5
—As % of implied equity (%)		5.0	5.0	5.0	5.0	5.0	5.0	5.0

Source: CC calculations based on Bristol Water data.

*At end of year.
†Excludes preference shares.
‡RCV less net debt and preference shares (£12.5 million).
§Excluding return of interest paid by parent company.
¶Loan to parent company used to return capital to shareholders.
#Net debt was recalculated by adding back the difference between payments to shareholders and payments at 5 per cent of notional implied equity at the end of previous year plus reduced interest payments arising from this lower level of net debt less interest paid on parent company loan. The interest rate was calculated from Bristol Water's net interest charges as a percentage of its net debt—this calculated interest rate was very low (below bank rate in most years) and we note that a larger reduction in debt and gearing would have been calculated with a higher interest rate assumption. The calculations are only approximate as they are not based on precise information about the timing of dividend and interest payments.

46.   As set out in Table 8, Bristol Water plc made two loans totalling £68.5 million to its parent company, Bristol Water Group Ltd.[30] In our calculation of gearing we have excluded these assets because the principals are not due to be repaid until 2032 and 2033. We understand that Bristol Water plc's existing dividend policy is partly determined by the policy of funding the interest due on these loans via the payment of dividend, such that there is no net income to Bristol Water plc resulting from these two offsetting transactions. We regard decisions on financing as a matter for companies but we note that alternative approaches (such as funding the interest receivable at Bristol Water plc[31] other than through dividends paid by itself, and/or defining a repayment schedule such that Bristol Water plc receives the principal on these loans earlier than currently scheduled) would reduce or eliminate Bristol Water plc's requirement for external finance, and if these loans were repaid in full this would result in gearing of 43 per cent at Bristol Water plc.

TABLE 8 Loans advanced to Bristol Water Group Ltd

Agreement date	Loan advance date	Fixed interest rate %	Loan repayment date	Principal outstanding £
4 December 2003	12 February 2004	6.042	30 September 2033	47.0
10 June 2005	13 July 2005	5.550	30 September 2032	21.5
Total				68.5

Source: Bristol Water plc, Annual Report and Accounts 2009.

[30]Bristol Water plc, Annual Report and Accounts 2009: Other investments—Loans to ultimate UK holding company.
[31]Approximately £4 million per year.

CC assessment: projections for Bristol Water with lower gearing

47. As our initial assessment (see paragraph 30 above) indicated that Bristol Water's interest coverage ratios were below target levels at its existing gearing (and that, for the reasons set out above, it appeared to us realistic to assume that lower levels of gearing may reasonably be achievable by the company), we considered scenarios with lower gearing.

48. We considered a scenario with 60 per cent gearing. The modelling assumptions to achieve 60 per cent gearing starting with Bristol Water's existing gearing of 68.5 per cent and raising new equity of £45 million in 2010/11,[32] and £50 million new debt later in the forecast period (in other words, Bristol Water would finance investment via a combination of debt and equity, an assumption that we consider to be appropriate given the projected levels of capital investment that we have accepted as reasonable). Under this scenario, all credit ratios were in line with target, and the adjusted cash interest cover ratio averaged 1.6, as shown in Table 9.

TABLE 9 **Key financial ratios: 60 per cent gearing scenario**

	Target ratio	2010/11	2011/12	2012/13	2013/14	2014/15	Average*
Adjusted cash interest cover	1.6–1.8	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Net debt/RCV (%)	68–75	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Cash interest cover (FFO)	3.5	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Debt payback (FFO/debt) (%)	17	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Debt payback (RCF/debt) (%)	10	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: CC analysis.

*Average gearing 2011/12–2014/15: 60 per cent.
Note: Before CIS ratio.

49. In a downside scenario, a 2.5 per cent reduction in cash flow reduces the adjusted cash interest cover ratio by around 13 basis points, resulting in adjusted cash interest ratios of [✂]. We noted that this might not automatically indicate a lower credit rating as other ratios remained above target levels, and Bristol Water might be able to take compensating action, including deferring dividends to maintain its existing credit rating.

