Methodology Information Paper 14: Econometric models

Introduction

In this information paper we review both the Ofwat econometric models and the revised models which include information from Scottish Water.

The paper begins by outlining how the Ofwat models were developed and their relevance to cost efficiency. It goes on to discuss how we developed the revised models, which are specific to Scottish Water. We explain each model in detail, comparing the original Ofwat models and our revised versions. We conclude by explaining our proposed approach at the Strategic Review of Charges 2010-14.

Development of Ofwat's econometric models

The econometric models that are used by Ofwat were originally developed by Ofwat and Professor Mark Stewart of the University of Warwick in the early 1990s. They were used by Ofwat at its 1994 price review. They were then reviewed in the late 1990s, again with input from Professor Mark Stewart, and revised models were used by Ofwat at its 1999 and 2004 price reviews.

We used these models to assess the efficiency of the Scottish water industry in both our 2001 and 2005 price reviews. We have continued to use the Ofwat models to monitor Scottish Water's progress towards achieving its efficiency targets and we publish the results of this analysis in our annual 'Costs and performance report'.

The Ofwat models are also used to monitor the relative efficiency of the companies south of the border on an annual basis. Ofwat publishes the results of this analysis in its annual report 'Water and sewerage service unit costs and relative efficiency'. This annual performance assessment influences the share prices of those water companies whose shares are quoted on the London Stock Exchange.

The purpose of each model is to establish a relationship between the costs reported by the companies and external cost drivers. These cost drivers have a significant impact on costs but are outside the control of the management of the company. By controlling the principal external cost drivers in the models, we can determine relative efficiency with a high degree of accuracy. The cost drivers and explanatory factors used to derive the current suite of models relate to the financial year 2004-05.

The models take different forms and are summarised in Table 1.

Table 1: Summary of econometric models and explanatory factors[1]

Model	Model type	Explanatory factors
Water resources and treatment	Linear model for unit cost	Population, number of sources, distribution input, proportion of supplies from rivers[2].
Water distribution	Log unit cost	Population, proportion of total mains length with diameter > 300mm.
Water power	Log linear	Distribution input, average pumping head.
Water business activities	Log linear	Number of billed properties.
Sewer network	Log linear	Sewer length, area, resident population, holiday population.
Large sewage treatment works	Log linear	Total load, use of activated sludge treatment, tight effluent consent for both suspended solids and BOD_5.[3]
Small sewage treatment works	Unit cost	Works size, works type, load.
Sludge treatment and disposal	Unit cost	Weights of dry solids, disposal route.
Sewerage business activities	Unit cost	Number of billed properties.

Our revision of the Ofwat models

Use of Scottish Water information

The information from Scottish Water that we used to revise the models relates to the financial year 2004-05. Ofwat also used information from the companies in 2004-05 in developing its models. We have made every effort to ensure that we collect information on the same basis. The companies provide the required information in their annual regulatory returns to Ofwat. Scottish Water provided the necessary information to us in its 2005 June Return.

Scottish Water has made good progress in improving the asset and customer information that we use in the modelling. Some issues remain relating to, for example, the information that is provided about how much water is put into the distribution system and the amount of pumping necessary. However we consider that these issues are not material to our assessment of the scope for efficiency.

Removal of PPP

We have excluded information about the costs, number and type of customers served and asset bases of Scottish Water's PPP contracts[4]. This

[1] Ofwat has indicated that it expects to have new models for water resources and treatment and sewage sludge treatment and disposal for its 2009 price review ('New approaches to expenditure and incentives: a discussion paper', Ofwat, May 2007).
[2] Ofwat replaced this with the proportion of supplies from boreholes in its 2005-06 model.
[3] The term BOD_5 in this and other tables refers to the five-day biochemical oxygen demand.
[4] Public private partnerships (PPPs) deliver a significant proportion of sewerage services in Scotland. See Methodology Information Paper 9.

is because we recognise that Scottish Water cannot control the operating costs at PPP works.

