CONNECTICUT WATER SVC INC
Capitalization and Financial Statistics
2005-2009, Inclusive

	2009	2008	2007	2006	2005	
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 221.8	$ 197.1	$ 193.1	$ 174.0	$ 174.4	
Short-Term Debt	$ 25.0	$ 12.1	$ 6.5	$ 5.3	$ 4.8	
Total Capital	$ 246.8	$ 209.2	$ 199.6	$ 179.2	$ 179.1	
Market-Based Financial Ratios						Average
Price-Earnings Multiple	18 x	22 x	23 x	30 x	28 x	24 x
Market/Book Ratio	175.8%	199.4%	203.9%	207.7%	223.1%	202.0%
Dividend Yield	4.1%	3.7%	3.6%	3.6%	3.4%	3.7%
Dividend Payout Ratio	75.4%	78.6%	81.7%	105.7%	95.6%	87.4%
Capital Structure Ratios						
Based on Permanent Captial.						
Long-Term Debt	50.5%	46.8%	47.8%	44.5%	45.7%	47.1%
Preferred Stock	0.3%	0.4%	0.4%	0.4%	0.5%	0.4%
Common Equity [3]	49.2%	52.8%	51.8%	55.1%	53.8%	52.5%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt Incl. Short Term	55.5%	49.9%	49.5%	46.1%	47.2%	49.6%
Preferred Stock	0.3%	0.4%	0.4%	0.4%	0.5%	0.4%
Common Equity [3]	44.2%	49.8%	50.1%	53.5%	52.4%	50.0%
	100.0%	100.1%	100.0%	100.0%	100.1%	100.0%
Rate of Return on Book Common Equity [1]	9.5%	9.2%	8.9%	7.0%	7.9%	8.5%
Operating Ratio [2]	75.0%	72.4%	71.4%	80.7%	75.1%	74.9%
Coverage excl. AFUDC [3]						
Pre-tax: All Interest Charges	3.94 x	3.63 x	3.95 x	2.53 x	3.68 x	3.55 x
Post-tax: All Interest Charges	3.15 x	2.81 x	2.99 x	2.50 x	2.78 x	2.85 x
Overall Coverage: All Int. & Pfd. Div.	3.13 x	2.79 x	2.97 x	2.48 x	2.76 x	2.83 x
Coverage excl. AFUDC [4]						
Pre-tax: All Interest Charges	3.89 x	3.60 x	3.93 x	2.43 x	3.52 x	3.47 x
Post-tax: All Interest Charges	3.10 x	2.78 x	2.97 x	2.40 x	2.63 x	2.78 x
Overall Coverage: All Int. & Pfd. Div.	3.07 x	2.76 x	2.94 x	2.38 x	2.60 x	2.75 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	2.6%	1.7%	1.1%	6.9%	9.0%	4.3%
Effective Income Tax Rate	26.6%	31.0%	32.5%	1.6%	33.5%	25.1%
Internal Cash Generation/Construction [4]	41.0%	48.9%	34.1%	23.0%	48.8%	39.2%
Gross Cash Flow/ Avg. Total Debt [5]	15.9%	17.2%	15.3%	13.2%	18.7%	16.1%
Gross Cash Flow Interest Coverage [6]	4.98 x	4.30 x	4.15 x	3.40 x	4.53 x	4.27 x
Common Dividend Coverage [7]	2.50 x	2.36 x	1.93 x	1.57 x	2.14 x	2.10 x

See Page 2 for Notes.

MIDDLESEX WATER CO
Capitalization and Financial Statistics
2005-2009, Inclusive

	2009	2008	2007	2006	2005	
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 271.6	$ 277.4	$ 271.4	$ 266.4	$ 233.9	
Short-Term Debt	$ 42.9	$ 25.9	$ 6.3	$ -	$ 4.0	
Total Capital	$ 314.5	$ 303.3	$ 277.7	$ 266.4	$ 237.9	
Market-Based Financial Ratios						Average
Price-Earnings Multiple	20 x	18 x	21 x	22 x	28 x	22 x
Market/Book Ratio	143.4%	156.8%	187.1%	200.9%	238.9%	185.4%
Dividend Yield	4.8%	4.4%	2.8%	3.7%	3.3%	3.8%
Dividend Payout Ratio	98.1%	78.0%	78.8%	83.6%	93.5%	86.4%
Capital Structure Ratios						
Based on Permanent Captial:						
Long-Term Debt	47.4%	49.1%	49.5%	50.0%	55.6%	50.3%
Preferred Stock	1.2%	1.2%	1.5%	1.5%	1.7%	1.4%
Common Equity [1]	51.4%	49.7%	49.0%	48.5%	42.7%	48.3%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	54.5%	53.4%	50.6%	50.0%	56.4%	53.0%
Preferred Stock	1.1%	1.1%	1.4%	1.5%	1.7%	1.4%
Common Equity [1]	44.4%	45.4%	47.9%	48.5%	42.0%	45.6%
	100.0%	99.9%	99.9%	100.0%	100.1%	100.0%
Rate of Return on Book Common Equity [1]	7.0%	8.9%	8.8%	8.5%	8.4%	8.3%
Operating Ratio [2]	77.9%	73.6%	73.7%	73.7%	76.9%	75.2%
Coverage incl. AFUDC [3]						
Pre-tax: All Interest Charges	3.24 x	3.59 x	3.66 x	3.15 x	2.88 x	3.30 x
Post-tax: All Interest Charges	2.48 x	2.73 x	2.79 x	2.43 x	2.36 x	2.56 x
Overall Coverage: All Int. & Pfd. Div.	2.40 x	2.65 x	2.69 x	2.35 x	2.27 x	2.47 x
Coverage excl. AFUDC [3]						
Pre-tax: All Interest Charges	3.09 x	3.49 x	3.57 x	3.06 x	2.79 x	3.20 x
Post-tax: All Interest Charges	2.33 x	2.64 x	2.71 x	2.34 x	2.27 x	2.46 x
Overall Coverage: All Int. & Pfd. Div.	2.26 x	2.56 x	2.61 x	2.26 x	2.18 x	2.37 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	10.2%	5.6%	4.6%	6.5%	6.7%	6.7%
Effective Income Tax Rate	34.1%	33.2%	32.6%	33.4%	27.6%	32.2%
Internal Cash Generation/Construction [4]	71.3%	43.7%	47.9%	31.7%	28.9%	44.7%
Gross Cash Flow/ Avg. Total Debt [5]	14.5%	14.5%	14.5%	13.5%	11.7%	13.7%
Gross Cash Flow Interest Coverage [5]	4.53 x	4.04 x	3.95 x	3.48 x	3.31 x	3.86 x
Common Dividend Coverage [7]	2.50 x	2.33 x	2.15 x	2.18 x	1.95 x	2.22 x

See Page 2 for Notes

SJW CORP
Capitalization and Financial Statistics
2005-2009, Inclusive

	2009	2008	2007	2006	2005	
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 487.5	$ 452.2	$ 440.6	$ 376.8	$ 331.1	
Short-Term Debt	$ 5.8	$ 18.4	$ 5.0	$ 15.5	$ -	
Total Capital	$ 493.3	$ 470.6	$ 445.6	$ 392.3	$ 331.1	
Market-Based Financial Ratios						Average
Price-Earnings Multiple	30 x	24 x	34 x	16 x	18 x	24 x
Market/Book Ratio	177.3%	206.7%	278.4%	286.6%	210.6%	231.9%
Dividend Yield	2.7%	2.3%	1.7%	1.7%	2.4%	2.2%
Dividend Payout Ratio	80.4%	55.3%	57.4%	27.3%	44.8%	53.0%
Capital Structure Ratios						
Based on Permanent Capital:						
Long-Term Debt	50.9%	48.1%	49.2%	43.6%	44.0%	47.2%
Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Common Equity [1]	49.1%	51.9%	50.8%	56.4%	56.0%	52.8%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	51.4%	50.1%	49.8%	45.8%	44.0%	48.2%
Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Common Equity [1]	48.6%	49.9%	50.2%	54.2%	56.0%	51.8%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Rate of Return on Book Common Equity [1]	6.4%	9.4%	8.9%	19.4%	12.2%	11.3%
Operating Ratio [2]	81.6%	79.1%	79.5%	75.2%	75.7%	78.2%
Coverage incl. AFUDC [3]						
Pre-tax: All Interest Charges	2.56 x	3.34 x	3.35 x	6.62 x	4.55 x	4.08 x
Post-tax: All Interest Charges	1.93 x	2.41 x	2.43 x	4.33 x	3.07 x	2.83 x
Overall Coverage: All Int. & Pfd. Div.	1.93 x	2.41 x	2.43 x	4.33 x	3.07 x	2.83 x
Coverage excl. AFUDC [3]						
Pre-tax: All Interest Charges	2.55 x	3.31 x	3.32 x	6.58 x	4.52 x	4.06 x
Post-tax: All Interest Charges	1.91 x	2.38 x	2.39 x	4.29 x	3.04 x	2.80 x
Overall Coverage: All Int. & Pfd. Div.	1.91 x	2.38 x	2.39 x	4.29 x	3.04 x	2.80 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	2.0%	2.1%	2.7%	1.2%	1.5%	1.9%
Effective Income Tax Rate	40.4%	39.5%	39.4%	40.8%	41.6%	40.3%
Internal Cash Generation/Construction [4]	62.4%	58.5%	33.9%	105.5%	75.1%	67.1%
Gross Cash Flow/ Avg. Total Debt [5]	19.6%	22.8%	17.9%	44.0%	30.8%	27.0%
Gross Cash Flow Interest Coverage [6]	3.91 x	4.44 x	3.62 x	7.16 x	5.24 x	4.87 x
Common Dividend Coverage [7]	3.93 x	4.39 x	3.24 x	6.93 x	4.57 x	4.61 x

See Page 2 for Notes.

YORK WATER CO
Capitalization and Financial Statistics
2005-2009, Inclusive

	2009	2008	2007	2006	2005	Average
			(Millions of Dollars)			
Amount of Capital Employed						
Permanent Capital	$ 164.5	$ 156.1	$ 138.1	$ 127.8	$ 102.5	
Short-Term Debt	$ 5.0	$ 6.0	$ 3.0	$ -	$ 7.3	
Total Capital	$ 169.5	$ 162.1	$ 141.1	$ 127.8	$ 109.8	
Market-Based Financial Ratios						
Price-Earnings Multiple	22 x	20 x	30 x	31 x	26 x	26 x
Market/Book Ratio	212.0%	187.7%	287.9%	339.8%	310.9%	267.7%
Dividend Yield	3.7%	4.3%	2.8%	2.5%	2.9%	3.2%
Dividend Payout Ratio	80.5%	85.9%	83.1%	79.1%	75.3%	80.8%
Capital Structure Ratios						
Based on Permanent Capital:						
Long-Term Debt	47.2%	55.3%	51.1%	48.8%	50.6%	50.6%
Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Common Equity [1]	52.8%	44.7%	48.9%	51.2%	49.4%	49.4%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Based on Total Capital:						
Total Debt incl. Short Term	48.7%	57.0%	52.1%	48.8%	53.9%	52.1%
Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Common Equity [1]	51.3%	43.0%	47.9%	51.2%	46.1%	47.9%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Rate of Return on Book Common Equity [3]	9.6%	9.4%	9.6%	10.5%	11.8%	10.2%
Operating Ratio [4]	53.1%	55.1%	54.9%	55.0%	52.3%	54.1%
Coverage incl. AFUDC [5]						
Pre-tax: All Interest Charges	3.42 x	3.11 x	3.44 x	3.23 x	3.56 x	3.35 x
Post-tax: All Interest Charges	2.51 x	2.35 x	2.55 x	2.46 x	2.62 x	2.50 x
Overall Coverage: All Int. & Pfd. Div.	2.51 x	2.35 x	2.55 x	2.46 x	2.62 x	2.50 x
Coverage excl. AFUDC [5]						
Pre-tax: All Interest Charges	3.38 x	2.98 x	3.38 x	3.12 x	3.51 x	3.27 x
Post-tax: All Interest Charges	2.46 x	2.22 x	2.49 x	2.36 x	2.57 x	2.42 x
Overall Coverage: All Int. & Pfd. Div.	2.46 x	2.22 x	2.49 x	2.36 x	2.57 x	2.42 x
Quality of Earnings & Cash Flow						
AFC/Income Avail. for Common Equity	2.8%	10.1%	3.6%	7.2%	3.1%	5.4%
Effective Income Tax Rate	37.9%	36.1%	36.5%	34.4%	36.7%	36.3%
Internal Cash Generation/Construction [6]	68.8%	25.9%	29.9%	25.7%	28.8%	35.8%
Gross Cash Flow/ Avg. Total Debt [2]	16.6%	14.2%	15.8%	16.5%	15.8%	15.8%
Gross Cash Flow Interest Coverage [b]	3.89 x	3.36 x	3.54 x	3.32 x	3.41 x	3.50 x
Common Dividend Coverage [7]	2.48 x	2.16 x	2.03 x	2.14 x	2.04 x	2.17 x

See Page 2 for Notes

OTS Exhibit No. 1
Schedule No. 9

Dividend Yields of Eight Company Peer Group

	Average	American States Water	Aqua America	Artesian Resources Corp	California Water	Connecticut Water Services	Middlesex Water	SJW Corp.	York Water Company
Symbol		AWR	WTR	ARTNA	CWT	CTWS	MSEX	SJW	YORW
Div		1.08	0.63	0 78	0.62	0.94	0.74	0.69	0.53
52 wk low		31.24	17.63	17.26	16.92	20 95	15 48	21.88	13 42
52 wk high		38.59	23.79	19.99	19.25	28.27	19.31	28	18
Spot Price		35.15	21.98	18.02	18.71	25 58	18.58	24.24	16.55
52 wk Div Yield	3 49%	3.09	3.04	4.17	3 40	3 84	4 24	2.77	3.39
Spot Div Yield	3.41%	3.07	2.87	4.31	3.29	3.69	3.97	2 85	3.22
Average	3.45%								

Source: Barrons July 1, 2011
Value Line April 22, 2011

OTS Exhibit No. 1
Schedule 10
Page 1 of 3

Five Year Growth Estimate Forecast for Eight Company Barometer Group

Company	Symbol	Yahoo	Clear Station	Smart Money	MSN	Morning star	Value Line	Average
		Source						
American States Water	AWR	5.50%	N/A	N/A	N/A	3.00%	8.00%	5.50%
Aqua America	WTR	6.00%	6.50%	6.50%	6.50%	7.50%	10.00%	7.17%
Artesian Resources Corp	ARTNA	4.53%	3.60%	3.60%	3.60%	3.60%	3.60%	3.76%
California Water	CWT	9.00%	N/A	N/A	N/A	5.00%	3.00%	5.67%
Connecticut Water Services	CTWS	3.00%	4.00%	4.00%	4.00%	3.00%	4.00%	3.67%
Middlesex Water	MSEX	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
SJW Corp	SJW	14.00%	N/A	N/A	N/A	9.00%	9.00%	10.67%
York Water Company	YORW	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
								5.68%

Source:
Internet

July 1, 2011

OTS Exhibit No. 1
Schedule 10
Page 2 of 3

Predicted Log Linear Growth Rates for Eight Company Barometer Group

Company	Predicted Log Linear Growth Rate
American States Water	9.2918
Aqua America	6.8458
Artesian Resources Corp	3.3919
California Water	5.2864
Connecticut Water Services	4.4288
Middlesex Water	4.1748
SJW Corp.	1.4982
York Water Company	5.9930
Average	5.1138

Source:

OTS Exhibit No 1
Schedule 10
Page 3 of 3

Predicted Log Linear Growth Rates for Eight Company Peer Group

AWR Year		Earnings Per Share	Natural Log
2005	1	1 32	0.2776
2006	2	1 33	0 2852
2007	3	1 62	0.4824
2008	4	1 55	0 4383
2009	5	1 62	0 4824
2010	6	2 25	0 8109
2011	7	2.37	0.8645
2012	8	2 50	0 9180
2013	9	2.64	0 9716
2014	10	2 79	1 0251
2015	11	2 94	1.0786
Slope			0 0889
Predicted growth rate			9.2918

