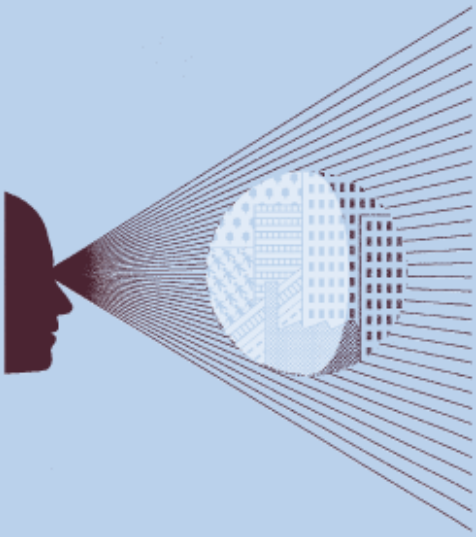
Oxera

What is the evidence on required returns for water-only companies at PR14?

Prepared for a selection of water-only companies

November 2013



Executive summary

In 2014, Ofwat will determine prices that water companies in England and Wales are allowed to charge over the next five-year period covering 2015–20, referred to as AMP6. As part of the ongoing price review process (PR14) the six smallest water-only companies (WOCs, referred to throughout this report as the 'small WOCs') have commissioned Oxera to review the evidence on returns required by investors to provide financing to the industry. The small WOCs that have commissioned Oxera are Bristol Water, South Staffordshire Water (including the acquired Cambridge Water business), Sutton & East Surrey Water, Sembcorp Bournemouth Water, Portsmouth Water, and Dee Valley Water.

To set prices, Ofwat will need to determine how much profit (return) it should include in the regulated companies' allowed revenues to ensure that investors are compensated for the risk of investing in the individual water companies, and, in turn, to enable companies to raise finance on reasonable terms to finance their investment programmes.

The introduction of two separate price controls—an important change in PR14—means that Ofwat will need to determine an appropriate return separately for wholesale and retail businesses, rather than for the entire business.

In this report, Oxera reviews the evidence for estimating the allowed rate of return for the water industry (both the wholesale and the retail business), drawing on quantitative and qualitative evidence, and regulatory best practice.

Based on Ofwat's methodology statement, it is not clear that there is a material transfer of risk from the wholesale business to retail that would allow a robust estimation of the difference in risk between the wholesale and the vertically integrated business. Therefore, in the absence of clarity around how risk will be distributed between wholesale and retail, we do not make any explicit adjustments to the asset beta derived for the vertically integrated business to arrive at a plausible asset beta range for the wholesale business.

In the past, the allowed rate of return for WOCs has typically been set at a higher level than for larger water and sewerage companies (WASCs). Therefore, this report also considers whether there is evidence of differences between WOCs and WASCs in their risk profiles, and in the availability and cost of different types of financing.

Applying the standard techniques used by regulators to estimate the allowed rate of return is challenging in the current market environment. Capital markets are influenced by macroeconomic policy, which has created an unusual source of uncertainty and volatility in some of the parameters. While there is a reasonable amount of data on the costs of debt finance, forecasting the appropriate cost of equity for the next regulatory period is more difficult than in the past.

Wholesale return—industry (WASCs)

Cost of debt

The cost of debt is estimated as a weighted average of the costs of existing and new debt, consistent with the approach taken in PR09.

– For the cost of existing debt, it is appropriate to use an industry average embedded cost of debt. The weighted average cost of existing debt for WASCs is estimated to be 2.7% (real). This number is cross-checked against wider corporate bond market data.

– Relative to the past, the observed cost of debt in the secondary market is currently low, but evidence from forward markets clearly indicates that it is expected to rise over the course of AMP6. Based on the expected increase in government bond yields over AMP6 and historical evidence on average debt premiums for investment-grade debt, we estimate a range of 2.2–2.5% (real) for the cost of new debt.

– A 10 basis point (bp) allowance is included for transaction costs for issuing debt.

– Assuming the same industry refinancing profile as in PR09, the range for the total cost of debt is **2.7–2.8%**.

Cost of equity—market parameters

Government bond yields (which are typically used to proxy the risk-free rate, RFR) declined significantly in the aftermath of the financial crisis, largely driven by the extraordinary loosening of central bank monetary policy to alleviate the impact of the crisis. Real government bond yields in a number of major economies, including the UK and USA, have been persistently negative, implying that investors will receive less money in real terms in the future than they invest today—this is highly unusual and cannot be expected to persist.

Evidence from forward markets implies that government yields are expected to rise over the course of AMP6, although how quickly they will rise is uncertain. This is an important consideration in the forthcoming price review.

Government bond yields have also been volatile in the post-crisis period, especially in recent months, due to speculation about the timing of the withdrawal of the unconventional monetary policy measures. The volatility of these yields seems incompatible with the notion of a risk-free asset in cost of capital models.

Notwithstanding this uncertainty, there is generally greater consensus among regulators on the appropriate level of total expected market returns than on its individual components, the RFR and the equity risk premium (ERP). For regulated companies with equity betas at or close to one, this decomposition is less important than the total market return.

Based on a review of long-term historical market evidence and regulatory precedent, we consider a range of **6.5–7.0%** for the total real market return to be appropriate. We propose to decompose the total market return in a way that is consistent with taking a long-term view of the data: on this basis, we propose an RFR of **1.25–1.50%** and an ERP of **5.25–5.50%**.

An RFR of 1.25–1.50% is materially above current spot government bond yields. We believe that, for the reasons set out above, this is a reasonable approach to ensure that necessary long-lived investments can be financed over the forthcoming price control period.

Cost of equity—industry risk

As for the risk of the water industry relative to the market, an industry range for the asset beta of **0.30–0.40** is recommended. This range is below that used at the previous price review but above that implied by measured equity betas. Factors taken into consideration include the following.

– With fewer market datapoints available to estimate the asset beta directly, and no evidence of a fundamental shift in the risk profile of the industry, we consider it reasonable not to depart markedly from the assumption used in the previous review. Therefore, we believe that an asset beta assumption of 0.40 that was within the range used at PR09 provides a plausible upper bound for PR14.

– The assessment of market data indicates lower asset and equity betas than at PR09. If some weight is placed on recent trends in the market data, given the long-lived nature of

the industry, more weight should be given to beta estimates derived using a longer time frame. On this basis, our proposed lower bound for the asset beta at PR14 is 0.30.

Using a notional level of gearing of 60% (the bottom of Ofwat's proposed range for PR14) implies a range for the equity beta of 0.75–1.00. At these levels of the equity beta, the sensitivity of the weighted average cost of capital (WACC) to the precise decomposition of the total market return is low.

Overall WACC for the WASCs
Taken together, this produces a **vanilla WACC range of 3.7–4.5% for the WASCs**.

Small-company premium

Small-company premium—debt
Relative to the WASCs, the WOCs have a much more limited number of sources of debt finance available to them—this limited supply of funds implies that WOCs typically obtain funds at less competitive rates than WASCs.

- Only the largest WOCs have been able to access the bond markets directly.
- Empirical evidence shows that the cost of accessing bond markets has, on average, been greater for the WOCs than for the WASCs.
- In the past, a number of WOCs have accessed bond markets indirectly through Artesian finance facilitated by monoline insurers. However, as the financial crisis put an end to the monoline insurers, such financing vehicles are no longer available.
- While being an efficient way to raise debt at the time by matching longer-lived assets with longer-maturity debt and by reducing the reliance on bank debt, empirical evidence shows that Artesian loans cost more than similar WASC bonds.
- The combination of existing bond and Artesian debt comprises more than three-quarters of the existing portfolios of the small WOCs. The real cost of this debt is in the range of 2.9–3.6%, with an average above 3%. This is higher than the cost of existing debt for WASCs. As none of this debt will mature over AMP6, a number of the WOCs are locked into paying a higher interest rate than the WASCs for the duration of the price control.
- The only other available source of finance for WOCs is bank debt. In the absence of future Artesian-type structures, bank financing will remain the primary source of any new debt over AMP6 for most of the small WOCs.
- As bank debt is more expensive than bond debt, and given that the WOCs have typically far fewer bank relationships than the WASCs, the cost of existing bank facilities and any new bank facilities required over AMP6 will remain higher for WOCs than for WASCs.

The combination of these factors suggests that **the overall cost of debt for WOCs is higher than that for the WASCs**. The difference is estimated to be in the range of **0.3–0.8%** on the overall cost of debt.

Small-company premium—equity
A review of the revenue and cost make-up of the WOCs and WASCs suggests that the WOCs have higher operational gearing (the relative share of fixed costs in the cost structure) than the WASCs. This implies that the impact of any revenue or cost shock on profits is typically higher for the WOCs than for the WASCs.

- While there is no universally agreed methodology for translating the impact of higher operational gearing into an uplift to the asset beta, there is theoretical support for the link between higher operational gearing and systematic risk, and hence, the asset beta.

– Having considered a number of possible metrics of operational gearing, and regulatory precedent—in particular, the Competition Commission findings in the Bristol Water appeal—**an uplift to the WASC asset beta of 0.05 is appropriate**. This produces a range for the asset beta for WOCs of 0.35–0.45.

The higher systematic risk exposure of WOCs also implies that a lower notional gearing assumption would be appropriate for the WOCs relative to the WASCs. For illustration purposes, a notional gearing level of 60% and 55% is used for the WASCs and the WOCs respectively. It will be up to the individual companies to determine the level of notional gearing appropriate for their business plans.

Wholesale return—summary

At the level of the overall WACC, this evidence translates into an uplift of 0.4–0.7% for the WOCs relative to the WASCs, at the chosen levels of gearing.

Proposed range for the PR14 wholesale WACC—summary

	WASCs		WOCs	
Parameter	**Low**	**High**	**Low**	**High**
Real RFR (%)	1.25	1.50	1.25	1.50
ERP (%)	5.25	5.50	5.25	5.50
Asset beta	0.30	0.40	0.35	0.45
Equity beta	0.75	1.00	0.78	1.00
Cost of equity (post-tax real, %)	5.2	7.0	5.3	7.0
Gearing (%)	60.0	60.0	55.0	55.0
Cost of debt (pre-tax real, %)	2.7	2.8	3.0	3.6
Vanilla WACC (real, %)	**3.7**	**4.5**	**4.0**	**5.1**
Small-company premium (%)			**0.4**	**0.7**

Note: Numbers may not add up due to rounding.
Source: Oxera analysis.

Values in the lower half of the estimated range are less plausible than those in the upper half of the range because the lower part of the range implies a relatively low risk premium for investing in the water company's equity compared with the risk premium on debt.

If the parameter values at the bottom of the estimated range for WASCs are used to calculate the cost of equity for an all-equity-financed firm, the resulting cost of equity is not much higher than the cost of debt. The cost of equity of an all-equity financed firm would be 2.8% compared with the cost of new debt of 2.3%, including transaction costs of issuance; the risk premium of new equity over new debt is therefore only 0.5%. Given that equity investors face considerably more risk than debt investors, the difference between the cost of equity and the cost of debt looks small.

Within the regulatory framework, it is important that a consistent approach to the relative risks of debt and equity prevails over time, and that this accords with expectations in the capital markets.

Other considerations that affect the choice of the point estimate from within the range and that are likely to suggest an estimate in the upper half of the range include:

– ongoing challenges in interpreting market evidence within a standard capital asset pricing model (CAPM) framework;

– Ofwat's financeability duty, and the need to ensure that companies have access to capital markets on reasonable terms, in an environment of rising interest rates;

– other cross-checks, such as the evidence from the dividend growth model.

However, the choice of the point estimate from within the proposed range will ultimately reflect the individual company's judgement and the overall consistency with the rest of the business plan. For example, the outcome of the financeability assessment might affect the overall judgement about which point estimate of the WACC represents the right balance between different stakeholders.

Retail return

The key objectives of setting separate price controls in the future are to:

– create the conditions for competition in the non-household market;
– provide targeted incentives across the different parts of the value chain, with both household and non-household retail businesses being more responsive to customer needs and putting more cost pressure on the wholesale business.

To meet these objectives, it is important to estimate the return that a stand-alone retail operator, dealing at arm's length with the wholesale business, would need to earn to remain financially viable in the market. This means that, in the absence of any robust evidence of a material transfer of risk from the wholesale business to the retail business, the total allowed return across the whole value chain may increase.

To capture the asset-light nature of retail businesses Ofwat has proposed to use a return on sales metric or net margin (defined as operating profit over turnover). Drawing on comparator evidence from other industries is likely to be the most appropriate way to estimate the net margin—in particular, evidence from retail businesses providing other utility services.

Energy retailers are likely to be the most suitable comparator group for the water retail market, of those comparators considered. The average net margins earned in energy have been in the range of 1.0–4.0% over the past five years, depending on the customer type.

As data on the precise contractual arrangements in energy retailing, as well as other comparators, is not generally available, no adjustments are made for any differences in the relative capital intensity (including working capital). Based on the evidence that is available, for the non-household market, a range of **2.0–4.0%** is suggested. Given the importance of stimulating competition, it would be appropriate to choose an estimate towards the top end of this range since the costs of foreclosing new entry are likely to be greater than the costs associated with the incumbents overcharging customers, at least initially.

For the household market, a lower margin would be appropriate, given that there are no immediate prospects for competition. Nevertheless, it is important to ensure financial viability of the retail business on a stand-alone basis, as well as to allow for potential future changes in the market, and to ensure a coherent regulatory framework across the household and non-household segments. A margin in the range of **1.0–2.0%** is considered appropriate, with the midpoint of the range representing a reasonable point estimate.

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1 Introduction

In 2014 Ofwat will determine prices that water companies in England and Wales are allowed to charge over the next five-year period covering 2015–20, referred to as AMP6. As part of the ongoing price review process (PR14), the six smallest water-only companies (WOCs, referred to throughout this report as the 'small WOCs') have commissioned Oxera to review the evidence on returns required by investors to provide financing to the industry. The small WOCs that have commissioned Oxera include Bristol Water, South Staffordshire Water (including the acquired Cambridge Water business), Sutton and East Surrey Water, Sembcorp Bournemouth Water, Portsmouth Water, and Dee Valley Water.

To set prices, Ofwat will need to determine how much profit (return) it should include in the allowed revenues of the regulated companies to ensure both that investors are compensated for the risk of investing in the individual water companies, and that companies can raise finance on reasonable terms to finance their investment programmes.

This report presents methodological considerations and empirical evidence that Oxera considers are relevant for the debate on setting the allowed rate of return at PR14. To that end, Oxera recommends a reasonable range for the key parameters underpinning the calculation of the allowed return, as well as some indications of where within this range we would expect a reasonable regulatory decision to sit.

However, each individual company relying on this report will need to consider what evidence is most relevant for its own business plan, taking into account the other elements of its plan in the round with its financing proposals, as well as taking into account the discussions with its customers.

Compared with previous price reviews, Ofwat is introducing some significant changes to how it determines allowed revenues, including:

– the introduction of two separate price controls—one for the wholesale part of the business and one for the retail part—instead of one price control covering the entire value chain;

– a more proportionate approach to regulation, including a risk-based review of business plans that aims to place different levels of scrutiny on the plans depending on the quality of the evidence submitted and the stakeholder support behind the plans;

– an increased focus on delivering the outcomes that customers want and are willing to pay for in the long run, including enhanced stakeholder engagement and greater ownership of business plans by companies;

– a number of changes to the cost assessment and cost recovery framework, to provide better value for money and encourage more innovation from companies.

One of the most significant changes in PR14 affecting how the allowed return for companies is determined is the introduction of separate price controls for wholesale and retail. Ofwat will now need to determine the appropriate return allowance separately for wholesale and retail, rather than for the entire business.

For the wholesale business, Ofwat has confirmed that it will continue to estimate a weighted average cost of capital (WACC) that will be applied to the regulatory capital value (RCV) of the companies to estimate allowed profit, largely unchanged from previous reviews:

– the cost of equity will be estimated using the capital asset pricing model (CAPM) as a primary tool with cross-checks;[1]
– the cost of debt will be fixed for the duration of the price control, as before;
– the proposed notional gearing range for AMP6 will be between 60–70%.

For the retail business, Ofwat will remunerate the business using a return on sales approach, expressed as a net margin (defined as operating profit over turnover). This will need to reflect the remuneration required to finance capital employed, as well as to compensate the company for the risks of the retail operations. There will also be a distinction between household (HH) and non-household (NHH) markets, with the NHH market expected to be opened up to competition from 2017.

In this report, Oxera reviews the evidence for estimating the allowed rate of return for the water industry (both the wholesale and the retail business), drawing on quantitative and qualitative evidence, and regulatory best practice.

To estimate the wholesale WACC, the report draws on evidence for the vertically integrated water companies. Based on Ofwat's methodology statement, it is not evident that there is a material transfer of risk from the wholesale business to retail that would allow a robust estimation of the difference in risk between the wholesale and the vertically integrated business. Therefore, in the absence of clarity around how risk will be distributed between wholesale and retail, we do not make any explicit adjustments to the asset beta derived for the vertically integrated business to arrive at a plausible asset beta range for the wholesale business.

The estimation of the wholesale WACC is first performed for the industry on average, based on evidence for larger water and sewerage companies (WASCs). Separately, we then consider whether there is evidence of differences between the WOCs and the WASCs in their risk profiles, and in the availability and cost of different types of financing.

To estimate the wholesale return, we primarily use the CAPM-WACC framework. However, we also consider the reasonableness of the results produced by this framework.

To estimate the appropriate margin for retail, we estimate the required return for a stand-alone retail business, which, Oxera considers, is consistent with Ofwat's objectives of:

– promoting competition in the non-household retail market;
– providing targeted incentives across the different parts of the value chain, with both HH and NHH retail businesses being more responsive to customer needs and placing more cost pressure on the wholesale business.

The report is structured as follows:

– section 2 considers the evidence on the industry (WASC) cost of debt;
– section 3 discusses the appropriate market parameters—the risk-free rate (RFR) and the equity risk premium (ERP);
– section 4 reviews the evidence on the relative risk of the industry, measured by the beta parameter in the CAPM framework;
– section 5 explores the evidence for a premium in the wholesale return for the small WOCs relative to the WASCs;
– section 6 brings together the evidence on the wholesale WACC;
– section 7 estimates the net margin for retail.

Further supporting evidence is provided in the appendices.

[1] The CAPM–WACC model, including the relationships between the individual parameters, is explained in appendix 1.

2 Cost of debt—industry

The cost of debt is estimated as a weighted average of the costs of existing and new debt, consistent with the approach taken in PR09.