Water service model

Water resources and treatment

This model predicts the costs associated with water resources, the treatment process and the operating environment. Specifically, it takes into account economies of scale at water source level and the extra costs of treatment resulting from the proportion of supplies that are taken from rivers. Costs per head are modelled rather than volumetric unit costs. This is to avoid rewarding high leakage or penalising companies that have minimised demand.

Table 2 sets out the statistical details of the model developed by Ofwat using information from the English and Welsh companies and our revised model developed using information from England and Wales and additional information from Scottish Water. We set out the details of each of the models in the same way.

Table 2: Original Ofwat model and our revised model for water resources and treatment operating expenditure

Water resources and treatment					
		Ofwat model		**Water Industry Commission for Scotland (WICS) model**	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost		Resources and treatment functional expenditure [£m], less power expenditure [£m], less Environment Agency/Scottish Environment Protection Agency charges [£m], divided by resident winter population [millions]			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		2.069	2.142	2.046	2.077
Number of sources divided by distribution input [Ml/day]		18.481	7.278	18.468	7.095
Proportion of supplies derived from rivers		4.128	2.734	4.170	2.637
Statistical indicators	R squared	0.256		0.256	
	Standard error	2.297		2.239	
	Model significance (F test)	0.060		0.052	
	Observations	22		23	
Form of the model (WICS)		Modelled cost = 2.046 + 18.468 x $\frac{\text{number of sources}}{\text{distribution input}}$ + 4.170 x (proportion of supply from rivers)			

Water distribution

This model uses the ratio of the length of large mains to small mains as the cost driver (see Table 3). Repairs, maintenance and inspection of large mains are likely to incur much greater costs than those on small mains. The model also reflects the higher costs of operating in urban areas, where the density of underground services and traffic congestion can impair productivity. The unit costs are again expressed per head of population, rather than by volume of water. This reduces the potential to penalise companies with low leakage and/or low demand.

Table 3: Original Ofwat model and our revised model for water distribution operating expenditure

Water distribution					
		Ofwat model		WICS model	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost[5]		ln (distribution functional expenditure excluding power expenditure [£m], divided by resident winter population [000s])			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		-5.173	0.143	-5.163	0.136
Length of main greater than 300 mm diameter [km] divided by total length of main [km]		5.014	1.807	4.850	1.684
Statistical indicators	R squared	0.278		0.283	
	Standard error	0.200		0.195	
	Model significance (F test)	0.012		0.009	
	Observations	22		23	
Form of the model (WICS)		Modelled cost = $-5.163 + 4.850 \times \frac{\text{length of main} > 300\text{ mm diameter}}{\text{total length of main}}$			

Water power

This model is based on the physical relationship between the amount of water pumped and the energy required (see Table 4). It incorporates both vertical lift and the energy required to overcome friction in pipes. The model recognises that economies of scale are available through pump maintenance and negotiation of electricity tariffs.

[5] The term ln in this and other tables is the natural logarithm.

Table 4: Original Ofwat model and our revised model for water power operating expenditure

Water power					
		Ofwat model		**WICS model**	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost		ln power expenditure [£m]			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		-8.794	0.298	-8.817	0.291
ln (distribution input [Ml/day] multiplied by average pumping head [metres])		0.926	0.028	0.928	0.027
Statistical indicators	R squared	0.983		0.983	
	Standard error	0.169		0.166	
	Model significance (F test)	0.000		0.000	
	Observations	22		23	
Form of the model (WICS)		Modelled cost = -8.817 + 0.928 x ln (distribution input x average pumping head)			

Water business activities

This model relates business activity costs (including customer services, scientific services and the charge for doubtful debts) to the number of billed properties (see Table 5). It recognises that there are economies of scale. Other potential cost drivers, for example the number of complaints, are within the control of management and so are not considered valid explanatory factors.