WTR Year		Earnings Per Share	Natural Log
2005	1	0 71	(0 3425)
2006	2	0.70	(0.3567)
2007	3	0 71	(0 3425)
2008	4	0.73	(0.3147)
2009	5	0 77	(0 2614)
2010	6	0.90	(0.1054)
2011	7	0 96	(0 0361)
2012	8	1.03	0.0331
2013	9	1 11	0 1023
2014	10	1.19	0 1715
2015	11	1 27	0 2407
Slope			0 0662
Predicted growth rate			6 8458

ARTNA Year		Earnings Per Share	Natural Log
2005	1	0 84	(0.1744)
2006	2	0 97	(0 0305)
2007	3	0 90	(0.1054)
2008	4	0 86	(0 1508)
2009	5	0 97	(0.0305)
2010	6	1 00	-
2011	7	1.04	0 0369
2012	8	1 08	0 0737
2013	9	1.12	0 1106
2014	10	1 16	0.1474
2015	11	1 20	0 1843
Slope			0 0334
Predicted growth rate			3 3919

CWT Year		Earnings Per Share	Natural Log
2005	1	1 47	0 3853
2006	2	1 34	0.2927
2007	3	1 50	0 4055
2008	4	1.90	0 6419
2009	5	1 95	0 6678
2010	6	1 81	0 5933
2011	7	1 91	0 6484
2012	8	2 02	0.7036
2013	9	2 14	0 7587
2014	10	2 26	0 8138
2015	11	2 38	0 8689
Slope			0 0515
Predicted growth rate			5 2864

CTWS Year		Earnings Per Share	Natural Log
2004	1	0 73	(0 3147)
2005	2	0 71	(0 3425)
2006	3	0 82	(0.1985)
2007	4	0 87	(0 1393)
2008	5	0 89	(0 1165)
2009	6	0 72	(0 3285)
2010	7	0.75	(0 2925)
2011	8	0 77	(0 2565)
2012	9	0 80	(0 2205)
2013	10	0 83	(0 1845)
2014	11	0 86	(0 1485)
Slope			0.0090
Predicted growth rate			0 9013

MSEX Year		Earnings Per Share	Natural Log
2005	1	0 71	(0 3425)
2006	2	0 82	(0 1985)
2007	3	0 87	(0.1393)
2008	4	0 89	(0 1165)
2009	5	0 72	(0 3285)
2010	6	0 96	(0 0408)
2011	7	0 99	(0.0113)
2012	8	1 02	0 0183
2013	9	1.05	0.0479
2014	10	1 08	0 0774
2015	11	1.11	0 1070
Slope			0.0409
Predicted growth rate			4 1748

SJW Year		Earnings Per Share	Natural Log
2005	1	1 12	0 1133
2006	2	1.19	0 1740
2007	3	1 04	0 0392
2008	4	1 08	0.0770
2009	5	0 81	(0 2107)
2010	6	0 84	(0 1744)
2011	7	0 93	(0 0730)
2012	8	1 03	0 0284
2013	9	1.14	0.1297
2014	10	1 26	0 2311
2015	11	1.39	0 3324
Slope			0 0149
Predicted growth rate			1 4982

YORW Year		Earnings Per Share	Natural Log
2005	1	0 56	(0 5798)
2006	2	0 58	(0.5447)
2007	3	0 57	(0 5621)
2008	4	0.57	(0.5621)
2009	5	0 64	(0.4463)
2010	6	0 71	(0 3425)
2011	7	0 75	(0 2842)
2012	8	0 80	(0.2260)
2013	9	0 85	(0.1677)
2014	10	0 90	(0 1094)
2015	11	0 95	(0.0511)
Slope			0 0582
Predicted growth rate			5 9930

Average of growth rates 5 2117

Source: Value Line
Schedule 10, page 1

Log-Linear Regressions

The best method for finding historic growth rates is by *log-linear* regression, which is a standard time-series linear regression in which the data points are plotted as natural logarithms. This type of regression can be performed easily on a calculator with regression functions or on a computer using one of the many statistical software packages available. In this appendix, we illustrate the use of log-linear regression techniques on a financial calculator to find General Foods' annual growth rates.

Table 4A-1 contains General Foods' historic dividends per share (DPS) as presented in Figure 4-1. Additionally, we used the calculator's natural log function, LN, to find the log of each year's DPS, and we numbered the data points from 0 to 14 for the 1968-1982 regression and from 0 to 5 for the 1977-1982 regression.

Table 4A-1
General Foods: Historic DPS

Year	DPS	Log DPS	1968-1982	1977-1982
1968	$1.20	0.18	0	—
1969	1.30	0.26	1	—
1970	1.33	0.29	2	—
1971	1.40	0.34	3	—
1972	1.40	0.34	4	—
1973	1.40	0.34	5	—
1974	1.40	0.34	6	—
1975	1.43	0.36	7	—
1976	1.54	0.43	8	—
1977	1.64	0.49	9	0
1978	1.72	0.54	10	1
1979	1.95	0.67	11	2
1980	2.20	0.79	12	3
1981	2.20	0.79	13	4
1982	2.30	0.83	14	5

Now, to perform the regression using the 1968-1982 historic data, we enter the number of the data point (0 through 14), along with the corresponding log DPS, into the calculator's statistical storage registers. The effect is to enter the data point number as the X coordinate and the corresponding log DPS as the Y coordinate. (In practice, we would not actually show the log values. Rather, we would enter the DPS value, transform it to log DPS in the calculator, and then utilize log DPS in the regression.)

Once the data are entered, the calculator's statistical functions are used to determine the Y-intercept and slope of the regression line. The exact procedure varies slightly depending on the specific calculator; see the manual for yours. The resulting Y-intercept is 0.15, and the slope coefficient is 0.0448. The Y-intercept is not needed for our purposes here, but the value is included so that you may use it as a check when duplicating the regression.

The slope coefficient, 0.0448, is the instantaneous (or continuous) growth rate. Since we typically think in terms of effective annual rates, our final step is to convert the instantaneous growth rate of 0.0448 = 4.48% to an annual effective rate. The conversion of data points to natural logarithms in the original step of the log-linear regression resulted in the growth rate (slope of the regression line) being an instantaneous growth rate. To convert an instantaneous growth rate to an effective annual rate, we use the calculator's antilog function, e^x:

$$\begin{aligned}\text{Effective annual rate} &= e^{\text{instantaneous rate}} - 1.0\\ &= e^{0.0448} - 1.0\\ &= 1.046 - 1.0\\ &= 0.046 = 4.6\%.\end{aligned}$$

The same procedure was followed to perform the log-linear regression on the 1977-1982 data. In this case, we obtained a Y-intercept of 0.50 and a slope of 0.0734. Thus, the effective annual growth rate over the period 1977-1982 is 7.6 percent:

$$e^{0.0734} - 1.0 = 0.076 = 7.6\%.$$

OTS Exhibit No. 1
Schedule No. 12

Expected Market Cost Rate of Equity
Using Data for the Barometer Group of Eight Water Companies
Log Linear Regression Growth Rates

	Time Period	Adjusted Dividend Yield(1) (1)	Growth Rate (2)	Expected Rate of Return (3=1+2)
(1)	52 Week Average Ending: July 1, 2011	3.49%	5.11%	8.61%
(2)	Spot Price Ending: July 1, 2011	3.41%	5.11%	8.52%
(3)	Average:	3.45%	5.11%	8.56%

Sources: Value Line April 22, 2011
Barrons July 1, 2011

OTS Exhibit No: 1
Schedule 13

Company	Beta
American States Water	0.75
Aqua America	0.65
Artesian Resources Corp	0.60
California Water	0.70
Connecticut Water Services	0.80
Middlesex Water	0.75
SJW Corp.	0.90
York Water Company	0.70
Average beta for CAPM	0.73

Source:
Value Line

OTS Exhibit No. 1
Schedule 14

Risk Free Rate

Treasury note 10-yr Note	Yield
2Q 2011	3.29
3Q 2011	3.20
4Q 2011	3.40
1Q 2012	3.60
2Q 2012	3.80
3Q 2012	4.10
4Q 2012	4.30
2013-2017	5.00
Average	3.84

Source:
Blue Chip

July 1, 2011

OTS Exhibit No. 1
Schedule No. 15
Page1of 2

Required Rate of Return on Market as a Whole Forecasted

	Dividend Yield		Growth Rate		Expected Market Return
Value Line Estimate	2.00%	+	12.47%	= (a)	14.47%
S&P 500	2.18%	(b)	10.60%		12.78%
Average Expected Market Return				=	13.62%

(a) (1.60^.25) -1) Value Line forecast for the 3 to 5 year index appreciation is 60%
(b) S&P 500 multiplied by half the growth rate

OTS Exhibit No. 1
Schedule No. 15
Page 2 of 2

Required Rate of Return on Market as a Whole Historic

	Expected Market Return
7 yr S&P Composite Index Historical Return	5.52%
12 yr S&P Composite Index Historical Return	2.93%
23 yr S&P Composite Index Historical Return	9.36%
43 yr S&P Composite Index Historical Return	9.73%
84 yr S&P Composite Index Historical Return	9.81%
Average Expected Market Return =	7.47%

Source:
2010 SBBI Yearbook

OTS Exhibit No. 1
Schedule No. 16
Page 1 of 2

CAPM with forecasted return

Re		Required return on individual equity security
Rf		Risk-free rate
Rm		Required return on the market as a whole
Be		Beta on individual equity security
Re	=	Rf+Be(Rm-Rf)
Rf	=	3.8363
Rm	=	13.6240
Be	=	0.7313
Re	=	10.99

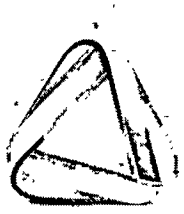
Sources: Value Line April 22, 2011
Blue Chip July 1, 2011
OTS Exhibit No. 1, Sch 15, page 1

OTS Exhibit No. 1
Schedule No. 16
Page 1 of 2

CAPM with historical return

Re		Required return on individual equity security
Rf		Risk-free rate
Rm		Required return on the market as a whole
Be		Beta on individual equity security
Re	=	Rf+Be(Rm-Rf)
Rf	=	3.8363
Rm	=	7.4701
Be	=	0.7313
Re	=	6.49

Sources: Value Line April 22, 2011
Blue Chip July 1, 2011
OTS Exhibit No. 1, Sch 15, page 2



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WATER COMPANIES

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WATER COMPANIES

COMPANY	TOTAL REV $ MILL (1)	% REG WATER REV	NET PLANT $ MILL	NET PLANT PER $ REV (1)	S&P BOND RATING	MOODY'S BOND RATING	COMMON EQUITY RATIO (3)	%RETURN ON BOOK VALUE COMMON EQUITY (4)	%RETURN ON BOOK VALUE TOTAL CAPITAL	REGULATION ALLOWED ROE	REGULATION ORDER DATE
American States Water Co. (NYSE-AWR)	458.6	72	1,049.8	2.29	A+	A2	56.8	12.4	9.9	9.43	1/1/2013
American Water Works Co , Inc. (NYSE-AWK)	3,159.4	87	13,933.0	4 41	A+/A-	A3/Baa1	43.5	9.6	7.0	9.75	12/12/2012
Aqua America, Inc. (NYSE-WTR)	814.2	96	4,688.9	5 76	AA-	NR	49.0	11.9	8.2	9.79	5/2/2014
Artesian Resources Corp (NDQ-ARTNA)	77.0	94	405 6	5 27	NR	NR	53.3	8 8	7.3	10.00	5/2/2014
California Water Service Group (NYSE-CWT)	588.4	100	1,680 5	2 86	AA-	NR	53.8	7.1	6.2	9 43	1/1/2013
Connecticut Water Service, Inc (NDQ-CTWS)	97.9	100	529.0	5 40	A/A-	NR	53.9	10 5	7.5	9 63	3/25/2014
Middlesex Water Company (NDQ-MSEX)	126 0	86	481.9	3 82	A	NR	58.4	9.8	7.2	9.75	8/19/2014
SJW Corporation (NYSE-SJW)	305.1	96	1,014.1	3 32	A	NR	47.8	10.2	7.7	9.43	1/1/2013
York Water Company (NDQ-YORW)	47.1	100	261.4	5.55	A-	NR	55.5	11.7	9.1	NM	2/28/2014
AVERAGE							52.4	10 2	7.8	9 65	

Ex-Dividend Dates: When Are You Entitled to Stock and Cash Dividends

Have you ever bought a stock only to find out later that you were not entitled to the next cash or stock dividend paid by the company? To determine whether you should get cash and most stock dividends, you need to look at two important dates. They are the "record date" or "date of record" and the "ex-dividend date" or "ex-date."

When a company declares a dividend, it sets a record date when you must be on the company's books as a shareholder to receive the dividend. Companies also use this date to determine who is sent proxy statements, financial reports, and other information.

Once the company sets the record date, the stock exchanges or the National Association of Securities Dealers, Inc. fix the ex-dividend date. The ex-dividend date is normally set for stocks **two business days before** the record date. If you purchase a stock on its ex-dividend date or after, you will not receive the next dividend payment. Instead, the seller gets the dividend. If you purchase before the ex-dividend date, you get the dividend.

Here is an example:

Declaration Date	Ex-Dividend Date	Record Date	Payable Date
7/27/2004	8/6/2004	8/10/2004	9/10/2004

On July 27, 2004, Company XYZ declares a dividend payable on September 10, 2004 to its shareholders. XYZ also announces that shareholders of record on the company's books on or before August 10, 2004 are entitled to the dividend. The stock would then go ex-dividend two business days before the record date.

In this example, the record date falls on a Tuesday. Excluding weekends and holidays, the ex-dividend is set two business days before the record date or the opening of the market – in this case on the preceding Friday. This means anyone who bought the stock on Friday or after would not get the dividend. At the same time, those who purchase before the ex-dividend date receive the dividend.

With a significant dividend, the price of a stock may move up by the dollar

amount of the dividend as the ex-dividend date approaches and then fall by that amount after the ex-dividend date. A stock that has gone ex-dividend is marked with an "x" in newspapers on that day.

Sometimes a company pays a dividend in the form of stock rather than cash. The stock dividend may be additional shares in the company or in a subsidiary being spun off. The procedures for stock dividends may be different from cash dividends. The ex-dividend date is set the first business day after the stock dividend is paid (and is also after the record date).

If you sell your stock before the ex-dividend date, you also are selling away your right to the stock dividend. Your sale includes an obligation to deliver any shares acquired as a result of the dividend to the buyer of your shares, since the seller will receive an I.O.U. or "due bill" from his or her broker for the additional shares. Thus, it is important to remember that the day you can sell your shares without being obligated to deliver the additional shares is ***not*** the first business day after the record date, but usually is the first business day after the stock dividend is paid.

If you have questions about specific dividends, you should consult with your financial advisor. You can also get information by going to your library and reading *Standard and Poor's Dividend Record Binder*.

http://www.sec.gov/answers/dividen.htm

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Choice among methods of estimating share yield

The search for the growth component in the discounted cash flow model.

David A. Gordon, Myron J. Gordon, and Lawrence I. Gould

The yield at which a share of stock is selling, also called its expected return or required return, is an important statistic in finance. Firms use it in choosing among investment opportunities and financing alternatives, and investors use it in making portfolio decisions. Nevertheless, the yield at which a share is selling is a difficult quantity to measure, which has limited its use in the practice of finance. This paper develops and tests a basis for choice among alternative methods of estimating a share's yield.

A share's yield, like a bond's yield, is the discount rate that equates its expected future payments with its current price. A bond's yield is easy to measure under the common practice of ignoring default risk, as the future payments are then known with certainty. The future payments on a share, however, are dividends and market price, and these payments are uncertain.