– For the cost of existing debt, it is appropriate to use an industry average embedded cost of debt. The weighted average cost of existing debt for WASCs is estimated to be 2.7% (real). This number is cross-checked against wider corporate bond market data.

– Relative to the past, the observed cost of debt in the secondary market is currently low, but evidence from forward markets clearly indicates that it is expected to rise in future. Based on the expected increase in government bond yields over AMP6 and historical evidence on average debt premiums for investment-grade debt, we estimate a range of 2.2–2.5% (real) for the cost of new debt.

– A 10 basis point (bp) allowance is included for transaction costs for issuing debt.

– Assuming the same industry refinancing profile as in PR09, the range for the WASC total cost of debt is **2.7–2.8%**.

2.1 Cost of existing debt

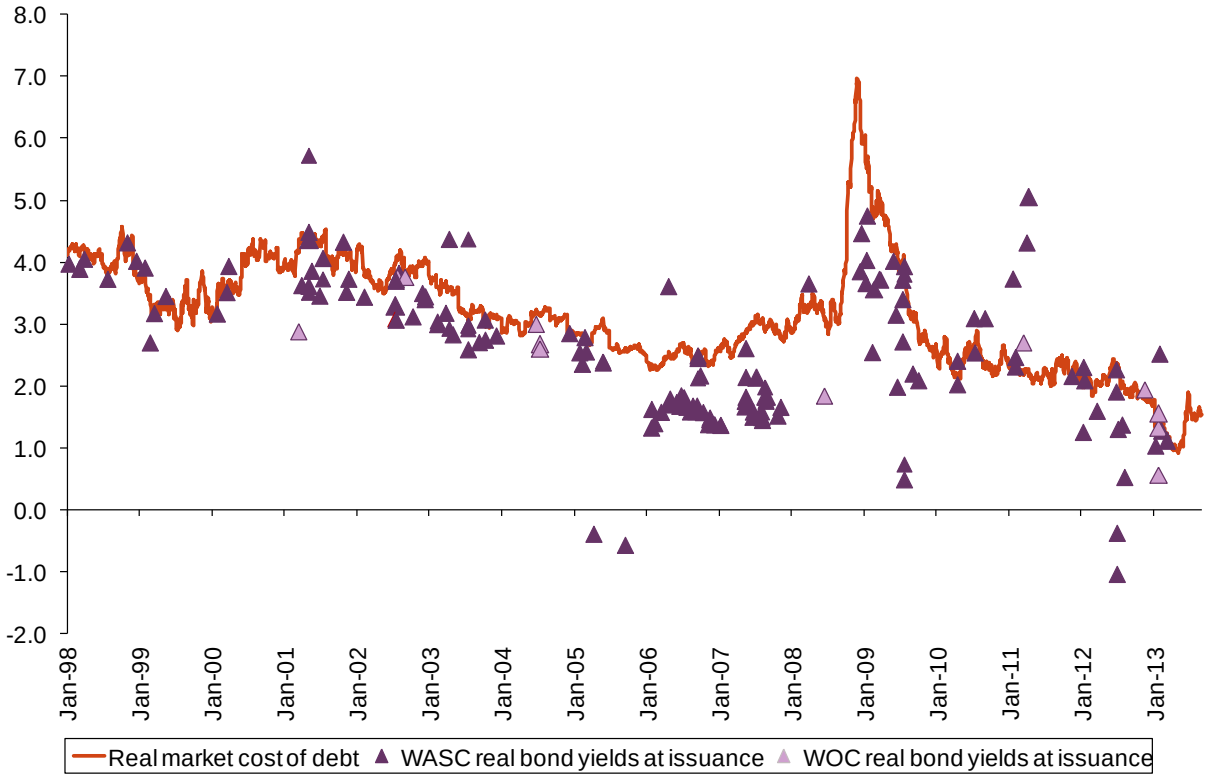
Using data on outstanding bonds issued by the WASCs, the weighted average real cost of existing bond debt for WASCs is estimated to be 2.7%.[2] This is broadly similar to the ten-year average of secondary A and BBB yields of 2.7% (Table 2.1). Most WASCs have issued bonds at yields below the market cost of debt at the time, which suggests that debt has been incurred efficiently (Figure 2.1).[3]

The estimate of 2.7% is based on bond data only and does not include bank debt costs. However, bond debt dominates WASCs' existing debt portfolios. As it is common for regulators to estimate the cost of debt primarily with reference to bond data, 2.7% is considered to be a reasonable estimate of the cost of existing debt of WASCs.

[2] The data on outstanding fixed-rate water bonds is obtained from Dealogic. The average cost of debt is calculated as the average real yield at issuance weighted by the value of the bond proceeds. The bonds include both index-linked and nominal bonds.

[3] The market cost of debt is based on the deflated average of A and BBB iBoxx 10+ non-financial indices. This is considered to be an appropriate benchmark for investment-grade water bond issues which typically have a maturity greater than ten years.

Figure 2.1 Water company bond issues and market cost of debt, yields (%)



Note: Yields at issuance include nominal and index-linked bond issues. Nominal yields have been converted into real yields using 10-year break-even inflation at the date of issuance. The market cost of debt is based on the average of yields on iBoxx A and BBB 10+ non-financial indices, deflated using 10-year break-even inflation.
Source: Datastream, Dealogic, and Oxera analysis.

Table 2.1 A and BBB iBoxx 10+ non-financial corporate bond indices, yields and spreads (%)

	Broad A rating	Broad BBB rating	Average
Real yields[1]			
Spot	1.3	1.8	1.5
Six-month average	1.1	1.5	1.3
10-year average	2.5	3.0	2.7
15-year average	2.9	3.3	3.1
Spreads[2]			
Spot	1.7	2.2	2.0
Six-month average	2.1	2.4	2.2
10-year average	1.6	2.1	1.8
15-year average	1.5	2.0	1.7

Note: Data up to August 30th 2013. [1] Nominal yields have been deflated using 10-year breakeven inflation at the relevant date. [2] Spreads are calculated relative to 10-year benchmark government bonds.
Source: Datastream, and Oxera analysis.

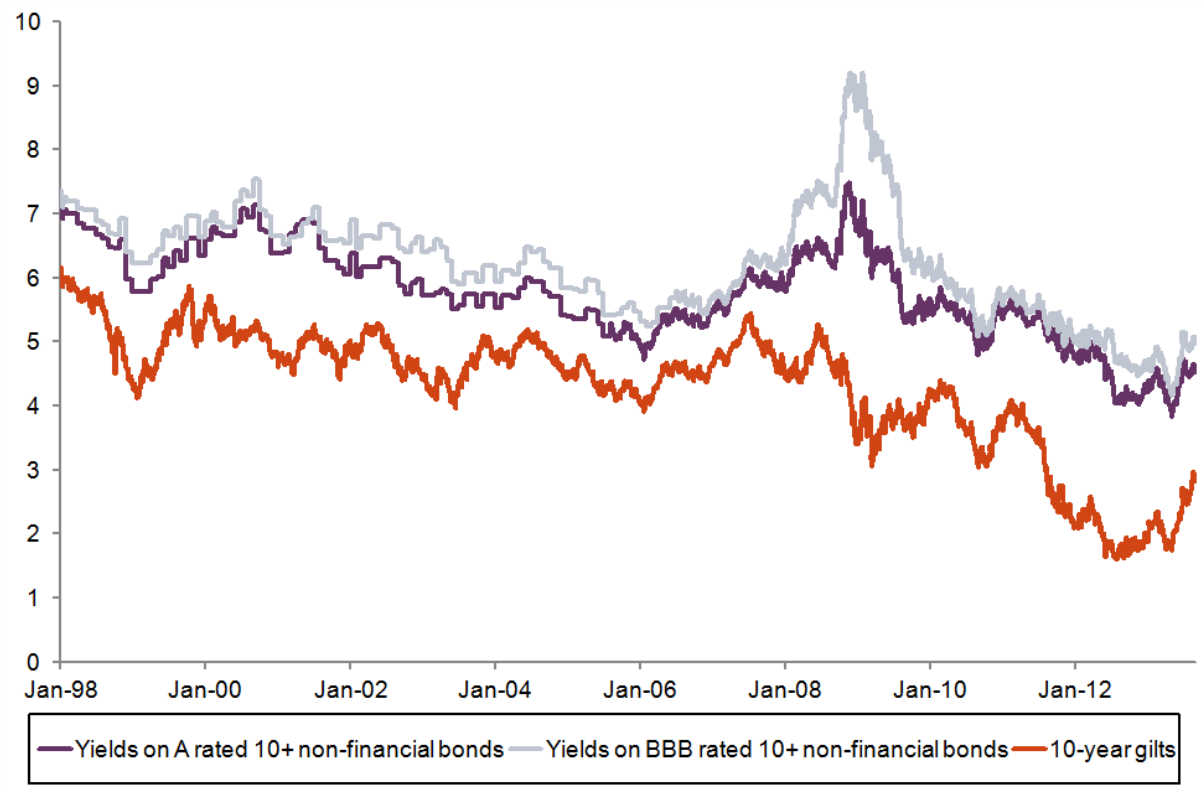
2.2 Cost of new debt

Since PR09, debt yields have followed a declining trend, driven largely by the decline in government bond yields (Figure 2.2), but moderated by the small increase in debt premia:

– A and BBB debt is trading currently at an average of 1.5% real (compared with longer-term averages of 2.7–3.1%) (Table 2.1);

– spreads on A and BBB debt are currently around 200bp, slightly higher than the long-run averages of around 170–180bp.

Figure 2.2 A and BBB iBoxx 10+ non-financial corporate bond indices and ten-year benchmark UK government gilts, nominal yields (%)

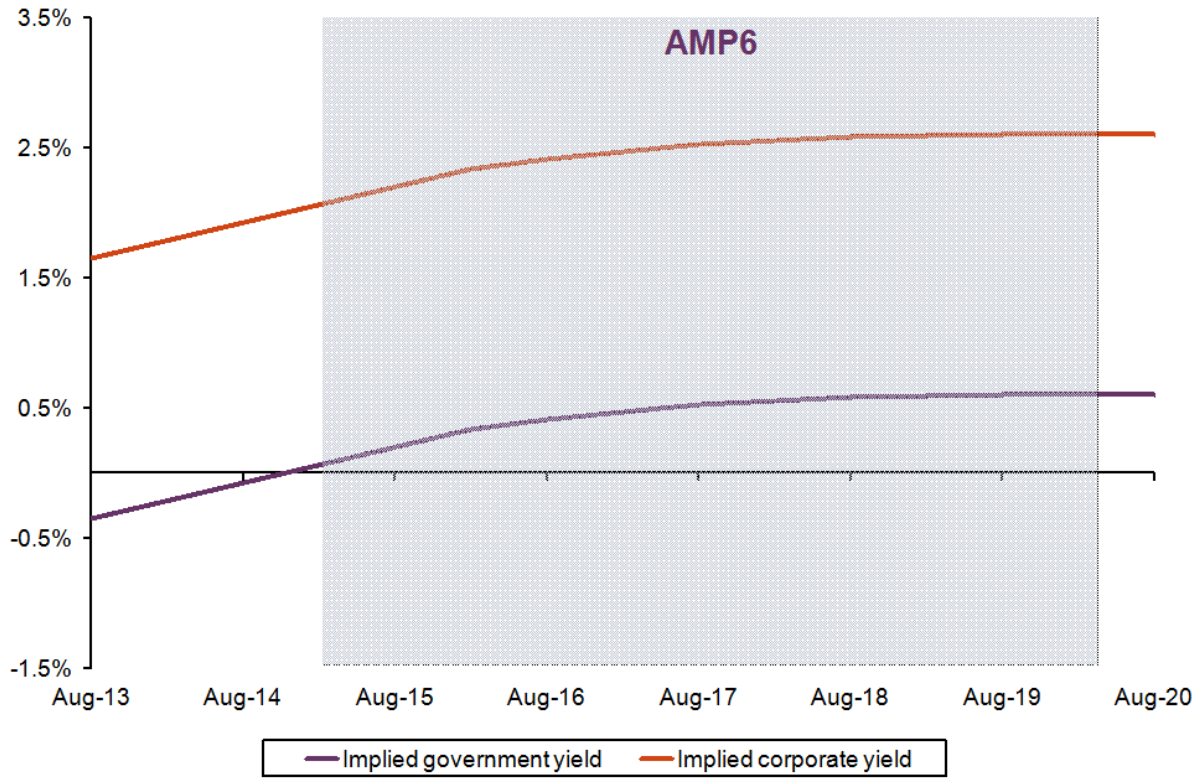


Source: Datastream, and Oxera analysis.

However, debt yields have started to increase since May 2013. Evidence from forward markets implies an average real forward-looking cost of corporate debt over AMP6 of ~2.5% (Figure 2.3). This is based on the real ten-year gilt yield of 0.5% that is currently projected to prevail over AMP6 (based on the forward yield curve), and assuming that spreads remain constant at current levels of 200bp. We consider 2.5% to be a reasonable estimate of the upper bound for the cost of new debt.

To estimate the lower bound, we use a more conservative assumption that, as interest rates rise, the spreads will tighten closer to longer-run averages, implying slightly lower forward-looking debt costs than 2.5%. Adding a spread of 170bp (consistent with longer-run averages from Table 2.1) to the forward real government bond rate of 0.5% produces a value of 2.2% as the lower bound for the cost of new debt.

Figure 2.3 Real forward-looking cost of debt (%)



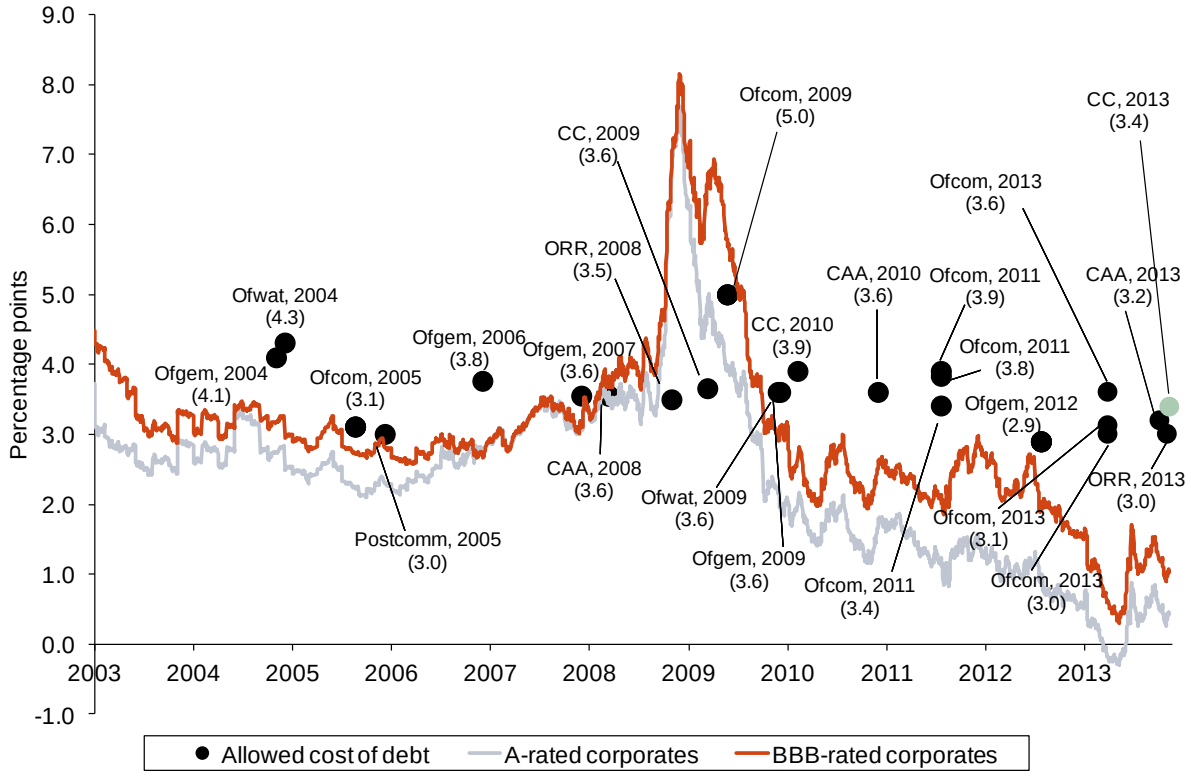
Note: As at August 30th 2013. The forward-looking real cost of corporate debt is obtained by adding a constant spread of 200bp to the implied ten-year real government bond yield derived from forward rates.
Source: Bank of England, Datastream, and Oxera analysis.

Overall, given market expectations of increases in yields, we consider a range of 2.2–2.5% for the cost of new debt appropriate.

2.3 Regulatory precedent

The most relevant recent regulatory decisions include Ofgem, ORR, and the CAA, which suggest a range of 2.9–3.2% (Figure 2.4). The top end of this range is for airports, which are higher-risk than water companies, and as a result their debt costs would be expected to be higher. The low end of the range is based on the Ofgem allowance of 2.9%. However, this allowance applies only to the first year for the transmission and gas distribution price controls (2013–14). It is likely to decrease throughout the eight-year price control period (2013–20) as the allowed cost of debt will be updated annually based on movements in the historical ten-year average of corporate bond yields.

Figure 2.4 Regulatory precedent on the allowed real cost of debt



Note: CC, Competition Commission; ORR, Office of Rail Regulation; CAA, Civil Aviation Authority. Green dots denote initial proposals, not final decisions.
Source: Oxera analysis, based on regulatory documents and data from Datastream.

2.4 Total cost of debt

The existing cost of debt is estimated at 2.7%, and the cost of new debt at 2.2–2.5%. In addition, it is appropriate to include an allowance for transaction costs associated with debt issuance. These costs include ongoing commitment, agency and arrangement fees paid to lenders, rating agencies and arrangers of finance. Based on regulatory precedent, an allowance of 10bp is added to the total cost of debt to account for these fees.[4]

Taking all the evidence together, and assuming the same refinancing profile as in AMP5—that the proportion of new and refinanced debt would be 25% over the price control period—gives an all-in cost of debt estimate of **2.7–2.8%**.

Table 2.2 Estimate of the total real cost of debt for WASCs (%)

	Low	High
Cost of existing debt	2.7	2.7
Cost of new debt	2.2	2.5
Expected proportion of new/refinanced debt (same as PR09)	25.0	25.0
Total cost of debt before transaction costs	2.6	2.7
Transaction costs	0.1	0.1
Total cost of debt	**2.7**	**2.8**

Source: Oxera.

[4] Competition Commission (2010), 'A reference under section 12(3)(a) of the Water Industry Act 1991', Appendix N, August.