Table 5: Original Ofwat model and our revised model for water business activities operating expenditure

Water business activities					
		Ofwat model		**WICS model**	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost		ln (business activities expenditure [£m] including doubtful debts [£m])			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		-3.728	0.278	-3.775	0.271
ln of number of billed properties [000s]		0.927	0.043	0.936	0.041
Statistical indicators	R squared	0.959		0.960	
	Standard error	0.242		0.241	
	Model significance (F test)	0.000		0.000	
	Observations	22		23	
Form of the model (WICS)		Modelled cost = -3.775 + 0.936 x ln (number of billed properties)			

Sewerage service model

Sewer network

This model expresses costs per unit length of sewer. It takes into account the amount of sewage being transported through the sewerage system (see Table 6). This is a function of area since this affects surface water drainage volumes. Costs associated with remoteness are also a function of area. Sewer network costs are also a function of population since this will impact on sewage volumes. The model takes account of the higher costs expected in regions with a significant holiday population.

Table 6: Original Ofwat model and our revised model for sewer network operating expenditure

Sewer network					
		Ofwat model		**WICS model**	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost		ln (sewerage network functional expenditure [£m], less Environment Agency/Scottish Environment Protection Agency charges [£m], less British Waterways charges [£m], per kilometre of sewer, for each area)			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		-6.244	0.415	-6.489	0.383
ln (area sewer district [km^2] per kilometre of sewer)		0.206	0.035	0.218	0.034
ln (resident population [000s] per kilometre of sewer)		0.500	0.219	0.352	0.199
Holiday population divided by resident population [000s]		1.282	0.879	1.328	0.859
Statistical indicators	R squared	0.452		0.490	
	Standard error	0.285		0.283	
	Model significance (F test)	0.000		0.000	
	Observations	64		68	
Form of the model (WICS)		Modelled cost = - 6.489 + 0.218 x ln (area of sewer district per km of sewer) + 0.352 x ln (resident population per km of sewer) + 1.328 x holiday population / resident population			

Large sewage treatment works

This model covers sewage treatment works serving a 'population equivalent' of at least 25,000 (see Table 7). Population equivalent is a measure of the amount of sewage treated, both household and industrial, expressed in terms of the number of household customers required to produce a similar strength and volume of sewage. The model takes into account the sewage load reaching the treatment works; the type of treatment in place (activated sludge increases power costs); and the quality of the discharged effluent required to meet environmental standards. The model exhibits considerable economies of scale in the treatment of sewage at the level of individual works.

Table 7: Original Ofwat model and our revised model for large sewage treatment works operating expenditure

Large sewage treatment works					
		Ofwat model		**WICS model**	
Data		June Returns 2005/Ofwat		Annual Return 2004-05	
Modelled cost		ln (functional expenditure on sewage treatment at large works [£000s] less Environment Agency/Scottish Environment Protection Agency charges [£000s] less terminal pumping costs [£000s])			
Explanatory variables:		Coefficient	Standard error	Coefficient	Standard error
Constant		-1.738	0.259	-1.636	0.255
ln of total load[6] [kg BOD/day]		0.804	0.029	0.794	0.029
Activated sludge[7]		0.330	0.056	0.304	0.056
Tight effluent consent for both suspended solids and BOD_5[8]		0.100	0.050	0.081	0.050
Statistical indicators	R squared	0.714		0.700	
	Standard error	0.493		0.497	
	Model significance (F test)	0.000		0.000	
	Observations	392		412	
Form of the model (WICS)		Modelled cost = -1.636 + 0.794 x ln (total load) + 0.304 x activated sludge + 0.081 x tight effluent consent for both suspended solids and BOD_5			

Small sewage treatment works

This model uses average unit costs (see Table 8). This is a necessary simplification given that there are thousands of small sewage treatment works. The cost matrix takes into account the size of the works – there are significant economies of scale – and the type of treatment process.

