The WACC for Drinking Water Companies in the Netherlands

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ACM

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I. Introduction and Summary

The Dutch Authority for Consumers and Markets (ACM) has commissioned The Brattle Group (Brattle) to calculate the current Weighted Average Cost of Capital (WACC) for drinking water distribution companies in the Netherlands.[1] In common with our previous reports, the ACM has instructed us to calculate the WACC using ACM's general methodology and the relevant prescriptions of the applicable legislation.[2] In preparing this report we use data up to and including April 2019, being the most recent data available at the time of our analysis.

ACM's methodology specifies the application of the Capital Asset Pricing Model (CAPM) to calculate the cost of equity. In line with ACM's methodology, we calculate the risk-free rate based on the five-year and two-year average yield on 10-year Dutch government bonds. Yields were on average 0.60% over the past five years, and 0.50% over the past two years. Taking the average between the two results in risk-free rate of 0.55%. This compares to a risk-free rate of 0.83% in our July 2017 report.

We calculate the Equity Risk Premium (ERP) using long-term historical data on the excess return of shares over long-term bonds, using data from European markets. Specifically, the methodology requires that the projected ERP should be based on the average of the arithmetic and geometric realized ERP for the Eurozone, using the market capitalization of each country's stock market as weights. The methodology also requires considering whether adjustments to the final ERP need to be made based on considerations of the historical average ERP, and ERP estimates based on dividend-growth models. Based on the available data, the methodology yields an ERP of 4.95%.

The Dutch water firms for which we are estimating the WACC are not publicly traded. Therefore we have selected a 'peer group' of publicly traded water distribution firms, as well as regulated energy network firms that have similar systematic risk to a regulated water

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1 ACM also commissioned Brattle to estimate the WACC for drinking water distribution companies in the Netherlands in 2013, 2015 and 2017. See, respectively, Dan Harris and Renato Pizzolla, "The WACC for Dutch Drink Water Companies", 28 June 2013 ("Brattle 2013 Report"); Dan Harris, Richard Caldwell, and Ying-Chin Chou, "The WACC for Dutch Drink Water Companies", 3 July 2015 ("Brattle 2015 Report"); and Dan Harris, Lucia Bazzucchi, and Flora Triolo, "Update to WACC Parameters for Drinking Water", 28 July 2017 ("Brattle 2017 Report").

2 The '*Drinkwaterbesluit*' and the '*Drinkwaterregeling*'.

distribution firm. We use the peer group of companies to estimate the beta and gearing for water distribution. We have tested that the shares of the peer group firms are sufficiently liquid to provide a reliable beta estimate. The methodology specifies a three-year daily sampling period for the betas. We estimate that the asset beta for water distribution in the Netherlands is 0.38. This compares to an asset beta of 0.42 in the July 2017 report.

Based on the gearing and credit ratings of the peer group, we conclude that a 30% gearing level is a reasonable target for a Dutch water distribution firm and consistent with an A credit rating.

The methodology specifies that the allowed cost of debt should be based on the average cost of debt for generic A-rated industrial bonds, and the cost of debt for a group of bonds issued by firms engaged in similar activities to drinking water distribution companies that have a rating at or close to A – so-called 'comparable bonds'. We understand that 'similar activities' in this context includes, in addition to water distribution companies, transport and/or distribution of gas and electricity. We identified a group of comparable bonds that fit these criteria. We estimate a pre-tax cost of debt of 1.61%, including 15 basis points for the cost of issuing debt. This compares to a pre-tax cost of debt of 1.93% in the July 2017 report.

Table 1 summarizes the WACC for drinking water distribution and the inputs to the WACC calculation. Applying the methodology results in an after-tax cost of equity of 3.24% and a nominal WACC of 2.75%, both pre-tax and post-tax.[3]

Table 1: Summary of WACC Calculation

Gearing (D/A)	[1]	Section VI	30.00%
Gearing (D/E)	[2]	[1]/(1-[1])	42.86%
Tax rate	[3]	Assumed	0.00%
Risk free rate	[4]	Section II	0.55%
Asset beta	[5]	Section V	0.38
Equity beta	[6]	[5]x(1+(1-[3])x[2])	0.54
Equity Risk Premium	[7]	Section III	4.95%
After-tax cost of equity	[8]	[4]+[6]x[7]	3.24%
Debt premium	[9]	Section VII	0.91%
Non-interest fees	[10]	Assumed	0.15%
Pre-tax cost of debt	[11]	[4]+[9]+[10]	1.61%
Nominal after-tax WACC	[12]	((1-[1])x[8])+([1]x(1-[3])x[11])	2.75%
Nominal pre-tax WACC	[13]	[12]/(1-[3])	2.75%

[3] Because the Dutch drinking water firms do not pay a corporate tax we apply an effective tax rate of 0%.

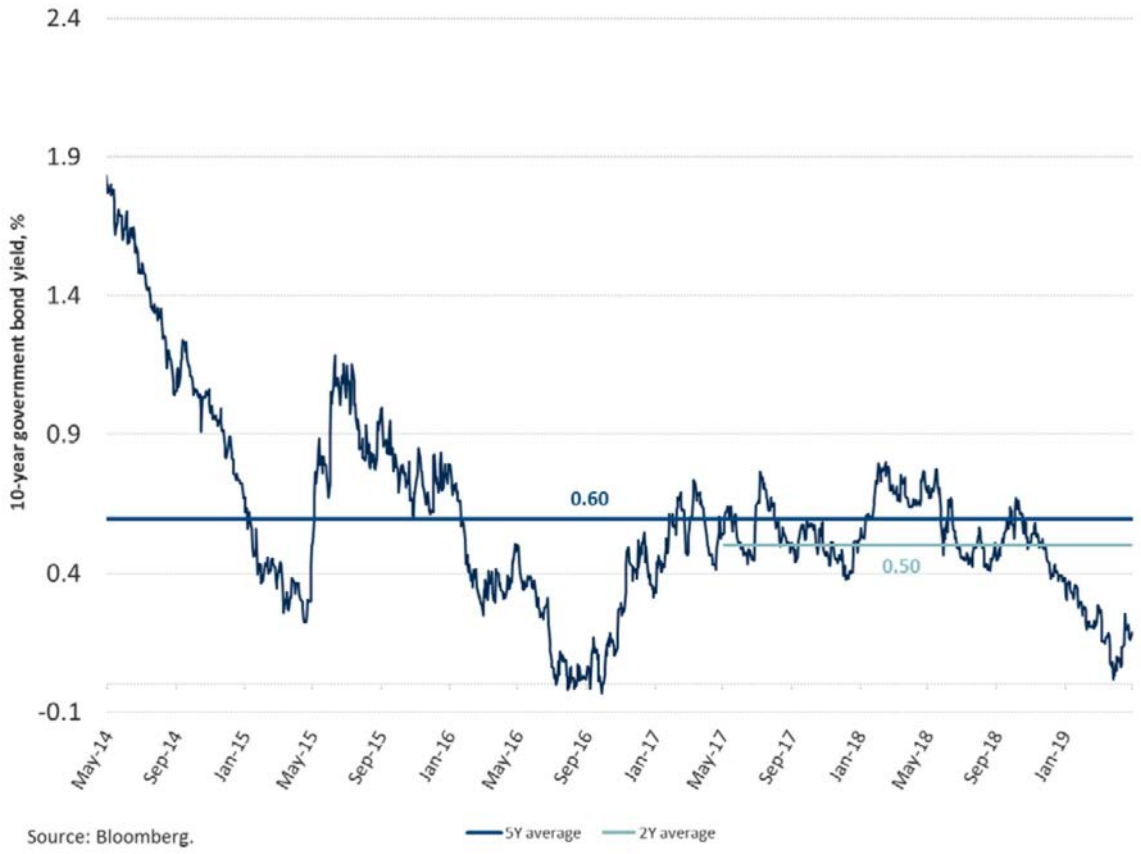
II. The Risk-Free Rate

The methodology specifies that to calculate the risk-free rate, we must calculate the average yield on 10-year Dutch government bonds over the last five years, and the average over the last two years. The risk-free rate is then the average between the two-year and five-year average.

Figure 6 below illustrates the yields on 10-year Dutch government bonds over the past five years. Yields were generally low over the entire period, exceeding one percentage point only in late 2014 and in mid-2015, and declined to absolute lows in mid-2016. Yields then stabilized around 0.5% in 2017 until mid-2018, before further declining at the end of the year.

The two-year average yield is 0.50%, and the five-year average is higher at 0.60%. The average of these two numbers gives a risk-free rate of 0.55%.[4]

Figure 1: Yield on Dutch Government 10 Year Bonds



[4] We note that the yield on Dutch government bonds turned negative in 10 days between July and September 2016. As sensitivity, we calculate that applying a lower bound of zero to the yield of government bonds increases the risk-free rate by only 0.0001%.

III. The Equity Risk Premium

ACM's methodology specifies that the ERP should be based on a historical time-series of the excess return of stocks over long-term bonds for the Eurozone economies. Specifically, ACM has determined to use the simple average of the long-term arithmetic and geometric ERP for the Eurozone as the anchor for the ERP estimate. The ERP for individual countries in the Eurozone should be weighted using the current capitalization of each country's stock market.[5] The methodology reflects an estimate of the ERP in the very long run, and notably excludes countries outside of the Eurozone. This is reasonable, because a Dutch investor is more likely to be diversified over the same currency zone, rather than to incur additional currency risks by diversifying within Europe but outside of the Eurozone.

Table 2, below, illustrates the realised ERP derived from one of the most widely used sources for long-run excess returns, being the data published by Dimson, Marsh and Staunton (DMS) for individual European countries taken from the February 2019 DMS report.[6] This report contains ERP estimates using data up to and including 2018. Table 2 shows the simple and weighted averages of the ERP for the Eurozone countries for which DMS have data. We find that the simple average between the arithmetic and geometric ERP for the period 1900 to 2018 inclusive was 5.49% for the Eurozone. Using each country's stock market capitalization to weight the averages across the Eurozone, we derive an ERP of 4.95%.[7] This value compares to a weighted average for the Eurozone of 4.98% in 2015.[8]

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5 Weighting based on the current market-capitalization reflects the idea that a typical investor would invest a larger share of his portfolio in countries with more investment opportunities.

6 Credit Suisse Global Investment Returns Sourcebook, Table 9.

7 Note that the in calculating the Eurozone averages, at the request of ACM, we include Austria, for which DMS reports a value of the arithmetic mean of 21.1%. Excluding Austria would reduce the value weighted Eurozone average of the arithmetic mean from 6.46% to 6.19%, and the average between the value weighted arithmetic and geometric means from 4.95% to 4.82%.

8 See Brattle 2015 Report, p. 29.

Table 2: Historic Equity Risk Premium Relative to Bonds (1900 – 2018)

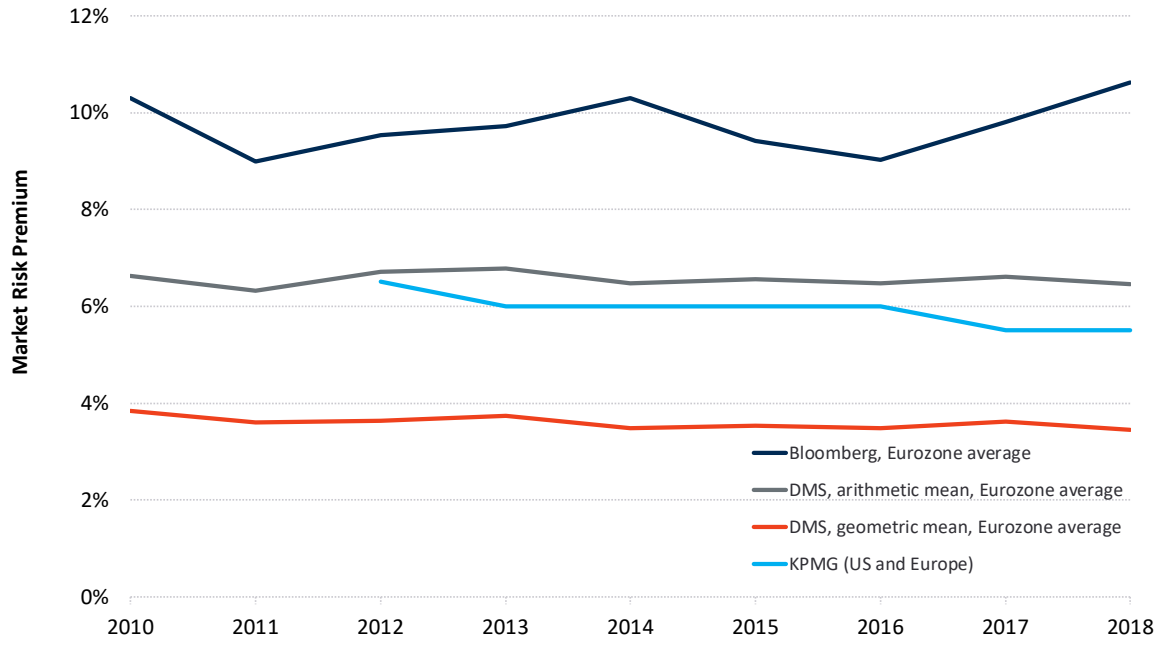
			Risk premiums related to bonds, 1900 - 2018			
		Eurozone	Geometric mean	Arithmetic mean	Average	Country Market Cap (2018)
			%	%	%	USD mln
			[A]	[B]	Average [A], [B]	[C]
Austria	[1]	1	2.70	21.10	11.90	122,356
Belgium	[2]	1	2.10	4.10	3.10	340,001
Denmark	[3]		3.30	4.90	4.10	388,059
Finland	[4]	1	5.10	8.60	6.85	240,126
France	[5]	1	3.00	5.30	4.15	2,195,157
Germany	[6]	1	4.80	8.20	6.50	1,953,108
Ireland	[7]	1	2.50	4.50	3.50	98,110
Italy	[8]	1	3.10	6.40	4.75	578,041
Norway	[9]		2.50	5.40	3.95	287,789
The Netherlands	[10]	1	3.20	5.50	4.35	479,091
Portugal	[11]	1	5.10	9.20	7.15	61,906
Spain	[12]	1	1.60	3.60	2.60	646,757
Sweden	[13]		3.00	5.20	4.10	685,034
Switzerland	[14]		2.10	3.60	2.85	1,468,465
United Kingdom	[15]		3.50	4.90	4.20	3,075,777
Average Eurozone	[16]		3.32	7.65	5.49	
Value-weighted average Eurozone	[17]		3.45	6.46	4.95	