50. We also considered a more conservative scenario with 55 per cent gearing (this was the level of gearing shown for 2009/10 in Ofwat's PR04 projections). We modelled a notional balance sheet with 55 per cent average gearing (consistent with Ofwat's projections for the end of PR04) and assuming a 5 per cent dividend yield,[33] and we re-examined the credit ratios. The results are set out in Table 10, showing that all ratios were consistent with target levels.

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[32]New equity of £45 million in 2010/11 (yielding proceeds after fees of £43 million and equivalent to a participation of about 38 per cent based on notional equity). Dividends at 5 per cent of notional equity: £3.6 million in 2009/10, £5.9 million in 2010/11, growing at 2.1 per cent per year thereafter. £50 million new debt issued in 2012/13–2013/14.
[33]£60 million adjustment to 2010/11 balance sheet, resulting in notional equity of £132.2 million. Annual dividends £6.6 million in 2010/11, growth of 2.1 per cent per year. New debt £45 million in 2012–14.

TABLE 10   **Key financial ratios: 55 per cent notional gearing**

	Target ratio	2010/11	2011/12	2012/13	2013/14	2014/15	Average
Adjusted cash interest cover	1.6–1.8	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
Net debt/RCV (%)	68–75	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
Cash interest cover (FFO)	3.5	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
Debt payback (FFO/debt) (%)	17	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]
Debt payback (RCF/debt) (%)	10	[✄]	[✄]	[✄]	[✄]	[✄]	[✄]

Source: CC analysis.

Note: Before CIS ratio.

51. Given that the adjusted cash interest cover gave rise to some concerns at the actual gearing level, we performed a sensitivity analysis on these results to explore the effect on credit ratios of lower cash flow. We found that the adjusted cash interest cover ratio was particularly sensitive to the assumptions for net cash flow from operating activities. For example, a 2.5 per cent reduction in cash flow would reduce the ratio by approximately 14 basis points in any given year of the forecast. As a result, a downside scenario of 2.5 per cent applied across the forecast period reduced the adjusted cash interest coverage ratio to [✄], consistent with the target ratio. We noted that Bristol Water might need to take mitigating steps to comply with its licence conditions, such as suspending dividends to maintain this ratio above target values. However, we also noted that care should be taken not to place too much emphasis on the value of this particular ratio given its sensitivity to assumptions for operating cash flow and in light of the indication that the other credit ratios were consistent with higher credit ratings.

52. As a result of our analyses, we found that there are a number of feasible scenarios under which Bristol Water can finance its investment programme and maintain its investment grade credit rating. These may involve some combination of lower dividends and additional equity to fund the growth in the RCV at a lower level of gearing. Both 55 and 60 per cent gearing scenarios showed acceptable financial ratios.

53. We therefore conclude that the financeability assessment raises no concerns about our key inputs, including the WACC, and that a gearing level of 60 per cent is appropriate for our calculation of the WACC (see Appendix N).

54. Given this conclusion, we did not consider in detail the other potential financeability solutions (see paragraph 31) for Bristol Water but, as we did consider them in general terms, we set out our views on each briefly below.

Increase the proportion of debt assumed to be index linked

55. As noted above, index-linked debt involves lower interest payments and higher repayments than conventional debt (as long as the RPI is increasing). A higher proportion of index-linked debt (with similar gearing) therefore tends to reduce total interest payments, and would tend to ease any financeability constraints.

56. There are a number of factors that may limit companies' ability to increase the proportion of index linked debt:

(a) The proportion cannot increase above 100 per cent.

(b) There may be costs or practical difficulties in repaying existing conventional debt and replacing it with index-linked debt (so that index-linked debt may be most relevant for new debt).

(c) One rating agency (S&P) may treat indexation of index-linked debt as interest in calculating financial ratios, reducing the financeability benefit from index-linked debt.

(d) Most companies seem to prefer to issue a mixture of index-linked and conventional debt. Bristol Water's proportion of index-linked debt is already above average for water companies, at 60 per cent. Bristol Water told us that a drawback of index-linked debt was the volatility it could introduce into the profit and loss account in the event of changes in inflation. Due to this potential volatility, Bristol Water did not believe that including a higher proportion of index-linked debt was appropriate.