[6] Total load in this model is estimated as population equivalent x 120.
[7] Activated sludge includes secondary and tertiary treatment (variable value is 0 if not used, 1 if used).
[8] Tight effluent consent is defined as 30 mg/litre or less for suspended solids and 20 mg/litre or less for BOD_5 (variable value is 0 if tight consent does not apply, and 1 if the tight consent does apply).

Table 8: Original Ofwat model and our revised model for small sewage treatment works operating expenditure

Cost of small sewage treatment works										
Data	June Returns 2005/Ofwat Annual Return 2004-05									
Unit cost model	For each treatment type we compared each company's average annual expenditure (direct costs [£000s], less Environment Agency/Scottish Environment Protection Agency charges [£000s], less sludge costs [£000s], plus general and support costs [£000s]) with each company's estimated expenditure (weighted average industry unit cost multiplied by each company's load [kg BOD_5/day]).									
Weighted average industry unit cost £000s/(kg BOD_5/day) – Ofwat model										
Treatment type	Primary secondary	Secondary activated sludge	Secondary biological	Tertiary A1	Tertiary A2	Tertiary A1	Tertiary A2	Sea outfall preliminary	Sea outfall screened	Sea outfall unscreened
Size band 1	0.46	0.81	0.95	1.01	0.72	0.88	1.46	0.59	0.05	0.43
Size band 2	0.18	0.65	0.51	0.63	0.26	0.52	0.61	N/A	N/A	N/A
Size band 3	0.21	0.46	0.29	0.44	0.43	0.35	0.39	0.28	0.06	0.01
Size band 4	0.26	0.22	0.18	0.20	0.27	0.19	0.16	N/A	0.11	0.01
Size band 5	N/A	0.15	0.14	0.16	0.15	0.14	0.12	0.02	N/A	N/A
Observations: 500										
Weighted average industry unit cost £000s/(kg BOD_5/day) – WICS model										
Treatment type	Primary secondary	Secondary activated sludge	Secondary biological	Tertiary A1	Tertiary A2	Tertiary A1	Tertiary A2	Sea outfall preliminary	Sea outfall screened	Sea outfall unscreened
Size band 0	0.83	4.27	3.18	4.78	2.34	3.26	2.02	N/A	N/A	0.11
Size band 1 (Scotland)	0.57	1.76	1.21	1.46	N/A	1.29	0.90	N/A	N/A	0.05
Size band 1 (England & Wales)	0.46	0.81	0.95	1.01	0.72	0.88	1.46	0.59	0.05	0.43
Size band 2	0.19	0.72	0.53	0.64	0.49	0.53	0.60	0.02	N/A	0.05
Size band 3	0.16	0.47	0.30	0.46	0.45	0.36	0.39	0.10	0.06	0.03
Size band 4	0.18	0.22	0.18	0.21	0.27	0.20	0.16	0.02	0.05	0.02
Size band 5	0.05	0.15	0.14	0.16	0.15	0.14	0.12	0.02	N/A	N/A
Observations: 560										

Sludge treatment and disposal

This model compares the costs of sludge treatment and disposal to the volume treated and the possible methods of disposal (see Table 9). The model uses average unit costs across England and Wales. The unit cost approach is again a necessary simplification given the large number of sludge treatment and disposal facilities.

Table 9: Original Ofwat model and our revised model for sludge treatment and disposal operating expenditure

Cost of sludge treatment and disposal		
Data	June Returns 2005 / Ofwat Annual Return 2004-05	
Unit cost model	We used a unit cost approach for modelling the treatment and disposal of sludge. For each disposal route, we compared each company's average annual expenditure (sludge functional expenditure [£000s], less Environment Agency/Scottish Environment Protection Agency charges [£000s]) with each company's estimated costs (weighted average industry unit cost multiplied by each company's load [total tonnes of dry solids]).	
Weighted average industry unit cost £000s/(thousand tonnes of dry solids)		
Disposal route	**Ofwat model**	**WICS model**
Farmland – untreated	224.0	224.0
Farmland – conventional	176.9	178.6
Farmland – advanced	230.0	231.5
Incineration	159.8	162.9
Landfill	131.6	133.7
Composted	150.0	150.0
Land reclamation	187.2	193.5
Other	212.3	210.1
Observations	80	88

Sewerage business activities

This model uses an average unit cost per billed property across England and Wales (see Table 10). There are too few sewerage companies of sufficiently different size to allow economies of scale to be estimated.