Notes and sources:
[A][1]-[15], [B][1]-[15]: Credit Suisse Global Investment Returns Sourcebook 2019, Table 9.
[16]: Average [1], [2], [4], [5], [6], [7], [8], [10], [11], [12].
[17]: Average [1], [2], [4], [5], [6], [7], [8], [10], [11], [12], weighted by [C].

ACM's methodology considers whether an adjustment to an ERP estimate based on historical data is warranted, based on evidence from models such as the dividend growth model (DGM) that are based on dividend forecasts. In Figure 2, below, we compare the DMS estimates of the arithmetic and geometric means of the historical ERP for the Eurozone to the forward looking estimates of the ERP based on Bloomberg's and KPMG's DGMs.[9]

[9] KPMG provides a DGM-based estimate of the ERP for Europe based on the implied equity returns of European indices. See "Equity Market Risk Premium - Research Summary", KPMG, 31 December 2018.

Figure 2: Eurozone Equity Risk Premiums by Year



Source: Bloomberg, various DMS reports, KPMG Netherlands and Brattle calculations. Markets included in the KPMG estimate are ASX, FTSE, Stoxx 600 and S&P 500.

As shown in Figure 2, both historical DMS estimates and DGM estimates have been relatively stable over the last five years. Low returns in recent years, however, have negatively affected the arithmetic and geometric means for the Eurozone. For example, the arithmetic mean of the historical ERP decreased from 6.61% in 2017 to 6.46% in 2018, while the geometric mean decreased from 3.61% in 2017 to 3.45% in 2018. Overall, the average between the arithmetic and geometric means decreased from 5.11% in 2017 to 4.95% in 2018. Similarly KPMG's estimate of the ERP remained unchanged between 2017 and 2018 at 5.5%. On the other hand, Bloomberg DGM estimate of the ERP increased from 9.8% in 2017 to 10.6% in 2018.

Based on the available evidence, ACM has asked us to apply the weighted average DMS ERP for the Eurozone equal to 4.95% in the WACC calculation.

IV. Selection of Peers and Screening Tests

IV.A. Potential Peers

The Dutch water distribution firms are not listed on a stock exchange. Therefore, to estimate the beta parameter, we need to find publicly traded firms with similar systematic risk to the Dutch water distribution firms. We can then estimate a beta value from these firms, which we call 'comparables' or 'peers'.

In determining the number of peers, there is a trade-off. On the one hand, adding more peers to the group reduces the statistical error in the estimate of the beta. On the other hand, as more peers are added, there is a risk that they may have a different systematic risk than the regulated drinking water firms, which makes the beta estimate less accurate. In statistical terms, once we have 6-7 peers in the group the reduction in the error from adding another firm is relatively small.

In this report we begin with the 14 companies selected as peers in 2017, and check whether they still meet our criteria for inclusion.[10] To this initial list we add the companies initially selected as potential peers but ultimately excluded in 2017, as these companies may now meet the criteria for inclusion.[11] Finally, we include five additional water distribution companies operating in the US.[12] Table 3 provides a list of the potential peers considered.

In the following sections, we describe how we test the potential peers for:

- Liquidity. We further divide this test into sub-tests for:
  - Trading Frequency
  - Maximum Bid-Ask Spread
  - Minimum Revenues
- Minimum revenues from Regulated Activities

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10 See Brattle 2017 Report, Table 5.

11 We only exclude the Dee Valley Group, as the company has been acquired by Severn Trent and is no longer listed.

12 Our potential group also includes companies operating in the US, because there are not enough European peers that meet our inclusion criteria to reach a sufficient number of peers.

- No major Merger and Acquisition (M&A) activity over the estimation period
- Minimum credit rating

Table 3: Firms Selected as Potential Peers

Potential peers		Country	Considered in 2017	Selected in 2017
European Water Companies				
Severn Trent PLC	[1]	United Kingdom	✓	✓
Pennon Group PLC	[2]	United Kingdom	✓	✓
United Utilities Group PLC	[3]	United Kingdom	✓	✓
Athens Water Supply & Sewerage	[4]	Greece	✓	✓
Tallinna Vesi	[5]	Estonia	✓	
Thessaloniki Water and Sewage Company SA	[6]	Greece	✓	
Eaux de Royan SA	[7]	France	✓	
Societe des Eaux de Douai SA	[8]	France	✓	
US Water Companies				
California Water Service Group	[9]	United States	✓	✓
Aqua America	[10]	United States	✓	✓
American Water Works Co Inc	[11]	United States	✓	
American States Water Co	[12]	United States		
Connecticut Water SVC Inc	[13]	United States		
Middlesex Water Co	[14]	United States		
SJW Group	[15]	United States		
York Water Co	[16]	United States		
European Network Companies				
Snam	[17]	Italy	✓	✓
Terna Rete Elettrica Nazionale	[18]	Italy	✓	✓
REN - Redes Energeticas Nacionais	[19]	Portugal	✓	✓
Red Electrica	[20]	Spain	✓	✓
Enagas	[21]	Spain	✓	✓
Elia System Operator	[22]	Belgium	✓	✓
Fluxys Belgium	[23]	Belgium	✓	✓

IV.B. Liquidity Tests

Illiquid stocks tend to underestimate the true industry beta.[13] Hence, for each of the potential peers in the initial sample, we test to see if the firms' shares are sufficiently liquid.

We apply three 'screens' or criteria related to liquidity. First, we test that each firm's shares trade frequently, the idea being that more frequent trading will give a more reliable beta estimate. We define a share as being sufficiently traded if it trades on more than 90% of days

[13] To understand why this is true, for example, consider a firm with a true beta of 1.0, so that the firm's true value moves exactly in line with the market. Now suppose that the firm's shares are traded only every other day. In this case, the firm's actual share price will only react to news the day after the market reacts. This will give the impression that the firm's value is not well correlated with the market, and the beta will appear to be less than one. Using weekly returns to calculate beta mitigates this problem, since it is more likely that the firm's shares will be traded in the week. However, using weekly returns have other disadvantages, such as providing 80% less data points over any given period.

in which the relevant market index trades.[14] We use as the relevant time period the three-year period, 1 May 2016 through 30 April 2019, which is the estimation window used for the beta. As illustrated in Table 4, Eaux de Royan and Eaux de Douai fail this test.

Table 4: Liquidity Test Results

		% of days company traded	Peer passes trading frequency test
European Water Companies			
Severn Trent PLC	UK [1]	100.00%	✓
Pennon Group PLC	UK [2]	100.00%	✓
United Utilities Group PLC	UK [3]	100.00%	✓
Athens Water Supply & Sewerage	GR [4]	97.27%	✓
Tallinna Vesi	EE [5]	98.18%	✓
Thessaloniki Water and Sewerage Company SA	GR [6]	96.49%	✓
Eaux de Royan SA	FR [7]	49.02%	
Societe des Eaux de Douai SA	FR [8]	12.35%	
US Water Companies			
California Water Service Group	US [9]	100.00%	✓
Aqua America	US [10]	100.00%	✓
American Water Works Co Inc	US [11]	100.00%	✓
American States Water Co	US [12]	100.00%	✓
Connecticut Water SVC Inc	US [13]	100.00%	✓
Middlesex Water Co	US [14]	100.00%	✓
SJW Group	US [15]	100.00%	✓
York Water Co	US [16]	100.00%	✓

Notes and sources:
Based on data from Bloomberg.
Average data from 1 May 2016 to 30 April 2019.

[14] Specifically we use the Euro Stoxx index for companies listed in countries in the Eurozone (Athens Water Supply & Sewerage, AS Tallinna Vesi, Thessaloniki Water & Sewage, Eaux de Royan, Ste des Eaux de Douai, Snam, Terna, Red Electrica, Redes Energeticas Nacionais, Enagas, Elia System Operator and Fluxys), the FTSE All-Share index for companies listed in the UK (Severn Trent, Pennon Group, United Utilities Group), the S&P 500 index for companies listed in the US (Aqua America, California Water Service Group, American Water Works, American States Water, Connecticut Water, SJW Group, York Water and Middlesex Water).

Table 5: Liquidity Test Results (continued)

		% of days company traded	Peer passes trading frequency test
European Network Companies			
Snam	IT [17]	99.09%	✓
Terna Rete Elettrica Nazionale	IT [18]	99.09%	✓
REN - Redes Energeticas Nacionais	PT [19]	99.74%	✓
Red Electrica	ES [20]	99.74%	✓
Enagas	ES [21]	99.74%	✓
Elia System Operator	BE [22]	99.09%	✓
Fluxys Belgium	BE [23]	99.74%	✓

Notes and sources:
Based on data from Bloomberg.
Average data from 1 May 2016 to 30 April 2019.

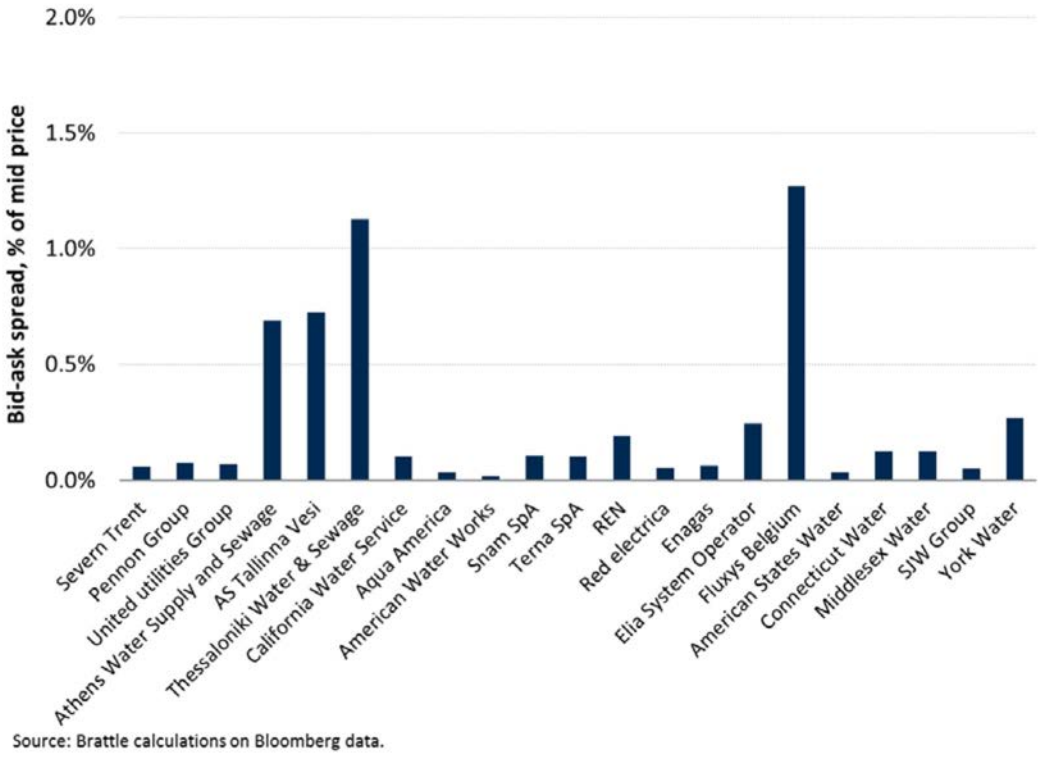
Second, we check the average bid-ask spread for the shares of potential peers. A low bid-ask spread indicates a liquidly traded stock, and hence a more reliable beta. We calculate the average bid-ask spread as a percentage of the stock price over the 1 May 2016 through 30 April, 2019 period.[15] As illustrated in Figure 3, the bid ask spread was generally below 0.25% for most companies. Fluxys Belgium and Thessaloniki Water and Sewage had spreads above 1% on average. Athens Water Supply and Sewage and AS Tallina Vesi had average spreads between 0.5% and 1%.