2.5 Gearing

In the methodology statement, Ofwat proposes a range of 60–70% for the notional gearing. This is higher than the assumptions used at PR09: 57.5% (WASCs) and 52.5% (WOCs).

Evidence shows that the WOCs have higher risk than the WASCs (see section 5). This means that a lower gearing assumption for the WOCs relative to the WASCs would be justified.

This is also consistent with the views expressed by credit rating agencies during the interviews conducted for this project.[5] The interviews confirmed that WOCs are typically required to exhibit healthier financial ratios than WASCs for the same level of gearing. This suggests that, from a financeability perspective, a more conservative gearing assumption for the WOCs than for the WASCs might be appropriate.

Throughout this report, gearing of 60% (WASCs) and 55% (WOCs) is used. Average levels of gearing in the water industry have been relatively stable since the start of the current price control period.[6] Therefore, it might be reasonable to assume a relatively small increase in the notional gearing level—for example, from 57.5% to 60% for WASCs and from 52.5% to 55% for WOCs. However, these numbers should be considered as illustrative only. It will be up to the companies to determine the level of gearing that is consistent with their own plans, also having regard to financeability considerations.

[5] All three credit rating agencies were interviewed as part of this project.

[6] For example, see PwC (2013), 'Cost of capital for PR14: Methodological Considerations', July, Figure 5.1, p. 24.

3 Cost of equity—market parameters

Applying the standard techniques used by regulators to estimate the allowed rate of return is challenging in the current market environment. Capital markets are influenced by macroeconomic policy, which has created an unusual source of uncertainty and volatility. While there is a reasonable amount of data on the costs of debt finance, forecasting the appropriate cost of equity for the next regulatory period is more difficult.

Government bond yields (which are typically used to proxy the RFR) declined significantly in the aftermath of the financial crisis, largely driven by the extraordinary loosening of central bank monetary policy to alleviate the impact of the crisis on the economy. Real government bond yields in a number of major economies, including the UK and USA, have been persistently negative, implying that investors will receive less money in real terms the future than they invest today. This is highly unusual and is not consistent with economic theory which predicts that negative real interest rates will not persist because consumers have incentives to bring forward their consumption.

Evidence from forward markets implies that government yields are expected to rise over the course of AMP6, although how quickly they will rise is uncertain. This is an important consideration in the forthcoming price review.

Government bond yields have also been volatile in the post-crisis period, especially in recent months, due to speculation about the timing of withdrawal of the unconventional monetary policy measures. The volatility of these yields seems incompatible with the notion of a risk-free asset in cost of capital models.

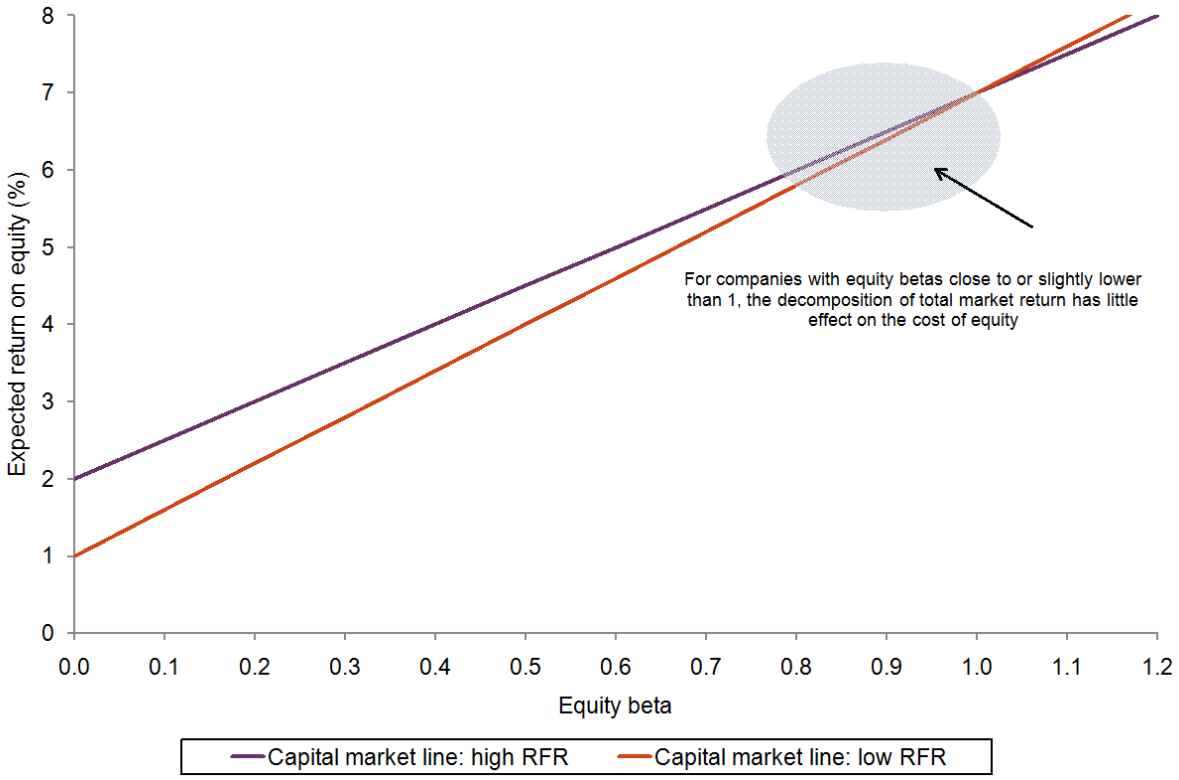
Notwithstanding this uncertainty, there is generally greater consensus among regulators on the appropriate level of total expected market returns than on its individual components, the RFR and the equity risk premium (ERP). Furthermore, the sensitivity of the cost of equity to the exact split between the RFR and the ERP is relatively small for companies with equity betas close to one such as those in the typical range assumed for regulated utilities (Figure 3.1).

The macroeconomic context for this review is set out in section 3.1, before considering the appropriate expected total market return (section 3.2) and its decomposition (section 3.3).

Based on a review of long-term historical market evidence and regulatory precedent, we consider a range of **6.5–7.0%** for the total real market return to be appropriate. We propose to decompose the total market return in a way that is consistent with taking a long-term view of the data: on this basis, we propose an RFR of **1.25–1.50%** and an ERP of **5.25–5.50%**.

An RFR of 1.25–1.50% is materially above current spot government bond yields. We believe that this is a reasonable approach given the expected increase in interest rates over AMP6, the exceptional influence of central banks on the level of interest rates, and their significant volatility. All of these factors suggest that an approach that places more weight on longer-run evidence is appropriate so as to ensure that necessary long-lived investments can be financed over the forthcoming price control period.

Figure 3.1 CAPM cost of equity using different decompositions of the market return



Note: For illustration, a total market return of 7% is assumed. In the high RFR scenario, the RFR is 2% and the ERP is 5%. In the low RFR scenario, the RFR is 1% and the ERP is 6%. These numbers are illustrative only. The equation that underpins the capital market line is: expected return on equity = RFR + equity beta * ERP.
Source: Oxera.

3.1 Macroeconomic developments

Since the end of 2008, UK government bond yields have declined materially, with spot yields for five-, ten- and 20-year index-linked gilts currently trading at –1.2%, –0.4% and 0.1%, respectively (Table 3.1). A number of factors have contributed to the reduction in gilt yields.

– Interventions by monetary authorities in financial markets—in particular, the reduction in the base rate and the Bank of England's quantitative easing (QE) programme, which has put downward pressure on gilt yields. Research from the Bank of England estimates that QE alone has reduced nominal gilt yields on average across a range of maturities by as much as 100–150bp.[7]

– Flight-to-quality towards safer assets as a result of the EU sovereign debt crisis, which has increased demand for UK gilts.

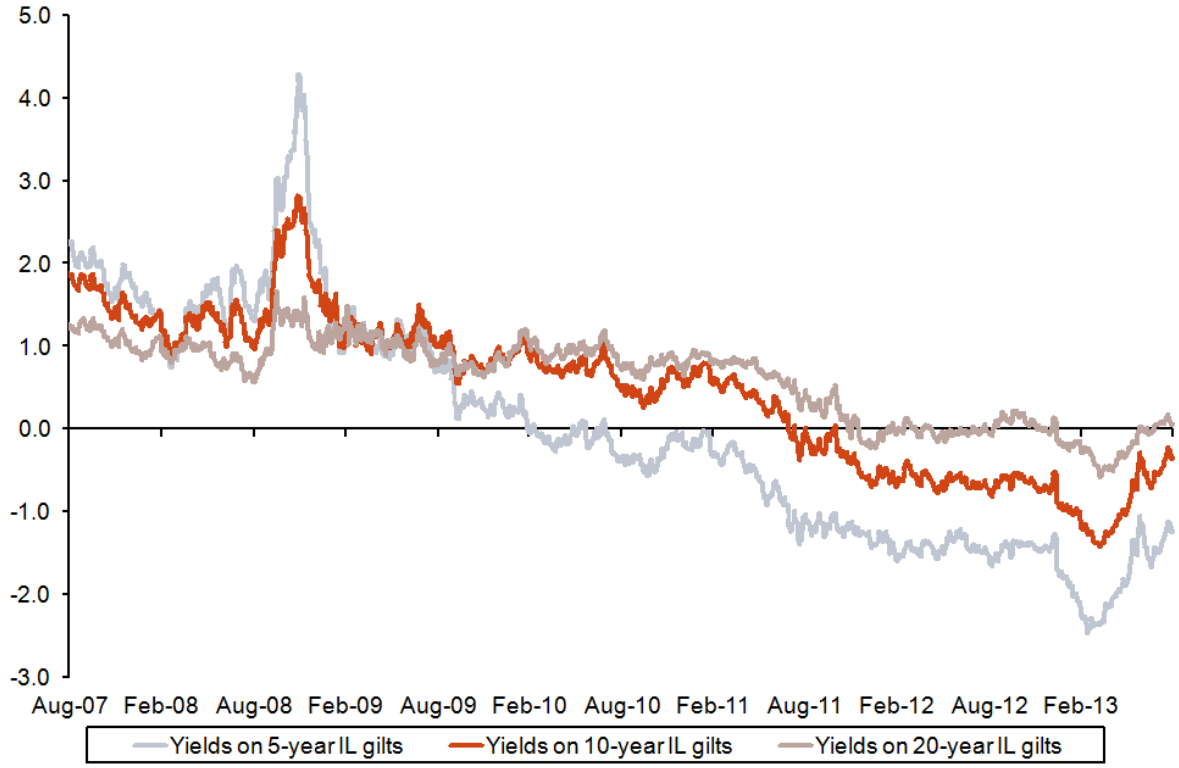
[7] Joyce, M., Tong, M. and Woods, R. (2011), 'The United Kingdom's Quantitative Easing Policy: Design, Operation and Impact', September 19th, *Bank of England Quarterly Bulletin* Q3 2011, p. 209; and Bridges, J. and Thomas, R. (2012), 'The impact of QE on the UK economy – some supportive monetarist arithmetic', Bank of England Working Paper no. 442, January, p. 4.

Table 3.1 Real yields on benchmark UK government index-linked gilts (%)

	5-year maturity	10-year maturity	20-year maturity
Spot	–1.2	–0.4	0.1
6-month average	–1.8	–1.2	–0.7
10-year average	0.7	0.9	1.0
15-year average	1.3	1.4	1.4

Note: Data up to August 30th 2013.
Source: Bank of England, and Oxera analysis.

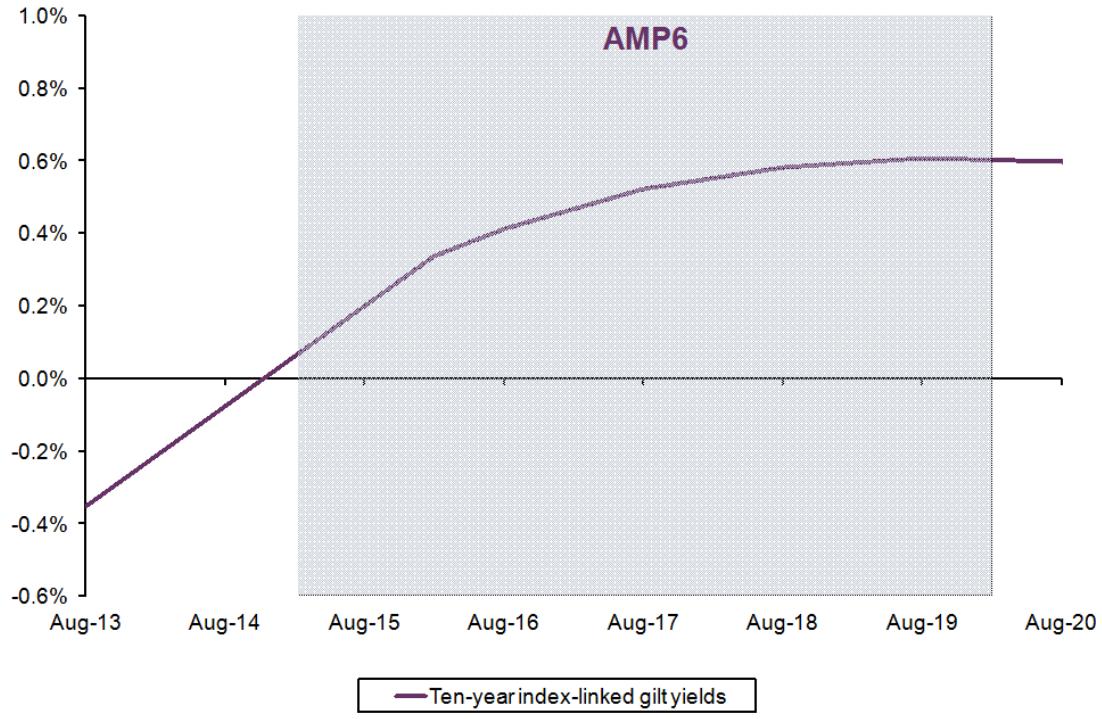
Figure 3.2 Yields on index-linked gilts (%)



Note: Data up to August 30th 2013.
Source: Bank of England, and Oxera analysis.

However, yields have been increasing in recent months (Figure 3.2). This is also supported by evidence from forward markets, which imply that markets expect government bond rates to increase over the course of AMP6 (Figure 3.3). The average real ten-year gilt yield over AMP6 that is currently implied by forward markets is ~0.5%. This is 90bp higher than the spot real ten-year yield.

Figure 3.3 Implied real ten-year gilt yield



Note: As at August 30th 2013.
Source: Bank of England, and Oxera analysis.

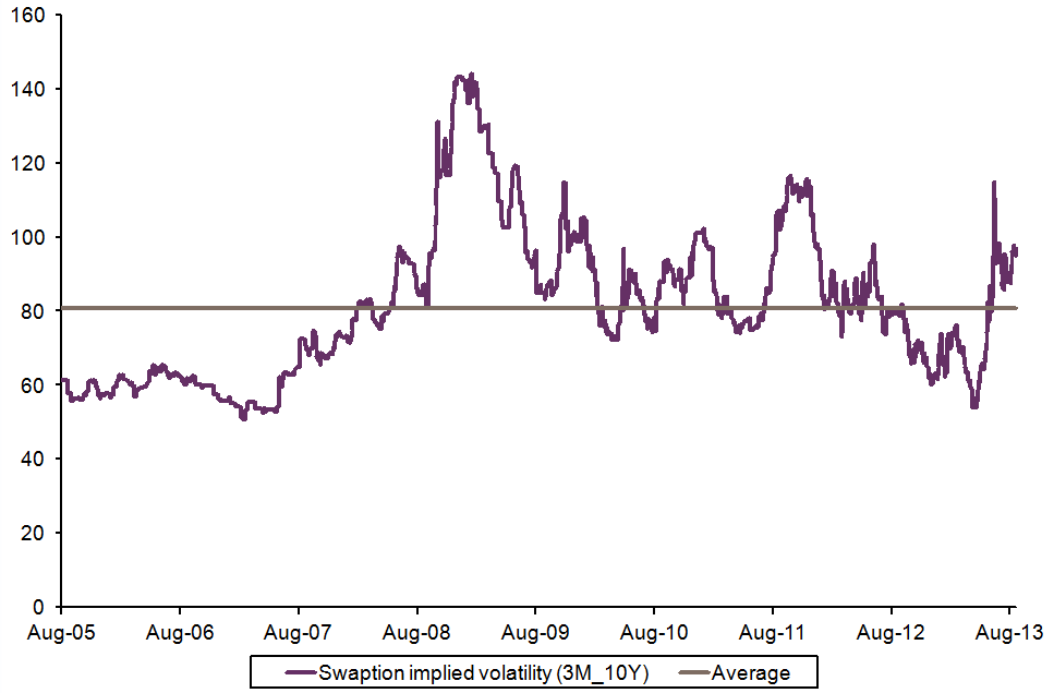
Government bonds have also been volatile since the crisis, especially in recent months, largely due to increased speculation about the timing of withdrawal of some of the unconventional monetary policy measures which have tended to depress the level of interest rates.

– The market price of interest rate risk has been persistently high over the last five years, as measured by the implied volatility of swaptions (options on interest rate swaps) (Figure 3.4).

– Forward rates have also been volatile in the last few years, illustrating the difficulty of forecasting interest rates over the forthcoming price control period (Figure 3.5).