The common practice is to represent these future dividend payments with estimates of two numbers: One is the coming dividend, and the other is a growth rate. The latter can be an estimate of the long-run growth rate in the dividend or of the growth rate in price over the coming period. In the latter case, the estimate is called the expected holding-period return (EHPR); in the former case, it is called the discounted cash flow yield (DCFY).[1] In either case, the estimate of a share's yield reduces to the sum of its dividend yield and a future growth rate, with the latter inferred in some way from historical data.

There is a wide variety of acceptable methods for using historical data to estimate future growth. This variation in method is illustrated in the testimony of expert witnesses before public utility commissions on the fair return for a public utility. In these cases, the estimates and the methods used are a matter of public record. Some idea of the various methods can be found in Morin (1984) and Kolbe, Read, and Hall (1984). The performance of alternative estimating methods has been examined in Gordon (1974), Kolbe, Read, and Hall (1984), Brigham, Shome, and Vinson (1985), and Harris (1986).

We have derived our basis for comparing the accuracy of alternative methods for estimating the DCFY on a share from the generally accepted propositions that yield should vary according to risk, and that beta is the best estimate of risk. Hence, the DCFY should vary among shares with beta, and, between two methods for estimating growth, the superior method is the one for which the variation in yield among shares is explained better by the variation in beta among the shares.

First we present simple, plausible, and objective measurement rules for implementing four popular and/or attractive methods for estimating the DCFY. We then describe how sample statistics may be used to judge the accuracy of each method. We also describe how the CAPM model has been used to estimate share yield and explain why we do not compare it with the various DCFY methods. The following section carries out the comparison with samples of utility and industrial shares, and the last section pre-

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sents the conclusions that may be drawn from the findings.

ALTERNATIVE MEASUREMENT RULES FOR A SHARE'S YIELD

Under the DCF method or model for estimating the expected return on a stock, the yield for the jth stock is:

$$DCFY_{jt} = DYD_{jt} + GR_{jt}, \quad (1)$$

where:

$DCFY_{jt}$ = DCF yield on the jth stock at time t,

DYD_{jt} = dividend yield on the jth stock at time t, and

GR_{jt} = long-run growth rate in the dividend on the jth stock that investors expect at time t.

In what follows, we omit the time and firm subscripts on the variables when they are not required. Also, DCFY will refer to the unknown true yield on a share.

The difficult problem in arriving at the DCFY is estimation of the long-run growth rate that investors expect. Four estimates of that quantity are:

EGR = rate of growth in earnings per share over a prior time period, usually the last five years;

DGR = rate of growth in dividend per share over a prior time period, usually the last five years;

FRG = consensus among security analyst forecasts of the growth rate in earnings, over the next five years; and

BRG = an average over the prior five years of the product of the retention rate b and rate of return on common equity r on a stock.

The estimate of share yield that incorporates each of these estimates of growth is denoted KEGR, KDGR, KFRG, and KBRG, respectively.

A case can be made for each of the four methods for estimating growth. KEGR, KDGR, and KBRG have been widely used in public utility testimony and in research on stock valuation models. The rationale for KEGR is the belief that the past growth rate in earnings is the best predictor of future growth in earnings and dividends. The rationale for KDGR is that the future growth rate in dividends is the statistic we want to estimate, and the past dividend record is free of the noise in past earnings.[2] The rationale for KBRG is that all variables will grow at this rate if the firm earns r and retains b. Furthermore, as Gordon and Gould (1980) show, KEGR and KDGR will be biased in one direction or another if r and b have changed over the last five years. As for KFRG, security analysts are professionals employed to forecast future performance; their forecasts are widely accepted by investors. The IBES collection of forecast growth rates of security analysts compiled by Lynch, Jones, and Ryan has increased the popularity of this estimate.

As stated earlier, we may also take the yield on a share as the sum of the dividend yield and the expected rate of growth in price over the coming period. This estimate of a share's yield is widely used in testing the CAPM, with the average HPR over the prior five years commonly used in such empirical work. On the other hand, this estimate of a share's yield varies so widely among firms and over time as to be patently in error as an estimate of share yield.[3]

BASIS OF COMPARISON

To compare the accuracy of the four estimates of the DCFY stated above, we regress the data under each estimate on beta for a sample of shares. If KEGR is the estimate,

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \epsilon_j. \quad (2)$$

The rationale for this expression lies in the risk premium theory of share yield, where the share yield is equal to the interest rate plus a risk premium that varies with the share's relative risk. Hence, if BETA is an error-free index of relative risk, α_0 is equal to the interest rate, and α_1 is the risk premium on the market portfolio or standard share.[4]

The higher the correlation between KEGR and BETA, assuming that α_1 is positive, the greater the confidence we may have in KEGR as an estimate of DCFY. We cannot rely solely on the correlation, though, in selecting among the methods for estimating DCFY. Errors in KEGR as a basis for estimating the DCFY on the jth share have random and systematic components. The former is ϵ_j, and its average value can be taken as the root mean square error of the regression (MSE). The larger the root MSE of the regression, the less attractive KEGR is as an estimate of share yield, because the error makes the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ more acute. (That problem will be discussed shortly.)

The systematic error is the difference between the unknown true yield on the jth share, $DCFY_j$, and the value predicted by Equation (2). There is no obvious measure of the systematic error, as we do not know $DCFY_j$, but sample values of α_0 may provide information on its average value. The difference between α_0 and the interest rate is an indicator of systematic error, because the difference is zero under the risk premium theory. Error in the measurement of BETA biases α_0 upward, but, with the same BETA for each share used in all four regressions, differences in α_0 are indicators of systematic error.[5]

In addition to regression statistics, the sample mean and standard deviation of KEGR is a source of information on its accuracy as a method for the estimation of DCFY. If the mean departs radically from the long-term bond rate, or if the standard deviation indicates an unreasonable range of variation among shares, the accuracy of the method is open to question. Also, the sample mean may be a source of information on the systematic error for a method of estimation. Hence, sample values for the mean, standard deviation, correlation, root MSE, and constant term all contribute to a judgment on a method's accuracy for estimating the DCFY on a share. Unfortunately, there is no simple criterion for choice among the alternatives.

Once a conclusion is reached on the most accurate method for estimating DCFY — say, KEGR — we then have the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ for the jth share. If the random error in $KEGR_j$ is due to error in its measurement for the jth share, we simply use the value predicted by Equation (2), which is $KEGR_j - \epsilon_j$. On the other hand, KEGR and DCFY may vary among shares with other (omitted) variables as well as BETA, in which case ϵ_j is also due to the omitted variables, and $KEGR_j$ may be the better estimate of DCFY. Unfortunately, we have no basis for choice among these two hypotheses, and the smaller the root MSE the less troublesome the problem of choice between them.

A more favorable tax treatment of capital gains over dividends should make investors prefer capital gains to dividends. As Brennan (1973) has shown, the yield investors require on a share would then vary with the excess of its dividend yield over the interest rate. To recognize this, Equation (2) becomes

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \alpha_2 DMI_j + \epsilon_j, \qquad (3)$$

with DMI_j the excess of the dividend yield over the interest rate for the jth firm. Although the tax effect should make α_2 positive, its information in DMI on share risk would tend to make α_2 negative. That is, dividend yield varies inversely with expected growth, and we would find α_2 negative insofar as growth is risky. To the extent that these two influences of the dividend yield offset each other, α_2 will tend toward zero.

The CAPM theory of how expected return varies among shares has been proposed as an alternative to the DCF model for measuring yield. Its value for the jth stock is

$$EHPR_j = INTR + BETA_j[EHPR_m - INTR], \qquad (4)$$

where:

$EHPR_j$ = expected holding-period return on the jth share,

INTR = one-period risk-free interest rate,

$EHPR_m$ = expected holding-period return on the market portfolio.

There is an important difference between this CAPM model of share yield and the DCF model represented by Equation (1). The latter is merely an instrument for measuring share yield: There is nothing in the DCF model that explains the variation in yield among shares. The CAPM, on the other hand, is a theory on why and how yield varies among shares, but one must go outside of the theory to estimate the variables on the right-hand side of Equation (4). Given rules for estimating the variables, EHPR and BETA, empirical work then provides a joint test of the theory and the estimating rules, such as we are carrying out here.[6]

The CAPM nonetheless has been used to estimate share yield in testimony before regulatory commissions by assigning numbers to each of the quantities on the right-hand side of Equation (4). For INTR, a long-term bond yield is sometimes used instead of a one-period rate. BETA is estimated by conventional methods.

The big problem is the expected return on the market portfolio. Here the practice has been to use the average realized risk premium over a period of about fifty years as the estimate of $EHPR_m - INTR$ in Equation (4). Although the implicit assumption is that the risk premium is a constant over time, we would expect the premium to change from one period to the next for various reasons, among them changes in the interest rate, the risk premium on the market portfolio, and the relative taxation of interest and share income. Hence, this estimate of share yield is more or less in error at any particular time, but we have no way of estimating this error and comparing the method with the others.

COMPARATIVE PERFORMANCE

We carried out our empirical work with a sample of 75 large electric and gas utility firms and a sample of 244 firms that includes 169 industrial firms drawn from the S&P 400. We obtained share yield under the four methods for estimating it as of the start of the year for the years 1984, 1985, and 1986.

For the explanatory variables, BETA for each share on each date was obtained by regressing the monthly HPRs for the share on the monthly HPRs for the S&P 500 over the prior five years. DMI for a share is its dividend yield less the interest rate on the one-month Treasury bill at the start of each year. EGR and DGR are the growth rates in earnings and in dividends per share, respectively, over the prior five years as reported on the Value Line Tape. BRG is a weighted

average of the retention growth rates over the prior five years,[7] and FRG is the average of forecast growth rates in earnings over the next five years reported by IBES. The corresponding estimates of share yield were obtained by adding the dividend yield at the start of each year to the estimate of growth.

Table 1 presents the statistics that we obtained with KBRG and KFRG as the estimates of DCFY for the sample of utility shares and of all shares. The means of KBRG for the utility shares seems reasonable, with the interest rate on ten-year government bonds the standard of comparison, the latter being 11.67%, 10.43%, and 9.19% at the start of 1984, 1985, and 1986, respectively.[8] The standard deviations for KBRG are small enough to make its range of variation well within the bounds of reason. The lower means for all shares reveal that the means for industrial shares are below the means for utility shares.[9] This casts doubt on the accuracy of KBRG as a basis for estimating the DCFY on industrial shares, because industrials are riskier than utility shares.

The beta model explains none of the variation in KBRG among utility shares, but the two-factor model is a substantial improvement. The DMI coefficient, α_2, is positive and significant in every year, meaning that the unfavorable tax effect of a high dividend yield dominates the favorable risk effect. The coefficient on BETA is positive and significant in two of the three years. The only disturbing feature of the data is the sharp fall in R^2 and the corresponding rise in the root MSE relative to the standard deviation of KBRG as we go from 1984 to 1986.

The KBRG statistics for all shares are substantially inferior to the utility share statistics. This forces the unhappy conclusion that, for industrial shares, BETA is a poor measure of risk, or KBRG is a poor measure of DCFY, or both.

The KFRG statistics for the utility sample are superior to the KBRG statistics. The means are reasonable under the two criteria of being above the interest rate and moving with it. The range of variation of KFRG suggested by its standard deviations seems reasonable. The statistics for the beta model are a slight improvement on the corresponding statistics for KBRG. Furthermore, the two-factor model does a good job of explaining the variation in KFRG among

TABLE 1

Sample and Regression Statistics for KBRG and KFRG, Utility Shares and All Shares, 1984, 1985, and 1986

	KBRG			KFRG		
	1984	1985	1986	1984	1985	1986
			UTILITY SHARES (75)			
Mean	14.84	14.38	12.93	15.64	14.56	12.93
Standard Deviation	2.51	1.87	1.80	2.26	1.43	1.42
Beta Model α_0	14.26	13.96	13.05	15.14	13.48	12.74
α_1	1.44	1.21	−0.28	1.25	3.09	0.42
t-statistic	(0.97)	(1.12)	(0.19)	(0.93)	(4.14)	(0.37)
Root MSE	2.52	1.87	1.81	2.26	1.29	1.43
R^2	0.013	0.017	0.001	0.012	0.190	0.002
Two-Factor Model α_0	12.45	12.75	12.42	13.30	12.46	11.97
α_1	3.45	2.11	0.11	3.28	3.85	0.89
t-statistic	(3.13)	(2.19)	(0.08)	(3.83)	(6.33)	(0.88)
α_2	0.68	0.45	0.34	0.68	0.38	0.41
t-statistic	(8.22)	(4.88)	(2.81)	(10.73)	(6.52)	(4.65)
Root MSE	1.82	1.63	1.73	1.41	1.03	1.26
R^2	0.491	0.262	0.100	0.620	0.491	0.232
			ALL SHARES (244)			
Mean	12.98	13.19	11.86	16.17	15.87	14.31
Standard Deviation	3.86	3.21	3.52	2.60	2.32	2.30
Beta Model α_0	15.00	14.71	13.90	15.56	14.50	12.57
α_1	−2.47	−1.91	−2.40	0.74	1.72	2.05
t-statistic	(4.23)	(4.15)	(4.25)	(1.83)	(5.29)	(5.70)
Root MSE	3.73	3.10	3.40	2.59	2.20	2.16
R^2	0.069	0.066	0.069	0.014	0.104	0.118
Two-Factor Model α_0	14.34	14.42	13.95	15.40	14.61	12.75
α_1	0.09	−1.18	−2.51	1.37	1.44	1.61
t-statistic	(0.13)	(2.04)	(3.45)	(2.69)	(3.52)	(3.49)
α_2	0.48	0.17	−0.02	0.12	−0.06	−0.10
t-statistic	(6.04)	(2.09)	(0.24)	(2.01)	(1.12)	(1.53)
Root MSE	3.49	3.08	3.41	2.57	2.20	2.16
R^2	0.191	0.083	0.070	0.030	0.108	0.127

utility shares. The R^2s are higher here than for KBRG in every year. Finally, α_2 is positive and significant in every year, and α_1 is not significant only in 1986.

The implicit means of KFRG for the industrial shares seem high but not beyond reason. On the other hand, the regression statistics for the all-shares sample are not good, which leads to the same unhappy conclusion for industrial shares as we reached for KBRG.

Table 2 presents the statistics that we obtained using KEGR and KDGR as estimates of the DCFY on the shares in our samples. Comparison of the regression statistics with those in Table 1 reveals that KEGR and KDGR, particularly the former, fall short by a wide margin of the performance of KBRG and KFRG as estimates of the DCFY on a share.

CONCLUSION

We have compared the accuracy of four methods for estimating the growth component of the discounted cash flow yield on a share: past growth rate in earnings (KEGR), past growth rate in dividends (KDGR), past retention growth rate (KBRG), and forecasts of growth by security analysts (KFRG). Criteria for the comparison were the reasonableness of sample means and standard deviations and the success of beta and dividend yield in explaining the variation in DCF yield among shares. For our sample of utility shares, KFRG performed well, with KBRG, KDGR, and KEGR following in that order, and with KEGR a distant fourth. If we had used past growth in price, it would have been an even more distant fifth. Nevertheless, none of the four estimates of growth performed well under the criteria for a sample that included industrial shares.