57. Index-linked debt may involve a higher cost (if the premium over gilts is greater than for conventional debt) and increasing the proportion may therefore increase the cost of capital and hence prices paid by customers. If the impact on prices is less than from reducing gearing, a higher proportion of index-linked debt may be an additional method of addressing a financeability problem.

58. Bristol Water already has about 60 per cent of debt index linked. We did not assume that it raised any additional index-linked debt in our projections (so that its proportion of index-linked debt declined in our projections). We note that if Bristol Water did issue new index-linked debt, this would improve its financial ratios.

Raise equity/constrain dividends

59. As discussed above, under some circumstances it might be appropriate to recognize a minimum level of gearing. If, at such a minimum level of gearing, there is still doubt about financeability, alternative methods of reducing debt would include reducing dividends and raising new equity. Raising new equity could involve additional costs (see Appendix N, paragraph 138) and it would seem appropriate to include such costs only if there were clear reasons why the initial gearing could not have been lower and why dividends could not be reduced.

60. In its FD09, Ofwat said that three companies (of which Bristol Water was one) had weaker financial ratios, associated with rapid RCV growth, and that in these cases Ofwat had assumed equity injections to relieve the financing constraint.[34] In the case of Bristol Water, Ofwat's assumed equity injection was 10 per cent of notional equity (RCV less net debt). Ofwat included transaction costs associated with the cost of new equity issuance, calculated as 5 per cent of equity raised. But it said that it would recover these transaction costs at the next price review in the event that the company did not issue equity in the period 2010–15 to finance its investment programme.

61. We note that Ofwat assumed that Bristol Water needed to inject 10 per cent of notional equity when it also assumed dividend payments totalling about 20 per cent of notional equity over the period. We also note that Ofwat's assumed injection (for which it included transaction costs) was in regard to Ofwat's notional gearing of 52.5 per cent, which was significantly below Bristol Water's actual gearing (net debt excluding preference shares / RCV), which was 76 per cent as at the end of March 2009 and 68.5 per cent at the end of March 2010.

62. Bristol Water made a number of criticisms of Ofwat's approach. We have considered some of these above under our consideration of reduced gearing (see paragraphs 33 to 43). Bristol Water also argued that the cost of raising equity might be materially in

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[34]Ofwat FD09, p140, paragraph 5.6.2.

excess of direct transaction costs if the market interpreted the need for finance as a signal that the share price was overvalued (leading to additional costs to shareholders in the form of a reduction in the value of their shares). We agree with Ofwat that, if additional equity is needed because of rapid RCV growth, there is no reason to expect the market to interpret the need for equity finance as a signal that the share price is overvalued.

63. Portsmouth Water and South East Water supported Bristol Water's points. Among the points made, South East Water said that, if equity injections were deemed to be a suitable response to a financeability gap, the cost of equity would need to be increased to reflect the short-term relative unattractiveness of the company to both debt and equity providers.[35] We have not seen evidence to support this point. It seems to us that water companies are valued principally on the basis of their RCV. Hence, potential capital growth as well as short-term ability to pay dividends would be relevant. A company with high capex (and hence increasing RCV) would have greater potential for capital growth, albeit (if highly geared) less potential to pay dividends in the short term.

Constrain capital expenditure

64. Constraining capital expenditure (for example, by delaying it until the next regulatory period) would disadvantage consumers, and it seems extremely unlikely that this could be justified to avoid the very small increase in prices that would result from other methods such as reducing gearing or increasing the proportion of index-linked debt.

Directly increase revenue during the next five years

65. Under this option, required revenue is increased until any financeability constraint is removed. As a result, prices are increased to consumers and the company earns a return greater than the cost of capital. As such, this option may be contrary to the consumer objective under WIA91 section 2(2A)(a).

66. It is possible, however, for an adjustment to be made to RCV so that the cost to consumers during the next period is offset by benefits to consumers in future periods. If so, there would just be an 'advancement' of revenue from future periods to the forthcoming period. This might be appropriate if a financeability problem was temporary, for example due to a short-term spike in capital expenditure. It does not seem appropriate for Bristol Water, as Bristol Water told us that it anticipated high levels of capital expenditure in the subsequent two periods (AMP 6 and AMP 7).

