

21 August 2019

1. Introduction

This note contains First Economics' comments on Ofwat's draft determination estimate of water and sewerage companies' asset beta.

2. Background

Ofwat's preferred value for the "unlevered beta" is 0.29. Ofwat states in its draft determination document that it derived this estimate from analysis of Severn Trent's and United Utilities' share prices and that:

We consider a point estimate anchored on two year daily betas is appropriate ...

In practical terms, this means that Ofwat is proposing to use share price evidence from the period 1 March 2017 to 28 February 2019 to fix its beta estimate for the 2020-25 regulatory period.

3. Analysis

We think that relying on such a limited evidence base is inappropriate, for the following reasons.

3.1 Inherent imprecision in empirical beta estimates

The capital asset pricing model (CAPM) says that an investor in any individual firm requires return to compensate him/her for the undiversifiable, systematic risks that the firm exposes the investor to. In practical terms, this systematic risk will impact the investor's wealth according to the extent to which a firm's share value moves in tandem with movements in the stock market as a whole.

The "true" beta is not something that is knowable. Practitioners that wish to obtain a CAPM estimate of cost of capital therefore have to use observed, historical covariance and variance numbers in order to gain insight into the beta that a firm is likely to exhibit in the future. However, historical data tends to be very noisy. In any given period of time, only a proportion of the day-to-day, week-to-week or month-to-month movement in a firm's share price will be due to the way in which systematic risks are crystallising in the economy. For the rest of the time, the ups and downs will be caused by firm-or sector-specific factors that CAPM says a well-diversified investor will generally be unconcerned about.

This idiosyncratic risk causes a problem insofar as it creates temporary, coincidental covariance (or lack thereof) between changes in a firm's share price and movements in the wider stock market, thus obscuring the true beta. Over any given estimation period, the scale of potential measurement errors can be quite large depending on the particular way in which company- or industry specific factors happen to have been driving movements in the company's share price.

As an illustration of this point, the standard errors and R-squared values from Ofwat's 28 February 2019 calculations of Severn Trent's and United Utilities' betas are set out in table 1.

Table 1: Unlevered OLS beta estimates, 28 February 2019

Estimate	Beta	Standard error	R-squared
Severn Trent, 2 years daily data	0.29	0.04	0.097
United Utilities, 2 years daily data	0.27	0.04	0.103

Source: Bloomberg and First Economics' calculations.

The above standard errors mean that the 95% confidence interval on the averaged unlevered beta calculated using two years of daily data extends from 0.20 to 0.36. The confidence interval around the levered equity beta is even larger at 0.48 to 0.88. These margins of uncertainty mean that, contrary to Ofwat's position, it is not possible to attribute short-term movements in betas to changes in investors' underlying perceptions of the riskiness of regulated water companies and consequent changes in true betas. Instead, absent major structural breaks, it is much more likely that small changes in measured betas constitute random noise.

3.2 Incompatibility with wider regulatory practice

When confronted with the kind of measurement difficulties that we have just described, it is usual regulatory practice for a regulator to look at the pattern that empirical estimates of beta exhibit over an extended period of time. A long window of analysis cannot completely eliminate the noise caused by idiosyncratic risk factors. However, the presumption might be that upward and downward errors tend to cancel each other out over time and, hence, that the average level of betas over long periods are a better indicator of a firm's true beta than estimates compiled with only a very short run of data.

Ofwat will be able to verify for itself that this line of thinking has permeated most of the regulatory and CC/CMA reviews that have taken place in this country, as well as much of the supporting academic research. The following references are especially instructive:

Wright et al study¹ for UKRN, 2018 –

"[there is] a quite strong *prima facie* case to use all available data to estimate beta, not just a relatively short recent sample."

Indepen study² for Ofgem/UKRN, 2018 –

"In all cases, a look back over at least five and probably ten years is desirable..."

Ofgem RIIO-2 sector-specific methodology decision.³ 2019 –

"We remain unconvinced that we should place material weight on short-term equity beta results. Statistically, we believe this is dubious and intuitively we do not think there is materially more information content within short-term (eg 2 to 5-year) beta values compared to long-run values. Our strong view is that the noise to signal ratio is particularly high within short-term results. We also observe a mean reversion effect within the data - we therefore believe that long runs of data will help us to see through the cycle, avoiding undue bias on high-points or low-points within the short-term date."

¹ Wright, Burns, Mason and Pickford (2018), Estimating the cost of capital for implementation of price controls by UK regulators.

² Indepen (2018), Ofgem beta study RIIO-2.

³ Ofgem (2019), RIIO-2 sector specific methodology decision.

Ofwat's evidence to the 2015 Bristol Water CMA inquiry,⁴ 2015 –

“...single-day estimates which only provide a snapshot from a single estimation window can be subject to one-off movements which do not reflect the underlying systematic risk of a company. As long-term data series are available for each of the three listed WaSCs analysed, we would encourage the CMA to remove single-day estimates from their beta assessment, placing more weight upon time series averages in their assessment of their water industry beta assessment as these are more reflective of underlying systematic risk.”

CMA NIE inquiry,⁵ 2014 –

“Given that beta can vary over time we think that it is right to base our estimate on a relatively long run of data.”

Looked at alongside this body of thinking, Ofwat's decision to take a single spot estimate of beta using only two years of share price data is unconventional and exposes companies to a greater degree of measurement error than is usually the case in a regulatory price review.

