South Staffs Water

Wholesale water price control, submission of proposed econometric models for Ofwat as part of PR24 consultation process.

January 2023

Introduction

We welcome this cost modelling consultation and the opportunity for the sector to play a part in the process.

Our focus for wholesale water base cost models has been on average pumping head (APH) as this is the cost driver which we believe was missing from PR19 models, and so the impact of topography on costs and historic efficiency was not fully reflected. APH has been used in models in some form earlier than PR09. In the past it was used as part of OPEX efficiency assessment, and then in later reviews it was incorporated in econometric models. Due to data quality concerns, Ofwat did not use APH at PR19, instead replacing it with the number of booster pumping stations per 1000 km of mains (BPS). We do not think that the BPS cost driver had a robust engineering based rationale for inclusion, and it also did not demonstrate correlation with power costs. It is our view that BPS was most likely acting as a proxy for capital maintenance or asset base scale, a case we have made to Ofwat in the past. BPS may have a validity of its own for this purpose, but it is not representing topography, which APH demonstrably does both from a first principles engineering perspective and a data correlation perspective.

We have replaced BPS with APH, using the data supplied in Ofwat's wholesale water v3 data file. There are no other changes, and no other new data used. The change in the Ofwat-supplied stata-do file to make this switch was straightforward, and we have enclosed the script we have used with this submission.

We have used the following combinations of the four available APH values for each of the models:

- For the single treated water distribution model, we have used the treated water distribution APH only (reflecting post treatment pumping into and within the network to customers).
- For the two wholesale water combined models, we have used the sum of all four APH components.
- In all models, APH is a logged value.

We attach the model template below, and enclosed with this submission is the modified stata file.

Wholesale water base cost model response:

Econometric model formulas:

1. SSC_TWD_1: $\ln(\text{realbotexplustwd}_{it}) = \alpha + \beta1.\ln(\text{lengthsofmain}_{it}) + \beta2.\ln(\text{weightedaveragedensityLAD}_{it}) + \beta3.\ln(\text{weightedaveragedensityLAD}_{it}))^2 + \beta4.\ln(\text{twdAPH}_{it}) + \varepsilon_{it}$

2. SSC_WW_1: $\ln(\text{realbotexplusww}_{it}) = \alpha + \beta1.\ln(\text{properties}_{it}) + \beta2.\ln(\text{weightedaveragedensityLAD}_{it}) + \beta3.\ln((\text{weightedaveragedensityLAD}_{it}))^2 + \beta4.\ln(\text{totalAPH}_{it}) + \beta5.(\%\text{watertreatedatlevels3-6}_{it}) + \varepsilon_{it}$

3. SSC_WW_2: $\ln(\text{realbotexplusww}_{it}) = \alpha + \beta1.\ln(\text{properties}_{it}) + \beta2.\ln(\text{weightedaveragedensityLAD}_{it}) + \beta3.\ln(\text{weightedaveragedensityLAD}_{it}))^2 + \beta4.\ln(\text{totalAPH}_{it}) + \beta5.\ln(\text{weightedaveragecomplexity}_{it}) + \varepsilon_{it}$

Description of dependent variables:

We have not changed the dependant variables for each of the existing models, they remain as per Ofwat's supplied stata file, reflecting botex costs across each of the modelled areas.

Description of explanatory variables:

We have replaced booster pumping stations with average pumping head. The other cost drivers are unchanged from Ofwat's original specification.

1. SSC_TWD_1: twdAPH = BN4870

2. SSC_WW_1: totalAPH = BN4861 + BN4862 + BN10902 + BN4870

3. SSC_WW_2: totalAPH = BN4861 + BN4862 + BN10902 + BN4870

APH has been logged in all models.

Comment on our models:

All models use the complete time period of data as provided in Ofwat's wholesale water data set v3.

All models perform well with regard to correlations and the specified tests. APH is significant at the highest level across all three models, along with the main scale driver (either properties or mains length) and the density drivers.

In terms of the sensitivity tests, APH has higher significance than BPS and although some combinations of tests do see a slight reduction in this level of significance, this is only back to the equivalent significance level of the BPS driver.