Before closing, we have three observations to make. First, the superior performance by KFRG should come as no surprise. All four estimates of growth rely upon past data, but in the case of KFRG a larger body of past data is used, filtered through a group of security analysts who adjust for abnormalities that are not considered relevant for future growth. We assume this is done by any analyst who develops retention growth estimates of yield for a firm. If we had done this for all seventy-five firms in our utility sample, it is likely that the correlations

TABLE 2

Sample and Regression Statistics for KEGR and KDGR, Utility Shares and All Shares, 1984, 1985, and 1986

	KEGR			KDGR		
	1984	1985	1986	1984	1985	1986
			UTILITY SHARES (75)			
Mean	16.16	0.32	14.91	16.49	15.76	14.13
Standard Deviation	3.31	3.47	4.66	3.12	2.41	2.21
Beta Model α_0	15.45	16.18	0.51	15.75	14.53	12.30
α_1	1.75	0.40	−7.87	1.83	3.53	3.99
t-statistic	(0.89)	(0.20)	(2.16)	(0.99)	(2.64)	(2.32)
Root MSE	3.32	3.49	4.55	3.12	2.32	2.15
R^2	0.010	0.001	0.060	0.013	0.087	0.069
Two-Factor Model α_0	14.20	15.83	18.76	14.10	13.56	12.64
α_1	3.13	0.66	−8.03	3.65	4.25	3.78
t-statistic	(1.66)	(0.32)	(2.18)	(2.23)	(3.26)	(2.20)
α_2	0.47	0.13	−0.13	0.61	0.35	−0.18
t-statistic	(3.32)	(0.66)	(0.42)	(5.02)	(2.86)	(1.21)
Root MSE	3.11	3.50	4.58	2.70	2.21	2.14
R^2	0.142	0.007	0.063	0.269	0.180	0.087
			ALL SHARES (244)			
Mean	11.14	9.42	7.88	15.08	13.63	11.35
Standard Deviation	10.67	11.67	11.45	6.08	6.30	6.71
Beta Model α_0	15.96	18.28	19.55	15.15	0.04	15.39
α_1	−5.90	−11.16	−13.70	−0.09	−1.78	−4.74
t-statistic	(3.62)	(7.07)	(8.10)	(0.09)	(1.92)	(4.41)
Root MSE	10.41	10.65	10.18	6.09	6.27	6.47
R^2	0.051	0.171	0.213	0.000	0.015	0.074
Two-Factor Model α_0	14.84	18.01	19.91	14.31	14.11	14.79
α_1	−1.56	−10.49	−14.62	3.17	0.63	−3.25
t-statistic	(0.77)	(5.27)	(6.72)	(2.73)	(0.55)	(2.36)
α_2	0.81	0.15	−0.21	0.61	0.55	0.34
t-statistic	(3.51)	(0.55)	(0.67)	(4.57)	(3.47)	(1.72)
Root MSE	10.18	10.67	10.19	5.86	6.13	6.45
R^2	0.097	0.172	0.215	0.080	0.062	0.085

would have been as good or better than those obtained with the analyst forecasts of growth.

Second, we examined shares and not portfolios, because our objective is to estimate the DCFY for shares and not for portfolios. As common practice in testing the CAPM has been to execute tests on portfolios instead of shares, we classified our population of shares into ten portfolios on the basis of their beta values. Regression statistics were substantially unchanged, except that correlations increased dramatically.

Finally, we must acknowledge that we have no basis for estimating the expected HPR or DCF yield for industrial shares with any confidence. Theories on financial decision-making in industrial corporations that rely on that statistic have a weak empirical foundation.

[1] The EHPR is a one-period return, while the DCFY is a yield to maturity measure. The two may differ in actuality because of measurement problems, but they also may differ in theory. That is, they may differ in the same way that interest rates on bonds of different maturities may differ. See Gordon and Gould (1984a). This source of difference between EHPR and DCFY will be ignored here.

[2] A widely accepted hypothesis is that dividends contain information on earnings, because management sets the dividend to pay out a stable fraction of normal or permanent earnings.

[3] Over a five-year period, there may even be a negative rate of growth in price for a large number of firms. Furthermore, this negative growth rate may be larger in absolute value than the dividend yield, which leads to the conclusion that investors are holding such shares to earn a negative return. The frequency of negative rates of growth in price is reduced as the prior time period used in its calculation increases in length. As that takes place, however, the estimate of the expected return for a firm approaches a constant or a constant plus the dividend yield. The expected return on a share is one statistic for which it is an error to assume that expectations are on average realized.

[4] Equation (2) is similar to the CAPM according to Sharpe, Lintner, and Mossin. They arrived at this expression under very rigorous assumptions. The heuristic risk premium model is adequate for our purposes.

[5] It may be thought that Theil's (1966) decomposition of the difference between the actual and predicted values of a variable can be used here, but in fact that decomposition applies to a different problem. It assumes that the observed (actual) past values of a variable are free of error, and it decomposes the error in a model that is employed to explain the past values. The purpose of Theil's decomposition is to cast light on the possible error in using the model to predict future values of the dependent variable. Our problem is to determine which set of observed values is closest to the true values, with the risk premium theory of share yield and BETA as the source of information on the true values. Theil's method would be appropriate for decomposing the difference between the actual and predicted values of the *realized* holding-period return on a share. The actual values here can be observed without error.

[6] There is an enormous volume of empirical work devoted to discovering whether the theory is true, but this empirical work does not provide useful estimates of the EHPR on a share. To test the truth of Equation (4), the practice has been to regress EHPR on BETA for a sample of firms with the average realized HPR over the prior five or so years used as an estimate of the EHPR. Because of the large error in the realized HPR over a prior time period, as noted earlier, neither the actual values of the dependent variable nor the values predicted by the model are usable as estimates of share yield. See Fama and MacBeth (1973) and Friend, Westerfield, and Granito (1978).

[7] BRG for a year is earnings less dividend divided by the end-of-year book value. The estimate of the expected value as of the start of 1986 is 0.3BRG85 + 0.25BRG84 + 0.20BRG83 + 0.15BRG83 + 0.10BRG82. If any value of BRG was negative, it was set equal to zero.

[8] We expect the yields on shares to be above the risk-free interest rate, but with a high enough interest rate the more favorable tax treatment of shares can reduce the yield below the interest rate. Interest rates were not that high in these years. See Gordon and Gould (1984b).

[9] The statistics reported for all shares and for utility shares were also obtained for industrial shares. All methods of estimation performed so poorly for industrial shares, however, as to suggest no confidence can be placed in any of them. To save space, we do not present statistics for the industrial shares. Whatever we want to know about them can be deduced by comparing the data for all shares and utility shares.

REFERENCES

Brennan, M.J. "Taxes, Market Valuation and Corporate Financial Policy." *National Tax Journal*, 23 (1973), pp. 417-427.

Brigham, E., D. Shome, and S. Vinson. "The Risk Premium Approach to Measuring a Utility's Cost of Equity." *Financial Management*, Spring 1985, pp. 33-45.

Fama, E., and J.D. MacBeth. "Risk, Return and Equilibrium: Empirical Tests." *Journal of Political Economy*, 81 (May 1973), pp. 607-636.

Friend, I., R. Westerfield, and M. Granito. "New Evidence on the Capital Asset Pricing Model." *Journal of Finance*, 33 (June 1978), pp. 903-917.

Gordon, M.J. *The Cost of Capital to a Public Utility*. East Lansing, Michigan: Michigan State University, 1974.

Gordon, M.J., and L.I. Gould. "Comparison of the DCF and HPR Measures of the Yield on Common Shares." *Financial Management*, Winter 1984a, pp. 40-47.

——. "The Nominal Yield and Risk Premium on the TSE-300, 1956-1982." *Canadian Journal of Administrative Sciences*, 1 (1984b), pp. 50-60.

——. Testimony Before the Federal Communications Commission in the Matter of American Telephone and Telegraph Company. FCC Docket No. 79-63, April 1980.

Harris, R.S. "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return." *Financial Management*, Spring 1986, pp. 58-67.

Kolbe, A.L., J.A. Read, and G.R. Hall. *The Cost of Capital: Estimating the Rate of Return for Public Utilities*. Cambridge, MA: MIT Press, 1984.

Morin, R.A. *Utilities' Cost of Capital*. Arlington, VA: Public Utilities Reports, Inc., 1984.

Theil, H. *Applied Economic Forecasting*. Chicago: North Holland, 1966.

PENNSYLVANIA PUBLIC UTILITY COMMISSION

Public Meeting held May 19, 2016

Docket Number: M-2016-2543615

BUREAU OF TECHNICAL UTILITY SERVICES

REPORT ON THE QUARTERLY EARNINGS

OF JURISDICTIONAL UTILITIES

FOR THE YEAR ENDED

December 31, 2015

Gladys M. Brown, Chairman
Andrew G. Place, Vice Chairman
John F. Coleman, Jr., Commissioner
Robert F. Powelson, Commissioner

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Introduction:

On September 20, 1991, the Commission initiated a rulemaking at L-00910061 pertaining to earnings disclosures by the public utilities subject to its jurisdiction. At that docket, the Commission stated that the submission of accurate, reliable and complete earnings disclosure reports, at regular intervals, is essential to the fulfillment of the broad regulatory oversight responsibilities entrusted to the Commission by the Legislature in the Public Utility Code. The earnings disclosure regulations promulgated by the Commission were adopted October 1, 1992, and published January 23, 1993, at 23 Pa.B. 463. Based upon those regulations, codified at 52 Pa. Code, Chapter 71, a reporting format was developed and distributed to the jurisdictional fixed utilities of Pennsylvania.

All fixed utilities having jurisdictional revenues of $1,000,000 or more, for a calendar year, are required to file the report by March 31 of each year. Such reports are to be based upon the results of operations for the 12-month period ending December 31 of the prior year. Utilities having more than $10,000,000 in jurisdictional revenues are also required to file reports for the 12 months ending on March 31, June 30, and September 30 of each year. On November 30, 2004, however, the Pennsylvania General Assembly signed into law Act 183 concerning alternative telecommunications regulation and broadband deployment. As a result of Act 183, the reporting requirements for the PUC jurisdictional telecommunications companies of Pennsylvania have been streamlined at section 3015(e) of the Public Utility Code. A quarterly earnings report is not listed among those reports now required of PUC jurisdictional telecommunications utilities in Pennsylvania and, therefore, this report does not address telephone company earnings.

The reports have been filed for the period ended December 31, 2015.[1] The Finance Staff of the Bureau of Technical Utility Services has reviewed the reports and has prepared this summary report for public release. This report sets forth the achieved return on equity for each company, the last allowed return for that utility, a market return as determined through the analysis of the barometer group data and the most recent returns allowed, per industry, by the Pennsylvania Public Utility Commission and by other regulatory bodies. Where a utility has not filed a report, the reasons for not filing are indicated.

Questions pertaining to the preparation and contents of this Report should be directed to Ms. Erin Laudenslager, Manager - Finance, Bureau of Technical Utility Services, at (717) 705-4364.

[1] UGI Utilities, Inc. -- Gas Division has a pending rate filing at Docket No. R-2015-2518438, and filed a letter with the Secretary in place of a report in accordance with 52 Pa. Code § 71.4.

The equity return summaries that follow in Attachment A are, for each quarter;

ACTUAL

1. Based on actual results of operations

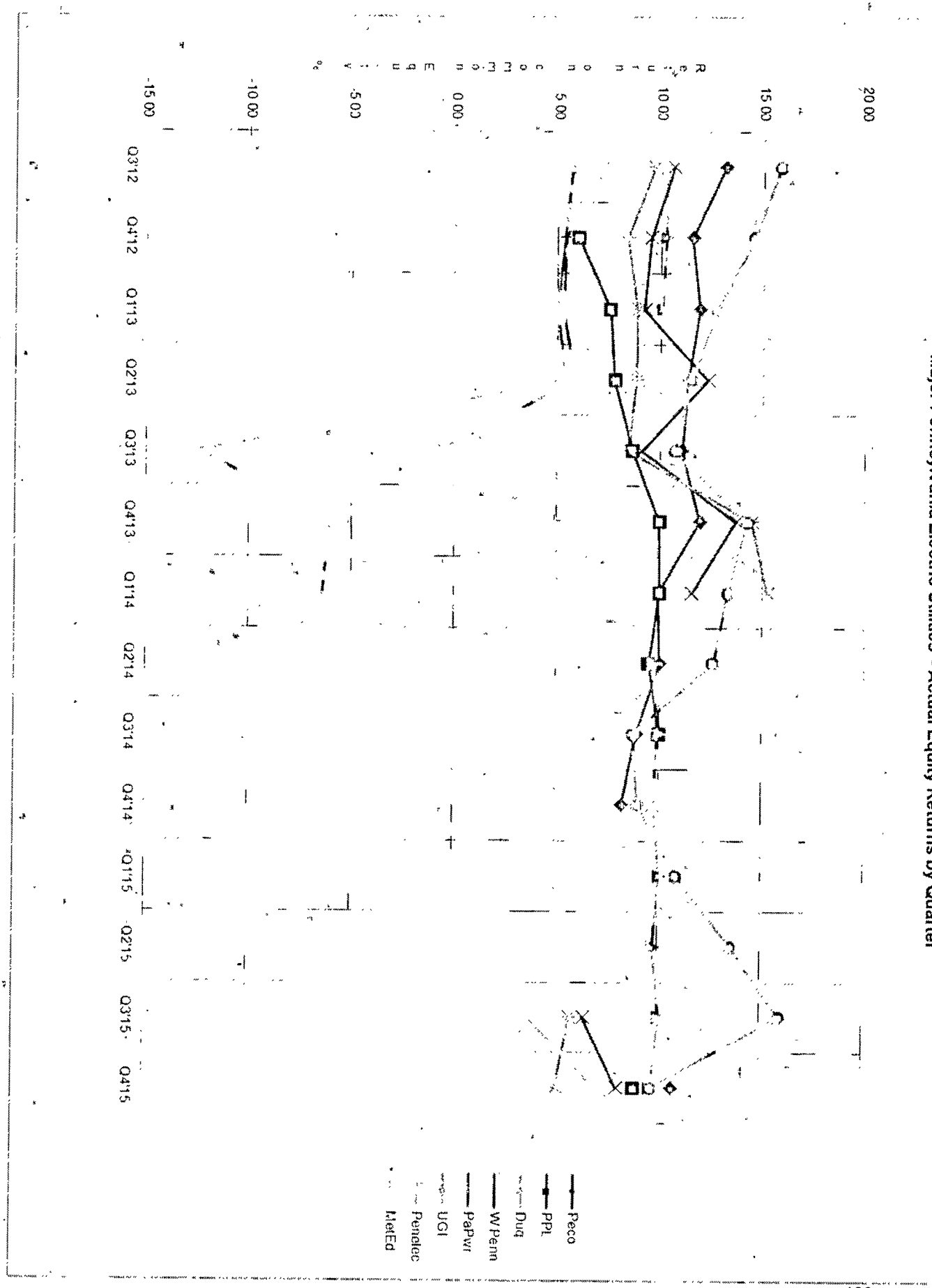
and

ADJUSTED

2. Based on company proposed pro forma and ratemaking adjustments

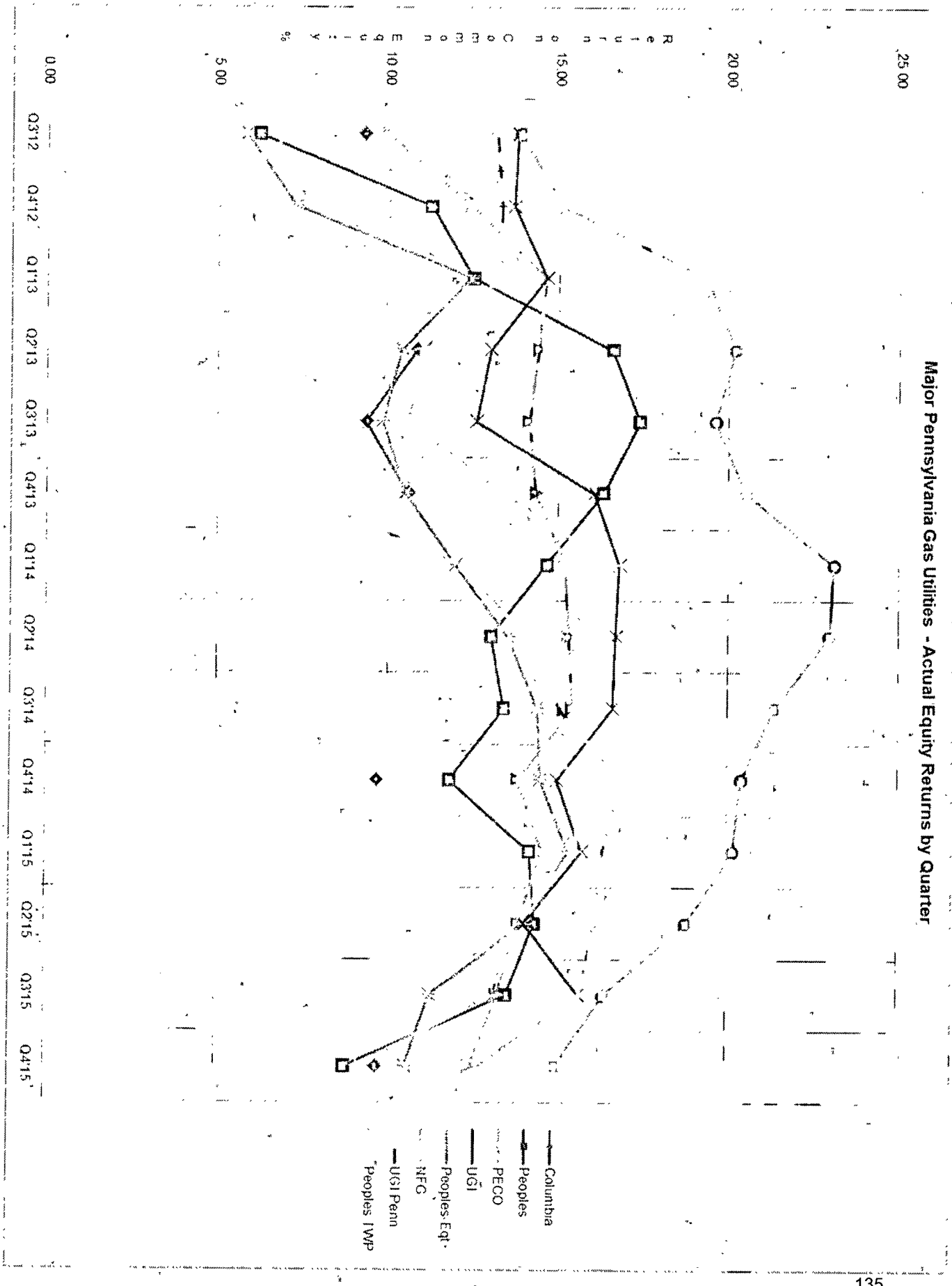
ELECTRIC UTILITIES
EQUITY RETURNS BY QUARTER