We conclude that a 1% cut-off for the bid-ask spread is reasonable to eliminate illiquid stocks in the sample. A 1% cut-off leads to the exclusion of Fluxys Belgium and Thessaloniki Water and Sewage.[16]

[15] More specifically, we calculate the daily value of the bid-ask spread as the difference between bid price and ask price at closing divided by the 'mid –price', being the average between the bid price and the ask price. We then calculate the simple average of the daily bid ask spreads over the relevant period.

[16] We acknowledge a trade-off in using a lower cut-off point, which would potentially lead to exclude companies otherwise considered as sufficiently liquid. A cut-off of 0.5% would only lead to the exclusion of Athens Water Supply and Sewage, because AS Tallina Vesi does not pass the revenue test.

Figure 3 Bid-Ask spread



Source: Brattle calculations on Bloomberg data.

Third, we check that the peer companies have annual revenues exceeding €100 million in each of the last three years. This is because companies with low revenue may also be relatively illiquid. This is a criterion which we applied in previous reports for the ACM. Table 3 shows that Eaux de Royan, Eaux de Douai, Tallinna Vesi, York Water and Thessaloniki Water all had revenues less than €100 million. We exclude these five companies from the peers on this basis.

Table 6: Annual Revenues

		Total Revenues						
		2012	2013	2014	2015	2016	2017	2018
European and US Water Companies								
Severn Trent PLC	[1]	2,245	2,184	2,255	2,473	2,213	1,973	n/a
Pennon Group PLC	[2]	1,491	1,520	1,672	1,865	1,651	1,580	n/a
United Utilities Group PLC	[3]	1,999	1,994	2,132	2,386	2,101	1,985	n/a
Athens Water Supply & Sewerage	[4]	360	354	343	340	347	350	n/a
Tallinna Vesi	[5]	53	53	53	56	59	60	n/a
Thessaloniki Water and Sewerage Company SA	[6]	77	76	77	77	78	76	n/a
Eaux de Royan SA	[7]	36	35	n/a	n/a	n/a	n/a	n/a
Societe des Eaux de Douai SA	[8]	15	13	n/a	n/a	n/a	n/a	n/a
US Water Companies								
California Water Service Group	[9]	449	451	463	544	566	590	591
Aqua America	[10]	590	579	587	734	741	717	710
American Water Works Co Inc	[11]	2,253	2,198	2,280	2,863	3,001	2,992	2,930
American States Water Co	[12]	363	355	351	413	394	390	370
Connecticut Water SVC Inc	[13]	72	75	76	93	95	101	106
Middlesex Water Co	[14]	86	86	88	114	120	116	117
SJW Group	[15]	204	208	241	275	307	345	337
York Water Co	[16]	32	32	35	42	43	43	41
European Network Companies								
Snam	[17]	3,946	3,848	3,566	3,649	2,560	2,533	2,586
Terna Rete Elettrica Nazionale	[18]	1,806	1,896	1,996	2,082	2,103	2,248	n/a
REN - Redes Energeticas Nacionais	[19]	811	789	756	819	739	748	n/a
Red Electrica	[20]	1,769	1,773	1,854	1,959	1,954	1,971	n/a
Enagas	[21]	1,198	1,308	1,227	1,222	1,218	1,385	1,342
Elia System Operator	[22]	1,307	1,390	839	851	868	888	n/a
Fluxys Belgium	[23]	626	548	555	538	509	511	n/a

Notes:
[1], [2], [3], [4], [5], [6], [18], [19], [20], [22], [23]: No data is available for 2018.
[7], [8]: No public data is available.

IV.C. Regulated Revenues

The peer companies used to estimate beta should have similar a systematic risk to the Dutch drinking water firms, meaning that, if the value of the drinking water firms were observable, it would react to changes in market conditions in the same way as the value of the peer firms.

Because revenues for water production, transport and supply are regulated, they are less sensitive to changes in economic conditions than a firm operating in the free market. Ideally, the firms we select as peers should earn most of their revenues from a mix of regulated production, network and supply activities which are similar to those of the drinking water

firms. Accordingly, we only include in the peer group companies with at least 70% of revenues from regulated production, network or supply activities.[17]

As shown in Table 7, all companies, with the exception of Eaux de Royan, Eaux de Douai, report revenues from regulated activity separately. Regulated activities represent at least 80% of total revenues for all peers, with the exception of American States, for which regulated activities represent between 73% and 79% of total revenues.

Table 7: Percentage of Regulated Revenues

		% of Regulated Revenues						
		2012	2013	2014	2015	2016	2017	2018
European and US Water Companies								
Severn Trent PLC	[1]	82%	82%	86%	86%	84%	90%	n/a
Pennon Group PLC	[2]	100%	100%	100%	100%	100%	98%	n/a
United Utilities Group PLC	[3]	99%	99%	100%	100%	99%	99%	n/a
Athens Water Supply & Sewerage	[4]	97%	96%	94%	94%	94%	93%	n/a
Tallinna Vesi	[5]	91%	90%	91%	88%	85%	86%	n/a
Thessaloniki Water and Sewerage Company SA	[6]	96%	95%	96%	94%	94%	96%	n/a
Eaux de Royan SA	[7]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Societe des Eaux de Douai SA	[8]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
US Water Companies								
California Water Service Group	[9]	97%	98%	97%	97%	97%	100%	100%
Aqua America	[10]	98%	98%	97%	96%	98%	99%	100%
American Water Works Co Inc	[11]	89%	89%	88%	86%	86%	88%	86%
American States Water Co	[12]	73%	76%	78%	79%	78%	77%	75%
Connecticut Water SVC Inc	[13]	92%	94%	94%	95%	95%	95%	95%
Middlesex Water Co	[14]	89%	88%	88%	88%	89%	88%	88%
SJW Group	[15]	96%	96%	96%	96%	96%	97%	97%
York Water Co	[16]	92%	92%	92%	92%	92%	92%	93%
European Network Companies								
Snam	[17]	96%	99%	98%	98%	95%	96%	96%
Terna Rete Elettrica Nazionale	[18]	95%	95%	91%	89%	90%	87%	n/a
REN - Redes Energeticas Nacionais	[19]	97%	97%	97%	95%	97%	96%	n/a
Red Electrica	[20]	97%	97%	97%	88%	89%	94%	n/a
Enagas	[21]	95%	94%	97%	95%	94%	83%	81%
Elia System Operator	[22]	93%	95%	93%	91%	90%	91%	n/a
Fluxys Belgium	[23]	95%	97%	97%	97%	98%	98%	n/a

Notes:
[1], [2], [3], [4], [5], [6], [18], [19], [20], [22], [23]: No data is available for 2018.
[7], [8]: No public data is available.

IV.D.M&A Activity

Substantial M&A activity will tend to affect a firm's share price in a way that is unrelated to the systematic risk of the business. Hence, the observed beta for a firm with substantial M&A

[17] Although American States Water passes the regulated revenue test, it derives a significant portion of the non-regulated revenues from business with military sites under long term contracts (50 years). Therefore we exclude it from our sample as American States Water faces a different systematic risk than Dutch drinking water firms.

activity will tend to underestimate the true beta for a firm with the same business activity absent M&A activity. Accordingly, we exclude firms that have been involved in 'substantial' mergers and acquisitions (M&A) during the period for which data is used to calculate the beta.

We define a 'substantial' M&A activity as a transaction involving more than 30% of the average market capitalization of the firm in the thirty days preceding the transaction, and having a noticeable effect on the daily returns of the stock price. Several firms were involved in large M&A activity – that is, exceeding 30% of market capitalization – during the analysis period.[18] Based on our analysis of M&A activity, we exclude REN, Aqua America, Connecticut Water Services and the SJW Group from the sample. We include details of the analysis in Appendix A.

IV.E. Credit Rating

Share prices of firms with lower credit ratings tend to be more reactive to company-specific news. This will lower the measured beta, in a way that may not be representative of the Dutch drinking water firms. To avoid this issue, we select as comparables firms with an investment grade credit rating.

Table 8 shows the credit rating of our potential peers, as assigned by the credit-rating agency Standard & Poor's (S&P). According to S&P's credit-rating scale, an investment grade rating is BBB- or higher.[19] S&P has assigned a credit rating to fourteen of the firms selected and all of them have a rating of BBB- or higher.[20]

S&P does not report a credit rating for several of the firms included in our group of potential comparables. We consider that Pennon Group would be investment grade, as its license

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[18] While we mainly focus on large M&A activity we have also investigated the effect of other large operations. For example in April 2018 the Belgian transmission system operator Elia, announced that it had completed the acquisition of an additional 20% stake in Eurogrid International SCRL ('Eurogrid'), the holding company of the German TSO 50Hertz Transmission GmbH. Hoever this did not have a significant effect on the returns of Elia.

[19] S&P actually states that BBB is investment grade. Since S&P adds pluses and minuses to its credit ratings, we interpret a BBB- rating to be investment grade.

[20] The rating for Aqua America is actually from another rating agency, Egan-Jones EJR). However EJR uses the same credit rating scales as S&P, namely from AAA to D (including the modifiers "+" and "-") for long-term ratings. See Gunter Strobl, Han Xia, The Issuer-Pays Rating Model and Ratings Inflation: Evidence from Corporate Credit Ratings (November 2011).

conditions require it to maintain financial metrics consistent with an investment grade credit rating.[21]

No rating is available for United Utilities Group, although its subsidiaries United Utilities and North West Water recently received from S&P a rating of BBB+ and A- respectively on their long term obligations.

There is also no credit rating for Athens Water Supply. This is likely because, since its listing on the Athens Exchange in 2000 and until 2013, the Company held only a relative small amount of short-term debt, which seemed to fund working capital. From 2014 onwards, the company did not arrange any bank debt, either long-term or short-term.[22] Accordingly, a credit rating does not seem relevant for Athens Water Supply.

We do not investigate further the credit rating of Eaux de Royan, Eaux de Douai, Fluxys, Tallinna Vesi and Thessaloniki Water as these firms do not pass our liquidity and revenue tests.

[21] For details of the requirement for British water firms to maintain an investment grade rating see Ofwat, January 2019. Monitoring Financial Resilience, p. 29.

[22] Athens Water Supply & Sewerage, Annual Report 2017, p. 24.

Table 8: Credit Rating

		Rating S&P [A]	Other [B]
European Water Companies			
Severn Trent PLC	[1]	BBB	
Pennon Group PLC	[2]	n/a	
United Utilities Group PLC	[3]	n/a	
Athens Water Supply & Sewerage	[4]	n/a	
Tallinna Vesi	[5]	n/a	
Thessaloniki Water and Sewage Company SA	[6]	n/a	
Eaux de Royan SA	[7]	n/a	
Societe des Eaux de Douai SA	[8]	n/a	
US Water Companies			
California Water Service Group	[9]	A+	
Aqua America	[10]	n/a	A-
American Water Works Co Inc	[11]	A	
American States Water Co	[12]	A+	
Connecticut Water SVC Inc	[13]	A-	
Middlesex Water Co	[14]	A	
SJW Group	[15]	n/a	
York Water Co	[16]	A-	
European Network Companies			
Snam	[17]	BBB+	
Terna Rete Elettrica Nazionale	[18]	BBB+	
REN - Redes Energeticas Nacionais	[19]	BBB	
Red Electrica	[20]	A-	
Enagas	[21]	BBB+	
National Grid	[22]	A-	
Elia System Operator	[23]	BBB+	
Fluxys Belgium	[24]	n/a	

Extracted from bloomberg as of 13 March 2019.
Aqua America rating comes from Egan-Jones for LC senior unsecured.

IV.F. The Final Sample of Peers

In Table 9, below, we provide a summary of the results of the screening tests we applied to arrive at our final sample of peers.