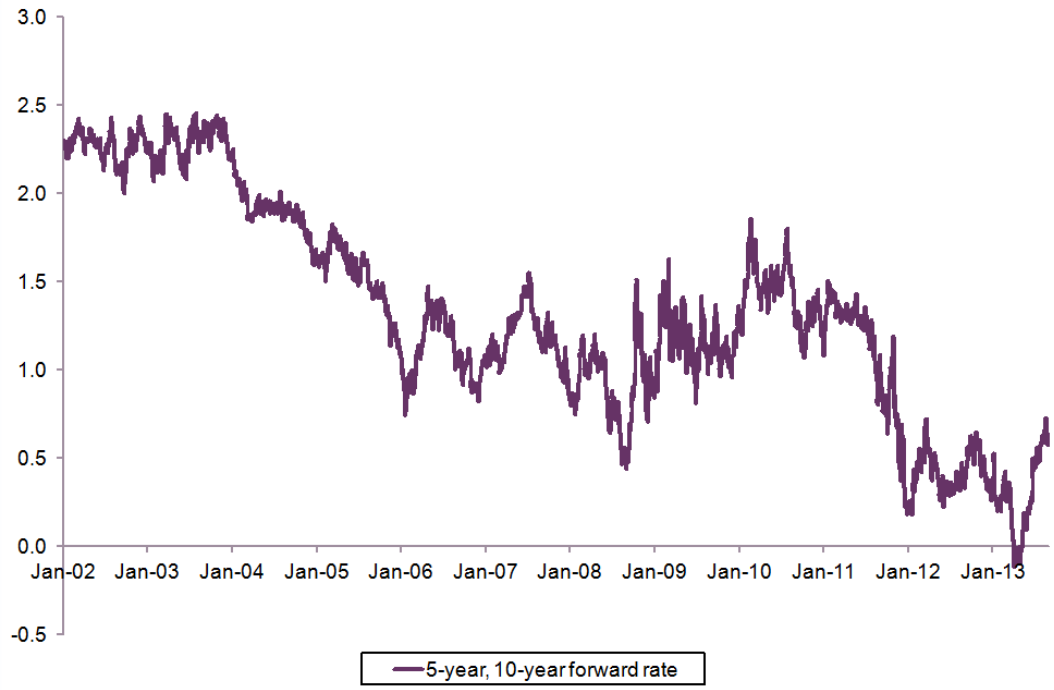
– Recent market movements illustrate how a single piece of news about future central bank policy can lead to a significant movement in the market (Figure 3.6).

Figure 3.4 Swaption implied volatility (bp)



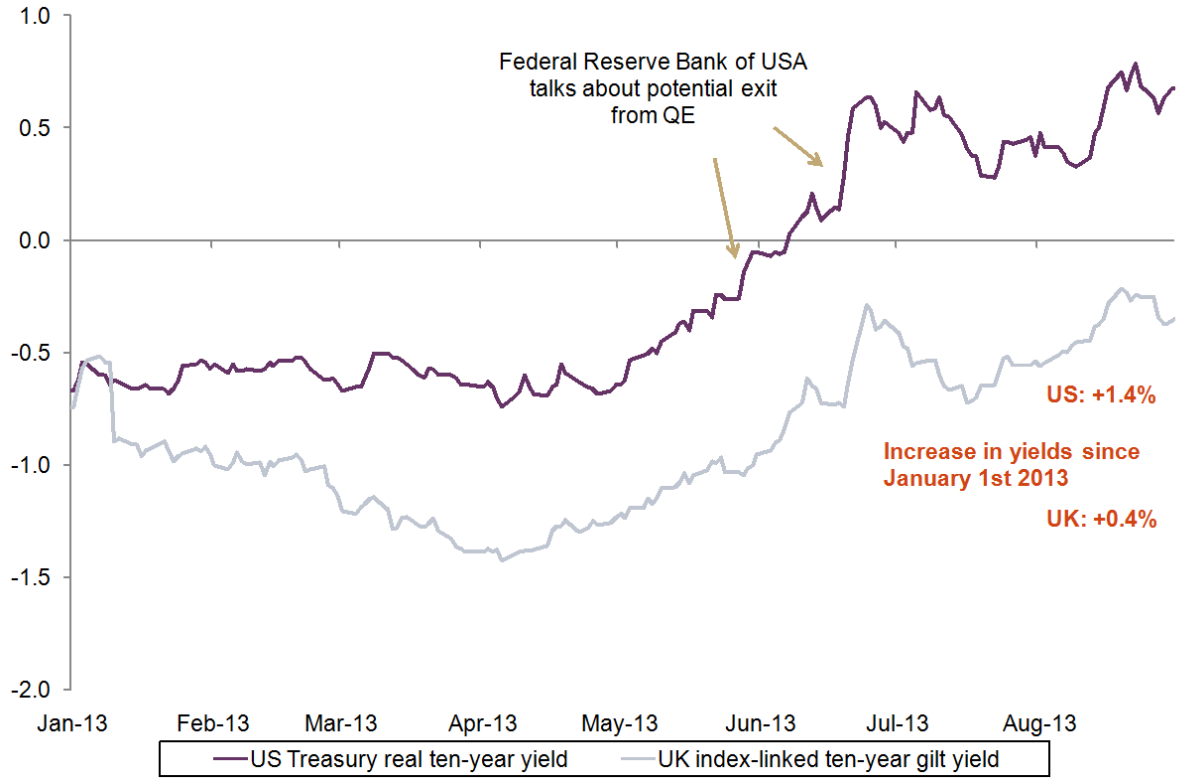
Note: Data up at August 30th 2013. A three-month, ten-year swaption gives the buyer the right to enter into a ten-year interest rate swap in three months' time. The option price can be solved for the volatility of the underlying interest rate instrument, in this case LIBOR.
Source: Bloomberg, and Oxera analysis.

Figure 3.5 Evolution of real ten-year forward gilt yield (%)



Note: Data up at August 30th 2013. The chart shows the ten-year real government bond yield that can be locked in, using forward contracts, in five years' time from the date shown.
Source: Bank of England, and Oxera analysis.

Figure 3.6 Ten-year real yields, US and UK benchmark government bonds (%)

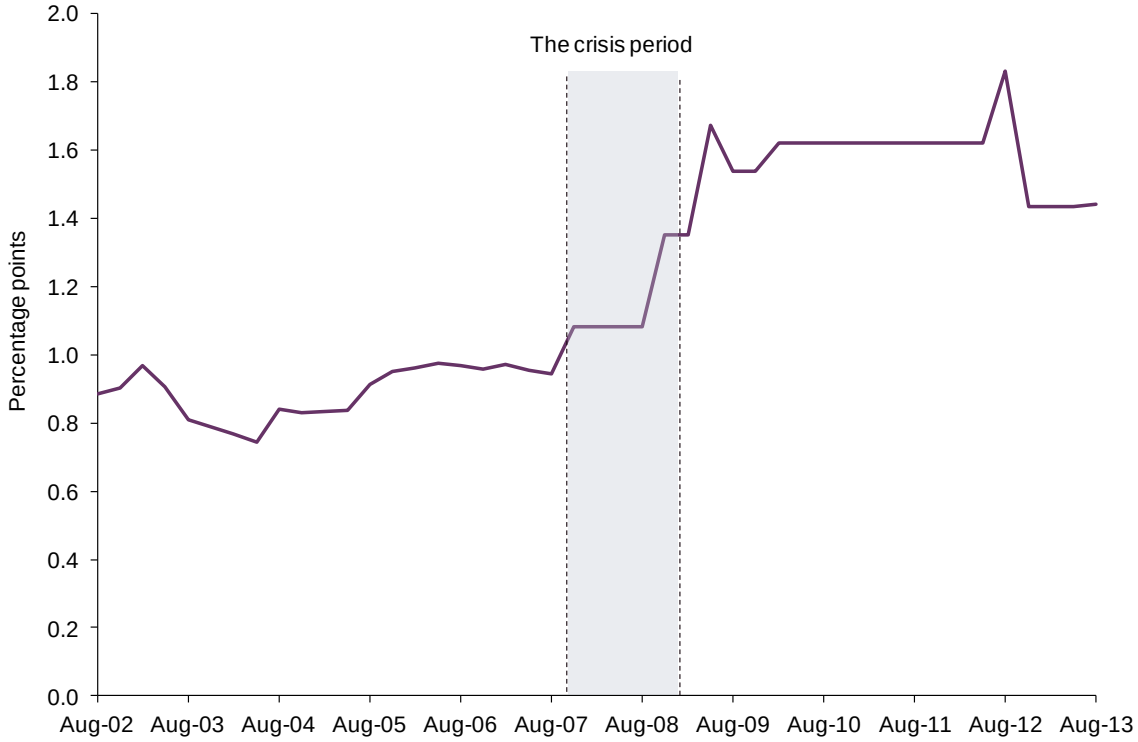


Source: Datastream, Bank of England, and Oxera analysis.

It is also important to consider the heightened GDP volatility to which equity investors will be exposed in AMP6. The Bank of England's estimates of the degree of uncertainty around its own forecasts of GDP growth have increased sharply since the crisis (Figure 3.7). Despite the slight recent dip, they remain significantly higher than before the crisis. There is some academic evidence that suggests that changes in macroeconomic uncertainty have some predictive power in explaining equity returns.[8] The increased macroeconomic uncertainty suggests that investors may require higher excess equity returns relative to a more benign economic environment.

[8] See Brogaard, J. and Detzel, A. (2013), 'The Asset Pricing Implications of Government Economic Policy Uncertainty', July. Available at SSRN: http://ssrn.com/abstract=2075375 or http://dx.doi.org/10.2139/ssrn.2075375.

Figure 3.7 Uncertainty in the Bank of England's GDP forecasts



Note: This figure presents a measure of the dispersion of the Bank of England's quarterly GDP projections. The scale should be interpreted as a relative measure.
Source: Bank of England, and Oxera analysis.

In summary, given the long-lived nature of investment in the water industry, and Ofwat's financeability duty, more emphasis should be placed on estimates of the total expected equity market return rather than its constituent components.

3.2 Total equity market return

An approach to estimating the expected total equity market return is to consider the average long-run historical return. One of the most widely cited sources of historical evidence on market returns is the annual publication by Dimson, Marsh and Staunton (DMS), which estimates historical returns for 19 countries using data since 1900.

Using data from 1990 to 2012, the annual return on the UK stock market has averaged 7.1% and 5.2% on an arithmetic and a geometric basis respectively.[9] Geometric averages are by construction lower than arithmetic averages as they do not take into account the volatility of annual returns over the averaging period. While there is debate around which is the most appropriate averaging method in any given context, the weight of opinion is in favour of using arithmetic averages when estimating required equity returns. Indeed, DMS (2013) themselves recommend the arithmetic average for use in 'asset allocation, stock valuation, and corporate budgeting applications'.[10] This is consistent with a number of analytical studies that suggest that greater weight should be placed on arithmetic than on geometric estimates of returns. Cooper (1996) noted:

> The use of the arithmetic mean ignores estimation error and serial correlation in returns. Unbiased discount factors have been derived that correct for both these effects. In all

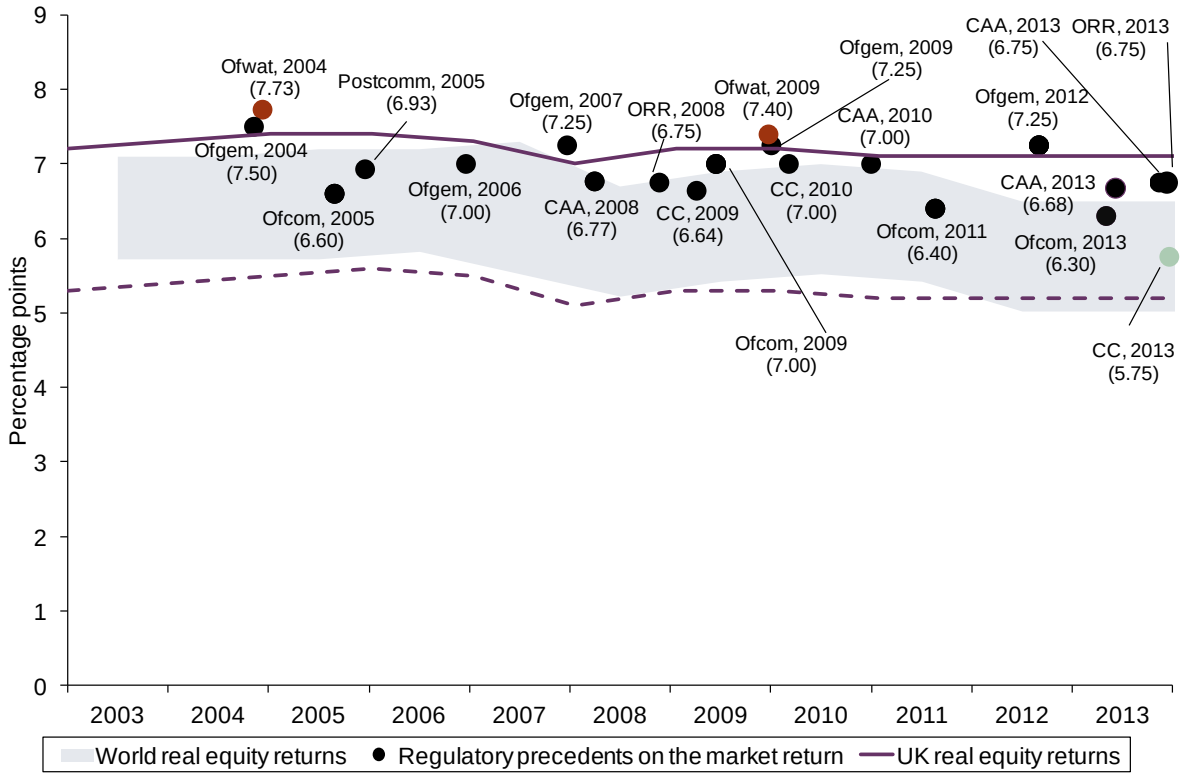
[9] Dimson, E., Marsh, P. and Staunton, M. (2013), 'Credit Suisse Investment Returns Sourcebook 2013', Table 2.
[10] Ibid., p. 34.

cases, the corrected discount rates are closer to the arithmetic than the geometric mean.[11]

In considering whether the historical return is an appropriate estimate of the forward-looking market return, DMS (2013) note that, after adjusting for non-repeatable factors of the past, such as the expansion in the price-to-dividends ratio, expected returns might be lower in the future.

Recent regulatory decisions suggest a lower total allowed market return than in PR09. The range is 5.75–7.25%, compared with 7.40% used by Ofwat in PR09. The top end of this range is based on Ofgem's RIIO decisions, which were based on evidence dating back to 2010 and which apply to an eight-year price control. The low end of this range is based on the Competition Commission's (CC) findings in the price control appeal by Northern Ireland Electricity; however, these findings are provisional at this stage. Without the Ofgem and the CC precedent, regulatory decisions lie in the 6.30–7.00% range.

Figure 3.8 Regulatory precedent on total equity market return



Note: CC, Competition Commission; ORR, Office of Rail Regulation; CAA, Civil Aviation Authority. Green dots denote initial proposals, not final decisions. The world and UK real equity market returns represent long-run historical averages based on the DMS database. The lower and upper bounds of the world and UK real equity returns represent geometric and arithmetic averages, respectively.
Source: Regulatory determinations, Dimson, Marsh and Staunton, and Oxera analysis.

Taking into account both long-run historical evidence and recent final regulatory determinations, we consider 6.5–7.0% an appropriate range for the total expected market return.

[11] Cooper, I. (1996), 'Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting', *European Financial Management*, **2**:2, p. 157.

3.3 Decomposing the total market return

As discussed in section 3.1, recent movements in capital markets, and specifically in government bond yields, have been difficult to interpret as they have been heavily influenced by macroeconomic policy. This is why we recommend decomposing the total market return in a way that is more consistent with longer-run evidence in this context.

3.3.1 Risk-free rate

Regulatory precedent suggests that UK regulators have taken into account the decline in yields by gradually reducing RFR allowances, but have also consistently set the RFR above spot market rates (Figure 3.9). This mainly reflects the volatile nature of government bond yields and the effects of central bank intervention.

In the current market environment, it is appropriate to set the regulatory allowance for the RFR higher than the spot yield in order to reflect the uncertainty over future levels of the RFR, and hence the required return on equity.

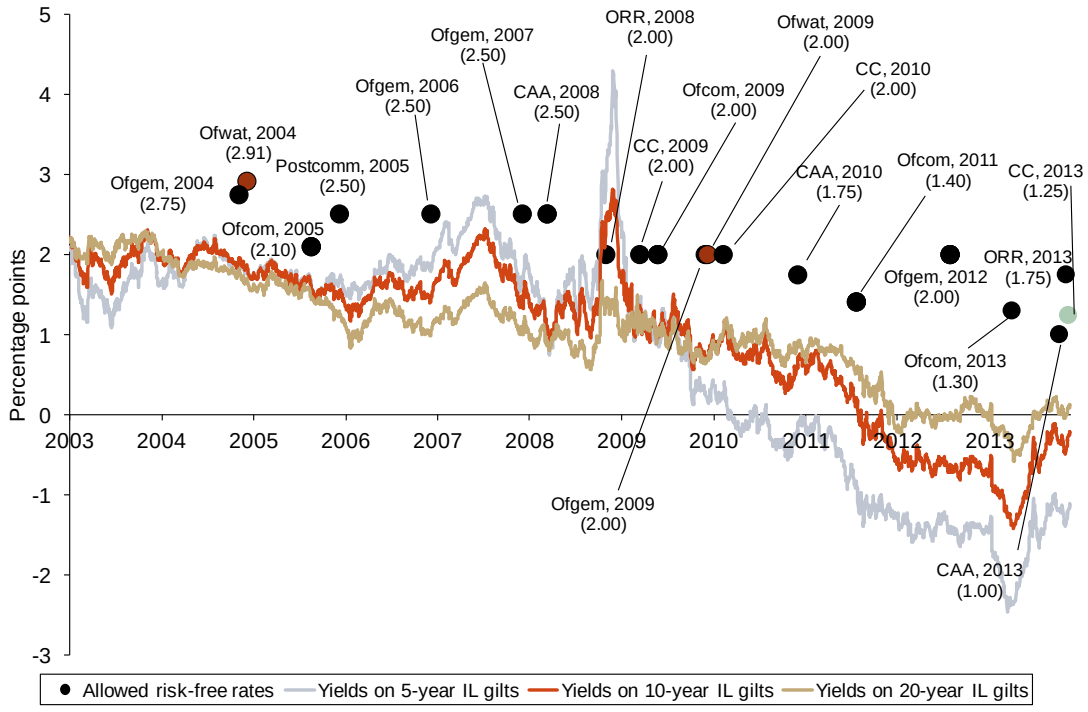
– This reflects the asymmetry around the future path of interest rates, with a much greater probability of interest rates rising than falling over AMP6.

– Government bond yields have been volatile and continue to be heavily influenced by the uncertainty about future monetary policy rather than economic fundamentals.

– The long-lived nature of investment in the water industry means that the risk of creating an under-investment problem is an important consideration for the regulator. This is especially important when regulators have an explicit financing duty.

On the basis of these considerations, we propose a range for the real RFR of 1.25–1.50%. This range is broadly in line with regulatory precedent and longer-run evidence.

Figure 3.9 Allowed real risk-free rate and index-linked gilt yields



Note: CC, Competition Commission; ORR, Office of Rail Regulation; CAA, Civil Aviation Authority. Green dots denote initial proposals, not final decisions. In determinations where the regulator sets a nominal rate of return (eg, Ofcom), a real RFR has been estimated using inflation assumptions reported by the regulator.
Source: Various regulatory documents, Datastream, and Oxera analysis.