Table 10: Original Ofwat model and our revised model for sewerage business activities operating expenditure

Sewerage business activities	
Data	
Unit cost model	We used a unit cost approach for modelling business activities, based on the number of billed properties. We compared each company's average annual business activities expenditure (total business activities [£m], plus doubtful debts [£m], divided by the number of billed properties) with the weighted average industry cost.
	Weighted average industry unit cost
Ofwat model **(£ per billed property)**	12.67
WICS extended model **(£ per billed property)**	13.02
Number of observations	Ofwat: 10; WICS: 11

Proposed approach 2010-14

For the next price review we propose to continue to use both Ofwat's econometric models and our revised versions. Our assessments of Scottish Water's relative efficiency would take account of the results of these models and our alternative model, described in Methodology Information Paper 15.

In our analysis we would continue to apply appropriate adjustments for special factors and differences in the scope of activities that apply in Scotland. We set out our proposed approach to these adjustments in Methodology Information Paper 16.

Related documents

'Strategic Review of Charges 2002-06', Water Industry Commissioner for Scotland, November 2001.

'The Strategic Review of Charges 2006-10: The draft determination', Volume 6, Water Industry Commissioner for Scotland, June 2005.

'The Strategic Review of Charges 2006-10: The final determination', Water Industry Commission for Scotland, November 2005.

Methodology Information Paper 15: Establishing the operating cost efficiency gap – our alternative model

Introduction

This paper describes our alternative model, developed in 2001, which provides a second approach to assessing the scope for Scottish Water to improve its operating cost efficiency.

The paper begins with a brief account of how we developed the alternative model. It goes on to describe the activities that are being modelled, the cost drivers for each activity, and the economies of scale associated with the cost drivers. The paper concludes with an outline of our proposals for the next price review.

Further technical details about the alternative model have been published and are available on our website[1].

Development of the alternative model

We originally developed the alternative model as part of the Strategic Review of Charges 2002-06. It was developed in response to the Competition Commission's view[2] that Ofwat should not rely solely on its suite of nine operating expenditure models to assess relative efficiency. The alternative model provides a separate, second approach to assessing the scope for Scottish Water to improve its efficiency.

In developing our alternative model we took particular care to use a different approach to that used in Ofwat's econometric models3. In our view, for an alternative method to have value, it has to provide an independent check. Our alternative model is therefore based on the premise that asset use, volumes and/or customers are the main drivers of most running costs. The model calculates the impact of each of these drivers separately on each of a number of activities. In contrast, the Ofwat econometric models examine the interrelationships between drivers, and focus on the drivers that explain differences in the observed costs of the companies most effectively. The Ofwat models do not separate the impact of each individual cost driver.

[1] 'Our work in regulating the Scottish water industry: The scope for operating cost efficiency', Section 3, Chapter 9, Water Industry Commissioner, October 2004.
[2] 'Mid Kent Water Plc: A report on the references under sections 12 and 14 of the Water Industry Act 1991', http://www.competition-commission.org.uk, 2000. The Competition Commission has recently reiterated its view in 'South East Water Limited and Mid Kent Water Limited: A report on the completed water merger of South East Water Limited and Mid Kent Water Limited', http://www.competition-commission.org.uk, 2007.
[3] Methodology Information Paper 14 gives details of our use of Ofwat's econometric models.