Table 9: Screening Tests Summary

		% days traded	Revenues	B-A spread	M&A activity	Final sample
European Water Companies						
Severn Trent PLC	UK	✓	✓	✓	✓	✓
Pennon Group PLC	UK	✓	✓	✓	✓	✓
United Utilities Group PLC	UK	✓	✓	✓	✓	✓
Athens Water Supply & Sewerage	GR	✓	✓	✓	✓	✓
Tallinna Vesi	EE	✓	×	✓	✓	×
Thessaloniki Water and Sewerage Company SA	GR	✓	×	×	✓	×
Eaux de Royan SA	FR	×	×	✓	✓	×
Societe des Eaux de Douai SA	FR	×	×	✓	✓	×
US Water Companies						
California Water Service Group	US	✓	✓	✓	✓	✓
Aqua America	US	✓	✓	✓	×	×
American Water Works Co Inc	US	✓	✓	✓	✓	✓
American States Water Co	US	✓	×	✓	✓	×
Connecticut Water SVC Inc	US	✓	✓	✓	×	×
Middlesex Water Co	US	✓	✓	✓	✓	✓
SJW Group	US	✓	✓	✓	×	×
York Water Co	US	✓	×	✓	✓	×
European Network Companies						
Snam	IT	✓	✓	✓	✓	✓
Terna Rete Elettrica Nazionale	IT	✓	✓	✓	✓	✓
REN - Redes Energeticas Nacionais	PT	✓	✓	✓	×	×
Red Electrica	ES	✓	✓	✓	✓	✓
Enagas	ES	✓	✓	✓	✓	✓
Elia System Operator	BE	✓	✓	✓	✓	✓
Fluxys Belgium	BE	✓	✓	×	✓	×

V. Asset Beta

ACM's methodology specifies that the cost of equity will be estimated by applying the Capital Asset Pricing Model, which expresses the cost of equity for a business activity as the sum of a risk-free rate and a risk premium. The size of the risk premium depends on ERP and the systematic risk of the underlying asset, a parameter referred to as 'beta'.[23] Beta is commonly estimated as the covariance of a firm's equity value relative to the market as a whole.

As explained above, the Dutch water distribution firms are not listed. Accordingly, we estimate the systematic risk for Dutch water distribution using our peer group of firms which are

[23] Further information on assumptions and theory underlying the CAPM can be found in most financial textbooks; see Brealey, Myers, Allen, *"Principles of Corporate Finance"*.

publicly traded and derive the majority of their profits either from water distribution, or from a regulated network activity which appears to face similar systematic risk to water distribution.

V.A. Peer Group Equity Betas

ACM's methodology specifies a three year daily sampling period for the beta. Accordingly, we estimate equity betas for the peer group of firms by regressing the daily returns of individual stocks on market returns over the last three years.[24]

The relative risk of each peer, as summarised in its beta parameter, must be measured against an index representing the overall market. A hypothetical investor in a Dutch water firm would likely diversify its portfolio within a single currency zone so as to avoid exchange rate risk. Accordingly, to calculate market returns we use a broad Eurozone index for companies operating in the Eurozone. We use national indices for companies operating in the UK and the US. Using indices from the relevant country or currency zone avoids exchange rate movements depressing the betas, and should result in a higher beta estimate than if we estimated betas against an index derived in a different currency.[25]

We perform a series of diagnostic tests to assess if the beta estimates satisfy the standard conditions underlying ordinary least squares regression. We test for autocorrelation using the Breusch-Godfrey test, but rely on the OLS estimate of the beta parameter even in the presence of autocorrelation.[26] We test for the presence of heteroscedasticity using the White's test and use White's-Huber robust standard errors.

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[24] As mentioned above, we use the three-year period 1 May 2016 through 30 April 2019 as our estimation window for the beta of all firms on the peer group.

[25] For example, suppose we calculate the beta of a UK firm, whose shares are priced in Pounds sterling (GBP) and which earns most of its profits in GBP, against an index denominated in Euros. Large changes in GBP-EUR exchange rates would reduce the beta. This is because, in Euro terms, the depreciation of the Euro would cause the returns of the UK firm to increase, while the Euro-denominated index has not changed. This reduces the covariance between the returns on the index and the return on the UK firm, which results in a lower estimate of beta. From the perspective of a Eurozone investor, the lower beta represents the diversification benefits of investing in another currency. However, it would not be correct to then apply this beta for a Eurozone investor investing in a firm in the Eurozone, which does not have the same diversification benefit, or for a UK investor investing in a UK firm. Hence, there is an argument that it would be reasonable to use an index which is in the same currency as the listed shares of the postal operator.

[26] We test for autocorrelation up to three lags. Note that the OLS estimator of the beta is unbiased (not systematically too high or too low) and consistent (converges to the correct value) even in the presence of autocorrelation.

In addition to the above diagnostic tools and adjustment procedures, we further consider the Dimson adjustment. The Dimson adjustment accounts for the issue that prices may react to news the day before or the day after the market index reacts. This could occur because of differences in market opening times and trading hours, or differences in the liquidity of the firm's shares relative to the average liquidity of the market. If such an effect is present, a beta estimated using only the correlation between the daily return on the firm's share and the return on the market index on the same day may be biased. Accordingly, the Dimson adjustment regresses a company's daily returns using the market index returns one day before and one day after as additional regressors.[27] The Dimson adjusted beta is the sum of the three coefficients calculated by the regression. If the market is perfectly efficient, all information should be dealt with on the same day. If the Dimson adjusted beta estimate is significantly different from the original beta estimate, this suggests that information about the true beta may be lost by considering only the simple regression.

We have performed this test for the firms in our peer groups. The Dimson adjustment is significant for two firms out of the total sample, suggesting that information on systematic risk is contained within the adjacent days. Hence for these two firms we take the adjusted beta. For the remaining firms we take the unadjusted beta. Table 10 shows our results.

Table 10 Results: Equity betas

		Tests		Results		Model chosen
		Heteroskedasticity	Serial correlation	Beta	Robust standard error	
European Water Companies						
Severn Trent PLC	United Kingdom	No	No	0.57	0.068	OLS
Pennon Group PLC	United Kingdom	No	No	0.63	0.068	OLS
United Utilities Group PLC	United Kingdom	Yes	No	0.60	0.076	OLS
Athens Water Supply & Sewerage	Greece	No	Yes	0.51	0.069	OLS
US Companies						OLS
California Water Service Group	United States	Yes	No	0.63	0.081	OLS
American Water Works	United States	Yes	No	0.35	0.067	OLS
Middlesex Water Co	United States	Yes	No	0.66	0.098	OLS
European Network Companies						
Snam	Italy	No	No	0.60	0.083	Dimson
Terna Rete Elettrica Nazionale	Italy	No	No	0.55	0.077	Dimson
Red Electrica	Spain	Yes	No	0.49	0.070	OLS
Enagas	Spain	Yes	No	0.56	0.059	OLS
Elia System Operator	Belgium	No	Yes	0.26	0.052	OLS

[27] More days of leads and lags can be applied, but in this case we look at only one.

V.B. Peers Group Asset Betas

As well as reflecting the systematic risk of the underlying business, equity betas also reflect the risk of debt or financial leverage. As debt is added to the company, the equity will become riskier as more cash from profits goes towards paying debt in each year before dividends can be distributed to equity. With more debt, increases or decreases in a firm's profit will have a larger effect on the value of equity. Hence if two firms engage in exactly the same activity, but one firm has more debt, that firm will have a higher equity beta than the firm with less debt.

To measure the relative risk of the underlying asset on a like-for-like basis it is necessary to 'unlever' the betas, imagining that the firm is funded entirely by equity. The resulting beta is referred to as an asset beta or an unlevered beta. To accomplish the un-levering, the methodology specifies the use of the Modigliani and Miller formula.[28] Table 11 illustrates both the equity beta and the asset betas for each firm.

[28] The specific construction of this equation was suggested by Hamada (1972) and has three underlying assumptions: A constant value of debt; a debt beta of zero; that the tax shield has the same risk as the debt.

Table 11 : Equity and Asset Betas

			Equity beta [A]	Gearing (D/E) [B]	Tax rate [C]	Asset beta [D]
European Water Companies						
Severn Trent PLC	United Kingdom		0.57	104.5%	19.3%	0.31
Pennon Group PLC	United Kingdom		0.63	85.0%	19.3%	0.37
United Utilities Group PLC	United Kingdom		0.60	126.3%	19.3%	0.30
Athens Water Supply & Sewerage	Greece		0.51	0.0%	28.9%	0.51
Median		[1]				0.34
US Companies						
California Water Service Group	United States		0.63	39.7%	34.6%	0.50
American Water Works	United States		0.35	52.0%	34.6%	0.26
Middlesex Water Co	United States		0.66	25.0%	34.6%	0.57
Median		[2]				0.50
European Network Companies						
Snam	Italy		0.60	87.8%	25.9%	0.36
Terna Rete Elettrica Nazionale	Italy		0.55	83.3%	25.9%	0.34
Red Electrica	Spain		0.49	56.1%	25.0%	0.35
Enagas	Spain		0.56	81.9%	25.0%	0.34
Elia System Operator	Belgium		0.26	105.3%	31.9%	0.15
Median		[3]				0.34

Notes and sources:
[B]: Calculated from Bloomberg data. Average values from Q2 2016 to Q1 2019.
[C]: KPMG. Average values from Q2 2016 to Q1 2019.
[D]: [A]/(1+(1-[C])x[B]).

V.C. Asset Beta for Dutch Water Distribution

Table 11 illustrates a range of asset betas. The median asset betas for European water companies is 0.34, the median asset betas for US water companies is 0.5, and the median asset betas for European network companies is 0.34. From this range, we must derive a single estimate for the asset beta for Dutch drinking water distribution.

There are several reasons to believe that the US water companies have structurally higher betas because of differences in regulation and the US water industry more generally. US firms have a price cap, rather than a revenue control. Firms with a price caps tend to have higher betas, because they face volume risk, which itself tends to be correlated to economic activity. In other words, a downturn in economic activity could cause a reduction in transported volumes, which in turn leads to reduced revenues and profits for the network. Hence price-cap regulation increases the correlation between the firm's share price and the market index, giving a higher beta. In the US, water firms change their tariff or rates when either the water company or its customers asks for the tariffs to be changed via a 'rate case'. Since rate cases are expensive and

risky – in that tariffs could change in unpredictable ways – they tend to be only brought when a large change in the market has occurred. Accordingly, there is a qualitative case that the revenues for US water firms will tend to be more highly correlated with the market, since it is more likely that, for example, the water firms' customers will ask for lower rates when there is a decrease in economic activity. This does not occur in Europe, where tariff reviews or price controls take place at regular fixed intervals, independent of macroeconomic activity. We also understand that US water firms are engaged in a historically high level of capital expenditure. This will lead to increased 'operating leverage', which will again tend to increases betas, all else being equal. Therefore, we conclude that the betas for US water firms are likely to overestimate the true beta for a Dutch water distribution firm.

European network firms have similar regulation to Dutch water distribution firms, in that they are subject to a regulated revenue control. However, they are not water firms. We expect that water demand may be less sensitive to macroeconomic conditions than demand for electricity or gas. While a regulated firm may have a revenue guarantee, a fall in revenues may only be compensated in a later period, and the present value of the compensation may not be sufficient to offset completely the earlier fall in revenues. Hence, differences in the sensitivity of demand to macroeconomic conditions could affect a regulated firm's beta. To the extent that water demand may be less sensitive to macroeconomic conditions than demand for electricity or gas, the beta for European network firms may be structurally higher than the beta for a Dutch water distribution firm.

We conclude that the asset betas we estimate for both US water companies and European network firms may overestimate the true beta for a Dutch water distribution firm. On the other hand, we prefer to rely on a sample of at least 10 firms in calculating beta. Given this, we give more weight to the European water firms, and less weight to the US water firms and the European network firms when estimating the asset beta for Dutch water distribution. Specifically, we give the European water firms a 50% weight, and the US water firms and the European network firms a 25% weight each. Table 12 shows that this results in an asset beta of 0.38. The asset beta of 0.38 is higher than the median European water firms' asset beta of 0.34, and in our view is more likely to overestimate the true asset beta for Dutch water distribution than to underestimate it.