3.3.2 Equity risk premium

A range for the ERP of 5.25–5.50% would be consistent with the proposed total market return and RFR ranges. This range is broadly in line with historical evidence and regulatory precedent, and is lower than forward-looking estimates. This is consistent with taking a longer-term view of capital market parameters.

Historical evidence

Table 3.2 presents the latest historical ERP estimates from DMS for the UK. Based on arithmetic averages, DMS estimates of the ERP in the UK lie between 5.0% and 5.2%. For geometric averages, the range is 3.6–3.9%. As explained in section 3.1, in a regulatory context it is appropriate to place greater weight on arithmetic averages.

Table 3.2 Dimson, Marsh and Staunton's ERP estimates for the UK (%)

	Geometric	Arithmetic
1900–2012	3.7	5.0
1900–2011	3.6	5.0
1900–2010	3.9	5.2

Note: The ERP is estimated relative to bonds.
Source: Dimson, Marsh and Staunton, and Oxera analysis.

Forward-looking evidence

Although historical estimates represent the best source of data available for the realised ERP, this approach is inherently backward-looking. Forward-looking models can provide a useful cross-check on the historical estimates. The basic concept behind forward-looking models is the assumption that the current market price of an asset represents the expected discounted value of all future cash flows to this asset. The general multi-period dividend growth model (DGM) is formulated as follows:

$$P_o = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \cdots + \frac{D_t}{(1+r)^t} + \frac{D_t}{(r-g) \times (1+r)^t}$$

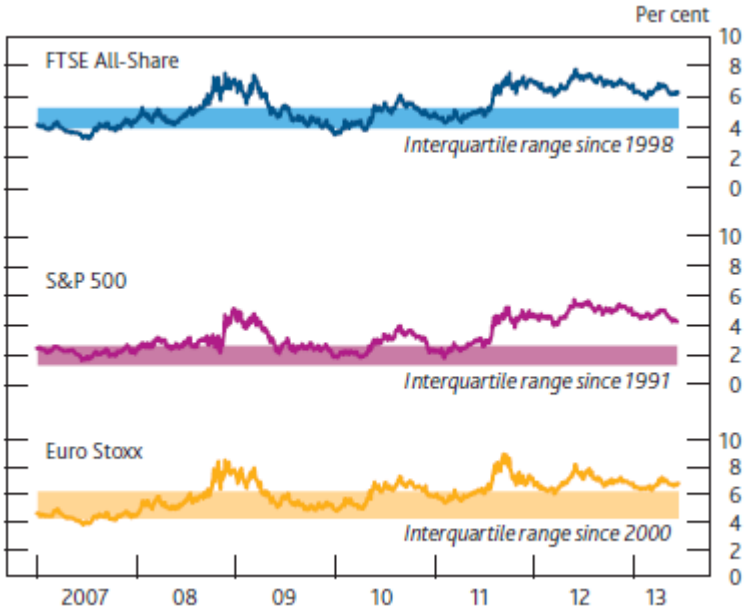
where P_0 is the current market price; D_n is the n-year-ahead dividend forecast; r is the cost of equity; and g is the long-term dividend growth rate.

To estimate the ERP, this equation is calculated for a broadly diversified market index ('the market portfolio') and is solved for r—ie, the expected market return. As inputs, the model requires the current index value, dividend forecasts for the index, and a long-term growth rate assumption. The ERP is then calculated by subtracting a measure of the RFR from the estimate of the expected market return.

For example, Figure 3.10 shows the forward-looking estimates of ERP from a multi-stage DGM produced by the Bank of England.[12]

[12] These estimates are produced using a variant of the multi-period DGM described above. In the near-to-medium term, dividend growth is proxied by earnings growth based on consensus earnings forecasts from the Institutional Brokers' Estimate System (IBES). The long-term growth rate is equal to an estimate of the potential growth of the economy. As the RFR measure, 'rates inferred from zero-coupon government bond yield curves at maturities up to ten years' are used. Inkinen, M., Stringa, M. and Voutsinou, K. (2010), 'Interpreting equity price movements since the start of the financial crisis', *Bank of England Quarterly Bulletin*, **50**:1, pp. 24–33.

Figure 3.10 Bank of England estimates of the ERP



Source: Bank of England (2013), 'Financial Stability Report', June.

The estimates of the ERP produced by the Bank of England have:

– trended upwards since 2010;
– been consistently above 6% since 2011.

Table 3.3 shows estimates of the ERP based on a simple, one-stage DGM.[13]

Table 3.3 Forward-looking ERP estimates on a one-step DGM (%)

	ERP
Spot	5.9
Six-month average	6.3

Note: Data up to August 30th 2013. The ERP is calculated using a long-term dividend growth rate of 1.8%. This is based on the average forecasts of GDP growth for the UK over the 2013–17 period provided by the HM Treasury survey of independent forecasters.
Source: Datastream; HM Treasury (2013), 'Forecasts for the UK Treasury: a comparison of independent forecasts', August; and Oxera calculations.

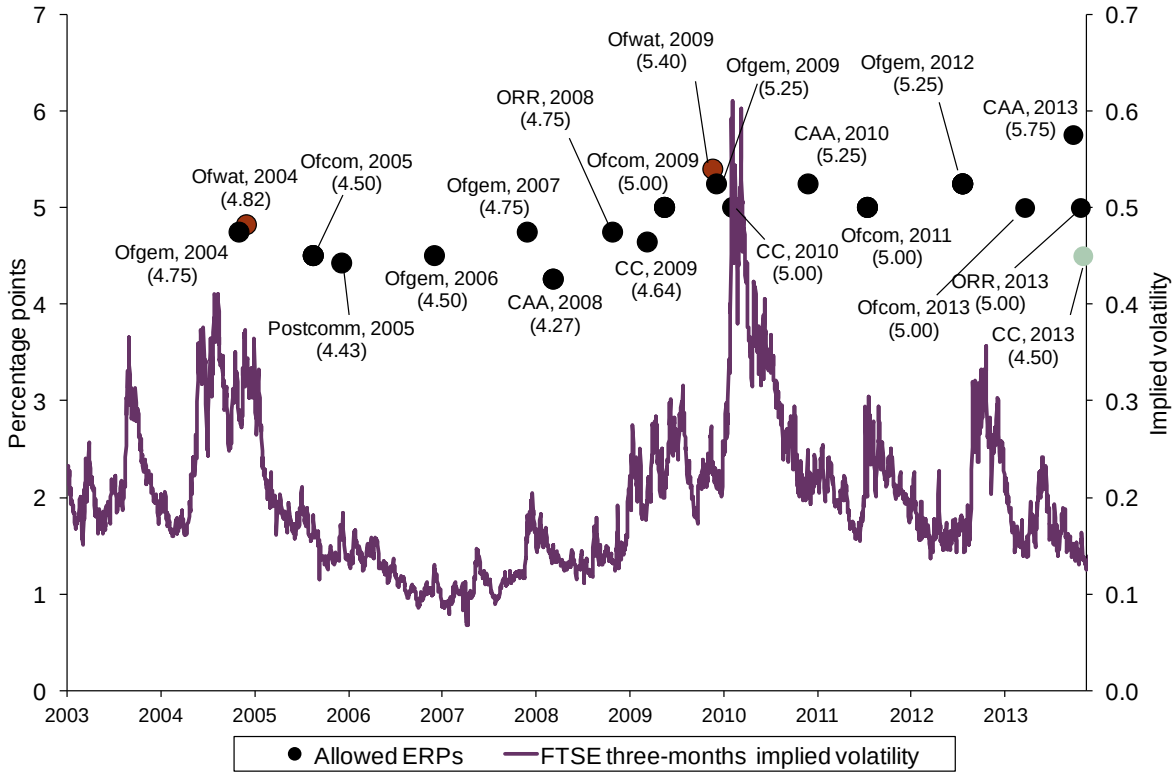
The results of the one-step DGM suggest an ERP of 5.9–6.3% using the most recent six months of data. These estimates are also higher than the historical DMS estimates. However, the estimates are derived using spot ten-year gilt yields, which are much lower than the historical data that underpins the historical estimates of the ERP. Consistent with our proposed approach of taking a longer-term view of the market parameters, we place less weight on these forward-looking estimates.

Regulatory precedent

Recent regulatory determinations on the ERP have been in the range of 4.50–5.75% (Figure 3.11). However, the ERP of 5.75% used by the CAA is combined with a lower RFR assumption than those of other regulators. The total market return assumed by the CAA is 6.75%. The lower end of the range of 4.50% is based on the provisional CC findings for NIE.

[13] In a one-stage model, the expected market return is equal to the sum of the expected dividend yield on the market index and the long-term dividend growth rate. The long-term growth rate is proxied by the long-term average expected GDP growth rate.

Figure 3.11 Allowed ERP and equity market volatility



Note: CC, Competition Commission; ORR, Office of Rail Regulation; CAA, Civil Aviation Authority. Green dots denote initial proposals, not final decisions. In determinations where the regulator sets a nominal rate of return (eg, Ofcom), a real RFR has been estimated using inflation assumptions reported by the regulator.
Source: Regulatory determinations, Datastream, and Oxera.

Summary

Overall, historical estimates of the ERP suggest a value no lower than 5.0% based on arithmetic averages. Forward-looking models suggest estimates around 6.0%. Given the uncertainty in equity markets, regulatory estimates of the ERP have generally increased since the start of the financial crisis, with more recent final determinations suggesting a range of 5.00–5.75%.

This evidence confirms that the ERP range of 5.25–5.50% that is consistent with the proposed total market return and RFR ranges is appropriate. This ERP range is broadly in line with historical ERP evidence and regulatory precedent, and is lower than forward-looking ERP estimates. This is consistent with our proposed approach to emphasising a longer-term view of the data.

4 Cost of equity—industry risk

In the CAPM framework, equity investors require compensation for systematic risk only (risk that cannot be diversified away by holding a portfolio of assets). This exposure to systematic risk is measured by the equity beta.

For a company listed in the market, equity, and its related asset beta (which isolates the impact of financial leverage), can be estimated using information on actual share returns, market returns and capital structure. Since the privatisation of the water industry, the number of listed water companies has decreased materially. Currently, only three WASCs are listed (with one of them having a substantial share of non-regulated assets). This creates additional challenges for estimating an equity and an asset beta that are representative of the average company in the industry.

Based on the evidence reviewed, an industry range for the asset beta of **0.30–0.40** is recommended. This range is below that used at the previous price review but above that implied by measured equity betas. Factors taken into consideration include the following.

– With fewer market datapoints available to estimate the asset beta directly, and no evidence of a fundamental shift in the risk profile of the industry, we consider it reasonable not to depart markedly from the assumption used in the previous review. Therefore, we believe that an asset beta assumption of 0.40 that was within the range used at PR09 provides a plausible upper bound for PR14.

– The assessment of market data indicates lower asset and equity betas than at PR09. If some weight is placed on recent trends in the market data, given the long-lived nature of the industry, more weight should be given to beta estimates derived using a longer time frame. On this basis, our proposed lower bound for the asset beta at PR14 is 0.30.

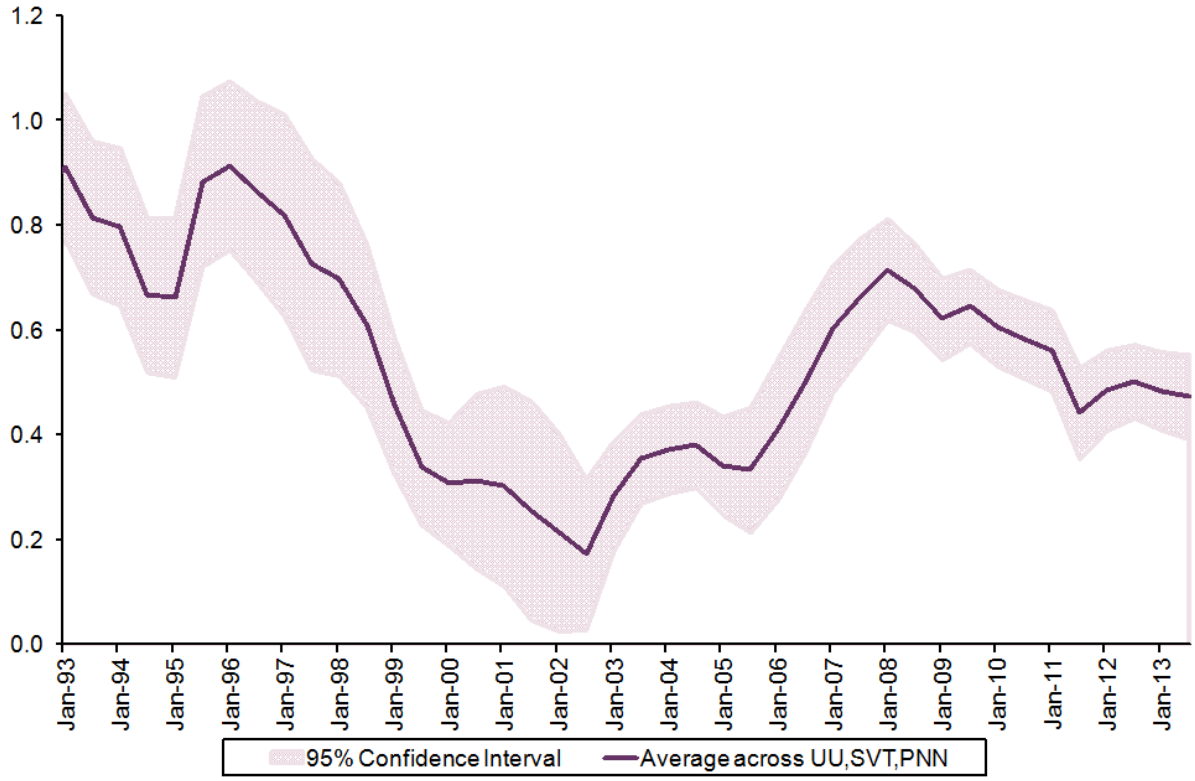
4.1 Market evidence

Since PR09, estimated equity and asset betas for the remaining listed water companies have declined (Figure 4.1). Current two-year daily estimates of the asset beta are in the range of 0.19–0.25 (Table 4.1),[14] whereas the range estimated by the CC in the Bristol Water appeal was 0.21–0.31.[15]

[14] Using a zero debt beta assumption. The assumption of a zero debt beta is consistent with PR09 methodology. While it is reasonable that the debt beta for the water companies is likely to be positive, to enable like-for-like comparisons, a zero debt beta is used to un-lever and re-lever the equity and asset betas.

[15] Competition Commission (2010), 'A reference under section 12(3)(a) of the Water Industry Act 1991', Appendix N, August. This is the asset beta range produced by the CC using a zero debt beta assumption.

Figure 4.1 Two-year daily equity betas of water companies



Note: The solid line is a series of simple averages of two-year daily beta estimates of the UK water companies.
Source: Datastream, and Oxera analysis.

Table 4.1 Current asset beta estimates for water and energy networks

	2-year daily	5-year weekly	10-year weekly
Water companies			
United Utilities Group	0.19	0.28	0.30
Pennon Group	0.25	0.35	0.31
Severn Trent	0.23	0.25	0.27
Average	**0.23**	**0.29**	**0.29**
National Grid	0.21	0.23	0.24
Scottish & Southern Energy	0.36	0.39	0.41

Note: A simple average is shown.
Source: Datastream, and Oxera analysis.

However, in previous reviews Ofwat's allowed betas have been somewhat higher than those obtained from market data. The equity betas for the listed water companies have averaged 0.50 since 1999, while allowed equity betas have never fallen below 0.70.

It is not evident that the demand and cost characteristics of the water industry have changed materially since PR09. If the fundamental risk of the water industry is largely unchanged, there is less reason to deviate materially from the PR09 asset beta assumption of 0.40.

However, the assessment of the market data indicates lower asset and equity betas than at PR09. If some weight is placed on market evidence, given that the water industry is characterised by very long-lived investment with relatively stable risk characteristics over time, we suggest placing more weight on estimates derived using longer time periods (eg, five years)—this points to estimates of around 0.30 (Table 4.1).

Overall, taking all the evidence together, our estimated range for the asset beta is 0.30–0.40.

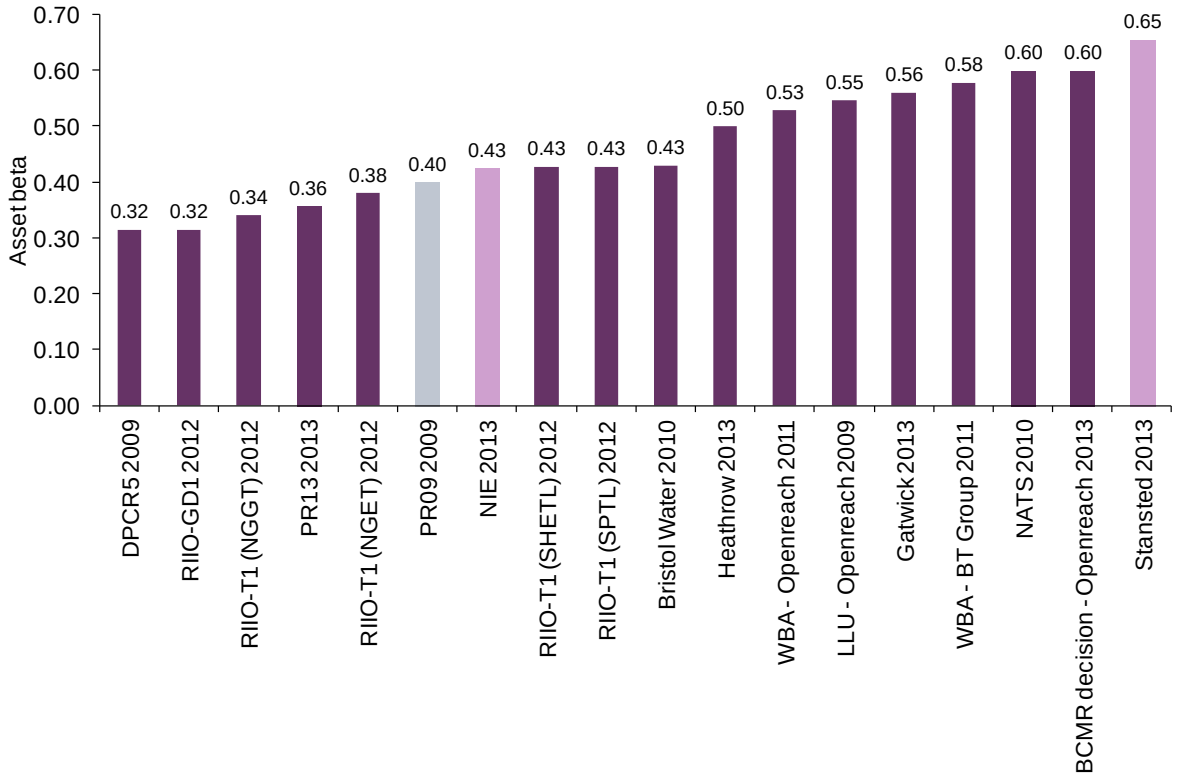
4.2 Regulatory precedent

The range of allowed asset betas for utilities is 0.32–0.43 (Figure 4.2). Since the PR09 decision, there have been a number of decisions in the energy sector.