Our alternative model used information from the ten water and sewerage companies in England and Wales. In preparation for the Strategic Review of Charges 2006-10 we developed a second version of the model, which had the same structure but incorporated management information from Scottish Water. We used both of these models at the Strategic Review of Charges 2006-10.

Alternative model activities

The alternative model splits the water and sewerage business into ten different activities:

- water abstraction and treatment,
- water distribution,
- business activities (water),
- bad debt (water),
- sewage collection,
- simple sewage treatment,
- complex sewage treatment,
- processing sludge,
- business activities (sewerage), and
- bad debt (sewerage).

For each of these activities, we determine the principal factors that would affect comparisons of operating costs between Scottish Water and the water and sewerage companies in England and Wales. As with the econometric models, we populate the model with published information from the annual returns of Scottish Water and the companies south of the border. We use this information to predict what it would cost, on average, to carry out each activity. We are primarily interested in the total predicted costs for the water service, the sewerage service and the combined services. The results of our modelling allow us to compare total predicted costs with actual reported costs.

This comparison indicates the likely scope for improvement.

Cost drivers

Tables 1 and 2 set out the cost drivers (for water and sewerage respectively) that we identified for each activity.

Table 1: Alternative model – cost drivers by activity for the water service

Activity	Cost drivers used in the model, associated with each activity				
	Assets operated	**Asset attribute**	**Customers served**	**Volume**	**Other**
Abstraction and treatment	Impounding reservoirs and lochs	Number and average size of each asset type		Annual distribution input	Average pumping head in abstraction and treatment
	Boreholes and springs				
	River and burn abstraction				
	Simple water treatment works				
	Complex water treatment works				
Water distribution	Large diameter water mains	Length of network	Number of connected customers	Annual distribution input	Average pumping head in the distribution system
	Small diameter water mains				
	Water pumping stations	Number and average size of each asset type			
	Service reservoirs				
Business activities			Number of billed water customers – household (unmeasured, measured) and non-household (unmeasured, measured)		Annual number of water samples taken
Bad debt					Annual revenue billed

Table 2: Alternative model – cost drivers by activity for the sewerage service

Activity	Cost drivers used in the model, associated with each activity				
	Assets operated	**Asset attribute**	**Customers served**	**Volume**	**Other**
Sewage collection	Sewers	Length of network	Number of connected customers		Size of area served
	Pumping stations	Number and average size			
	Storm outfalls	Number			
Simple sewage treatment	Sea outfalls – screened and unscreened	Number and average size		Load treated	
	Preliminary treatment works				
	Primary treatment works				
	Public septic tanks	Number			
Complex sewage treatment	Secondary treatment works using i) activated sludge processes and ii) biological processes	Number and average size		Load treated	
	Tertiary treatment works using i) activated sludge processes and ii) biological processes				
Processing sludge	Own sludge works and sludge treatment centres	Number and average size		Tonnes disposed (dry weight)	
Business activities			Number of billed water customers – household (unmeasured, measured) and non-household (unmeasured, measured)		
Bad debt					Annual revenue billed

We use information from Scottish Water and from the water and sewerage companies south of the border for each of the cost drivers listed above. The aim is to understand the costs associated with each driver, and to add up each of these costs to obtain an estimate of the total cost of each activity. We also need to take account of any economies of scale. This is discussed below.

Economies of scale

Economies of scale at an asset level can be significant in the water industry. In the alternative model, we are particularly interested in economies of scale that are a function of the type and size of the assets. We have used information from the annual returns of the companies and of Scottish Water to estimate economies of scale associated with different types of assets. As far as possible, we have sought to ensure that our estimates of economies of scale are reasonable. For example, we have different estimates of economies of scale for simple sewage treatment works and for complex sewage treatment works.