	SSC_TWD_1	**SSC_WW_1**	**SSC_WW_2**
depvar	lnrealbotexplustwd	lnrealbotexplusww	lnrealbotexplusww
lnproperties		1.096*** {0.000}	1.087*** {0.000}
pctwatertreated36		0.003* {0.059}	
lnWAD_LAD	-3.203*** {0.000}	-2.579*** {0.000}	-2.401*** {0.000}
lnWAD_LAD2	0.245*** {0.000}	0.177*** {0.000}	0.164*** {0.000}
lnwac			0.280* {0.094}
lnlengthsofmain	1.069*** {0.000}		
lntotalaph		0.323*** {0.008}	0.309*** {0.008}
lntwdaph	0.313*** {0.000}		
_cons	2.892* {0.057}	-2.888* {0.072}	-3.486** {0.021}
Estimation_method	RE	RE	RE
N	187	187	187
Robustness Test			
R_squared	0.960	0.969	0.969
RESET_P_value	0.599	0.786	0.824
VIF_statistic (OLS)	Due to correlation of the two LAD variables we have instead shown the VIF of the new APH variable only.		
	1.01	1.52	1.64
Pooling (OLS)	0.824	0.592	0.534
Normality (OLS)	0.918	0.069	0.439
Heteroskedasticity (OLS)	0.474	0.000	0.000
LM (RE)	0	0	0
Efficiency scores			
Efficiency score min	0.714	0.809	0.784
Efficiency score max	1.330	1.333	1.317

Sensitivity to removing most efficient	G	G	A
Sensitivity to removing least efficient	G	A	A
Sensitivity to removing 2021/22 year	G	G	G
Sensitivity to removing 2011/12 year	G	A	A

Efficiency scores SSC_TWD1

Rank	Company	SSC_TWD_1
1	SWB	0.714
2	SES	0.921
3	NWT	0.967
4	WSX	0.97
5	SVE	0.993
6	PRT	1.002
7	SSC	1.016
8	TMS	1.038
9	HDD	1.048
10	NES	1.087
11	SRN	1.126
12	SEW	1.132
13	ANH	1.191
14	AFW	1.234
15	WSH	1.264
16	YKY	1.324
17	BRL	1.33

Efficiency scores SSC_WW_1

Rank	Company	SSC_WW_1
1	SSC	0.809
2	PRT	0.936
3	SVE	0.949
4	ANH	0.954
5	SWB	1.003
6	TMS	1.014
7	AFW	1.016
8	SEW	1.047
9	NES	1.068
10	NWT	1.098
11	WSX	1.105
12	YKY	1.122
13	SES	1.179
14	HDD	1.193
15	BRL	1.198
16	WSH	1.234

17	SRN	1.333

Efficiency scores SSC_WW_2

Rank	Company	SSC_WW_2
1	SSC	0.784
2	PRT	0.916
3	ANH	0.926
4	SVE	0.973
5	SWB	1.001
6	AFW	1.01
7	TMS	1.026
8	SEW	1.041
9	NES	1.067
10	WSX	1.093
11	NWT	1.098
12	YKY	1.132
13	BRL	1.169
14	SES	1.203
15	HDD	1.209
16	WSH	1.221
17	SRN	1.317

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Retail price control, submission on econometric models for Ofwat as part of PR24 consultation process.

January 2023

We appreciate the opportunity to submit our views and recommendations on the PR24 retail cost models. We have reviewed the latest data files and trialled a range of potential models but have found it challenging to resolve the clear issues with both the rationale of the cost drivers, and their statistical significance when updating for the latest years of data, particularly in the case of the bad debt models. We believe this is due to the small sample size potentially creating spurious correlations, and the endogenous management choices which cloud the interpretation of cost differences between companies. Therefore, we outline below some important areas of concern and look forward to further engagement in the spring, where we will review how Ofwat has considered these challenges.