While Ofgem is not explicit about its asset beta assumptions, the implied range of asset betas in RIIO-T1 and GD1 is 0.32–0.43, although the upper end is only for the fast-tracked electricity transmission networks that have received a better financial package than the other energy networks.

The proposed industry range for the asset beta of 0.30–0.40 is considered to be consistent with regulatory precedent.

Figure 4.2 Regulatory precedent on the asset beta



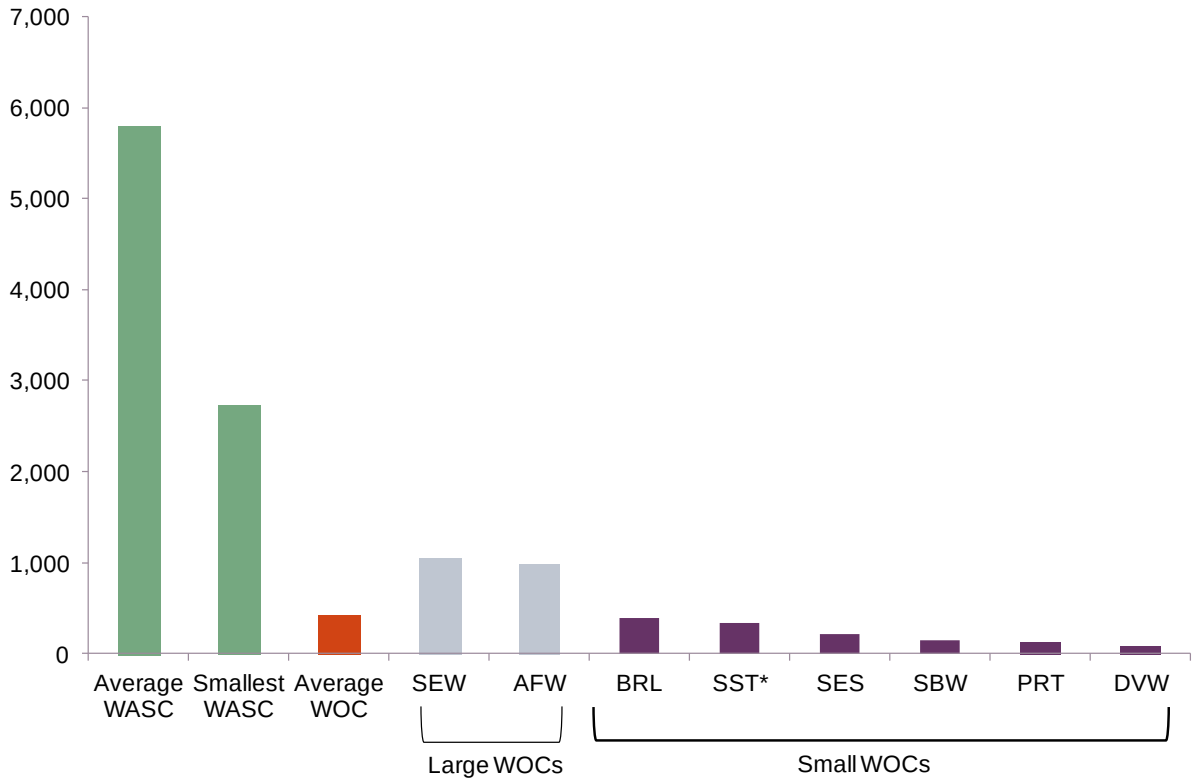
Note: Pink bars denote initial proposals, not final decisions. Some of the asset betas (eg, for Bristol Water, for NIE and the airports) have been derived using a debt beta of 0.10, rather than a zero debt beta used by Ofwat in PR09 and by Ofgem in DPCR5 and the RIIO price controls.
Source: Oxera analysis, based on regulatory decisions.

5 Small-company premium

This section reviews the evidence on the small-company premium for WOCs relative to WASCs for both the cost of debt and the cost of equity. In previous price controls, Ofwat has set a higher allowed rate of return for WOCs than for WASCs, mainly because of their relative size (Figure 5.1).

Company size is relatively well established in academic literature as a factor that empirically has explanatory power in predicting asset returns. For example, the three-factor Fama-French model includes a size premium as one of three risk factors that explain the return on a particular stock.[16] Specifically, smaller stocks are associated with higher returns. Given the material difference in size between an average WASC and an average WOC, it is therefore appropriate to consider if a different rate of return needs to be applied to the two groups of companies.

Figure 5.1 Closing 2012–13 RCV by company (£m, 2012–13 prices)



Note: * Includes South Staffordshire and Cambridge. For the company abbreviations, see Appendix 2.
Source: Ofwat, and Oxera analysis.

On the debt side, Ofwat has typically recognised that, given their relatively smaller size, WOCs face higher debt costs. On the equity side—at least until PR09—Ofwat also recognised that the rate of return required by equity investors was greater largely due to the higher trading costs associated with trading equity in smaller companies.

[16] Fama, Eugene F., French, Kenneth R. (1993). "Common Risk Factors in the Returns on Stocks and Bonds". *Journal of Financial Economics* **33** (1): 3–56.

In PR09, Ofwat concluded that the evidence of higher trading costs was less conclusive, especially given that most WOCs were no longer publicly listed. It also concluded that there was insufficient evidence that WOCs were exposed to more systematic risk than WASCs; however, it acknowledged that WOCs could be more exposed to specific risks (low-probability events, such as a major disruption to a water treatment facility) which in turn led Ofwat to adopt a lower notional level of gearing for the WOCs. Despite its adoption of a lower notional gearing, Ofwat left the cost of equity assumption unchanged for the WOCs relative to WASCs, which led to an 'implicit premium' in the cost of equity (Table 5.1).

After the PR09 Final Determination, one of the WOCs—Bristol Water—appealed the final decision to the CC. In its review of the evidence, the CC concluded that there was no robust evidence that size in itself implied differences in systematic risk exposure; however, the CC did find that some distinctive features in the WOCs' cost structure made them riskier than the WASCs, and reflected that in its decision on the cost of equity.

Table 5.1 Recent regulatory precedent on small-company premium

Small-company premium	Ofwat PR09 largest WOCs (SEW and AFW[1])	Ofwat PR09 other WOCs	CC Bristol Water
Equity (%)	0.5[2]	0.5[2]	0.9
Debt (%)	0.1	0.4	0.3[3]
Vanilla WACC (%)	**0.2**	**0.4**	**0.5**

Note: [1] Affinity Water was formed after PR09 following the merger of three WOCs: Veolia Central, Veolia South East and Veolia East. Veolia Central and South East Water were the two largest WOCs at the time of the PR09 Final Determinations. [2] The premium is derived by comparing the allowed cost of equity for WOCs and the cost of equity that would be consistent with the lower notional gearing assumption assumed by Ofwat for the WOCs, and leaving all the other parameters of the cost of equity unchanged. [3] The CC did not provide an explicit assessment of the appropriate cost of debt for the WASCs. The premium is derived by taking the difference between the cost of debt allowed by the CC for Bristol and the Ofwat PR09 WASC cost of debt allowance.
Source: Ofwat (2009), 'Future water and sewerage charges 2010–15: Final determinations', November; CC (2010), op. cit.; and Oxera analysis.

The analysis presented in this section strongly suggests that it is appropriate to continue to set a higher allowed rate of return for WOCs than for WASCs at PR14—in particular for the small WOCs that are the focus of this report.

Cost of debt

Relative to the WASCs, the WOCs have a much more limited number of sources of debt finance available to them—this limited supply of funds implies that WOCs typically obtain debt finance at less competitive rates than WASCs.

– Only the largest WOCs have been able to access the bond markets directly.

– Empirical evidence shows that the cost of accessing bond markets has, on average, been greater for the WOCs than for the WASCs.

– In the past, a number of WOCs have accessed bond markets indirectly through Artesian finance facilitated by monoline insurers. However, as the financial crisis put an end to the monocline insurers, such financing vehicles are no longer available.

– While being an efficient way to raise debt at the time by matching longer-lived assets with longer-maturity debt and by reducing the reliance on bank debt, empirical evidence shows that Artesian loans cost more than similar WASC bonds.

– The combination of existing bond and Artesian debt comprises more than three-quarters of the existing portfolios of the small WOCs. The real cost of this debt is in the range of 2.9–3.6%, with an average above 3%. This is higher than the cost of existing debt for

WASCs. As none of this debt will mature over AMP6, a number of the WOCs are locked into paying a higher interest rate than the WASCs for the duration of the price control.

– The only other available source of finance for WOCs is bank debt. In the absence of future Artesian-type structures, bank financing will remain the primary source of any new debt over AMP6 for most of the small WOCs.

– As bank debt is more expensive than bond debt, and given that the WOCs have typically far fewer bank relationships than the WASCs, the cost of existing bank facilities and any new bank facilities required over AMP6 will remain higher for WOCs than for WASCs.

The combination of these factors suggests that the overall cost of debt for WOCs is higher than that for the WASCs. The difference is estimated to be in the range of **0.3–0.8%** on the overall cost of debt.

Cost of equity

A review of the revenue and cost make-up of the WOCs and WASCs suggests that the WOCs have higher operational gearing (the relative share of fixed costs in the cost structure) than the WASCs. This implies that the impact of any revenue or cost shock on profits is typically higher for the WOCs than for the WASCs.

– While there is no universally agreed methodology for translating the impact of higher operational gearing into an uplift to the asset beta, there is theoretical support for the link between higher operational gearing and systematic risk, and hence, the asset beta.

– Having considered a number of possible metrics of operational gearing, and regulatory precedent—in particular, the Competition Commission findings in the Bristol Water appeal—an uplift to the WASC asset beta of **0.05** is appropriate. This produces a range for the asset beta for WOCs of 0.35–0.45.

5.1 Small-company premium—debt

The practicalities of raising debt finance for the small WOCs compared with their larger industry peers are very different. The number and types of different debt instruments available to these WOCs is much more limited compared with the WASCs (and to some extent, compared with the two largest WOCs that are not involved in this study). This limited supply of funds typically manifests itself in less competitive debt rates. This observation has been confirmed to Oxera by a number of market participants interviewed during this project.[17]

The RCV of the small WOCs is in the range of £75m–390m.[18] Assuming gearing of around 55%, this implies debt levels of around £40m–215m. The range and availability of sources of funds will vary depending on the size of debt requirements. Through the interviews with market participants, the following 'pecking order' of debt instruments emerged (Figure 5.2).

– For individual debt issuances in the £10m–£20m range, the only source of finance available to WOCs is bank debt.

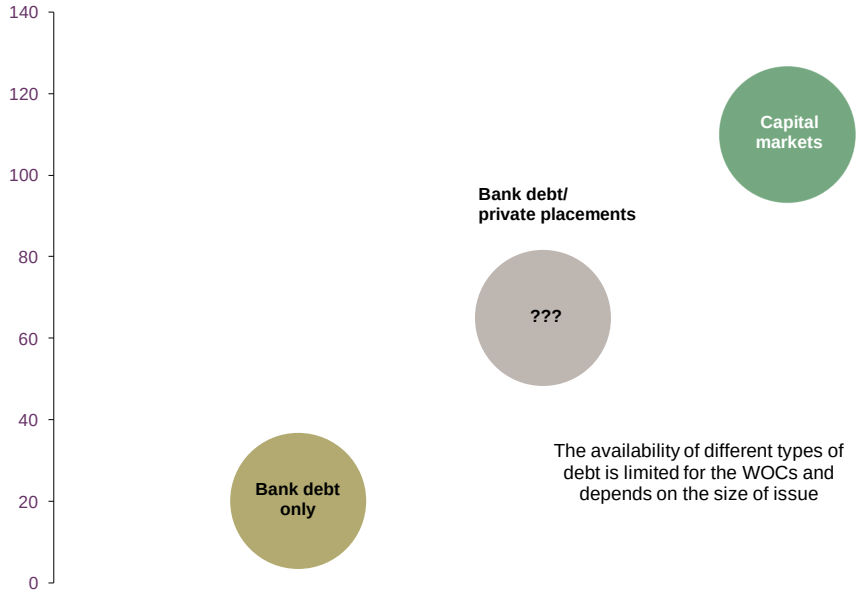
– For debt issues in the £20m–100m range, it may be possible to issue bonds through the private placement market. However, as confirmed by market participants and illustrated later in the section, investors are likely to require a significant liquidity premium to hold these bonds. For bank debt, the size of debt requirements might be too large, especially given that debt of £20m–£100m is likely to represent a significant proportion of total debt in a capital structure of a typical WOC. This means that, in some instances, raising debt in these quantities could be difficult altogether.

[17] Oxera interviewed The Royal Bank of Scotland, HSBC and all three credit rating agencies.

[18] Closing RCV for 2012–13. Source: Ofwat.

– For debt issues above £100m, debt capital markets might become available. However, given the relative size of the WOCs, their debt requirements would need to be significant relative to their existing debt portfolio before issuing debt in this size becomes attractive.

Figure 5.2 Availability of debt by issuance size



Source: Oxera.

Evidence on the differences in the cost of finance for WASCs and WOCs by different instrument type is examined below, bearing in mind some of the practical issues of raising debt for WOCs.

5.1.1 Bond debt

It remains the case that only the largest WOCs can access the bond markets. Since the PR09 Final Determinations, Bristol Water and South Staffordshire Water are the only two medium-sized WOCs that have issued bonds. Both bonds were of relatively small size (c. £40m) and were issued at yields on average 0.5% higher than comparable WASC bonds (Table 5.2).[19]

The bond issued by Yorkshire Water, chosen as one of the comparators for the Bristol Water bond, was issued about 6 months later, which, in an environment of declining yields, could explain its lower yield. However, it is worth noting that the spread at issuance was still lower for Yorkshire's bond than for Bristol's. Thames Water, on the other hand, issued a bond a year and a half earlier than Bristol's, when market interest rates were higher, albeit still at a materially lower yield. In the case of Thames Water, however, some of the difference might also be explained by the difference in the credit rating.

It is also worth noting that both comparator bonds are of small issuance size. Relative to WASC bonds of larger size, which are more common, the difference in the cost for a WOC relative to a WASC would be expected to be greater.

For the South Staffordshire bond, the comparator bonds are of higher credit quality, which could explain some of the difference in yields. Nevertheless, the yield on the Severn Trent bond is considerably lower than that on the South Staffordshire bond, despite having a materially higher maturity.

[19] Data on traded yields and spreads for these bonds is not available.

The interviews with banks, undertaken for this project, confirmed that it is common for WOC bonds to be issued at a significant premium to comparable benchmarks—some of the premium is due to a liquidity premium, as well as to the size of the issue. (When investing in an individual bond issue, many debt investors have a minimum size requirement that often exceeds the issuance size of WOC bonds.)

The small size of the issues also implies that, as a proportion of bond value, the WOC bond issues incur higher transaction costs. For example, legal fees and rating agency fees have a large fixed element.[20]

Table 5.2 Recent WOC and WASC bond issues

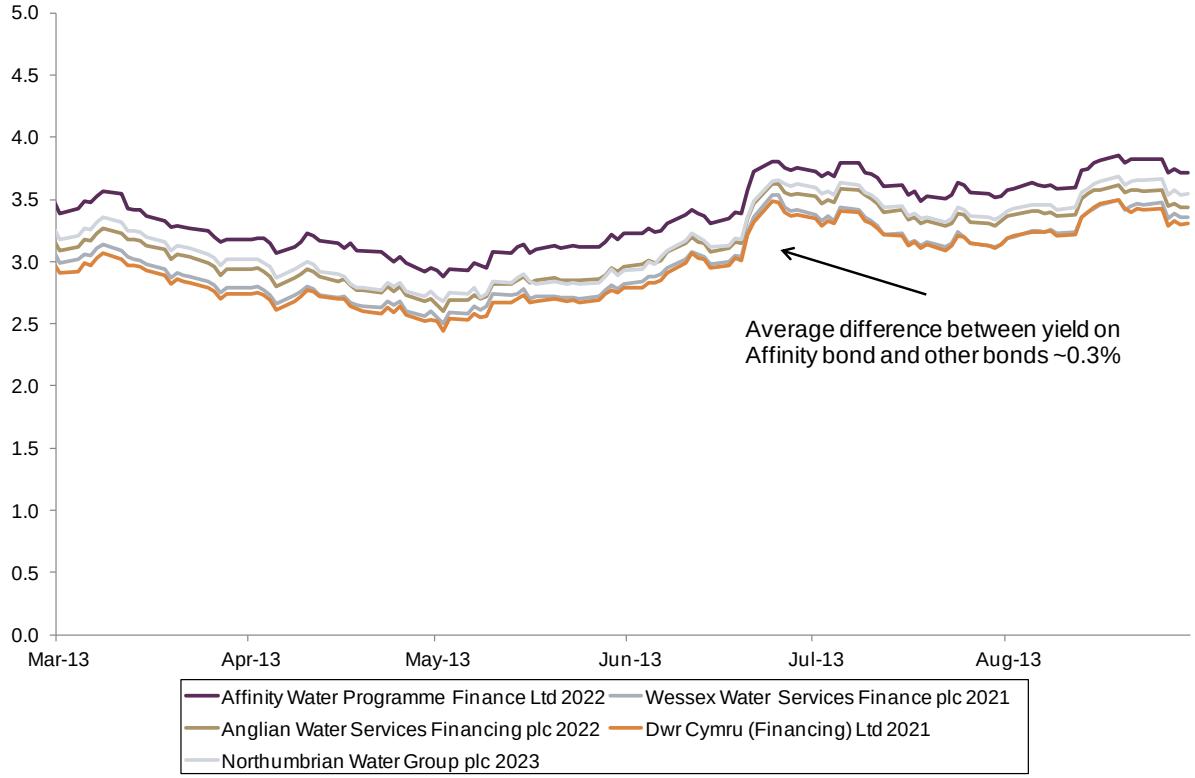
Issuer	Pricing date	Maturity date	Proceeds (£m)	Yield at issuance (%)	Spread to benchmark at issuance (bp)	Rating at issuance
Bristol Water plc index-linked	Mar 2011	Mar 2041	40	2.7	200	BBB+
Yorkshire Water Services Bradford Finance Ltd index-linked	Nov 2011	Dec 2041	50	2.2	185	n/a
Thames Water Utilities Cayman Finance Ltd index-linked	Oct 2009	Oct 2042	55	2.1	n/a	A–
Difference in yields				**0.5–0.6**		
South Staffordshire plc	Nov 2012	Jan 2020	41	4.4	n/a	BBB–
Wessex Water Services Finance plc	Jan 2012	Sep 2021	200	4.0	203	A-
Severn Trent Utilities Finance plc	Sep 2013	Sep 2026	500	3.7	145	A-
Difference in yields				**0.3-0.7**		
Average difference in yields across the sample				**0.5**		

Note: Comparators were chosen on the basis of similarity of issuance dates, maturity and credit rating.
Source: Dealogic, and Oxera analysis.