67. We would also regard a need for advancement of revenue in this way as potentially indicating that the calculation of regulatory depreciation (and/or other allowances for capital consumption) was too low. Any such need should be a trigger for a re-evaluation of the methodology used in these calculations.

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[35]South East Water submission, Section 1.2: www.competition-commission.org.uk/inquiries/ref2010/bristol/pdf/ 100331_south_east_waters_%20submission_to_the_cc%20on_bristol_vs_2_2_.pdf.

Glossary

Adjustment factor See **K factor**.

AMA Asset Management Assessment: a process applied by **Ofwat** to set the amount of capital maintenance expenditure (see **capex**) that it assumes in price limits.

AMP Asset Management Plan: a plan submitted by a water company to **Ofwat** for a five-year period.

AMP period A five-year period in relation to which an **AMP** is submitted by water companies to **Ofwat**: AMP2—the AMP period 1995–2000; AMP3—the AMP period 2000–2005; AMP4—the AMP period 2005–2010; AMP5—the AMP5 period 2010–2015; and AMP6—the AMP period 2015–2020.

Bristol Water Bristol Water plc.

Bristol Water reply **Bristol Water**'s reply to **Ofwat response**, submitted to the **CC** on 17 March 2010.

BRL A term occasionally used by **Ofwat** to refer to **Bristol Water** and which hence appears in certain **Ofwat** comments about **Bristol Water**.

Capex Capital expenditure. For **Bristol Water**, capex may be categorized as either capital maintenance (or base capex), which is the capex needed to maintain **Bristol Water**'s assets in the condition necessary to deliver stable levels of **serviceability**, and enhancement capex, which is capex to create new assets to deliver improved levels of **supply demand balance**, **resilience**, and water **quality**.

CBA Cost benefit analysis: an analysis of the cost effectiveness of different alternatives in order to see whether the benefits outweigh the costs.

CC Competition Commission.

CCD Current cost depreciation: the reduction in the value of an asset over its useful life based on its current replacement cost.

CCWater The Consumer Council for Water. A statutory consumer body representing water and sewerage consumers in England and Wales.

Charges limit The maximum amount a water company may charge under the terms of its **licence**. Condition B 3.2 of **Bristol Water**'s **licence** defines the charges limit as **RPI + K** where **RPI** is the percentage change in the retail prices index between November in the prior year and the immediately preceding November and **K** is the **adjustment factor**.

CIS Capital Expenditure Incentive Scheme: a scheme introduced by **Ofwat** in **PR09** to give water companies an incentive to forecast

their **capex** as accurately as possible. The calculation of the CIS ratio is the ratio of company's projected **capex** to **Ofwat**'s assessment of projected **capex**. In calculating the CIS ratio, **Ofwat** makes two types of adjustment. It makes one-sided adjustments where it excludes **capex** from its own projection (this increases the CIS ratio). It makes two-sided adjustments where it excludes **capex** both from its own projection and from the water company's projection. Two-sided adjustments are neutral: the water company is not penalized for having included the relevant amount in its **capex** projection.

COPI	The construction output price index, a measure of capex inflation.
Cost of capital	See **WACC**.
DD09	**Ofwat**'s draft determination of water companies' price limits for the period 1 April 2010 to 31 March 2015.
DWI	Drinking Water Inspectorate.
EA	Environment Agency.
FBP	**Bristol Water**'s final business plan submitted to **Ofwat** in April 2009.
FD	Final determination: produced by **Ofwat** at the end of each **periodic price review**, setting out the **K factor**s for each water company. To indicate which one is being referred to a year indication is added, for example the most recent final determination for the period 1 April 2010 to 31 March 2015 is referred to as 'FD09', the one from 2004 as 'FD04' and so on.
Gearing	A company's net debt expressed as a percentage of its total capital. For **Bristol Water**, this is calculated as: net debt/**RCV**.
Halcrow	Halcrow Management Sciences Limited, the consultant engineers engaged by the **CC** to advise it about **Bristol Water**'s **capex** proposals.
IDoK	Interim Determination of K: a new determination of the **K factor** by **Ofwat** between **periodic price review**s in response to changes in circumstance as set out in Condition B of the **licence**.
June return	A return which each water company is required to provide annually to Ofwat. This provides the financial and performance information needed to ensure that a water company is complying with its instrument of appointment.
K or K factor	At each periodic review **Ofwat** determines K factors for each year of the five-year price control period. K factors are different for each water company and represent the amount by which a company is allowed to increase customers' bills in real terms. The price limits **Ofwat** sets for companies are accompanied by a set of outputs that **Ofwat** expects the company to deliver within those price limits. Also known as an **adjustment factor**.