1. **Bad debt drivers**
   - **Average Bill**

     This driver was used at PR19 and seems to remain significant in updated PR19 models. Ofwat outline two reasons for this significance which we dissect below.

     Firstly, a lower bill is easier for customers to pay and hence recovery rate will be higher than larger bills. We have not seen any evidence for this view, and in fact the opposite could be just as plausible. Customers faced with larger bills may feel pressure to tackle this first as it is less likely to be abandoned by a creditor. Also, in comparison to other household bills such as energy, rent or mortgages, the range of bill size in the water sector is far smaller and likely to take lower priority than these other bills. This challenge is particularly relevant for WoCs as Ofwat only include their water bill, but in several cases, WOCs bill the sewage element on behalf of the WaSC. As customers only see one bill, it is highly unlikely that customers would only pay the water component. Therefore, a lower bill does not mean higher recovery as there is no rationale nor evidence for this reasoning.

     Secondly, companies with larger bills will have a larger absolute level of debt for the same proportion of defaults. The size of the bill is considered exogenous for the retail function. However, we have observed from the data that, when used in this way, the variable is simply proxying WOC vs WASCs as a scale driver. The correlations are weak overall but there is no correlation when the variable is considered for the WOC group, and so the variable is being carried by only the weak correlation in the WASC group. Therefore, this variable simply proxies for company type and allows the influence of legacy bill factors within the current retail assessment with no demonstrable link to bad debt performance.

   - **Deprivation**

     Proportion of households with default and the index of multiple deprivation (IMD) were included in the PR19 models bad debt models to account for differing levels of deprivation. There is a clear rationale for areas with higher deprivation having higher bad debt costs, all else being equal. However, when updating the models for the latest data, these drivers do not appear to be significant.

As a result, we reviewed all the alternative drivers for deprivation that Ofwat provided in their dataset, including credit risk, average number of partial insight accounts or county court judgements per household and council tax collection rates. We agree in principle that we would expect these cost drivers to reflect exogenous deprivation levels and to have a relationship to bad debt costs, however that is not what we are seeing when they are used in models. We have examined the significance of each available variable and they are all weak.

We think this could be due to endogenous management choices, including companies' debt collection policy and effectiveness, being a far more significant factor in determining debt collection. Therefore, variables that should exogenously represent deprivation are being overshadowed by endogenous factors, leading to significant statistical bias in the model coefficients. Unless an alternative driver can be found that improves confidence in supporting the relationship between deprivation and bad debt, we recommend Ofwat considers deep dive reviews of the impact of deprivation, and potential cost adjustment claims to resolve this issue.

2. Triangulation

Ofwat has suggested in its methodology consultation that they are considering focusing only on total cost models for retail. We are concerned about this proposal because, as highlighted above, there are challenges with the robustness of the retail models. Reducing the number of models would exacerbate this issue and give less confidence in the calculation of retail allowances.

3. Covid-19 and cost-of-living impact

During the Covid-19 pandemic, the sector's provision for bad debt costs increased significantly in 2020 and 2021. Analysis shows that this spike in costs significantly undermines the quality and robustness of the PR19 bad debt and total cost models. In the retail stata do file provided, Ofwat consider using 'smoothed doubtful debt' from the April 2022 data request to improve model robustness. However, when using this data the robustness issues with the model significance persist. This suggests that the impact of Covid-19 must be further accounted for in the model, for example through dummy variables identifying the years of the pandemic, or additional data adjustments.

Moreover, there may be further increases in bad debt provision due to the current cost-of-living crisis. This may prove to be even more significant than the pandemic due to the high levels of inflation on energy and food, lower levels of government support available (furlough) and a likely significant recession in the next few years. The macroeconomic factors present should be considered where appropriate within or outside of the models, for example through Real Price Effects (RPE) adjustments.

Conclusion

Overall, we recognise the significant challenges in creating robust retail models. We continue to support Ofwat's cost modelling principles, which highlight the importance of consistency with operational and economic rationale and are concerned that the PR19 models no longer align with this principle. We hope that Ofwat consider the points we have raised in the spring cost modelling consultation, and we look forward to providing further input.