The larger WOCs—Affinity Water and South East Water—have also accessed the bond markets in recent years. As an example, Figure 5.3 shows the traded yield on a bond recently issued by Affinity Water relative to a comparator sample of WASC bonds.[21] Over the past six months the bond has traded on average 0.3% higher than the WASC bonds.

[20] As an example, rating agencies typically would charge a fixed fee for providing the first rating, and then charge an ongoing annual fixed fee to continue rating the bond/issuer.
[21] Data on other bonds issued by Affinity Water and South East Water is not presented owing to the absence of either traded yield/spread data for these bonds or suitable WASC comparator bonds.

Figure 5.3 Yields on Affinity bond and a selection of comparators (%)



Source: Dealogic, Bloomberg, and Oxera analysis.

5.1.2 Artesian finance

For a number of WOCs, a proportion of existing debt comes from Artesian loans. This form of loan resembles a long-term bond in many respects. Issued through a special-purpose vehicle, Artesian loans pooled the loans of individual WOCs, allowing the WOCs to overcome some of the liquidity and issue-size limitations of accessing the bond markets. These bonds were guaranteed by monoline insurers, which provided credit risk insurance.

When issued, Artesian loans were more expensive than comparable WASC bonds, on average by 0.4% (Table 5.3).[22] These bonds also continue to trade at higher yields than comparable WASC bonds (Figure 5.4), with an average difference of 0.4% over the last six months.

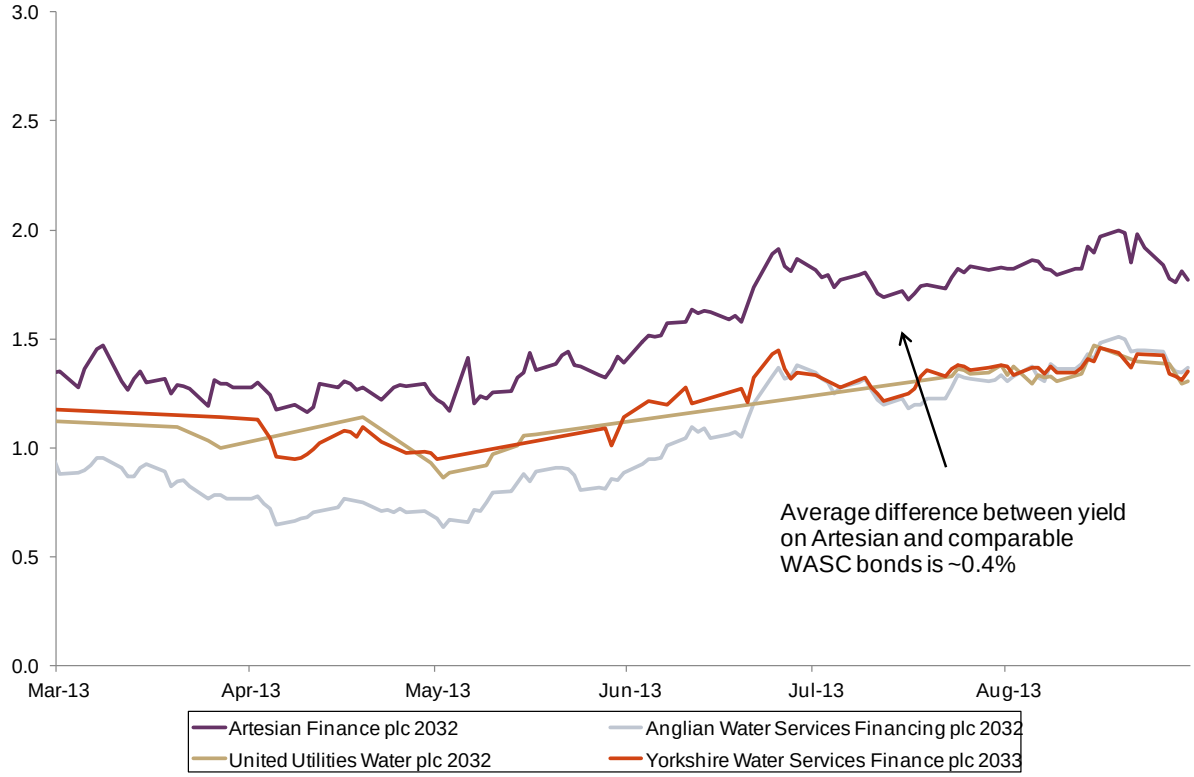
[22] Comparable WASC bonds were only identified for Artesian Finance I issue. There were two additional Artesian Finance issues—Artesian Finance II and Artesian Finance III.

Table 5.3 Artesian loans and comparable WASC issues

Issuer	Pricing date	Maturity date	Proceeds (£m)	Yield at issuance (%)	Spread to benchmark at issuance (bp)	Rating at issuance
Artesian Finance plc index-linked	Jun 2002	Sep 2032	78 (initial tranche)	3.6	n/a	AAA
Anglian Water Services Financing plc index-linked	Jul 2002	Jul 2032	200	3.1	85	AAA
United Utilities Water plc index-linked	Nov 2002	Dec 2032	49	3.5	n/a	A
Yorkshire Water Services Finance plc index-linked	Feb 2003	Jul 2033	100	3.0	180	A
Difference in yields				**0.1–0.6**		
Average difference in yields across the sample				**0.4**		

Note: Comparators were chosen on the basis of similarity of issuance dates, maturity and credit rating.
Source: Dealogic, and Oxera analysis.

Figure 5.4 Yields on Artesian loans and a selection of comparators (%)



Source: Dealogic, Bloomberg, and Oxera analysis.

At the time, Artesian finance provided a reasonably competitive and long-term source of financing for the WOCs. Although they cost more than comparable WASC bonds, this was an efficient financing choice at the time since it allowed WOCs to match more closely the tenor of their financing to asset lives, and to rely less on bank financing.

Going forward, however, the market is not open for new issuances of this kind, as confirmed through our interviews with market participants. The monoline insurance market is now closed following the financial crisis. Thus, in future the WOCs will have to rely mainly on bank debt, which is typically more expensive than bond debt (section 5.1.3).

5.1.3 Bank debt

There is some evidence that bank loans are more expensive than comparable WASC bonds, by up to 0.8% (or 0.6% on average) (Table 5.4). This is derived by comparing margins on WOC bank loans to traded spreads on WASC bonds with remaining time to maturity similar to the tenor of bank loans.

The margins shown in Table 5.4 do not include other costs associated with bank facilities, such as ongoing commitment fees and utilisation fees. These costs alone could add 1% to the all-in cost of bank financing over a typical five-year loan term.[23] This implies a cost of about 20bp per annum.

While bond issues also have associated transaction costs, on a per annum basis these costs are likely to be smaller since the average maturity of water bonds is around 30 years. In section 2, 10bp for transaction costs of issuing debt were included in the cost of debt for WASCs, based on regulatory precedent. This is likely to understate the transaction costs associated with issuing debt for the WOCs.

Furthermore, the interviews with the banks showed that WOCs' bank debt is likely to be provided by at most 1–2 relationship banks, suggesting that the bargaining power of the WOCs in the loan negotiations process is weaker than that of the WASCs. In contrast, WASCs have a much wider range of bank debt options available to them.

As confirmed during the interviews with the banks, given the absence of ancillary services from which banks might be able to generate further revenue, the rates on the loans are likely to be greater for the WOCs than for the WASCs. Furthermore, company size in itself is a factor that affects how much lending a firm can obtain and at what cost, as size is one of the factors affecting the perceived creditworthiness of the firm.

Therefore, the average difference in the cost of bank debt for the WOCs and the cost of debt for the WASCs shown in Table 5.4 is likely to be a lower bound.

Table 5.4 Bank loan costs relative to comparable WASC bonds

WOC loan		Margin to LIBOR (bp)	Six-month average of spreads on comparable WASC bonds (bp)[1]	Average difference
1.	[✂]	105	90	15
2.	[✂]	150	70	80
3.	[✂]	125	78	47
4.	[✂]	90	70	20
5.	[✂]	100	70	20
Range (bp)				**15–80**
Average (bp)				**60**

Note: [1] Spreads are relative to swap rates.
Source: Company information, Dealogic, and Oxera analysis.

5.1.4 Summary

The evidence reviewed in this section shows that, relative to the WASCs, WOCs typically incur higher costs on all types of debt that they might be able to issue.

– The cost of issuing a bond is higher for a small WOC than for a WASC.
– The cost of accessing bond markets indirectly (through Artesian finance) has also historically been higher than the cost of comparable WASC bonds.

[23] Based on data provided by the companies.

– The cost of WOC bank loans is higher than the cost of comparable WASC bonds.

The combination of existing bond and Artesian debt comprises more than three-quarters of the existing portfolios of the small WOCs. The real cost of this debt ranges between 2.9 and 3.6%, with an average above 3%. This is higher than the cost of existing bond debt for WASCs. As none of this debt will mature over AMP6, a number of WOCs are locked into paying a higher interest rate than the WASCs for the duration of the price control.

Any new debt requirements of the WOCs will need to be met primarily through bank debt, as only the largest WOCs can access the bond markets, or bank debt, given that the market for new Artesian-type finance is closed.

– The cost of issuing a bond could be on average around 0.3–0.5% higher for a WOC.
– The cost of bank loans for the WOCs could be up to 0.8% higher than the cost of bond finance for the WASCs, with an average of 0.6%. Relatively higher transaction costs could add a further 10bp to the cost of debt for the WOCs relative to the WASCs.

This means that, as a minimum, the total cost of debt for the small WOCs is likely to be at least 0.3% greater than for the WASCs, and could be higher by as much as 0.8%, depending on the individual company's existing debt portfolio and future funding needs. Therefore, a range of 0.3–0.8% is suggested for the small-company premium on debt.

5.2 Small-company premium—equity

Differences in asset risk between companies could be driven by differences in exposure to revenue and cost risk, and by the relative contribution of revenue and cost risk to total risk. To the extent that some of the revenue and/or cost volatility has a systematic component, these differences will translate into differences in the asset beta. This principle was explicitly recognised in the CC decision for Bristol Water.

A review of the revenue and cost make-up of the WOCs and WASCs suggests that there are material differences in their cost structures. Specifically, the WOCs appear to have higher operational gearing—the relative proportion of fixed cost in their cost structure. This means that the impact on profits of any revenue or cost shock is likely to be greater for the WOCs than for the WASCs.

Operational gearing can be measured in different ways. The CC, for example, considered the proportion of revenue that is not accounted for by the allowed return and depreciation as a relevant metric—in this case, the higher the proportion of revenue that is made up of return and depreciation, the smaller is the impact of any shock on profit. Figure 5.5 shows that there is a noticeable difference between the WOCs and the WASCs.[24] For the WOCs, the difference also appears to be correlated with size.

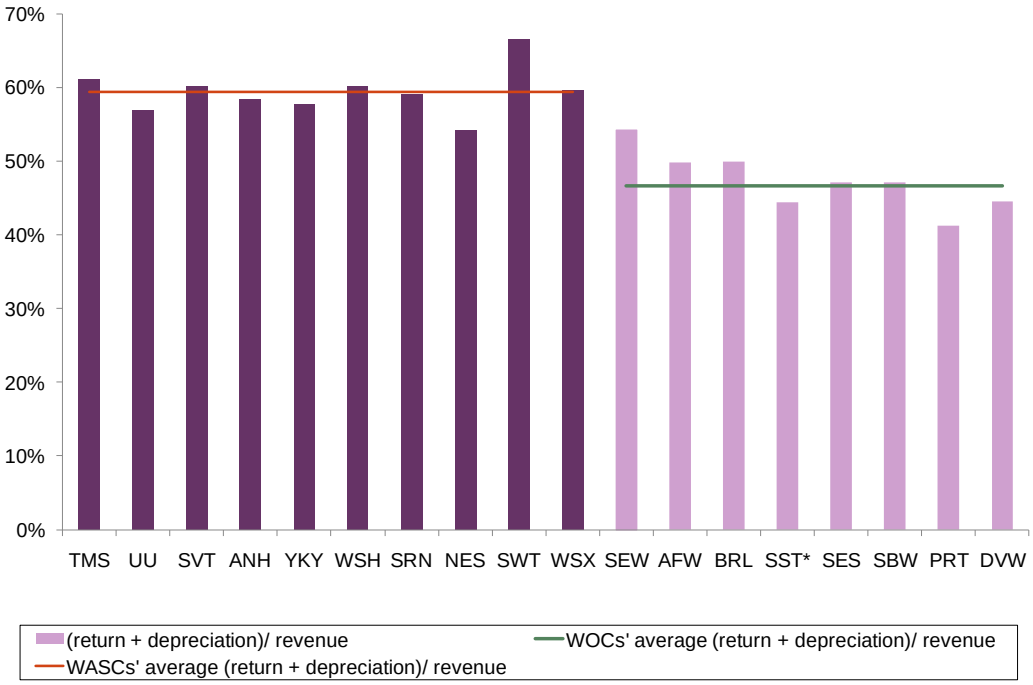
An alternative way to measure operational gearing is to consider the ratio of costs to asset value. Since it is total cash costs that affect the relative present value (PV) of costs to the present value (PV) of assets, this means that both CAPEX and OPEX matter. What matters for the rate of return on assets required by investors is the long-term expected ratio of PV of costs to PV of assets. This long-term ratio can be proxied by the TOTEX/RCV ratio—a higher TOTEX/RCV ratio is consistent with having higher operational gearing. Figure 5.6 similarly suggests that there is a noticeable difference between the WOCs and WASCs.[25]

Historically, the WOCs have earned, on average, lower operating margins than the WASCs. This would also imply that any revenue or cost shock has a greater impact on the WOCs' profits than on those of the WASCs (Figure 5.7).

[24] This observation has been cross-checked using PR04 data.

[25] This observation has been cross-checked using PR04 data.

Figure 5.5 Proportion of allowed revenue accounted for by return and depreciation

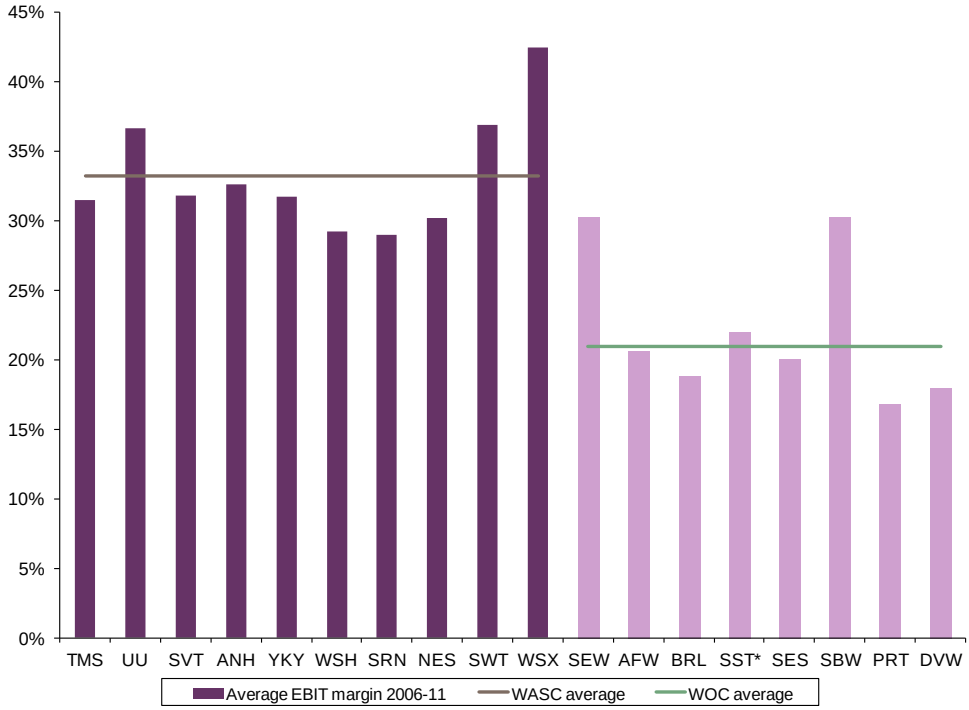


Note: * SST includes Cambridge Water. Companies have been ranked by size, starting with the largest from left to right. Revenue and return for the WOCs have been adjusted in line with the CC methodology in the Bristol Water case.
Source: Ofwat (2009), op. cit.; CC (2010), op. cit.; and Oxera analysis.

Figure 5.6 TOTEX/RCV

Note: * SST includes Cambridge Water. Companies have been ranked by size, starting with the largest from left to right.
Source: Ofwat (2009), op. cit.; CC (2010), op. cit.; and Oxera analysis.

Figure 5.7 Operating margins



Note: * SST includes Cambridge Water. Companies have been ranked by size, starting with the largest from left to right.
Source: June Returns 2006–11, and Oxera analysis.

Regardless of the chosen metric, it is evident that the WOCs are different to the WASCs, and are likely to experience greater profit fluctuations as a result of revenue or cost shocks.

There is no universally agreed methodology for translating the impact of higher operational gearing into a difference in the asset beta. One way to approximate the impact is to apply the CC methodology used in the Bristol Water case. Under this methodology, the asset beta is proportionately increased by comparing the relative difference in the proportion of revenue accounted for depreciation and return. Based on Figure 5.5, the average difference between the WOCs and WASCs is 20%. Applying this uplift to the industry asset beta range produced in section 3 would translate into an asset beta range of 0.36–0.48 for the WOCs.

– However, it is worth noting that the CC acknowledged that its methodology might overestimate the effect of higher operational gearing on the asset beta.