QTR END		PECO		PPL		Duq		W Penn		PaPwr		UGI		Penelec		MetEd	
		ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ
2010	2							6.41	6.41	12.28	10.19	13.41	11.89	8.04	6.97	5.89	4.47
	3							6.63	6.63	12.19	10.23	12.46	11.97	8.37	7.32	8.24	6.83
	4	14.35	9.61	7.91	6.98			4.78	4.80	6.88	4.69	12.95	11.55	9.11	8.10	6.12	4.86
	1	11.74	11.34	8.31	8.31			8.43	6.80	10.90	8.55	13.46	13.47	9.57	8.62	10.56	9.21
2011	2	12.25	11.03	9.41	9.41	10.86	10.39	10.05	8.40	7.41	5.81	14.11	12.94	6.51	6.38	7.68	6.43
	3	10.35	11.07	8.89	8.89	10.05	9.58	12.95	11.21	11.67	10.05	14.84	12.93	8.73	8.18	9.90	7.50
	4	13.41	11.38			10.21	9.97	13.33	11.58	5.91	7.60	14.60	9.79	6.45	8.43	4.24	5.23
	1	12.89	11.26			10.95	10.71	11.66	13.16	5.78	7.02	15.04	8.42	5.76	7.54	3.90	4.64
2012	2	12.63	12.01			10.81	10.42	10.61	9.15	8.95	8.95	14.61	8.53	6.48	8.08	3.44	4.01
	3	13.14	12.66			10.33	9.92	10.63	10.45	9.69	9.54	15.85	9.48	7.34	8.58	5.72	6.28
	4	11.55	11.56	6.02	4.88	10.27	9.24	9.54	9.54	8.41	8.27	14.60	8.98	5.41	7.74	5.39	6.81
	1	11.92	11.27	7.56	6.24	10.12	9.74	9.23	9.23	8.89	8.74	12.77	9.84	5.30	7.67	5.01	6.47
2013	2	11.40	10.74	7.80	7.37			12.34	12.34	8.85	8.70	11.53	10.49	5.86	8.21	5.36	6.79
	3	11.09	10.96	8.67	8.38			9.13	9.13	8.49	8.34	10.74	10.65	-0.77	2.07	-12.43	-10.43
	4	11.97	10.52	10.01	9.79			13.73	13.73	14.49	14.30	14.25	11.99	4.85	2.99	-6.06	-7.87
	1	9.97	10.34	10.02	10.04			11.58	9.45	15.28	15.04	13.36	10.25	5.17	3.34	-6.40	-8.13
2014	2	10.05	10.08	9.50	10.09	9.77	9.29					12.64	9.21				
	3	8.93	9.25	10.07	9.99	9.97	9.48					8.76	9.22				
	4	8.23	9.58			9.77	9.40					9.01	10.00				
	1					10.08	9.65					10.88	10.39				
2015	2					9.80	9.42					13.57	9.49				
	3					10.11	9.73	6.45	6.45	5.77	5.77	15.93	7.57	2.94	2.94	3.69	3.69
	4	10.74	8.84	8.89	8.48	9.73	9.36	8.09	8.09	5.13	5.13	9.74	9.21	5.45	5.45	7.04	7.04


Major Pennsylvania Electric Utilities - Actual Equity Returns by Quarter
Return on Equity
20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
Q3'12
Q4'12
Q1'13
Q2'13
Q3'13
Q4'13
Q1'14
Q2'14
Q3'14
Q4'14
Q1'15
Q2'15
Q3'15
Q4'15
Peco
PPL
Duq
WPenn
PaPwr
UGI
Penelec
MetEd

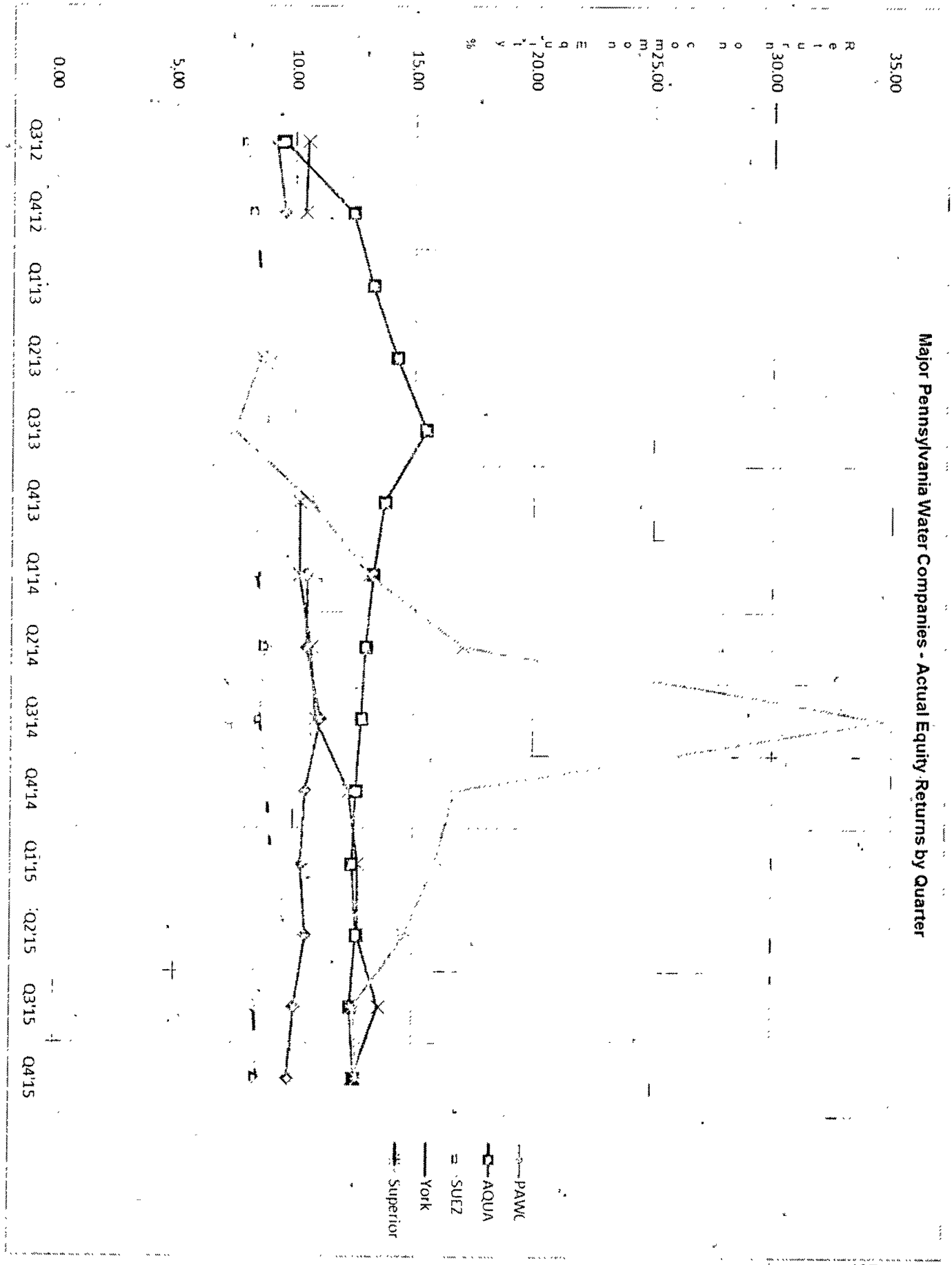
GAS UTILITIES
EQUITY RETURNS BY QUARTER

QTR	Columbia		Peoples		PECO		UGI		Peoples-Eqt		NFG		UGI Penn		Peoples TWP	
END	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ
2010 2			9.65	5.25			15.97	11.48	9.47	8.99	19.13	10.33	8.86	7.95		
3							14.84	11.79	8.87	8.56	18.19	10.99	8.62	9.03		
4	12.50	7.67			10.21	9.94	16.52	11.88	8.78	8.67	18.97	11.29	9.57	10.12	3.27	9.57
1					11.74	11.34	19.61	13.11	9.48	9.78	19.87	12.11	13.08	12.17	6.52	9.06
2011 2					11.97	10.79	19.67	13.92	10.81	10.71	20.83	12.97	14.08	12.65	6.10	6.94
3			5.67	8.47	12.56	11.15	18.24	11.98	10.40	9.93	21.16	13.05	14.32	11.48	5.78	6.67
4					11.69	12.06	16.55	9.18	7.99	8.89	19.62	12.34	14.01	9.35	6.75	5.56
1	8.65	11.24			8.98	12.09	15.71	8.95	2.29	8.05	15.76	10.51	13.22	9.63	5.24	3.39
2012 2	9.00	10.17			8.72	12.03	13.60	9.90	5.51	7.51	14.10	10.06	13.63	10.40	4.57	6.43
3	9.27	8.88	6.21	9.35	9.98	13.48	13.79	10.05	5.84	7.79	13.88	10.39	13.16	10.66	7.02	7.41
4			11.24	9.57	12.42	15.10	13.68	9.44	7.27	8.05	15.11	10.17	13.31	10.63	5.05	6.94
1			12.49	9.89	14.63	15.13	14.65	10.27	12.42	8.40	19.33	10.25	13.28	10.58		
2013 2	10.85	7.15	16.59	8.35	14.43	14.40	13.02	10.21	10.40	8.92	20.18	10.25	10.98	10.27		
3	9.36	9.86	17.39	8.72	14.14	14.01	12.60	9.38	9.84	9.48	19.61	10.72	10.59	10.76		
4	10.60	10.78	16.33	10.02	14.35	13.97	16.08	9.20	10.52	9.76	20.51	10.07	13.41	10.49	7.21	12.23
1			14.68	9.94	15.23	13.52	16.81	8.35	12.00	8.73	23.11	9.78	16.67	10.06	12.19	11.87
2014 2			13.05	9.78	15.32	13.24	16.71	8.39	13.54	8.49	22.97	12.00	15.30	10.90	14.06	12.32
3			13.43	9.16	15.45	13.21	16.63	8.64	14.41	9.15	21.36	11.03	13.77	10.15	15.07	12.62
4	9.71	9.97	11.85	7.89	13.86	12.59	15.00	7.93	14.52	12.46	20.40	10.79	15.64	9.82	16.91	11.83
1			14.22	7.90	14.60	13.01	15.76	7.87	15.36	12.14	20.17	10.31	15.57	9.52	16.36	11.23
2015 2			14.37	8.88	13.89	12.32	14.07	7.62	14.08	11.26	18.82	10.39	13.76	8.90	16.15	12.90
3			13.55	8.14	13.29	11.77	15.67	6.51	11.30	10.87	16.41	10.27	13.16	8.32	15.69	12.58
4	9.75	9.73	8.80	9.83	12.50	12.70			10.60	10.00	15.01	10.59	9.17	7.25	12.71	12.14


Major Pennsylvania Gas Utilities - Actual Equity Returns by Quarter
Regulated Common Equity %
25.00
20.00
15.00
10.00
5.00
0.00
Q3'12
Q4'12
Q1'13
Q2'13
Q3'13
Q4'13
Q1'14
Q2'14
Q3'14
Q4'14
Q1'15
Q2'15
Q3'15
Q4'15
Columbia
Peoples
PECO
UGI
Peoples Eqt.
NFG
UGI Penn
Peoples TWP

WATER UTILITIES
EQUITY RETURNS BY QUARTER

QTR		PAWC		AQUA		SUEZ		York		Superior	
END		ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ
2010	2	9.30	9.30			6.59	7.54				
	3	9.58	9.58	10.19	10.35	7.15	8.34				
	4	9.18	8.52	10.10	8.94	4.66	8.69	10.4	11.2		
	1			10.68	8.32	5.02	8.81	10.8	11.1		
2011	2			10.92	7.93	4.72	8.61	11.1	10.2		
	3					3.92	7.69	10.9	10.2		
	4					7.69	8.00	10.8	10.0		
	1	8.98	8.98			7.38	7.84	10.7	9.5		
2012	2	9.06	9.06			7.30	7.65	10.4	9.4		
	3	9.17	9.17	9.50	7.77	7.96	8.38	10.5	9.1		
	4	9.54	9.04	12.41	12.56	8.33	8.49	10.4	9.1		
	1			13.24	11.96	8.53	8.71				
2013	2			14.26	12.52	8.99	9.15			8.57	7.85
	3			15.49	12.21	8.83	9.01			7.46	6.85
	4			13.77	11.97	8.43	9.05	10.2	10.8	10.71	10.01
	1	10.52	9.98	13.29	11.56	8.45	9.02	10.2	10.2	13.12	9.97
2014	2	10.51	10.02	13.01	11.42	8.81	9.32	10.7	10.7	17.09	9.61
	3	11.11	10.57	12.82	11.29	8.57	9.06	10.9	10.9	34.68	9.88
	4	10.49	9.38	12.62	11.49	8.90	9.44	12.3	11.6	16.74	7.96
	1	10.33	9.14	12.46	11.11	9.11	9.83	12.7	12.7	15.92	8.37
2015	2	10.51	9.31	12.66	11.62	8.36	9.25	12.7	12.7	14.65	8.93
	3	10.06	8.81	12.41	11.95	8.39	9.37	13.6	13.6	12.54	9.37
	4	9.80	8.48	12.61	12.16	8.54	8.77	12.50	11.10	12.73	9.50


Major Pennsylvania Water Companies - Actual Equity Returns by Quarter
Return on common equity %
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Q3'12
Q4'12
Q1'13
Q2'13
Q3'13
Q4'13
Q1'14
Q2'14
Q3'14
Q4'14
Q1'15
Q2'15
Q3'15
Q4'15
PAWC
AQUA
SJWI
York
Superior

Attachment B includes:

A. Overall Returns on rate base
1. Actual
2. Company proposed pro forma and ratemaking adjustments

and

B. Equity Returns
1. Actual
2. Company proposed pro forma and ratemaking adjustments

Summary of Returns
For the Year Ended December 31, 2015

COMPANY NAME	OVERALL RETURN ACTUAL	OVERALL RETURN ADJ	EQUITY RETURN ACTUAL	EQUITY RETURN ADJ	ROE AUTH	YEAR AUTH
ELECTRIC						
$10,000,000 Revenues						
PECO Energy	7.87	6.83	10.74	8.84	Settled	2010
PPL Electric Utilities Corp.	6.91	6.70	8.89	8.48	10.40	2012
Duquesne Light Company	7.64	7.42	9.73	9.36	Settled	2014
West Penn Power Company	6.61	6.61	8.09	8.09	Settled	2015
Pennsylvania Power Company	5.28	5.28	5.13	5.13	Settled	2015
UGI Utilities, Inc.	7.52	7.26	9.74	9.21	Settled	1996
Pennsylvania Electric Company	6.17	6.17	5.45	5.45	Settled	2015
Metropolitan Edison Company	6.30	6.30	7.04	7.04	Settled	2015
$1,000,000 to $10,000,000 Revenues						
Citizens Electric Company	6.69	6.69	6.76	6.76		
Pike County Light & Power Co.	7.07	7.40	9.70	9.24		
Wellsboro Electric Company	8.46	8.46	21.46	21.46		
GAS						
$10,000,000 Revenues						
Columbia Gas of PA, Inc.	7.63	7.71	9.75	9.73	Settled	2013
Peoples Natl Gas LLC	6.85	7.04	8.80	9.83	Settled	2012
PECO Energy	8.88	8.99	12.50	12.70	Settled	2010
UGI Utilities, Inc.*					Settled	1995
Peoples-Equitable Division	7.56	7.07	10.60	10.00	Settled	2008
National Fuel Gas Distribution Co.	10.16	7.81	15.01	10.59	Settled	2006
UGI-Penn Natural Gas, Inc.	7.40	6.19	9.17	7.25	Settled	2009
Peoples TWP, LLC	8.16	7.83	12.71	12.14	Settled	2013
UGI Central Penn Gas, Inc.	9.94	7.50	12.69	9.67	Settled	2009
$1,000,000 to $10,000,000 Revenues						
North East Heat & Light Co.	8.40	8.40	11.58	11.57		
Valley Energy	8.10	8.10	11.80	11.80		
Pike County Light & Power Co.	3.45	3.34	2.57	1.23		
WATER						
$10,000,000 Revenues						
PA American Water Company	7.90	7.21	9.80	8.48	Settled	2013
AQUA Pennsylvania	8.86	8.65	12.61	12.16	Settled	2012
York Water Company	9.70	8.90	12.5	11.10	Settled	2014
SUEZ Water Pennsylvania, Inc.	6.98	7.10	8.54	8.77	Settled	2009
Superior Water Company, Inc.	9.16	7.46	12.73	9.50	Settled	2011
$1,000,000 to $10,000,000 Revenues						
Newtown Artesian Water Co.	6.79	5.42	9.62	6.69		
Columbia Water Company	4.94	4.94	5.04	5.04		

* UGI Utilities, Inc. – Gas Division has a pending rate filing at Docket No. R-2015-2518438, and filed a letter with the Secretary in place of a report in accordance with 52 Pa. Code § 71.4.

ALLOWED RATES OF RETURN ON COMMON EQUITY

This is a historical chart that shows the most recent fully litigated rate cases for select companies in electric, gas, and water. A docket number followed by their final return on equity and year is also given.

ELECTRIC	Docket Number	ROE (%)	Year
Recent PA PUC Allowed			
PPL Electric Utilities Corp.	R-2012-2290597	10.40	2012
PECO Energy Company	R-2010-2161575	Settled	2010
UGI - Electric	R-00953524	Settled	1996
Pennsylvania Electric Company	R-2014-2428743	Settled	2015
Metropolitan Edison Company	R-2014-2428745	Settled	2015
Pennsylvania Power Company	R-2014-2428744	Settled	2015
West Penn Power Company	R-2014-2428742	Settled	2015
Current Market Indicated ROE as calculated by the Bureau of Technical Utility Services.			**7.71-10.01**

GAS			
Recent PA PUC Allowed			
Columbia Gas of Pa.	R-2014-2406274	Settled	2014
UGI Utilities, Inc. – Gas	R-00953297	Settled	1995
Peoples Natural Gas	R-2012-2285985	Settled	2012
UGI Penn Natural Gas	R-2008-2079660	Settled	2009
UGI Central Penn Gas	R-2008-2079675	Settled	2009
PECO Energy	R-2010-2161592	Settled	2010
Peoples TWP	R-2013-2355886	Settled	2013
Current Market Indicated ROE as calculated by the Bureau of Technical Utility Services.			**8.09-10.12**

WATER			
Recent PA PUC Allowed			
Aqua Pennsylvania	R-2011-2267958	Settled	2012
PA American Water	R-2013-2355276	Settled	2013
Columbia Water	R-2013-2360798	9.75	2014
York Water	R-2012-2336379	Settled	2014
Current Market Indicated ROE as calculated by the Bureau of Technical Utility Services.			**6.14-9.44**

Distribution System Improvement Charge (DSIC) Eligible Utilities
Return on Equity (ROE) Summary

	Utility Adjusted ROE[2] (%)	Commission Approved ROE[3] (%)
ELECTRIC		
PECO Energy	8.84	9.80
PPL Electric Utilities Corp.	8.48	9.80
GAS		
Columbia Gas of PA, Inc.	9.73	9.90
Peoples Natural Gas LLC	9.83	9.90
PECO Energy	12.70	9.90
UGI Utilities, Inc.*		9.90
Peoples-Equitable Division	10.00	9.90
UGI Penn Natural Gas, Inc.	7.25	9.90
Peoples TWP LLC	12.14	9.90
UGI Central Penn Gas, Inc.	9.67	9.90
WATER		
PA American Water Company	8.48	9.80
PA American - Wastewater	8.48	9.80
AQUA Pennsylvania	12.16	9.80
AQUA Pennsylvania - Wastewater	1.84	9.80
York Water Company	11.10	9.80
SUEZ Water Pennsylvania Inc.	8.77	9.80
Columbia Water+	5.04	9.80
Newtown Artesian Water+	6.69	9.80
Superior Water	9.50	9.80

* UGI Utilities, Inc. – Gas Division has a pending rate filing at Docket No. R-2015-2518438, and filed a letter with the Secretary in place of a report in accordance with 52 Pa. Code § 71.4.

+ These utilities have annual revenue less than $10 million and only file a year end, 4th quarter report.

2 Each utility lists adjustments on Schedule B of their quarterly financial report.

3 The ROE is approved in a utility's most recent fully litigated base rate proceeding for which a final order was entered not more than two years prior to the effective date of the DSIC. If more than two years have elapsed between the entry of a final order and the DSIC effective date, the ROE is from this report. If the base rate proceeding is settled, without a stipulated ROE, the ROE is from this report.

Explanation of Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM)

Barometer Group Criteria

The criteria used for determining the industry barometer groups used to calculate ROEs in this report are as follows:

- 50% or more of the company's assets must be related to the jurisdictional utility industry;
- The company's stock must be publically traded;
- Companies involved in merger & acquisition activity will be excluded;
- Investment information for the company must be available to the Commission from more than one source; and.
- Geographic Regions:
  EDCs: Value Line East Group Electric Utility companies;
  NGDCs: Value Line Investment Survey's Natural Gas Utility industry group companies;
  Water/Waste water: Value Line Investment Survey's Water Utility industry group companies.

The barometer group companies are reviewed by staff on a quarterly basis and make any changes to these companies based upon the criteria above.

ROE Calculations

The Commission consistently uses the DCF model to determine the appropriate cost of equity for utilities. In this report, the DSIC ROE is calculated using two DCF models.

TUS uses the following formula to calculate the current dividend DCF: $K = D_1/P_0 + G$

TUS uses the following formula to calculate the 52-week average dividend DCF: $K = D_1/P_a + G$

Definitions:

K	=	Cost of equity
D_1	=	Dividend expected during the year
	=	$D_0 + ½g$
D_0	=	Latest indicated dividend, obtained from Yahoo! Finance
g	=	Expected 5-year dividend growth rate of barometer group obtained from Value Line Investment Survey.
P_0	=	Current price of the stock, obtained from Yahoo! Finance
P_a	=	Average of high and low stock price over the latest 52-week period, obtained from Yahoo! Finance
G	=	Average of 5-year expected earnings growth rate forecasts obtained from Value Line Investment Survey, Zacks Investment Survey, Yahoo! Finance, Morningstar and/or Reuters.

The CAPM uses the yield of a risk-free interest bearing obligation plus a rate of return premium that is proportional to the systematic risk of an investment.

TUS uses the following formula to calculate CAPM: $K = \beta(R_m - R_f)$

Three components are necessary to calculate the CAPM cost of equity:

β	=	Beta, a measure of systematic risk for each stock
R_f	=	The risk-free rate of return, 10-year U.S. Treasury yields are used for R_f. Yields are taken from the previous two quarters and forecasted next four quarters.
R_m	=	Total return of the equity market as determined by the SBBI Yearbook

The Commission determines the ROE used for DSIC purposes based on the range of reasonableness from the DCF barometer group data, CAPM data, recent ROEs adjudicated by the Commission, and informed judgment.

The market indicated common equity cost rate range consists of data used from the barometer groups and is based on a series of calculations to average the DCF methods.

Market Based Returns on Common Equity[1]

April 21, 2016

Electric Company Barometer Group

	Cost Rates %
(1) Current DCF:	8.28
(2) 52-Week Average DCF:	8.62
(3) Overall DCF ((1) + (2)) / 2 :	8.45
(4) Market Indicated Common Equity Cost Rate Range: @ 1 standard deviation around the mean.[2]	6.92-9.97
(5) CAPM Check of DCF Reasonableness:	9.12
(6) Recent Commission Approved ROEs[3]: *None within last two years	*
(7) Distribution System Improvement Charge (DSIC) Return[4]:	**9.80%**

Barometer Group Companies
Consolidated Edison
NextEra Energy
PPL Corporation
Public Service Enterprise Group
SCANA Corp.
Eversource Energy

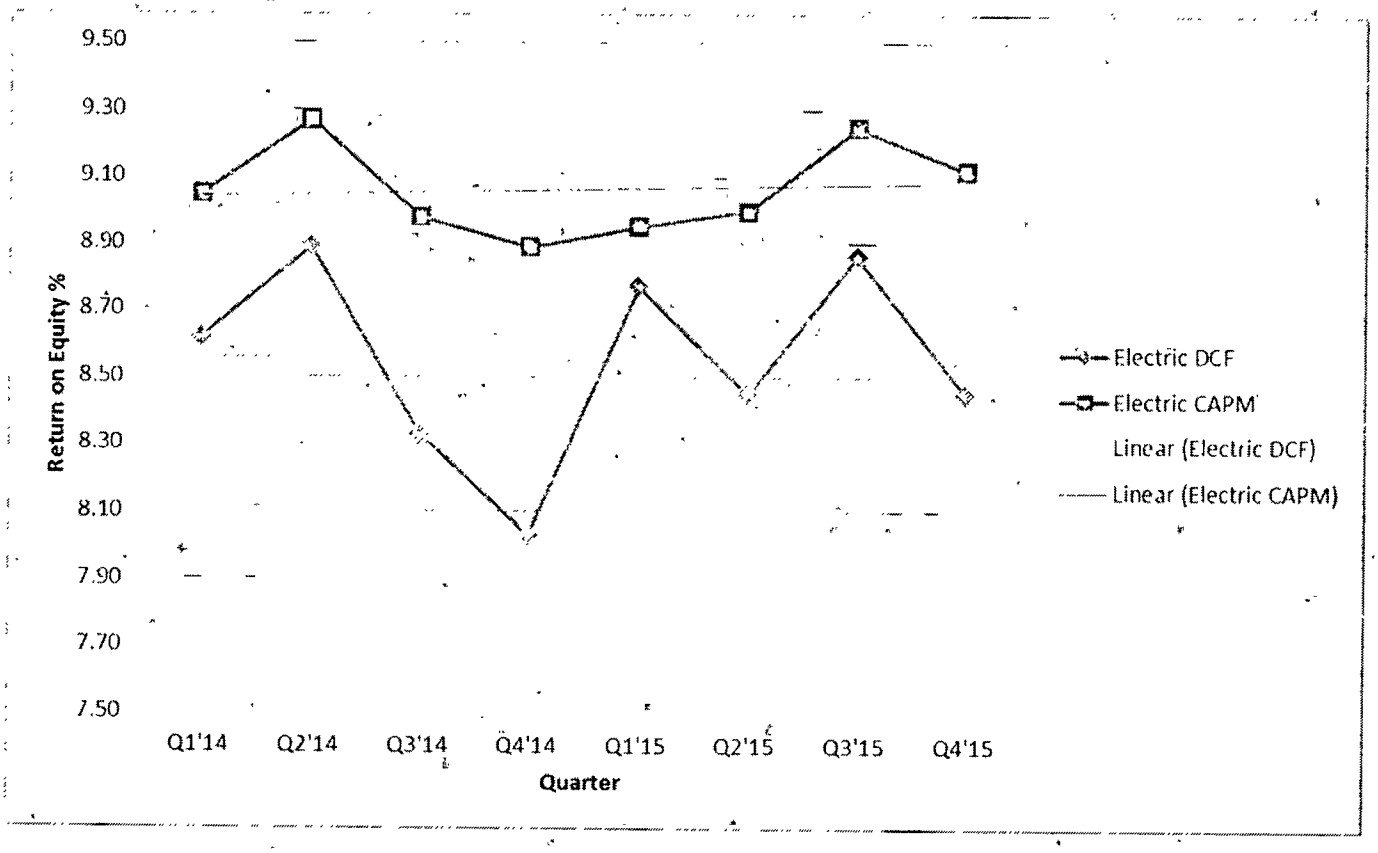
[1] As calculated by the Bureau of Technical Utility Services
[2] Standard Deviation of 12 DCF observations
[3] Base rate case ROEs within last two years, fully litigated or stipulated for DSIC purposes
[4] Commission authorized Return on Equity (ROE) for DSIC purposes

Any questions concerning DSIC should be directed to Andrew Herster of the Bureau of Technical Utility Services at (717) 783-5392.

Historic Electric Industry Barometer Group DCF and CAPM Average ROEs

	Electric	
	DCF	CAPM
Q1'14	8.62	9.05
Q2'14	8.89	9.27
Q3'14	8.33	8.98
Q4'14	8.03	8.89
Q1'15	8.77	8.95
Q2'15	8.45	9.00
Q3'15	8.86	9.25
Q4'15	8.45	9.12

Linear Trend Line Chart of Historic Electric Industry DCF and CAPM Average ROEs



Barometer electric companies are used to calculate a current DCF in the first chart. The second chart demonstrates the companies 52 week average DCF. A final average of the two calculations is also shown at the bottom.

Electric Company Barometer Group

Calculation of a Current Dividend Yield

	Closing Market Price (Po) 4/20/2016	Latest Indicated Dividend Do	Ind Div Plus 1/2 Div. Growth Rate (D1)	Current Dividend Yield(D1/Po)	DCF
	($)	($)	($)	(%)	(%)
Consolidated Edison	76 01	2 68	2 72	3 58	6 11
NextEra Energy	118 10	3 48	3 66	3 10	10 06
PPL Corporation	37 80	1 52	1.54	4 07	8 49
Public Service Enterprise Group	47 12	1 64	1 68	3 56	6 65
SCANA Corp	69 88	2 30	2 34	3 35	8 40
Eversource Energy	57 04	1 78	1 83	3 21	9 91
Group Average D1/Po				3 48	
Group Average G				4 80	
DCF				**8.28**	

Electric Company Barometer Group

52-week Average Dividend Yield Calculation

	High	Low	Average (Pa)	Latest Indicated Dividend (Do)	Average Dividend Yield (Do/Pa)	DCF
	($)	($)	($)	($)	(%)	(%)
Consolidated Edison	77 23	56 86	67.05	2 68	4 00	6 53
NextEra Energy	119 37	93 74	106 56	3 48	3.27	10 23
PPL Corporation	38 30	29 18	33 74	1 52	4 51	8 93
Public Service Enterprise Group	47 41	36 80	42 11	1 64	3 90	6.98
SCANA Corp	71 27	49 89	60 58	2 30	3 80	8 85
Eversource Energy	59 09	44 64	51 87	1 78	3 43	10.13
Group Average Do / Pa					3 82	
Group Average G					4 80	
DCF					**8.62**	
			Average of Current and 52-Week		**8.45**	

Multiple sources of the Barometer companies projected 5 year Earnings Per Share are used to calculate the Group Average Dividend Growth Estimate.