We combine information about the size of the assets that are operated by each water and sewerage company and our estimates of economies of scale, to determine a 'standard' size for each type of asset within the model. This allows us to calculate how many such 'standard' size assets each water and sewerage service provider has in its asset base and consequently to calculate a single unit cost for each asset type. We multiply the number of 'standard' assets by the appropriate unit cost to calculate the predicted costs of operating each company's assets.

We assume that economies of scale do not apply to non-asset costs. The model simply uses the information relating to customer numbers, volumes and so on that is provided by the companies south of the border and by Scottish Water.

Proposed approach for 2010-14

We propose to continue to use the two forms of the alternative model that we developed for the last price review. We intend to recalibrate the models using detailed information for 2007-08 taken from the annual returns of the water and sewerage companies and Scottish Water.

We propose again to use these models to confirm the results of our analysis of both the original Ofwat and our revised econometric models.

Related documents

'Strategic Review of Charges 2002-06', Water Industry Commissioner for Scotland, November 2001.

'The Strategic Review of Charges 2006-10: The draft determination', Volume 6, Water Industry Commissioner for Scotland, June 2005.

'The Strategic Review of Charges 2006-10: The final determination', Water Industry Commission for Scotland, November 2005.

Methodology Information Paper 16: Adjustment for Scottish factors

Introduction

In Methodology Information Papers 14 and 15 we explained that we benchmark Scottish Water's operating expenditure efficiency relative to the water and sewerage companies in England and Wales. This paper sets out how we adjust the results of our modelling to ensure that we have taken full account of any factors that are unique to Scotland.

We find it useful to think of two types of adjustment that we make for Scottish factors. These are:

- special factors, and
- the scope of activities.

We make adjustments to the extent that these Scottish factors are not already taken account of in our benchmarking.

Scottish factors already accounted for in the benchmarking

In order to benchmark Scottish Water, we use Ofwat's econometric models. Some commentators have questioned the application of Ofwat's econometric models to Scottish Water[1]. These criticisms generally focus on perceived differences in Scottish Water's operating environment or on the different ownership structures.

The Ofwat models have been successfully applied to companies as different as Severn Trent Water and South West Water, and to both large and small water and sewerage companies as well as to the smaller water only companies. We believe that as Ofwat has successfully applied the models to such diverse companies we can reasonably apply these models to Scottish Water.

Moreover, we have revised the Ofwat models to include information from Scottish Water. This means that differences in Scottish Water's operating environment influence the models that we use before we make any discrete adjustments for Scottish factors.

The econometric models include variables such as the size of the required asset base and the area served. Scottish Water operates with a relatively large number of relatively small assets over a relatively large area. Our benchmarking takes account of such factors and allows for increased costs. Our modelling at the 2006-10 review allowed for an additional £30 million annually for Scottish factors.

[1] See, for example, J Findlay 'Financing the Scottish water and sewerage industry' paper to the Scottish Trade Union Conference, April 2004.

It should be noted that the majority of Scottish Water's operating environment is directly comparable with that in England and Wales. Most customers live within the central belt and most rural customers in Scotland are no more rural than customers in, say, Wales or the West Country. We do recognise, however, that there are exceptional circumstances and that our analysis should take account of these in assessing the level of costs to allow for.

Special factors

Ofwat's econometric models provide a simple explanation of water and sewerage company costs. Not every factor that might determine costs is included in the models. The factors that are included are the principal cost drivers. They are the most relevant to explaining the costs of the companies south of the border and Scottish Water.

For an individual company, it is possible that there are additional factors that are not included in the models but which influence costs. These are known as 'special factors' because they may be relevant to just one or two companies' costs. Special factors can both increase or reduce costs. Perhaps not surprisingly, companies tend to concentrate on providing information about those factors that increase costs when explaining their efficiency to regulators.

Our allowances at the last price review

At the 2005 price review, Scottish Water claimed more than £50 million of special factors for operating expenditure. Following detailed analysis of the claim, we allowed for additional operating costs to reflect the following special factors[2]:

- the central regulatory laboratory,
- travel costs,
- electricity costs,
- bad debt,
- sewer laterals,
- water works sludge disposal,
- public septic tanks.