– Regulatory precedent on the asst beta (shown in section 3) indicated a range of 0.32–0.43 for the asset betas of utilities (albeit for utilities on average larger than the WOCs). The PR09 decision implied an asset beta for the WOCs of 0.45.

Taking these factors into account, an upper bound of 0.45 for the WOCs' asset beta is considered appropriate. This implies an uplift of 0.05 to the top end of the proposed asset beta range for the WASCs. Applying the same uplift to the lower end of the WASC range gives a value of 0.35.

Overall, an uplift to the asset beta of WASCs of 0.05 appears reasonable based on the evidence considered, which implies an asset beta range for the WOCs of 0.35–0.45.

6 Wholesale return—summary

Table 6.1 brings together all the evidence from the previous sections. The estimated vanilla WACC range for the WASCs is **3.7–4.5%**. At the chosen levels of gearing for the WASCs and WOCs, the implied uplift to the vanilla WACC for WOCs relative to WASCs is **0.4–0.7%**.

Table 6.1 Proposed range for the PR14 wholesale WACC

	WASCs		WOCs	
Parameter	**Low**	**High**	**Low**	**High**
Real RFR (%)	1.25	1.50	1.25	1.50
ERP (%)	5.25	5.50	5.25	5.50
Asset beta	0.30	0.40	0.35	0.45
Equity beta	0.75	1.00	0.78	1.00
Cost of equity (post-tax real, %)	5.2	7.0	5.3	7.0
Gearing (%)	60.0	60.0	55.0	55.0
Cost of debt (pre-tax real, %)	2.7	2.8	3.0	3.6
Vanilla WACC (real, %)	**3.7**	**4.5**	**4.0**	**5.1**
Small-company premium			**0.4**	**0.7**

Note: Numbers may not add up due to rounding.
Source: Oxera analysis.

Values in the upper half of the range because the lower part of the range implies a relatively low risk premium for investing in the water company's equity compared with the risk premium on debt.

If the parameter values at the bottom of the estimated range are used to calculate the cost of equity for an all-equity financed firm, the resulting cost of equity is not much higher than the cost of debt. The cost of equity of an all-equity financed WASC would be 2.8% compared with the cost of new debt of 2.3%, including transaction costs of issuance; the risk premium of new equity over new debt is therefore only 0.5%. Given that equity investors face considerably more risk than debt investors, the difference between the cost of equity and the cost of debt looks low.

Within the regulatory framework, it is important that a consistent approach to the relative risks of debt and equity prevails over time, and that this accords with expectations in the capital markets.

Other considerations that affect the choice of the point estimate from within the range and that are likely to suggest an estimate in the upper half of the range include:

– ongoing challenges in interpreting market evidence within a standard CAPM framework;

– Ofwat's financeability duty, and the need to ensure that companies have access to capital markets on reasonable terms, in an environment of rising interest rates;

– other cross-checks, such as the evidence from the DGM (section 6.1).

However, the choice of the point estimate from within the proposed range will ultimately reflect the individual company's judgement and the overall consistency with the rest of the

business plan. For example, the outcome of the financeability assessment might affect the overall judgement of which point estimate of the WACC represents the right balance between different stakeholders.

6.1 DGM evidence

The ranges for the CAPM-based cost of equity are cross-checked against the cost of equity calculated by applying a simple one-step DGM to the listed water companies. Table 6.2 presents these estimates. The one-year-ahead dividend forecasts are based on average analyst forecasts provided by IBES and available from Datastream. The long-term dividend growth rate is proxied by the long-term average expected GDP growth rate of 1.8%.[26]

This produces a range for the DGM-based estimates of the cost of equity for the listed WASCs of 6.2–7.1%, which is broadly consistent with the top of end of the CAPM-based range (for the WASCs). Although the results of this analysis are sensitive to the assumption about the long-term growth rate, one would need to adopt a highly conservative growth rate assumption (eg, 0%) to support the low end of the CAPM-based cost of equity range.

This evidence provides further support for choosing an estimate from the upper half of the cost of equity range presented in Table 6.1.

Table 6.2 Real cost of equity estimates (%)

	United Utilities	Pennon	Severn Trent
Spot	7.1	6.2	6.6
Six-month average	6.7	6.3	6.3
Since PR09 Final Determination	7.2	5.9	6.8

Note: Data up to August 30th 2013.
Source: Bank of England, Datastream, HM Treasury, and Oxera analysis.

[26] This is the same growth rate assumption that was used to derive the forward-looking ERP estimates in section 3.3. The growth rate assumption is based on the HM Treasury survey of independent forecasters of medium-term GDP forecasts.

7 Retail return

The key objectives of setting separate price controls in the future are to:

– create the conditions for competition in the NHH market;
– provide targeted incentives across the different parts of the value chain, with both HH and NHH retail businesses being more responsive to customer needs and putting more cost pressure on the wholesale business.

To meet these objectives, it is important to estimate the return that a stand-alone retail operator, dealing at arm's length with the wholesale business, would need to earn in order to remain financially viable in the market. This means that, in the absence of any robust evidence of a material transfer of risk from the wholesale business to the retail business, the total allowed return across the whole value chain may increase.

Given the relatively asset-light nature of retail businesses, Ofwat has proposed to set the allowed return in retail using a return on sales metric or net (EBIT) margin, defined as EBIT over turnover. Drawing on comparator evidence from other industries—in particular, retail businesses providing other utility services—is likely to be the most appropriate way to estimate the net margin for PR14.

Of the comparators considered, energy retailers are likely to be the most suitable comparator group for the water retail market. The average net margins earned in energy have been in the range of 1.0–4.0% over the past five years, depending on customer type.

As data on the precise contractual arrangements in energy retailing, as well as other comparators, is not generally available, no adjustments are made for any differences in the relative capital intensity (including working capital). Based on the evidence that is available, for the NHH market, a range of **2.0–4.0%** is suggested. Given the importance of stimulating competition, it would be appropriate to choose an estimate towards the top end of this range since the costs of foreclosing new entry are likely to be greater than the costs associated with the incumbents overcharging customers, at least initially.

For the HH market, a lower margin would be appropriate, given that there are no immediate prospects for competition. Nevertheless, it is important to ensure financial viability of the retail business on a stand-alone basis, as well as to allow for potential future changes in the market, and to ensure a coherent regulatory framework across the HH and NHH segments. A margin in the range of **1.0–2.0%** is considered appropriate, with the midpoint of the range representing a reasonable point estimate.

7.1 Proposed framework

The returns earned by companies in 'asset-light' industries might be thought of as comprising two parts:

– a return on capital employed, derived using the traditional return on assets approach;
– a return on sales, or margin, which reflects the additional risks faced by the business.

The two parts combined can be expressed as a return on sales metric, or an operating (net) margin, calculated as EBIT/turnover. This is the parameter that needs to be estimated in the context of PR14 for both the HH and NHH markets.

The return on capital employed, in a capital-intensive industry, is by far the most dominant component of the profit that the company needs to make. However, a business with virtually

no physical assets or working capital needs will still require a return to allow it to remain financially viable in the event of negative shocks.

In a regulatory context, it is therefore important to ensure that the average expected return reflects the fact that retailers need to earn sufficient profit in good years in order to compensate for the risk of a bad year. This will not necessarily be fully captured in the return on physical assets and working capital. This point has recently been acknowledged by Ofcom in the context of Royal Mail (Box 7.1).

Box 7.1 Royal Mail example

As Royal Mail is a business structured primarily around people, in reviewing what the appropriate regulatory framework for Royal Mail should be, Ofcom questioned whether applying the standard RAB-WACC approach that provides Royal Mail with a return on its tangible assets indeed provides the company with sufficient return to remain financially viable. In the analysis of a commercial rate of return for Royal Mail, Ofcom has shown that the possible EBIT range is quite wide, depending on how risk is defined and remunerated:

– a standard 'RAB-WACC type' approach would suggest an EBIT margin of around 5–6%;
– a consideration of profitability that credit rating agencies would expect from Royal Mail in order to be able to maintain an investment-grade credit rating, as well as evidence from comparator sectors, would suggest a margin of around 8–10%.

Ofcom concluded that a range of 5–10% for the EBIT margin was reasonable for Royal Mail, and indicated that a value towards the top half of the range was likely to be more appropriate, given the risk profile of the business. This suggests that Ofcom has decided that the profit Royal Mail needs to earn in order to remain financially viable could be double the level implied by the traditional RAB-WACC approach.

In relation to the 5–6% margin produced by the standard RAB-WACC analysis, Ofcom noted that:

> this level of return does not appear to provide a return from the activities required to provide the universal service which would be likely to result in Royal Mail being able to raise finance from capital markets. [...] This reflects a different scenario to other companies regulated by Ofcom, where the return on regulated assets is more consistent with the returns observable in capital markets.

Source: Ofcom (2011), 'Securing the universal postal service', Proposal for the future framework for economic regulation, pp. 45–9.

However, one of the difficulties with expressing the required return as a return on sales is that there is no established theoretical framework for estimating an appropriate ex ante level of operating margins.

In this case, analysis of margins earned in comparable industries is likely to be the most useful source of evidence to inform the assessment of appropriate net margins for PR14.

7.2 Comparator analysis

The comparator analysis is based on the following sectors and companies.

Primary sample—sectors providing infrastructure services:

– Energy retailers—the retail arms of the 'Big 6' energy suppliers in the UK, where they provide electricity and gas to both domestic and business customers. The analysis includes Centrica, E.ON, EDF, RWE Npower, Scottish Power, and Scottish and Southern Energy (SSE).
– Water in Scotland—Business Stream, Scottish Water's retail division, which has been delivering water to business customers in Scotland since 2006.

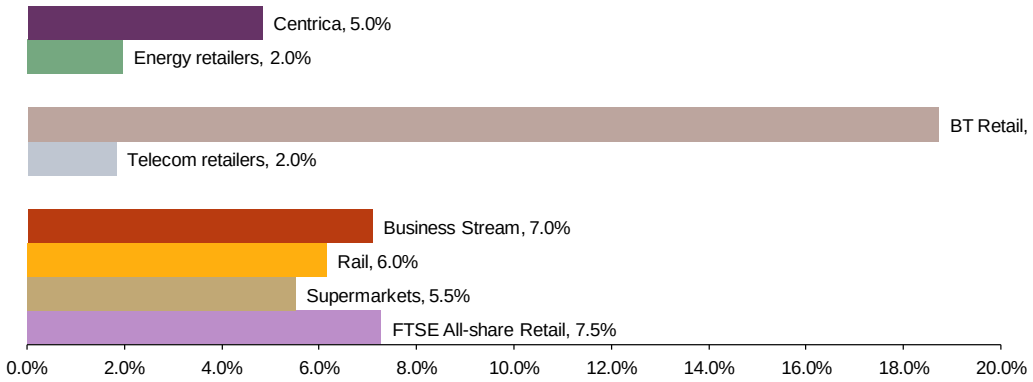
– Telecoms retailers—firms that purchase bandwidth from wholesalers and sell it to end-customers via mobile contracts. This sample includes Tesco Mobile, Lebara Mobile, Lyca Mobile, and Mundio Mobile.
– BT Retail—the retail arm of BT, selling broadband Internet, landline, mobile, and digital television services to consumers and businesses in the UK.
– Rail franchises—a sample of 19 train operating companies in Great Britain.[27]

Secondary sample—other retail businesses

– Supermarkets—the five largest grocery retailers in the UK: Tesco, Sainsbury, Morrison, Marks & Spencer, and Waitrose.
– Companies classified as retail in the FTSE All-Share—29 UK listed retailers operating in the following sectors: food, supermarkets, clothing, sports, automotives, homeware, electronics, home shopping, stationery, pharmaceuticals, funeral services, car parts, and home furnishing.

Figure 7.1 shows the average margins earned by the various sectors over the past five years. The range of estimated margins for the primary sample is 2.0–6.0%, and for the secondary sample 6.0–7.5%. As the underlying data is disparate in nature, the numbers throughout this section have been rounded to the nearest half a percent.

Figure 7.1 Average margins by company/sector, 2008–12 (%)



Note: BT Retail is included in the average for the telecoms retailers sector.
Source: Company accounts (except for energy retailers, where data is obtained from the Consolidated Segmental Statements published by Ofgem, and the FTSE All Share Retail where data is obtained from Bloomberg), and Oxera analysis.

The estimated margins for the secondary sample are higher than for the primary sample, which is consistent with the intuition that the risk profile of retailers providing more essential utility or infrastructure services might be lower (for example, due to demand being less sensitive to macroeconomic conditions). Therefore, placing more weight on the evidence from the primary sample might be more appropriate.

Within the primary sample, there is a marked difference between margins earned by former monopoly incumbents relative to other providers. Within energy, Centrica's margins have averaged 5% relative to 1.5% earned by other retailers. Similarly, BT Retail has earned double-digit margins, whereas some of the other market players have earned very low margins. This difference is likely to be due to the number of legacy customers who have never switched providers.

[27] The sample includes Cross Country, East Midlands, Greater Western, East Coast, West Coast, Chiltern, Greater Anglia, Integrated Kent, London Overground, London Tilbury & Southend, South Central, South Western, Thameslink/Great Northern, West Midlands, Merseyrail, Northern Rail, ScotRail, TransPennine, and Wales & the Borders

A similar picture can be observed in the non-domestic market for water in Scotland. According to a recent discussion paper by Open Water, only 5% of customers have switched supplier since market opening.[28] This is likely to explain the relatively high ex post margin of 5.5% earned by Business Stream.

In terms of the business characteristics, Business Stream and energy retailers are likely to be the closest comparators to the English and Welsh water companies. Both sectors contract with the network business to provide the end-product to customer, are responsible for billing and meter reading, and manage bad-debt risk. Both also provide essential utility services bringing the demand characteristics closer. However, as noted above, the competitiveness of the water market in Scotland is likely to be quite low, so placing more weight on data from energy retailers might be more appropriate.

In energy, the simple five-year average of actual margins earned is 2.0% (Figure 7.1). Within the energy sector, it is also worth noting the differences in margins earned on domestic versus non-domestic customers: 1.0% and 4.0% respectively over the last five years. Therefore, the average net margins earned in energy have been in the range of 1.0–4.0%, depending on customer type.

As the data on the precise contractual arrangements in energy retailing, as well as other comparator industries, is not generally available on a consistent basis, no robust adjustment can be made for any differences in the relative capital intensity (including working capital).

On the basis of the available evidence, for the NHH market a range of 2.0–4.0% is suggested. The top end of the range reflects the higher margins earned in energy on non-domestic customers, and the low end of the range reflects the average across the industry. Given the importance of stimulating competition, it would be appropriate to choose an estimate towards the top end of this range since the costs of foreclosing new entry are likely to be greater than those associated with the incumbents overcharging customers, at least initially.

For the HH market, a lower margin would be appropriate, given no immediate prospects for competition. Nevertheless, it is important to ensure financial viability of the retail business on a stand-alone basis, as well as to allow for potential future changes in the market, and to ensure a coherent regulatory framework across the HH and NHH segments. A margin in the range of 1.0–2.0% is considered plausible, the top end reflecting the average margins across the industry and the lower end the lower margins on domestic customers. The midpoint of the range is considered to be a reasonable point estimate.

[28] Open Water (2013), 'The New Retail Market for Water and Sewerage Services', p. 13.

A1 CAPM–WACC framework

Ofwat, as well as other UK regulators, uses the concept of the WACC to determine the allowed rate of return. Specifically, Ofwat uses a vanilla WACC, which is calculated as the average of the pre-tax cost of debt ($R_{D,\ pre\text{-}tax}$) and the post-tax cost of equity ($R_{E,\ post\text{-}tax}$) weighted by the relative values of debt (D) and equity (E) in the total value of the firm (D+E). The ratio of debt to total firm value is typically referred to as gearing.

$$WACC_{vanilla} = R_{D,\ pre\text{-}tax}\frac{D}{D+E} + R_{E,\ post\text{-}tax}\frac{E}{D+E}$$

In a number of regulated sectors, including water, the pre-tax cost of debt is typically estimated taking into account both historical and forward-looking debt costs of a notionally efficient company. This approach reflects the explicit financing duty of the regulator.

To estimate the cost of equity, regulators primarily use the CAPM framework, where the cost of equity (R_E) is equal to the sum of the risk-free rate (R_f) and the company-specific risk premium, measured by the equity beta (β_i) multiplied by the expected excess return of the market portfolio ($R_m - R_f$), also known as the ERP, as in the following equation:

$$R_E = R_f + \beta_E(R_m - R_f)$$

In the CAPM framework, the equity beta represents the extent to which a company's shareholders are subject to risk arising as a result of correlation with the returns of the market as a whole, known as 'systematic risk'.

Variability in observed equity returns can be attributed to two primary sources of risk: business risk and financial risk, where the latter results from the choice of capital structure. For this reason, equity betas cannot be compared across companies unless adjustments are made to standardise gearing. This adjustment involves 'de-levering' the equity beta to calculate an asset beta, which reflects the systematic risk associated with the business, independent of capital structure. De-levering is performed using the following formula:

$$\beta_{asset} = (1-g) * \beta_{equity} + g * \beta_{debt}$$

where g is equal to the level of gearing for the entity to which the equity beta corresponds. Once an appropriate asset beta has been determined for the companies or sectors of interest, this can be 're-levered' to yield an equity beta that is consistent with the notional level of gearing.

In the past, Ofwat, as well as some other regulators, has assumed that the debt beta (β_{debt}) is zero. The asset betas of water companies implied by market data have been derived in this report using the same assumption in order to allow for a consistent comparison between previous Ofwat decisions and recommendations in this report. As long as equity betas are de-levered and re-levered using consistent assumptions about the debt beta, whether a zero or a positive debt beta is used should make no material difference to the cost of equity.

A2 Company codes

Code	Water company	WASC/ WOC
TMS	Thames Water	WASC
UU	United Utilities	WASC
SVT	Severn Trent Water	WASC
AHN	Anglian Water	WASC
YKY	Yorkshire Water	WASC
WSH	Welsh Water (Dwr Cymru)	WASC
SRN	Southern Water	WASC
NES	Northumbrian Water	WASC
SWT	South West Water	WASC
WSX	Wessex Water	WASC
SEW	South East Water	WOC
AFW	Affinity Water	WOC
BRL	Bristol Water	WOC
SST	South Staffordshire Water	WOC
SES	Sutton & East Surrey Water	WOC
SBW	Sembcorp Bournemouth Water	WOC
PRT	Portsmouth Water	WOC
DVW	Dee Valley Water	WOC

Source: Ofwat.

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