Table 12: Asset Beta for Dutch Water Distribution

	Median Beta	Weight
European Water Companies	0.34	50%
US Water Companies	0.50	25%
European Network Companies	0.34	25%
Weighted average	0.38	

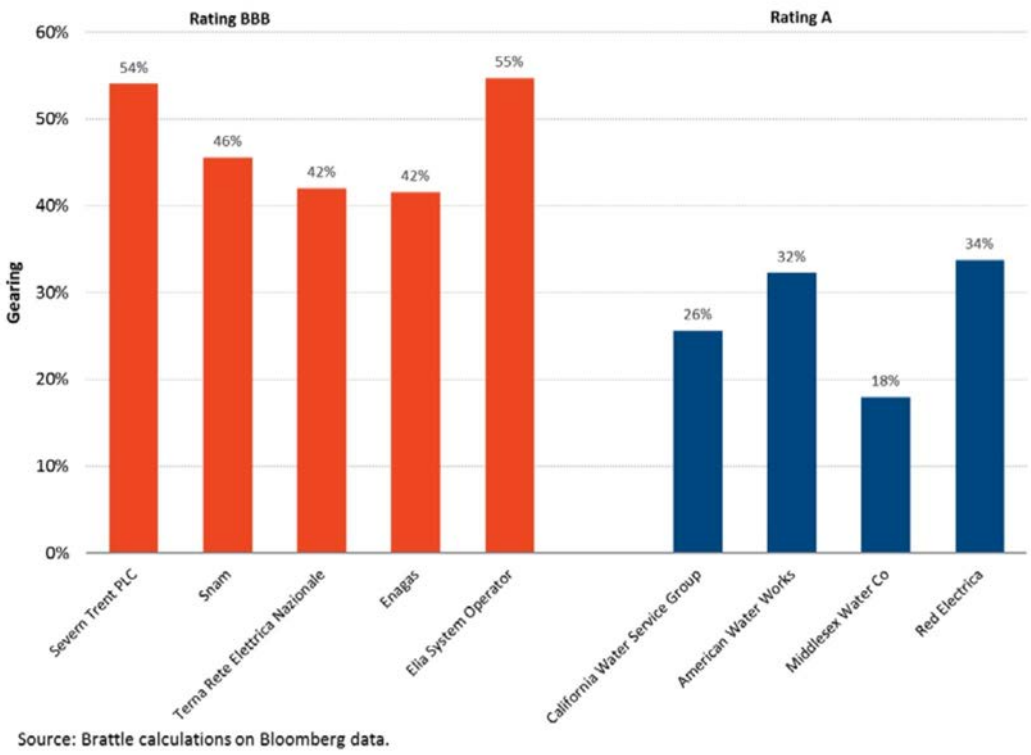
In practice, for this period and with the selected peer group, the median beta for European network firms is identical to the median beta for the European water companies. Hence, the weighting of the European network firms makes very little difference to the final beta estimate. We note that if we had simply taken the median of the European and US water firms, we would have obtained a similar but slightly lower asset beta of 0.37. The median of the entire unweighted peer group is 0.35.

VI. Gearing

The relevant decree states that the financing structure used for calculating the WACC should be that which is considered reasonable for drinking water companies given the situation on the financial markets. The explanatory notes to the decree also state that this value may deviate from the actual equity capital of the Dutch drinking water companies. Given that the cost of debt will be based on a firm with an A rating, we interpret this to mean that the assumed gearing should also be consistent with an A rating.

We have investigated the relationship between gearing and credit rating for a number of network firms. Figure 4 illustrates our findings. The average gearing of A rated firms is 27% (see also Table 13) and the average gearing of firms rated BBB is 48. While this confirms that gearing is an important factor for credit ratings, another factor driving credit ratings include the sector in which the firm is active and the countries in which it operates.

Figure 4: Gearing vs S&P Credit Rating[29]



Source: Brattle calculations on Bloomberg data.

[29] Rating as of end of April 2019 and gearing ratio for Q1 2019.

Table 13: Average Gearing (D/A) of A rated Peers

	Country	Rating	D/A
California Water Service Group	United States	A+	26%
American Water Works	United States	A	32%
Middlesex Water Co	United States	A	18%
Red Electrica	Spain	A-	34%
Average			
A- to A+			27%

In the past other EU regulators have allowed higher gearing levels – up to around 65% – in their WACC calculations. However since 2008 firms have generally had to hold less debt to maintain an investment grade rating. Targeting an A grade rating – which is the last-but-one credit rating before debt loses its investment-grade status – seems prudent.

We also note two other factors relevant to Dutch water distribution. First, Dutch water distribution firms pay no tax. This means that one of the main attractions of debt financing – being that interest is tax deductible –has no relevance for Dutch water firms. As a result, we might expect Dutch water firms to have less debt than a comparable firm that pays tax. Second, and relatedly, we understand that there is a requirement that Dutch water distribution firms are financed by no more than 70% equity, so in other words that they have at least 30% debt. This places a minimum or floor on the gearing for Dutch water distribution firms.

We note that the final WACC results are not sensitive to the choice of gearing, as long as the firms maintain an A credit rating. As gearing increases, the proportion of relatively cheap debt in the WACC formula increases. However, increased debt means more risk for equity holders, which results in a higher equity beta and a higher cost of equity. The cost of debt will also start to increase. These two effects – more relatively cheap debt versus increasing equity and eventually debt costs – largely offset one another.[30] As long as the target level of debt and the credit rating assumed are consistent with one another, and the credit rating is reasonable given that the country in which the firms operate, then the resulting WACC should be reasonable. For example, we estimate that the WACC varies by only 0.1 percentage points (10 basis points) as the gearing increases from 30% to 40%.

[30] The insensitivity of the WACC to the financing choices under certain assumptions is known as the Modigliani–Miller theorem.

Given the observed gearing levels of between 18-34%, the need to maintain an A credit rating and the relative insensitivity of the WACC to the final choice of gearing (as long as it consistent with an A rating), a gearing level of 30% is consistent with an A credit rating for regulated water firms operating in the Netherlands.

VII. Cost of Debt

The method prescribes that we must estimate the cost of debt for water distribution by looking at two different sources of debt yields and spreads:[31]

1. Yields and spreads on A-rated Euro bonds with a maturity of 10 years, where the bonds have been issued by firms active in the industry sector. We refer to these yields and spreads as 'generic industry';[32]

2. Yields and spreads on bond issued by firms that engage in activities which are comparable to that of drinking water companies and which have a rating of A, A+ or A- and a maturity of around 10-years. In our view 'activities which are comparable to that of drinking water companies' in this context means not only firms engaged in drinking water distribution but also firms engaged in activities such as the transport and/or distribution of gas and electricity. We refer to these as the 'comparable' bonds.

In both cases, we calculate two year average and five year average of the differences between the bond yields and the relevant government bond rates. We describe the results below.

VII.A. Spread on the Generic Industry Bonds

The method requires the calculation of the spread of the cost of 10-year debt over the risk-free rate. We take the risk-free rate to be the contemporaneous yield on a Dutch government 10-year bond. The spread is the difference between the yield on the generic A-rated industrial Euro-denominated debt with 10 years maturity and the contemporaneous yield on a Dutch government 10-year bond.

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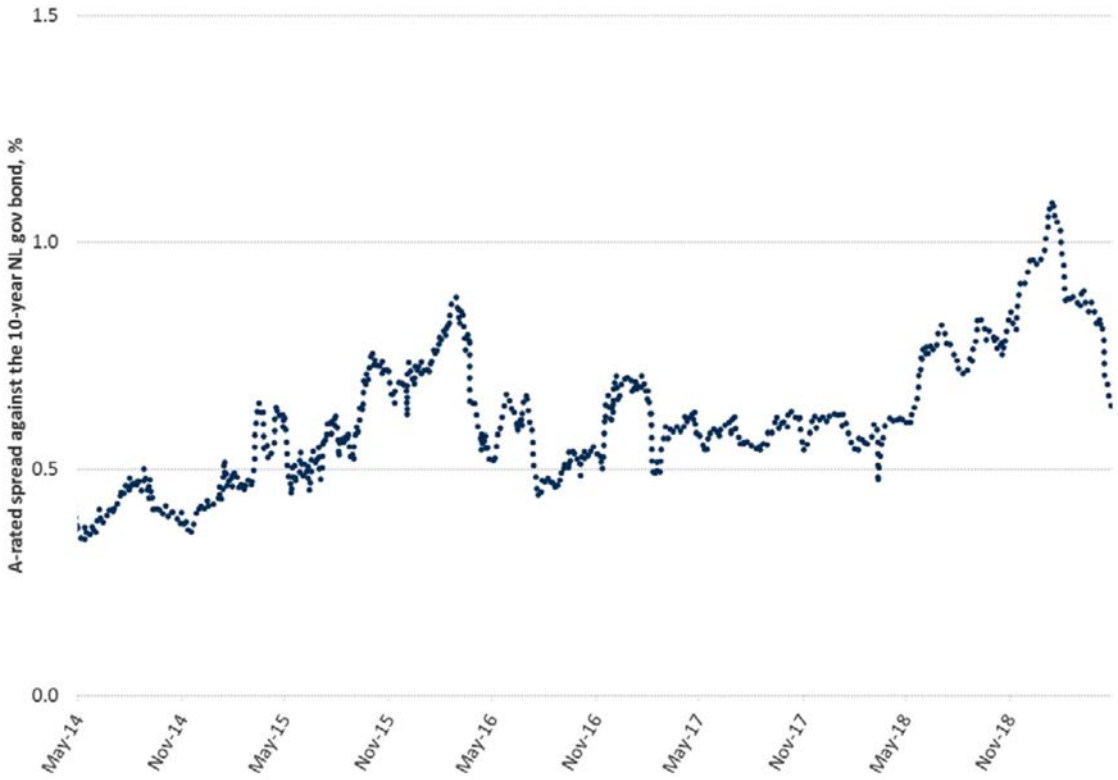
31 By spread we mean the difference between the yield to maturity and the risk-free rate.

32 By 'generic', we mean these are yields for a group of A-rated industrial firms calculated by Bloomberg, where the individual firms used in the sample have not been identified.

Figure 5 illustrates how this spread has developed over the last five years. The average spread over the last five years is 0.62% and the average spread over the last two years is 0.70%. The average of these two numbers gives a spread of 0.66%

Figure 5: Spread of 10-year A-rated European Industrial Debt over 10-year Dutch Government bonds



Source: Bloomberg and Brattle calculations.

VII.B. Spread on the Comparable Bonds

We considered two sources of 'comparable' bonds: a generic utility bond and individual bonds issued by firms engaged in similar activities to drinking water distribution.

VII.B.1. Generic Utility

We took the difference between the yield on the generic A-rated utility Euro-denominated debt with 10 years maturity and the contemporaneous yield on a Dutch government 10-year bond. The average spread for the generic A-rated EUR utility bonds was 0.70% over the last

five years and 0.76% over the last two years. The average of these two numbers gave a spread of 0.73%.

VII.B.2. Firms engaged in similar activities to drinking water distribution

We identified a 'long-list' of issuers whose bonds are traded and who seemed to be engaged in similar activities to drinking water distribution. This includes water distribution companies, but also network companies more generally. To increase the sample size we considered firms from around the world, and not only Europe, though we limited the currencies to GB Pounds Sterling, US Dollars, Canadian Dollars and Euros. We then screened the long-list to find debt which was rated either A, A+ or A- by Standard & Poors (S&P), and had a maturity of between 9 to 11 years during 1 May 2014 to 1 May 2019. We also eliminated so-called 'callable bonds',[33] 'putable bonds',[34] 'convertible bonds'[35] and 'sinkable bonds'.[36] Applying these criteria reduced the number of possible bonds to 175. From the list of 175, we then checked that the firms were really engaged in activities that could be considered similar to drinking water distribution. Specifically, we checked that most of the firms' revenues were derived from regulated activities in energy or water. Applying this criterion reduced the number of bond issuers to 26 (6 in water and 20 network companies), and the number of bond issues to 66. Appendix B gives details of the firms considered.

We include yields during the period when bonds still have 9 to 11 year maturity and calculate spreads against yields of relevant government bonds with 10-year maturity. We decide the relevant government bond based on the country where the business predominantly operates.

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[33] Callable bonds can be redeemed by the issuer prior to maturity and generally attract a higher yield than bonds that mature on a fixed date. Callable bonds cannot be compared on a like-for-like basis with Government bonds that have a fixed maturity, which is why we do not use them in our analysis. Callable bonds generally attract a higher yield because bonds are more valuable if interest rates fall, but in this scenario the callable bond may be re-deemed. Hence the bond holder has an asymmetric pay-off.