3.3 Inconsistency with Ofwat's PR14 beta calculation

The position that Ofwat has taken in its PR19 draft determinations is also out of line with the approach that Ofwat took in PR14. In its January 2014 risk and reward guidance, Ofwat stated that:⁶

...we consider that relying solely on historical data for a limited number of water companies is not a perfect indicator of expected beta ...

In its final determination, Ofwat elected to focus on observed daily and monthly betas during the period 2009 to 2013. In effect, this meant that Ofwat used up to ten years worth of share price data when making its estimate of the PR14 beta.

Importantly, the data that Ofwat had in front of it in December 2014 showed that betas had been increasing in the run up to Ofwat's final price control determinations. Figures 1 and 2 reproduce the evidence base that Ofwat presented in its December 2014 document.

Figure 1: Two-year daily beta estimates



Figure 2: Five-year monthly beta estimates



Source: Ofwat.

⁴ Ofwat (2015), Ofwat response to CMA provisional findings.

⁵ Competition Commission (2014), Northern Ireland Electricity Limited price determination.

⁶ Ofwat (2014), Setting price controls for 2015-20 – risk and reward guidance, p.18.

The conclusions that Ofwat drew from the data were as follows:⁷

Although daily beta estimates have recently risen above 0.3, these estimates have peaked in recent months (and changes since January could be influenced by the PR14 regulatory process). We therefore place greater weight on the daily betas for Severn Trent Water and United Utilities over the 2009 to 2013 period which have tracked 0.30 closely.

(emphasis added)

Had Ofwat take a spot reading of betas in late 2014, using share price data only from the two-year period leading up to its December 2014 determinations, its PR14 beta would have been around 0.38 (see the far right-hand side of figure 1). However, Ofwat – rightly in our view – elected to look through the day-to-day volatility in share price data and was guided instead by empirical estimates of beta over a longer time horizon.

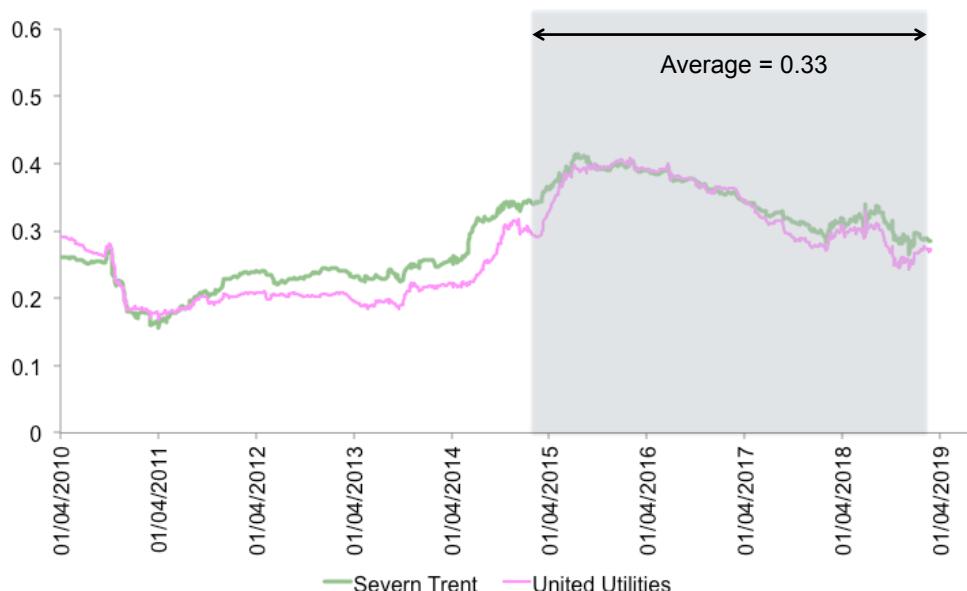
This decision remains relevant five years later because it is the exact opposite of the policy stance that Ofwat is proposing to take in PR19, even though Ofwat knows that share prices in recent times have been just as, if not more, impacted by company- and industry-specific factors, like PR19 announcements and the wider debate about nationalisation.

In effect, Ofwat is now saying to companies: “heads you lose, tails you lose as well”.

If a company is to be able consistently to earn a return that is commensurate with its cost of capital, Ofwat needs to apply the same policy consistently with respect to short- vs long-term averaging at each review. Since in PR14 Ofwat’s decided to set beta in line with a five-year average, even though betas had been increasing to a level that was clearly above previously observed values, it is only logical that Ofwat should once again set the PR19 beta in line with five-year averages, notwithstanding that spot estimates might currently be lower than normal.

Figure 3 shows that this directs Ofwat to a five-year average unlevered beta of around 0.33.

Figure 3: Two-year daily beta estimates



Source: Bloomberg and First Economics’ calculations.

⁷ Ofwat (2014), Setting price controls for 2015-20 final price control determination notice: policy chapter A7 – risk and reward, pp.34-35.

4. Conclusion

An unlevered beta of 0.33 is equivalent to an equity beta of approximately 0.80 at 60% gearing.

This is much closer to Ofgem's RIIO-2 equity beta estimate of 0.77,⁸ notwithstanding Ofgem's novel approach to de-gearing and re-gearing. It is also in line with Ofwat's PR14 estimate of beta.

⁸ Calculated from the following CPI-stripped values: cost of equity = 4.8%; a risk-free rate = -0.75%; expected market return = 6.5%.