Licence	An instrument appointing a water undertaker (or water and sewerage undertaker) under Part II of the **WIA 91**.
Logging up	A process by which **Ofwat** takes into account at the next **periodic price review** any qualifying net additional costs (or reductions in outputs and associated costs, as the case may be) which have not been taken into account in the current periodic review or in an **interim determination of K**.
NI	Notified item: an item listed by **Ofwat** in a final determination which, if its cost changed, could be used by water companies as a reason for a request for an **IDoK**. A 'one way' NI allows the water company to request that **Ofwat** make an allowance before the next **periodic price review** if certain conditions are met. A 'two way' NI also allows **Ofwat** to intervene to reduce an allowance.
Ofwat	The Water Services Regulation Authority. The economic regulator of water and sewerage companies in England and Wales.
Ofwat response	**Ofwat**'s response to **Bristol Water**'s **SoC**, submitted to the CC on 3 March 2010.
Opex	Operating expenditure. For **Bristol Water**, opex may be categorized as base opex, which is the expenditure necessary to maintain stable serviceability, and enhancement opex, which is the expenditure necessary to support enhancement **capex** (in terms of **supply demand balance**, **resilience** and water **quality**.)
Periodic price review	The process undertaken every five years by **Ofwat** to determine water company price limits for the next five years. PR94 covered the period from 1995 until 2000; PR99 the period from 2000 until 2005; PR04 the period from 2005 until 2010; and in particular **PR09** covered the period from 1 April 2010 until 31 March 2015. PR14 will cover the period from 2015 to 2020.
Quality (projects)	One of the categories of water company enhancement **capex**, referring to projects aimed at improving water quality.
RCV	Regulatory capital value. The capital base used in setting price limits. The RCV was the market value initially assigned to each company prior to PR94 and now includes the net movement from this opening position of any additional net capital expenditure, less **CCD** and infrastructure renewal charges.
Reporter	An independent engineering expert appointed to review all regulatory submissions by **Bristol Water** and provide objective advice regarding those submissions to **Ofwat**. The Reporter provides advice to **Ofwat** but is appointed by **Bristol Water** in accordance with **licence** conditions B and C.
Resilience (projects)	One of the categories of water company enhancement **capex**, referring to projects designed to enhance the resilience of water supplies.
RPI	Retail prices index: a general purpose domestic measure of inflation in the UK.

Serviceability	**Ofwat** measures serviceability by reviewing the trend in the number of actual incidents on the companies' networks, such as regulatory compliance failures at water treatment works for above-ground assets, and burst water mains for underground assets. The reference level of service is determined from a specific subset of public health, environmental and customer service indicators.
SoC	**Bristol Water**'s Statement of Case, submitted to the **CC** on 17 February 2010.
Supply demand balance (projects)	One of the categories of water company enhancement **capex**, referring to projects aimed at ensuring that there is sufficient supply of water to meet overall demand.
WACC	The weighted average cost of capital of a company, taking account of its various sources of finance. The 'vanilla WACC' is the weighted average real pre-tax cost of debt and real post-tax cost of equity, where tax is UK corporation tax. There are various approaches to calculating WACC and the appropriate method depends upon the context.
WaSC	Water and sewerage company. WaSCs provide water and sewerage services.
Water UK	A water industry association, representing UK statutory water supply and wastewater companies.
WIA91	Water Industry Act 1991 (as amended).
WoC	A water-only company. WoCs provide water but not sewerage services.