The total adjustment that we made in response to evidence on these factors was £17.5 million. We considered that Scottish Water's claims in respect of four other areas – leakage, service reservoirs and towers, political queries and cryptosporidium – did not merit an adjustment to the results of the econometric models.

[2] 'The Strategic Review of Charges 2006-10: The final determination', November 2005, Chapters 10-14 provides details. For further explanation, see 'The Strategic Review of Charges 2006-10: The draft determination', Volume 6, June 2005, Chapters 11-12.

Our proposed approach

As part of its business plan submissions, we will ask Scottish Water to submit its current views of the special factors that influence its costs. We again intend to take account of the special factors that are material and outside the control of management by adjusting the results of our models.

We intend to apply similar criteria to those used previously by the Commission and by Ofwat. For an adjustment to be valid, Scottish Water will have to provide a high standard of evidence. It will need to set out whether the factors are the result of particular legal, environmental or quality obligations upon it, the character of all or part of its customer base, or the result of historical development of the water and sewerage systems in its area of supply. Key questions to be addressed are:

- What are the special circumstances that produce a material difference from industry norms?
- What is the overall net impact of the special factors on Scottish Water's costs?
- What has Scottish Water done to manage the additional costs arising from the special factors and to limit their impact?
- Are there other special factors that reduce costs relative to industry norms? If so, have these been quantified and offset against the upward cost pressures?

We intend to seek confirmation of cost evidence from the independent Reporter.

We will give Scottish Water feedback on our initial assessment of the special factors that it includes in its first draft business plan. This will form part of our overall feedback on the first draft business plan on 31 July 2008.

In the Strategic Review of Charges 2006-10, we held a workshop with Scottish Water to discuss its special factor submission. We intend to hold a similar session as part of the 2010-14 review. This should increase transparency and should help ensure that our benchmarking of Scottish Water's operating expenditure is objective and fair.

The scope of activities

In order to make an accurate assessment of Scottish Water's efficiency relative to that of the companies south of the border, we need to take account not only of special factors, but also of the different scope of activities that Scottish Water undertakes. For example, unlike the companies south of the border, Scottish Water carries out no significant household metering.

The scope of activities within England and Wales is comparable. In general, Ofwat does not therefore have to adjust the result of its models to reflect any differences in the scope of activities. In Scotland, such differences in the scope of activities are material to customers as they influence the price they should pay. These differences can both add to and reduce the costs that Scottish Water incurs.

Our adjustments at the Strategic Review of Charges 2006-10

As part of the Strategic Review of Charges 2006-10, we asked Scottish Water to submit its views on adjustments to our benchmarking to take account of differences in the scope of activities. It did not include any scope adjustments within its business plan submissions; however, we were still able to take account of differences in the scope of activities in our benchmarking.

Table 1 summarises the differences in the scope of activities that we took into account at the Strategic Review of Charges 2006-10.

Table 1: Scope adjustments in the Strategic Review of Charges 2006-10

Water service adjustments	Waste water service adjustments
Household metering Non-household metering Leakage Nitrate removal Reporter costs	Household metering Non-household metering Reporter costs

Our proposed approach

We will review any evidence from Scottish Water, the Reporter, Ofwat, the companies in England and Wales and other stakeholders before considering any adjustments to modelled operating expenditure to take account of differences in the scope of activities.

Conclusion

It is important that we take account of special factors and differences in the scope of activities. Adjusting for these Scottish factors helps us to ensure that we are making like-for-like comparisons and provides a more complete assessment of Scottish Water's relative operating cost efficiency.

Related documents

‘The Strategic Review of Charges 2006-10: The draft determination’, Volume 6, Water Industry Commissioner for Scotland, June 2005.

‘The Strategic Review of Charges 2006-10: The final determination’, Water Industry Commission for Scotland, November 2005.