Development of a Representative Dividend Growth Rate
for the Barometer Group of Six Electric Companies

		5 Year Forecast					
	Value Line DPS	Value Line EPS	Zack's EPS	Yahoo EPS	Morningstar EPS	Avgerage Earnings Growth	Growth Estimate
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Consolidated Edison	3 00	2 50	2 80	2 43	2 40	2 53	2 53
NextEra Energy	10.50	7 00	6 80	6 95	7 10	6 96	6 96
PPL Corporation	2 50		4 70	4 14	24 10	10 98	4 42
Public Service Enterprise Group	4 50	4 00	3 10	2 05	3 20	3 09	3 09
SCANA Corp	3 50	4 50	5 30	5.40	5 00	5 05	5 05
Eversource Energy	6 00	7 00	6 80	5 98	7 00	6 70	6.70
Group Average	5 00	5 00	4 92	4 49	8.13	5 64	4 79
USE							**4.80**

Sources:
Morningstar, April 21, 2016 (http //financials morningstar com)
Value Line Investment Survey, April 21, 2016
Zacks, April 21, 2016 (www zacks com)
Yahoo!, April 21, 2016 (http //finance yahoo com/)

The market indicated common equity cost rate range consists of data used from the barometer groups and is based on a series of calculations to average the DCF methods.

Market Based Returns on Common Equity[1]

April 21, 2016

Gas Distribution Company Barometer Group

	Cost Rates %
(1) Current DCF:	8.57
(2) 52-Week Average DCF:	8.92
(3) Overall DCF ((1) + (2)) / 2 :	8.74
(4) Market Indicated Common Equity Cost Rate Range: @ 1 standard deviation around the mean.[2]	7.52-9.97
(5) CAPM Check of DCF Reasonableness:	9.54
(6) Recent Commission Approved ROEs[3]: *None within last two years	*
(7) Distribution System Improvement Charge (DSIC) Return[4]:	**9.90%**

Barometer Group Companies
Laclede Group, Inc.
New Jersey Resources
Northwest Natural Gas Company
Chesapeake Utilities Corporation
South Jersey Industries
WGL Holdings

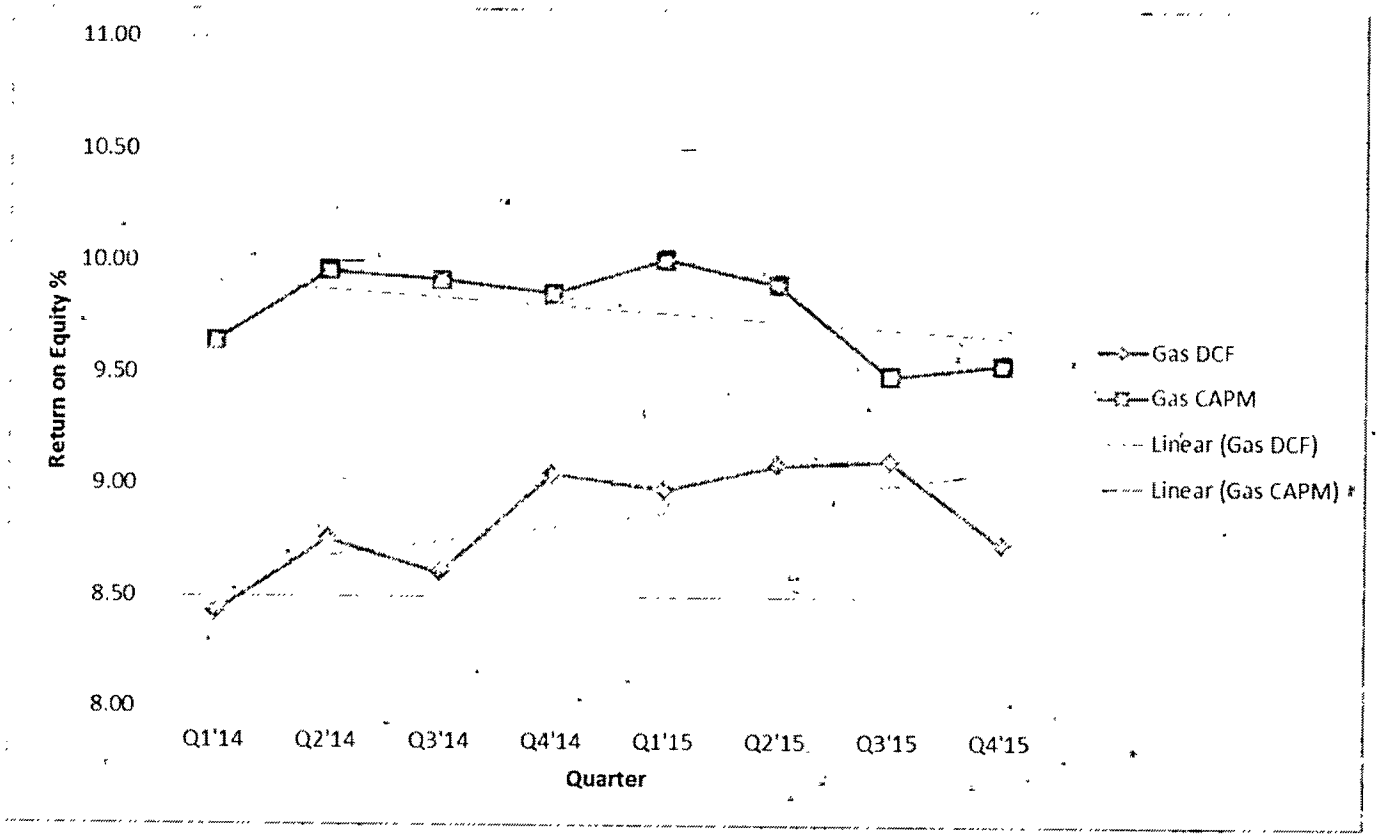
[1] As calculated by the Bureau of Technical Utility Services
[2] Standard Deviation of 12 DCF observations
[3] Base rate case ROEs within last two years, fully litigated or stipulated for DSIC purposes
[4] Commission authorized Return on Equity (ROE) for DSIC purposes

Any questions concerning DSIC should be directed to Andrew Herster, of the Bureau of Technical Utility Services at (717) 783-5392.

Historic Gas Industry DCF and CAPM Average ROEs

	Gas	
	DCF	CAPM
Q1'14	8.43	9.64
Q2'14	8.76	9.96
Q3'14	8.61	9.92
Q4'14	9.05	9.86
Q1'15	8.98	10.01
Q2'15	9.09	9.90
Q3'15	9.11	9.49
Q4'15	8.74	9.54

Linear Trend Line Graph of Historic Gas Industry DCF and CAPM Average ROEs



Barometer gas companies are used to calculate a current DCF in the first chart. The second chart demonstrates the companies 52 week average DCF. A final average of the two calculations is also shown at the bottom.

Gas Company Barometer Group
Calculation of a Current Dividend Yield

	Closing Market Price (Po) 4/20/2016 ($)	Latest Indicated Dividend Do ($)	Ind Div Plus 1/2 Div Growth Rate (D1) ($)	Current Dividend Yield(D1/Po) (%)	DCF (%)
Laclede Group	67 34	1 96	1 99	2 96	9 86
New Jersey Resources	36 72	0 96	0.97	2 65	8 09
Northwest Natural Gas	52 16	1 87	1.88	3 61	7 86
Chesapeake Utilities Corporation	61 55	1 15	1 18	1 92	6 76
South Jersey Industries	28 15	1 05	1 08	3 85	9 73
WGL Holdings	69 51	1 95	1 97	2 84	9 32
Group Average D1 / Po				2 97	
Group Average G				5 60	
DCF				**8.57**	

Gas Company Barometer Group
52-week Average Dividend Yield Calculation

	High ($)	Low ($)	Average (Pa) ($)	Latest Indicated Dividend (D1) ($)	Average Dividend Yield (D1/Pa) (%)	DCF (%)
Laclede Group	68 79	49 66	59 23	1 99	3 37	10 27
New Jersey Resources	36 88	26 77	31 83	0.97	3 06	8 50
Northwest Natural Gas	54 51	42 00	48 26	1 88	3 90	8 15
Chesapeake Utilities Corporation	67 36	44 37	55 87	1.18	2 12	6 95
South Jersey Industries	29 14	21 24	25 19	1 08	4 30	10 18
WGL Holdings	74 10	51 86	62 98	1.97	3 13	9 61
Group Average Do / Pa					3 32	
Group Average G					5 60	
DCF					**8.92**	
		Average of Current and 52-Week			**8.74**	

Multiple sources of the Barometer companies projected 5 year Earnings Per Share are used to calculate the Group Average Dividend Growth Estimate.

Development of a Representative Dividend Growth Rate
for the Barometer Group of Gas Companies

	5 Yr Forecast						
	Value Line DPS	Value Line EPS	Zack's EPS	Yahoo EPS	Morningstar EPS	Avgerage Earnings Growth	Growth Estimate
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Laclede Group	3 50	9 00	4 80	19 98		11 26	6 90
New Jersey Resources	3 00	1 50	6 50	6 50	3 30	4 45	5 43
Northwest Natural Gas	1 50	5 00	4 00	4 00	4 00	4 25	4 25
Chesapeake Utilities Corporation	6 00	8 50		3 00	3 00	4 83	4 83
South Jersey Industries	6 50	5 50	6 00	6 00	6 00	5 88	5 88
WGL Holdings	2 50	5 00	7 30	8 00	5 60	6 48	6.48
Group Average	3 83	5 75	5.72	7 91	4 38	6.19	5 63
USE							**5.60**

Sources
Morningstar, April 21, 2016 (http //financials morningstar com)
Value Line Investment Survey, April 21, 2016
Zacks, April 21, 2016 (www zacks com)
Yahoo!, April 21, 2016 (http //finance yahoo com/)

The market indicated common equity cost rate range consists of data used from the barometer groups and is based on a series of calculations to average the DCF methods.

Market Based Returns on Common Equity [1]

April 21, 2016

Water Company Barometer Group	Cost Rates %
(1) Current DCF	8.66
(2) 52-Week Average DCF	8.93
(3) Average DCF	8.79
(4) Market Indicated Common Equity Cost Rate Range @ 1 standard deviation around the mean.[2]	6.87-10.72
(5) CAPM Check of DCF Reasonableness	9.27
(6) Recent Commission Approved ROEs[3]: *None within last two years	*
(7) Distribution System Improvement Charge (DSIC) Return[4]:	**9.80%**

Barometer Group Companies
American States Water Company
Connecticut Water Service, Inc.
Middlesex Water Company
California Water Service Group
SJW Corporation
Aqua America , Inc.
American Water Works Co., Inc.

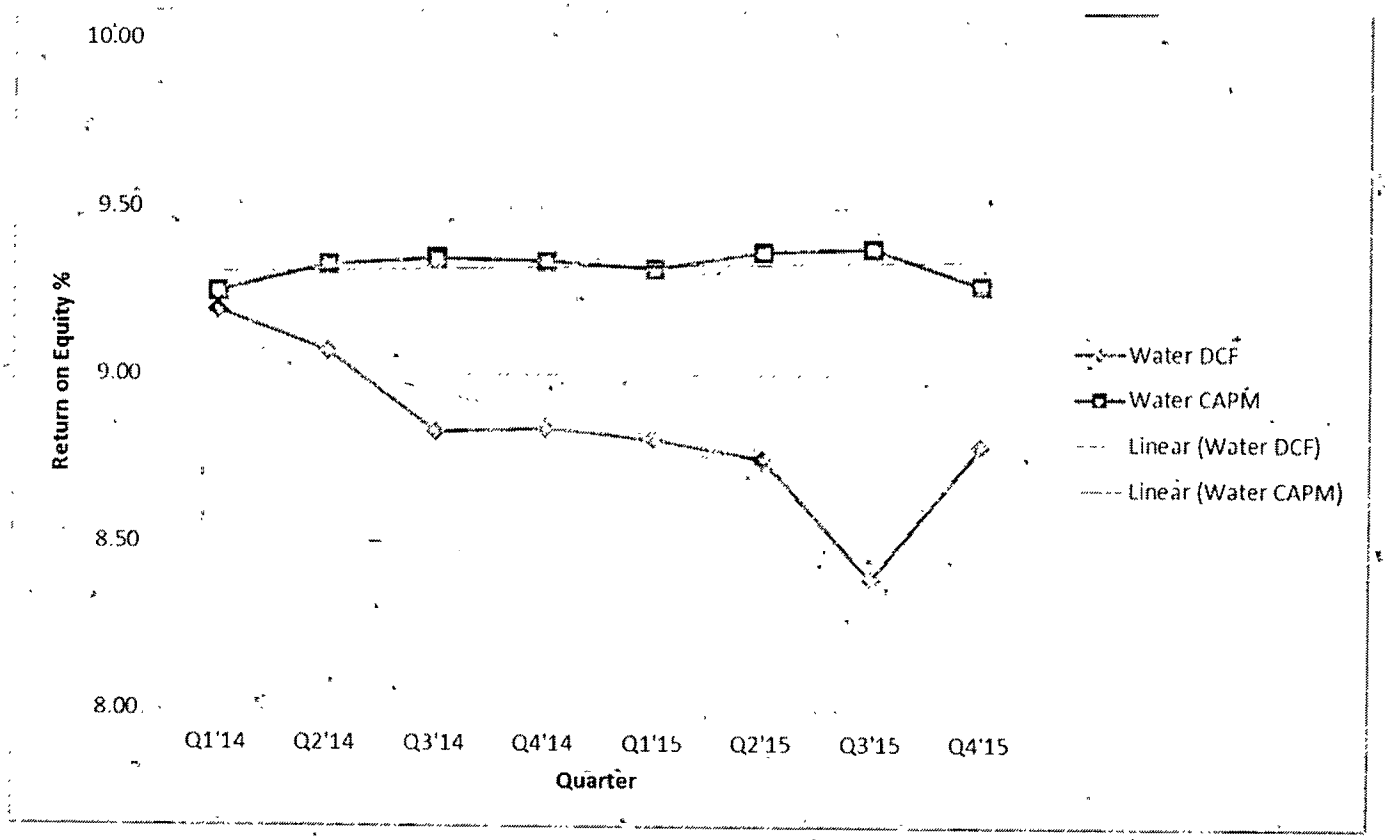
[1] As calculated by the Bureau of Technical Utility Services
[2] Standard Deviation of 14 DCF observations
[3] ROEs from base rate cases within last two years, fully litigated or stipulated for DSIC purposes
[4] Commission authorized Return on Equity (ROE) for DSIC purposes

Any questions concerning DSIC should be directed to Andrew Herster of the Bureau of Technical Utility Services at (717) 783-5392.

Historic Water Industry DCF and CAPM Average ROEs

	Water	
	DCF	CAPM
Q1'14	9.19	9.25
Q2'14	9.07	9.33
Q3'14	8.83	9.35
Q4'14	8.84	9.34
Q1'15	8.81	9.32
Q2'15	8.75	9.37
Q3'15	8.39	9.38
Q4'15	8.79	9.27

Linear Trend Line Chart of Historic Water Industry DCF and CAPM Average ROEs



Barometer water companies are used to calculate a current DCF in the first chart. The second chart demonstrates the companies 52 week average DCF. A final average of the two calculations is also shown at the bottom.