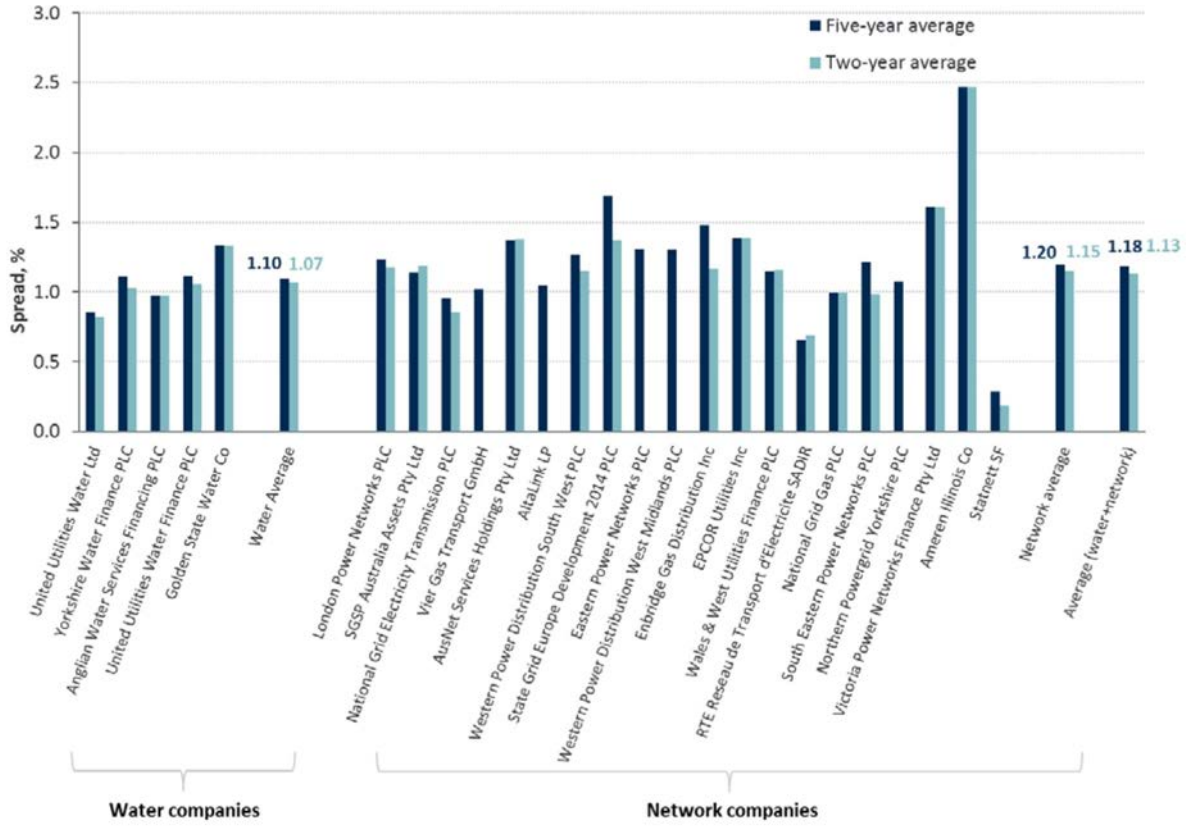
[34] Putable bond gives bond holders options to sell back bonds to issuers at one or several specific dates before maturity. When interest rate arises, investors could exercise such option and use the proceeds in higher-yield investments. Bond holders are generally willing to accept a lower yield to have such option.

[35] Convertible bond is a type of bond that can be converted into equity at certain dates during its life. Convertible bond usually attracts a lower yield because investors could convert it into stocks and receive a higher yield when stock price arises.

[36] Sinkable bond is a bond issue backed by sinking fund, which sets aside money on a regular basis to ensure the repayments will be made. Sinkable bond has less risk to investors and allows the issuers to offer a lower interest rate to bond holders.

For example, for a bond issued by Elia we use a Belgian government bond of the same outstanding maturity and of the same currency to calculate the spread. The average spreads for water peers are 1.10% and 1.07% respectively over the last five years and over the last two years. Both figures are slightly lower than the average spreads for network peers, 1.20% and 1.15%. The average spread for all peers over the last five years is 1.18% and the average spread over the last two years is 1.13%. The average of these two numbers gives a spread of 1.16%.

Figure 6: Spread of A-rated Peers over Relevant Government Bonds



VII.C. Conclusions on Debt Spreads

Table 13 summarises the debt spreads for the Generic Industry bonds, the Generic Utility bonds and the individual bonds of the comparable peers. Table 13 shows that the comparable peers have the highest spreads, followed by the Generic Utility bonds and then the Generic Industrial bonds.

Table 14: The average spreads on the generic industry and comparable bonds

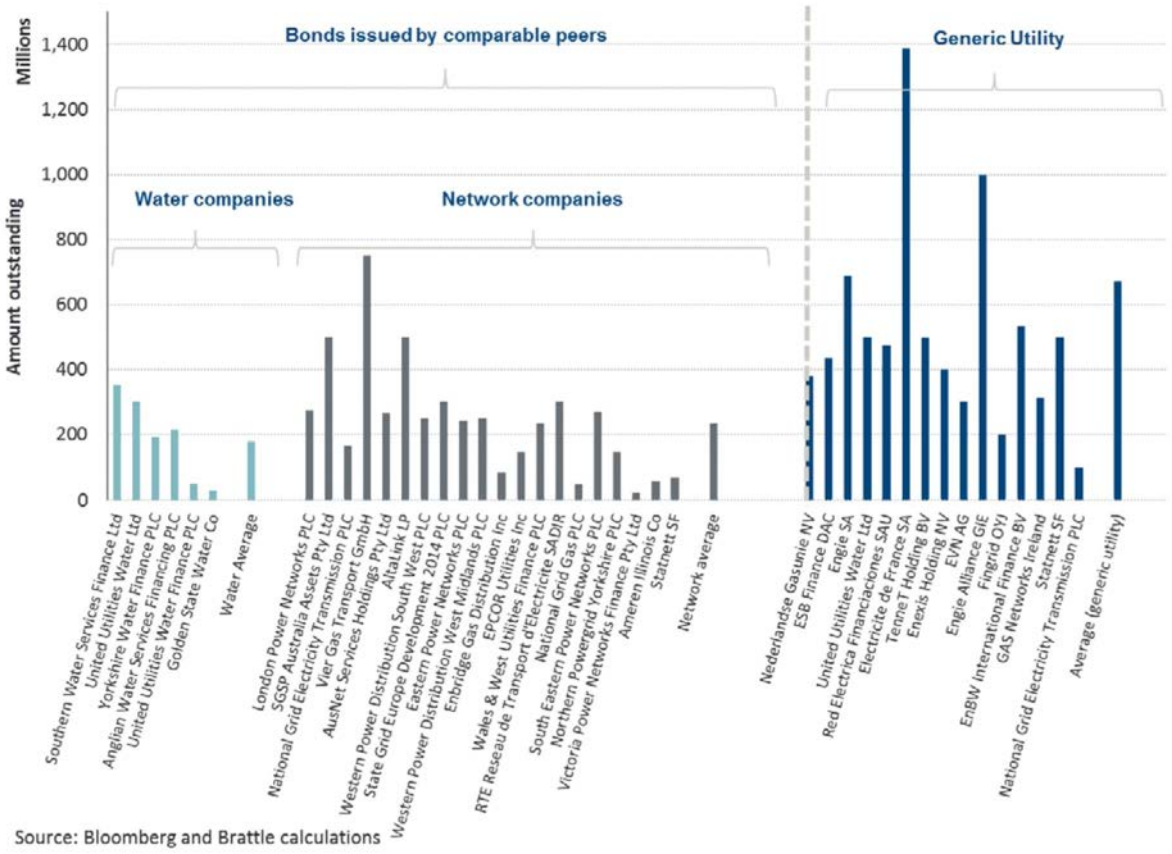
		Spreads		
			Comparables*	
		Generic industry	Utility index	Individual bonds*
Five-year average	[1] See note	0.62%	0.70%	1.18%
Two-year average	[2] See note	0.70%	0.76%	1.13%
Average	[3] Average [1], [2]	0.66%	0.73%	1.16%
Average between generic industry and comparables	[4] See note		0.69%	0.91%

*Comparable bonds include A-rated bonds of 9-11 years maturity issued by network and water companies in EUR, GBP, USD, or CAD. We exclude from the sample bonds with lower average yields than local government bonds, as these imply a negative spread over the risk free rate.

We suspected that an important part of the difference between the spread on the Generic Utility bonds and the spread on comparable peers was to do with liquidity. Investors will generally demand a higher return for bonds that are less frequently traded and are therefore less liquid. This is known as a liquidity premium. To confirm if the difference was indeed due to a liquidity premium, we asked Bloomberg – the data provider that compiles the Generic Utility bonds data – for the firms which make up the Generic Utility bonds series. As a proxy for liquidity, we looked at the value of the bonds outstanding, the logic being that larger bond issues will tend to be more heavily traded and hence more liquid. Figure 7 shows that the average value of the outstanding bond issues for the comparable peers is less than half of that for the bonds Bloomberg used for calculating generic utility yields.[37] We conclude it is likely that the higher debt spreads for the bonds of comparable peers is because these bonds are less liquid than the bonds that make up the Generic Utility set.

[37] The bonds selected by Bloomberg change day by day. These are bonds used as of 15 May 2019.

Figure 7: Value of outstanding bond issues for various firms



We also understand from the ACM that the Dutch water distribution firms are relatively small, and finance their activities using bank debt rather than by issuing bonds. If the Dutch water firms were to issue bonds, they would be at the lower end of the scale in terms of the size of the issue. The bonds would also be less liquid than average, and we would expect that they would command some sort of liquidity premium. In our view, for the reasons stated above, the comparable peers are more comparable to the Dutch drinking water companies than the utility index. Therefore, we do not consider the utility index in the cost of debt. Given this context, we think it would be appropriate to calculate the debt spread for Dutch water distribution using the simple average of the 0.66% spread for the generic industry bonds and the 1.16% spread for the comparable peers. This results in an average spread of 0.91%.

VIII. WACC

Based on the preceding calculations and discussions, Table 15 illustrates the overall calculation of the nominal WACC for drinking water distribution in the Netherlands.[38]

Table 15: WACC for drinking water distribution

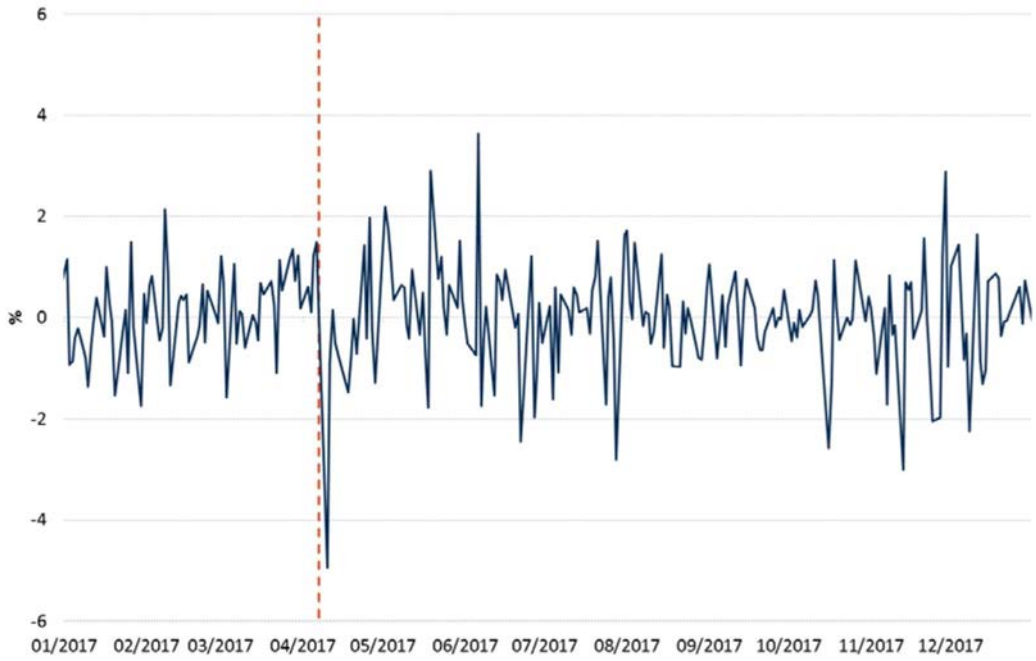
Gearing (D/A)	[1]	Section VI	30.00%
Gearing (D/E)	[2]	[1]/(1-[1])	42.86%
Tax rate	[3]	Assumed	0.00%
Risk free rate	[4]	Section II	0.55%
Asset beta	[5]	Section V	0.38
Equity beta	[6]	[5]x(1+(1-[3])x[2])	0.54
Equity Risk Premium	[7]	Section III	4.95%
After-tax cost of equity	[8]	[4]+[6]x[7]	3.24%
Debt premium	[9]	Section VII	0.91%
Non-interest fees	[10]	Assumed	0.15%
Pre-tax cost of debt	[11]	[4]+[9]+[10]	1.61%
Nominal after-tax WACC	[12]	((1-[1])x[8])+([1]x(1-[3])x[11])	2.75%
Nominal pre-tax WACC	[13]	[12]/(1-[3])	2.75%

[38] The method assumes that since the water companies are publicly held and do not pay taxes, a tax rate of zero should be applied.

Appendix A. M&A Activity of Peer Companies

On 7 April 2017 REN announced the purchase of 100% of the capital of EDP Gás for EUR 532.4 million. The value of the transaction represented 37% of REN's market capitalization. Figure 8 shows that the daily returns for REN were clearly affected on the day following the announcement of the transaction. Hence, the REN M&A activity meets our definition of substantial.

Figure 8: Impact of EDP Gas acquisition announcement on REN daily returns

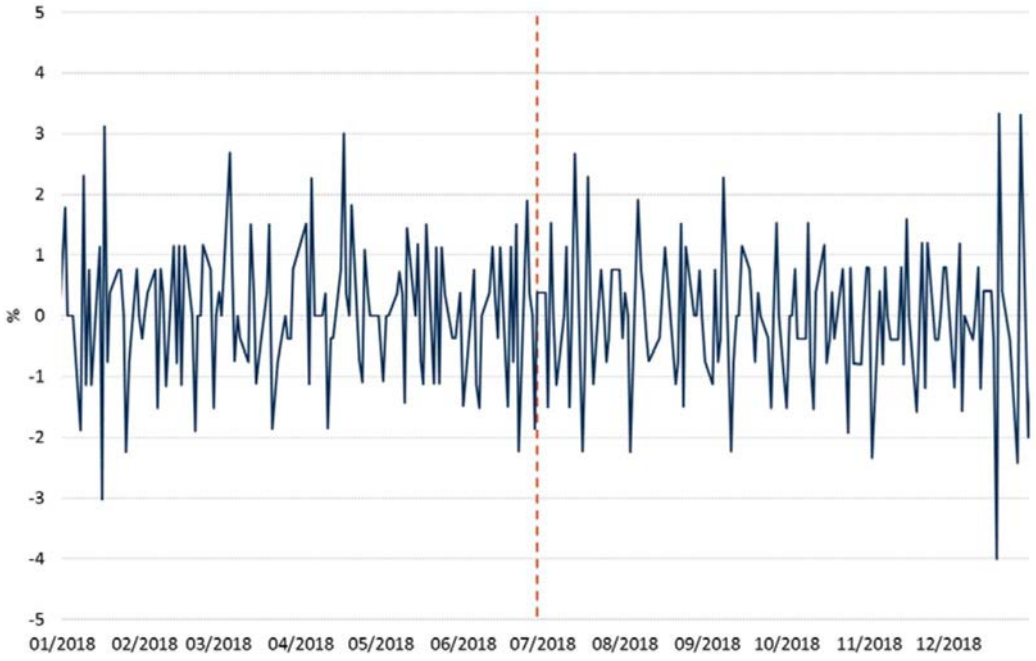


Source: Bloomberg.

On 29 June 2018 French utility EDF announced it had agreed to sell its 65.01% stake in the Dunkirk LNG terminal to two groups of investors, one of which was led by Fluxys, the Belgian gas transmission operator. The average enterprise value for the entire stake amounted to about 2.4 billion euros.[39] Because we are not able to calculate the amount payed by Fluxys as a percentage of its average market capitalization, we have examined daily returns for Fluxys, to check whether these have been affected by the announcement of the acquisition. Figure 9 shows that the daily returns for Fluxys were unaffected by the transaction. Hence, Fluxys's M&A activity does not meet our definition of substantial.

[39] "UPDATE 1-EDF sells 65 pct stake in Dunkirk LNG terminal to Fluxys, IPM ", Reuters, accessed March 25, 2019, https://af.reuters.com/article/commoditiesNews/idAFL8N1TV5GI.

Figure 9: Impact of LNG Terminal of Dunkirk acquisition announcement on Fluxys daily returns

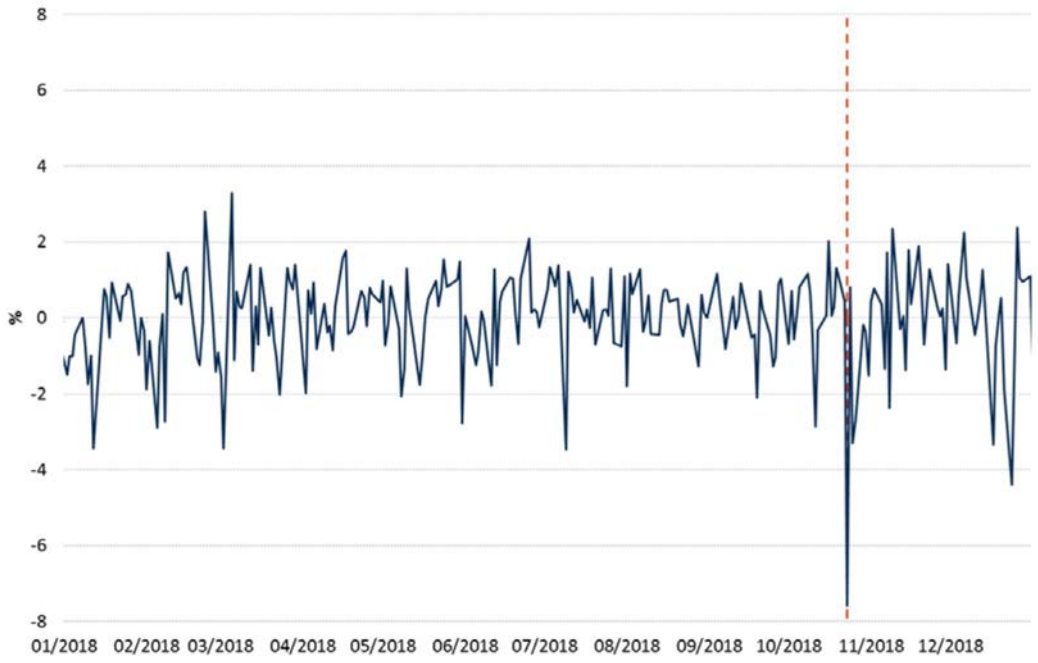


Source: Bloomberg.

On 23 October 2018 Aqua America announced it would acquire Peoples for USD 4.275 billion.[40] The value of the transaction represented more than 60% of Aqua America's average market capitalization in the thirty days preceding the transaction. The combined enterprise will be among the largest publicly traded water utilities and natural gas local distribution companies in the U.S. Figure 10 shows that the announcement of the deal had a significant impact on the daily returns of Aqua America and for this reason, the transaction meets our definition of substantial.

[40] "Aqua America Announces Agreement to Acquire Peoples", Aqua America press release, October 23, 2018.

Figure 10: Impact of Peoples acquisition announcement on Aqua America daily returns



Source: Bloomberg.

In March 2018 the SJW Group and Connecticut Water Service announced their intention to combine to create the third-largest investor-owned water and wastewater utility in the United States.[41] Following the announcement of the proposed deal, other local companies expressed their interest in the two businesses – California Water Service for SJW and Eversource Energy for Connecticut Water Service. [42] Eventually, Connecticut Water Service refused the acquisition proposal by Eversource Energy and SJW rejected the offer from California Water Service, which contextually withdrew its bid to acquire SJW. [43] Then, SJW Group went ahead

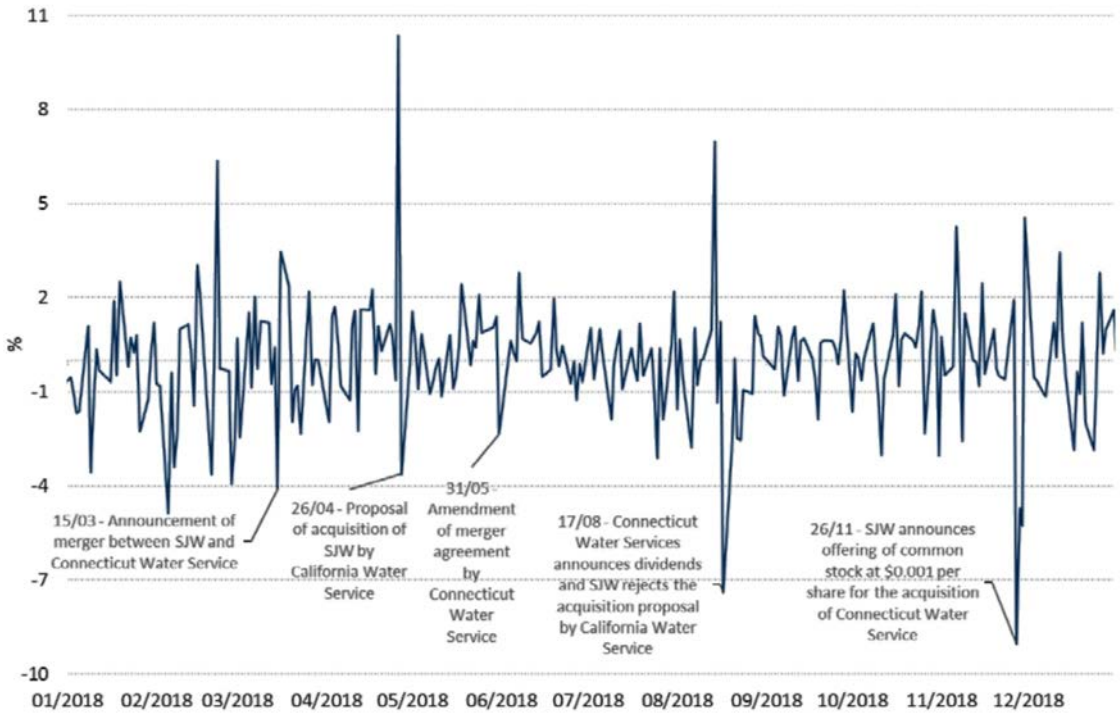
41 "SJW Group and Connecticut Water Service Inc. to Combine in All-Stock Transaction to Create Leading Water Utility Company", SJW and Connecticut Water Service Inc. press release, March 15, 2018.

42 "Eversource Energy Discloses Proposal to Acquire Connecticut Water Service Inc. for $63.50 per Share", Eversource Energy press release, April 19, 2018; "California Water Service Group Confirms Proposal to Acquire SJW Group for $68.25 Per Share in Cash", California Water Service Group press release, April 26, 2018.

43 "Connecticut Water Service Confirms Receipt and Evaluation of Revised Acquisition Proposal from Eversource Energy", Connecticut Water Service Inc. press release, July 13, 2018; "SJW Group Board of Directors Rejects California Water Service Group's Revised Proposal", SJW press release, August 17, 2018; "California Water Withdraws $70.00 Per Share Proposal to Acquire SJW Group After Rejection by SJW", California Water Service Group press release, August 17, 2018.

with the $1.1 billion acquisition of the Connecticut-based water utility.[44] Even in the case of a terminated deal, the effects of M&A activity might still be relevant since many investors prefer to sell stock that is undergoing mergers to avoid event risk. This compresses the stock price and hence the returns and results in a biased estimate of the equity beta. The graph below summarises the effects of M&A activity on the returns of California Water Service, Connecticut Water Service and SJW Group. The daily returns of SJW Group and Connecticut Water Service seem to fluctuate significantly in correspondence of events that can be associated to the merger, and we therefore exclude them from the sample of peers. We cannot identify a large deviations in the returns of California States Water, also because of the higher volatility of the returns of the company, which we decide to include in the sample.

Figure 11: SJW returns[45]



Source: Bloomberg.

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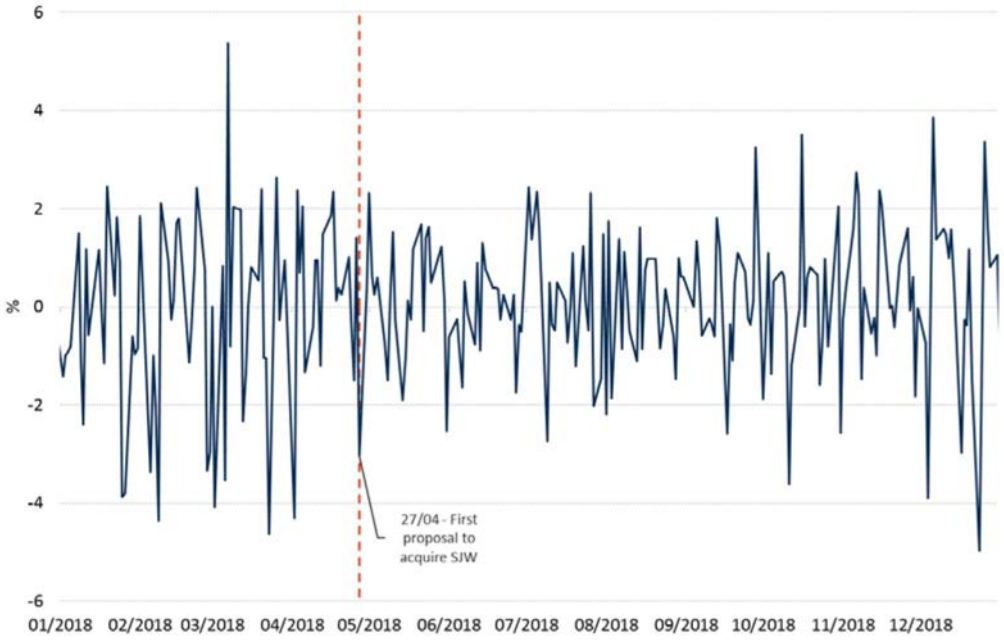
44 "CalWater ends SJW pursuit, clearing way for Connecticut Water deal", Reuters, accessed March 22, 2018, https://www.reuters.com/article/us-sjw-group-m-a-ca-water-serv/calwater-ends-sjw-pursuit-clearing-way-for-connecticut-water-deal-idUSKBN1L216U.

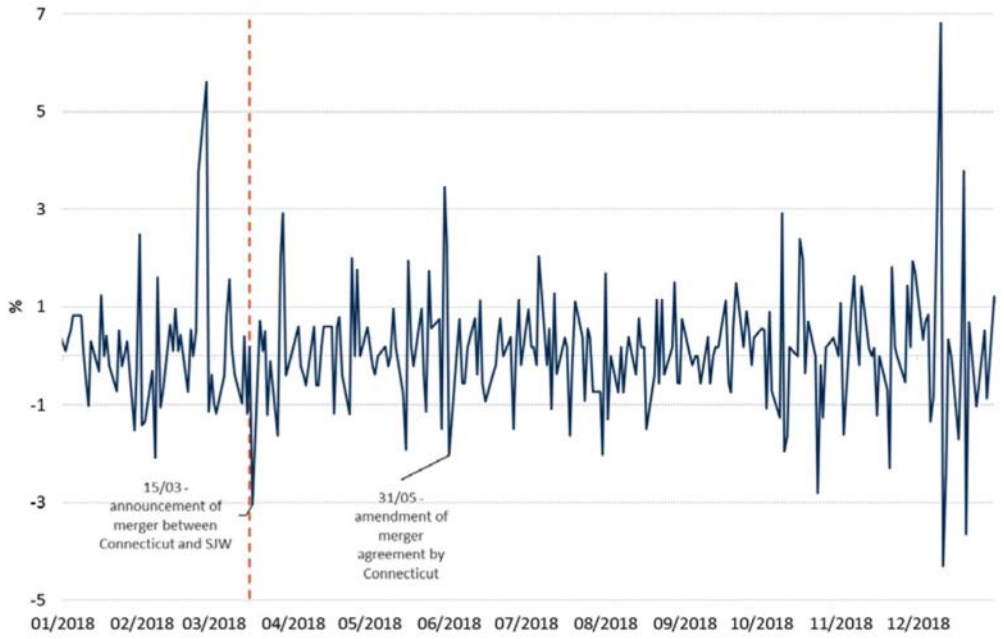
45 "SJW Group and Connecticut Water Service Inc. to Combine in All-Stock Transaction to Create Leading Water Utility Company", SJW and Connecticut Water Service Inc. press release, March 15, 2018; "California Water Service Group Confirms Proposal to Acquire SJW Group for $68.25 Per Share in Cash", California Water Service Group press release, April 26, 2018; "Connecticut Water Service Announces Amendment to Merger Agreement with SJW Group to Allow for Solicitation of Alternative Proposals", Connecticut Water Service Inc. press release, May 31, 2018; "SJW Group

Figure 12 California Water Service returns



Source: Bloomberg.

Figure 13 Connecticut Water Service returns



Source: Bloomberg.

Board of Directors Rejects California Water Service Group's Revised Proposal", SJW press release, August 17, 2018; "SJW Group Announces Proposed Offering of Common Stock", SJW press release, November 26, 2018.

Appendix B. Bonds Issued by Firms Engaged in Similar Activities

Company	Maturity date	Currency	Bond yield (%)		10-year sovereign (%)		Bond spread (%)		Amount outstanding
			5 yr	2 yr	5 yr	2 yr	5 yr	2 yr	
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]
London Power Networks PLC	1-Mar-29	GBP	2.61	2.61	1.19	1.19	1.42	1.42	250,000,000
SGSP Australia Assets Pty Ltd	7-Jul-27	USD	3.67	3.67	2.64	2.64	1.03	1.03	500,000,000
National Grid Electricity Transmission PLC	8-Jun-27	GBP	2.07	2.07	1.26	1.35	0.82	0.72	301,259,000
SGSP Australia Assets Pty Ltd	29-Jul-26	USD	3.50	3.61	2.26	2.26	1.25	1.35	500,000,000
Vier Gas Transport GmbH	10-Jul-23	EUR	2.34		1.35		0.99		750,000,000
Southern Water Services Finance Ltd	31-Mar-26	GBP	2.74		1.55		1.19		350,000,000
United Utilities Water Ltd	20-Dec-27	GBP	2.21	2.20	1.36	1.38	0.85	0.82	300,000,000
National Grid Electricity Transmission PLC	2-Feb-24	GBP	3.44		2.39		1.05		146,487,000
Red Electrica Financiaciones SAU	24-Apr-25	EUR	1.68		1.80		n/a		500,000,000
Red Electrica Financiaciones SAU	21-Apr-26	EUR	0.89		1.36		n/a		500,000,000
AusNet Services Holdings Pty Ltd	26-Feb-27	EUR	1.30	1.22	0.27	0.44	1.03	0.78	560,000,000
AltaLink LP	6-Nov-23	CAD	3.22		2.17		1.05		500,000,000
Western Power Distribution South West PLC	16-May-29	GBP	2.77	2.77	1.37	1.37	1.40	1.40	250,000,000
State Grid Europe Development 2014 PLC	26-Jan-27	EUR	1.94	1.79	0.26	0.41	1.69	1.38	300,000,000
Eastern Power Networks PLC	8-Mar-24	GBP	3.62		2.32		1.29		350,000,000
Yorkshire Water Finance PLC	1-Aug-29	GBP	2.58	2.58	1.35	1.35	1.23	1.23	250,000,000
Yorkshire Water Finance PLC	28-May-27	GBP	2.24	2.16	1.25	1.34	0.98	0.82	135,476,000
Western Power Distribution West Midlands PLC	9-May-25	GBP	3.34		2.04		1.30		250,000,000
Anglian Water Services Financing PLC	21-Aug-23	GBP	3.74		2.75		0.99		200,000,000
Eastern Power Networks PLC	31-Mar-25	GBP	3.39		2.07		1.32		132,279,000
Enbridge Gas Distribution Inc	5-Jul-23	CAD	3.46		2.30		1.15		100,000,000
EPCOR Utilities Inc	28-Jun-29	CAD	3.58	3.58	2.18	2.18	1.40	1.40	150,000,000
National Grid Electricity Transmission PLC	27-Jul-28	GBP	2.36	2.36	1.37	1.37	0.99	0.99	55,310,000
Western Power Distribution South West PLC	25-Mar-27	GBP	2.38	2.20	1.26	1.31	1.12	0.90	250,000,000
London Power Networks PLC	7-Jun-27	GBP	2.32	2.28	1.26	1.34	1.06	0.93	300,000,000
Anglian Water Services Financing PLC	30-Jul-24	GBP	0.74		2.21		n/a		75,000,000
Anglian Water Services Financing PLC	5-Oct-27	GBP	2.15	2.19	1.35	1.37	0.80	0.82	250,000,000
AusNet Services Holdings Pty Ltd	13-Feb-24	EUR	2.03		0.93		1.10		350,000,000
Wales & West Utilities Finance PLC	13-Dec-23	GBP	3.62		2.52		1.10		250,000,000
RTE Reseau de Transport d'Electricite SADIR	12-Sep-23	EUR	2.17		1.62		0.55		500,000,000
Enbridge Gas Distribution Inc	19-May-28	CAD	3.36	3.36	2.09	2.09	1.28	1.28	100,000,000
Enbridge Gas Distribution Inc	29-Oct-26	CAD	3.25	2.92	1.49	1.80	1.77	1.12	100,000,000
Anglian Water Services Financing PLC	15-Jan-29	GBP	2.53	2.53	1.41	1.41	1.12	1.12	200,000,000
AusNet Services Holdings Pty Ltd	1-Mar-30	EUR	1.70	1.70	0.03	0.03	1.67	1.67	150,000,000
National Grid Gas PLC	16-Dec-24	GBP	3.09		2.14		0.95		82,141,000
Vier Gas Transport GmbH	12-Jun-25	EUR	1.64		0.59		1.05		750,000,000
Wales & West Utilities Finance PLC	7-Mar-28	GBP	2.32	2.32	1.35	1.36	0.97	0.96	150,000,000
EPCOR Utilities Inc	28-Jun-29	CAD	3.49	3.49	2.12	2.12	1.37	1.37	150,000,000
South Eastern Power Networks PLC	5-Jun-26	GBP	2.70	2.10	1.48	1.12	1.22	0.99	269,997,000
RTE Reseau de Transport d'Electricite SADIR	20-Jun-29	EUR	1.34	1.34	0.64	0.64	0.70	0.70	600,000,000
National Grid Gas PLC	27-Jun-25	GBP	2.98		1.94		1.04		16,281,000
Dwr Cymru Financing Ltd	31-Mar-26	GBP	0.13		1.53		n/a		128,600,000
Northern Powergrid Yorkshire PLC	1-Apr-25	GBP	2.95		1.88		1.07		150,000,000
Enbridge Gas Distribution Inc	3-Nov-27	CAD	3.37	3.37	2.27	2.27	1.10	1.10	100,000,000
RTE Reseau de Transport d'Electricite SADIR	6-Nov-28	EUR	1.40	1.40	0.70	0.70	0.69	0.69	50,000,000
United Utilities Water Finance PLC	30-Sep-28	GBP	n/a	n/a	1.40	1.40	n/a	n/a	20,000,000
Golden State Water Co	25-Jan-29	USD	4.13	4.13	2.86	2.86	1.27	1.27	40,000,000
Dwr Cymru Financing Ltd	31-Mar-27	GBP	n/a	n/a	1.26	1.31	n/a	n/a	75,000,000
Western Power Distribution West Midlands PLC	16-May-28	GBP	n/a	n/a	1.35	1.35	n/a	n/a	30,000,000
National Grid Gas PLC	2-Oct-28	GBP	2.39	2.39	1.40	1.40	1.00	1.00	50,000,000
Western Power Distribution South Wales PLC	14-Mar-29	GBP	n/a	n/a	1.39	1.39	n/a	n/a	50,000,000
Ameren Illinois Co	15-Dec-28	USD	5.30	5.30	2.83	2.83	2.47	2.47	60,000,000
Enbridge Gas Distribution Inc	2-Oct-25	CAD	3.20		1.45		1.75		20,000,000
Statnett SF	12-Jun-26	EUR	0.61	0.53	0.32	0.34	0.29	0.18	70,000,000
United Utilities Water Finance PLC	27-Apr-27	EUR	1.42	1.52	0.30	0.46	1.11	1.06	52,000,000
United Utilities Water Finance PLC	23-Apr-25	GBP	0.52		1.84		n/a		25,000,000
Golden State Water Co	23-Mar-28	USD	4.04	4.05	2.64	2.66	1.40	1.39	15,000,000
RTE Reseau de Transport d'Electricite SADIR	30-Oct-28	EUR	1.38	1.38	0.71	0.71	0.67	0.67	50,000,000
South Eastern Power Networks PLC	13-Feb-25	GBP	0.52		1.93		n/a		25,000,000
Eastern Power Networks PLC	7-Oct-25	GBP	0.45		1.59		n/a		35,000,000
Eastern Power Networks PLC	13-Feb-25	GBP	0.51		1.93		n/a		40,000,000
Enbridge Gas Distribution Inc	2-Dec-24	CAD	3.35		1.52		1.83		85,000,000
AusNet Services Holdings Pty Ltd	2-Mar-30	EUR	1.70	1.70	0.02	0.02	1.68	1.68	11,000,000
Victoria Power Networks Finance Pty Ltd	24-Apr-30	EUR	1.60	1.60	-0.02	-0.02	1.61	1.61	24,000,000
Wales & West Utilities Finance PLC	29-Mar-30	GBP	2.52	2.52	1.16	1.16	1.36	1.36	300,000,000
United Utilities Water Finance PLC	23-Apr-30	GBP	n/a	n/a	1.19	1.19	n/a	n/a	35,000,000
Average							1.18	1.13	

Notes and sources:
Mid yields to maturity reported by Bloomberg. Government bond yields from Bank of Canada, Bank of England, Federal Reserve.
[C]: Average yields from 01/05/2014 to 30/04/2019 (included) if the yields are in the date range of 9 to 11 years from the maturity date.
For example, if a bond matures on the 18/07/2025, only yields reported between 18/07/2014 and 18/07/2016 are considered in the average.
[D]: Average yields from 01/05/2017 until 30/04/2019 (included) if the yields are in the date range of 9 to 11 years from the maturity date.
[E], [F]: Average 10 year government bond yields in the same period as that of the bond yields included. Government bond yields are assigned based on the currency.
[G]: [C]-[E]. [H]: [D]-[F].

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