Water Company Barometer Group
Calculation of a Current Dividend Yield

	Closing Market Price (Po) 4/20/2016 ($)	Latest Indicated Dividend Do ($)	Ind Div. Plus 1/2 Div Growth Rate (D1) ($)	Current Dividend Yield(D1/Po) (%)	Growth (%)	DCF (%)
American States Water Company	42 03	0 90	0 93	2 22	4 55	6 77
Connecticut Water Service, Inc	46 34	1 07	1 09	2 36	4 83	7 19
Middlesex Water Company	36 86	0 80	0 81	2 20	3 71	5 91
California Water Service Group	27 94	0 69	0 71	2 55	8 05	10 60
SJW Corporation	37 83	0 81	0 83	2 21	7 23	9 44
Aqua America, Inc	32 24	0.71	0 74	2 30	7 48	9 78
American Water Works Co , Inc	72 20	1 36	1 43	1 98	8 92	10 90
Group Average D1/Po				2 26		
Group Average G				6 40		
DCF				**8.66**		

52-week High-Low Dividend Yield Calculation

	High ($)	Low ($)	Average (Pa) ($)	Latest Indicated Dividend (Do) ($)	Average Dividend Yield (Do/Pa) (%)	Growth (%)	DCF (%)
American States Water Company	47 24	35 80	41 52	0 90	2 17	4 55	6 72
Connecticut Water Service, Inc	47 05	33 15	40 10	1.07	2 67	4 83	7 50
Middlesex Water Company	36 89	21 24	29 07	0 80	2 75	3 71	6 46
California Water Service Group	28 14	19 55	23 85	0 69	2 89	8 05	10.94
SJW Corporation	37 86	27 60	32 73	0 81	2 47	7 23	9 70
Aqua America , Inc	32 44	24 40	28 42	0 71	2 50	7.48	9.98
American Water Works Co , Inc	72 40	48 36	60 38	1 36	2 25	8.92	11 17
Average							
Group Average Do / Pa					2 53		
Group Average G					6.40		
DCF					**8.93**		
			Average of Current and 52-Week		**8.79**		

Multiple sources of the Barometer companies projected 5 year Earnings Per Share are used to calculate the Group Average Dividend Growth Estimate.

Development of a Representative Dividend Growth Rate
for the Barometer Group of Water Companies

	5 Yr Forecast						
	Value Line	Value Line	Zacks	Yahoo	Reuters	Avgerage Earnings	Growth
	DPS	EPS	EPS	EPS	EPS	Growth	Estimate
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
American States Water Company	7 00	6 00	3 80	3 85	27 83	10 37	4 55
Connecticut Water Service, Inc	4 50	4 50	5 00	5 00	12 48	6 75	4 83
Middlesex Water Company	3 00	3 50		2 70	4 93	3 71	3 71
California Water Service Group	6 50	6 00	9 10	9 05	0 08	6 06	8 05
SJW Corporation	6 00	1 50		14 00	7 23	7 58	7 23
Aqua America, Inc	9 00	7 00	6 20	5 85	10 88	7 48	7.48
American Water Works Co , Inc.	10 50	8 00	7 40	7 60	12 67	8 92	8 92
Group Average	6 64	5 21	6 30	6 86	10 87	7 27	6 40
USE							**6.40**

Sources:
Reuters, April 21, 2016 (www reuters com/finance/stocks)
Value Line Investment Survey, April 21, 2016
Zacks, April 21, 2016 (www zacks com)
Yahoo!, April 21, 2016 (http://finance yahoo com/)

Regulatory Research Associates

WP-PRM-6R

REGULATORY FOCUS

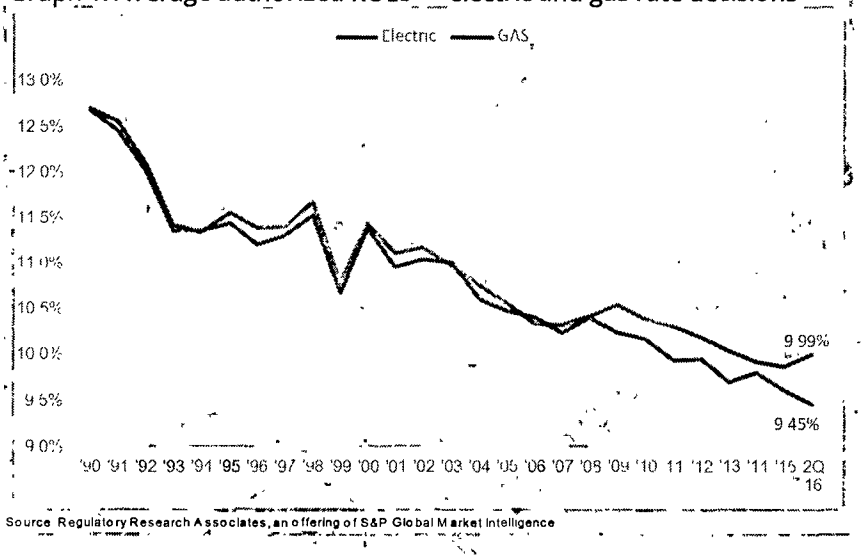
RRA is an offering of S&P Global Market Intelligence

July 15, 2016

MAJOR RATE CASE DECISIONS — JANUARY-JUNE 2016

The average ROE authorized electric utilities was 9.99% in the first half of 2016, compared to 9.85% in 2015. There were 16 electric ROE determinations in the first six months of 2016, versus 30 in all of 2015. This data includes several limited issue rider cases; excluding these cases from the data, the average authorized ROE was 9.52% in the first six months of 2016 versus 9.6% in 2015. RRA notes that this differential in electric authorized ROEs is largely driven by Virginia statutes that authorize the State Corporation Commission to approve ROE premiums of up to 200 basis points for certain generation projects (see the Virginia Commission Profile). The average ROE authorized gas utilities was 9.45% in the first half of 2016 versus 9.6% in all of 2015. There were 12 gas cases that included an ROE determination in the first six months of 2016, compared to 16 in 2015.

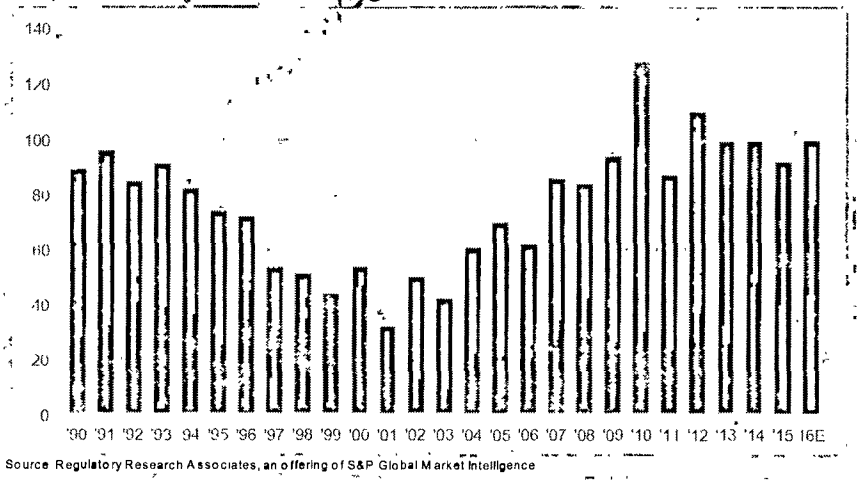
Graph 1: Average authorized ROEs — electric and gas rate decisions



Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

As shown in Graph 2 below, after reaching a low in the early-2000s, the number of rate case decisions for energy companies has generally increased over the last several years, peaking in 2010 at more than 125 cases.

Graph 2: Volume of electric and gas rate case decisions



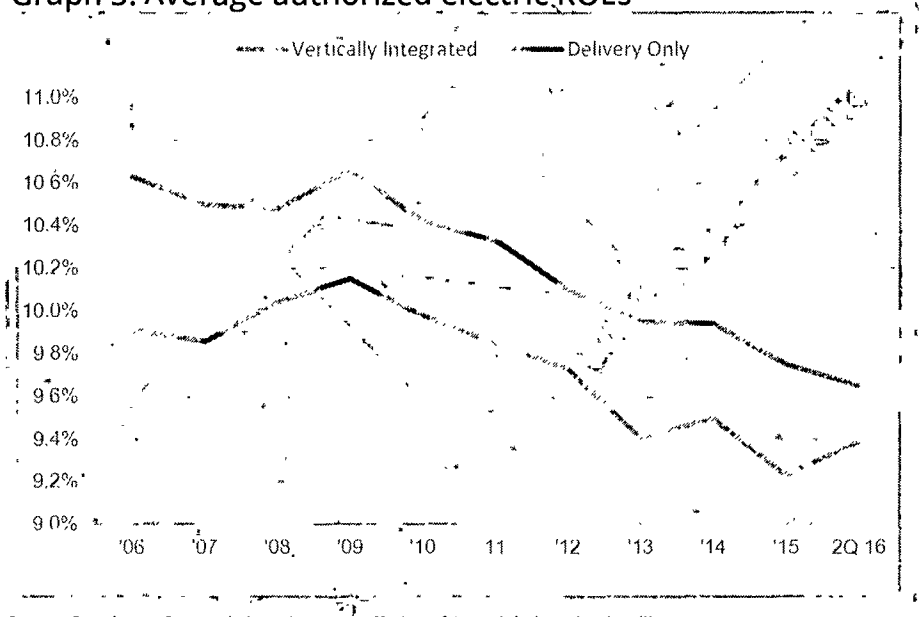
Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Since 2010, the number of rate cases has moderated somewhat but has approximated 90 or more in the

last five calendar years. There were 92 electric and gas rate cases resolved in 2015, 99 in both 2014 and 2013, 110 in 2012 and 87 in 2011, and this level of rate case activity remains robust compared to the late 1990s/early 2000s. Increased costs associated with environmental compliance, including possible CO_2 reduction mandates, generation and delivery infrastructure upgrades and expansion, renewable generation mandates and employee benefits argue for the continuation of an active rate case agenda over the next few years. In addition, if the Federal Reserve continues its policy initiated in December 2015 to gradually raise the federal funds rate, utilities eventually would face higher capital costs and would need to initiate rate cases to reflect the higher capital costs in rates. However, the magnitude and pace of any additional Federal Reserve action to raise the federal funds rate is quite uncertain.

Included in tables on pages 6 and 7 of this report are comparisons, since 2006, of average authorized ROEs by settled versus fully litigated cases, general rate cases versus limited issues rider proceedings and vertically integrated cases versus delivery only cases. For both electric and gas cases, no pattern exists in average annual authorized ROEs in cases that were settled versus those that were fully litigated. In some years, the average authorized ROE was higher for fully litigated cases and in others it was higher for settled cases. Regarding electric cases that involve limited issue riders, over the last several years the annual average authorized ROEs in these cases was typically at least 100 basis points higher than in general rate cases, driven by the ROE premiums authorized in Virginia. Limited issue rider cases in which an ROE is determined have had extremely limited use in the gas industry. Comparing electric vertically integrated cases versus delivery only proceedings, RRA finds that the annual average authorized ROEs in vertically integrated cases are from roughly 40 to 70 basis points higher than in delivery only cases, arguably reflecting the increased risk associated with generation assets.

Graph 3: Average authorized electric ROEs



Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

We note that this report utilizes the simple mean for the return averages. In addition, the average equity returns indicated in this report reflect the cases decided in the specified time periods and are not necessarily representative of the returns actually earned by utilities industry wide.

As a result of electric industry restructuring, certain states unbundled electric rates and implemented retail competition for generation. Commissions in those states now have jurisdiction only over the revenue requirement and return parameters for delivery operations, which we footnote in our chronology beginning on page 8, thus complicating historical data comparability. We note that since 2008, interest rates declined significantly, and average authorized ROEs have declined modestly. We also note the increased utilization of limited issue rider proceedings that allow utilities to recover certain costs outside of a general rate case and typically incorporate previously-determined return parameters.

The table on page 4 shows the average ROE authorized in major electric and gas rate decisions annually since 1990, and by quarter since 2012, followed by the number of observations in each period. The tables on page 5 indicate the composite electric and gas industry data for all major cases summarized annually since 2002 and by quarter for the past six quarters. The individual electric and gas cases decided in the first 6 months of 2016 are listed on pages 8-11, with the decision date shown first, followed by the company name, the abbreviation for the state issuing the decision, the authorized rate of return, or ROR, ROE, and percentage of common equity in the

adopted capital structure. Next we indicate the month and year in which the adopted test year ended, whether the commission utilized an average or a year-end rate base, and the amount of the permanent rate change authorized. The dollar amounts represent the permanent rate change ordered at the time decisions were rendered. Fuel adjustment clause rate changes are not reflected in this study.

Please Note: Historical data provided in this report may not match data provided on RRA's website due to certain differences in presentation, including the treatment of cases that were withdrawn or dismissed.

Dennis Sperduto

Average Equity Returns Authorized January 1990 - June 2016

		Electric Utilities		Gas Utilities	
Year	**Period**	**ROE %**	**(# Cases)**	**ROE %**	**(# Cases)**
1990	Full Year	12.70	(44)	12.67	(31)
1991	Full Year	12.55	(45)	12.46	(35)
1992	Full Year	12.09	(48)	12.01	(29)
1993	Full Year	11.41	(32)	11.35	(45)
1994	Full Year	11.34	(31)	11.35	(28)
1995	Full Year	11.55	(33)	11.43	(16)
1996	Full Year	11.39	(22)	11.19	(20)
1997	Full Year	11.40	(11)	11.29	(13)
1998	Full Year	11.66	(10)	11.51	(10)
1999	Full Year	10.77	(20)	10.66	(9)
2000	Full Year	11.43	(12)	11.39	(12)
2001	Full Year	11.09	(18)	10.95	(7)
2002	Full Year	11.16	(22)	11.03	(21)
2003	Full Year	10.97	(22)	10.99	(25)
2004	Full Year	10.75	(19)	10.59	(20)
2005	Full Year	10.54	(29)	10.46	(26)
2006	Full Year	10.32	(26)	10.40	(15)
2007	Full Year	10.30	(38)	10.22	(35)
2008	Full Year	10.41	(37)	10.39	(32)
2009	Full Year	10.52	(40)	10.22	(30)
2010	Full Year	10.37	(61)	10.15	(39)
2011	Full Year	10.29	(42)	9.92	(16)
	1st Quarter	10.84	(12)	9.63	(5)
	2nd Quarter	9.92	(13)	9.83	(8)
	3rd Quarter	9.78	(8)	9.75	(1)
	4th Quarter	10.10	(25)	10.07	(21)
2012	**Full Year**	**10.17**	**(58)**	**9.94**	**(35)**
	1st Quarter	10.28	(14)	9.57	(3)
	2nd Quarter	9.84	(7)	9.47	(6)
	3rd Quarter	10.06	(7)	9.60	(1)
	4th Quarter	9.91	(21)	9.83	(11)
2013	**Full Year**	**10.03**	**(49)**	**9.68**	**(21)**
	1st Quarter	10.23	(8)	9.54	(6)
	2nd Quarter	9.83	(5)	9.84	(8)
	3rd Quarter	9.87	(12)	9.45	(6)
	4th Quarter	9.78	(13)	10.28	(6)
2014	**Full Year**	**9.91**	**(38)**	**9.78**	**(26)**
	1st Quarter	10.37	(9)	9.47	(3)
	2nd Quarter	9.73	(7)	9.43	(3)
	3rd Quarter	9.40	(2)	9.75	(1)
	4th Quarter	9.62	(12)	9.68	(9)
2015	**Full Year**	**9.85**	**(30)**	**9.60**	**(16)**
	1st Quarter	10.29	(9)	9.48	(6)
	2nd Quarter	9.60	(7)	9.42	(6)
2016	Year to Date	9.99	(16)	9.45	(12)

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Electric Utilities--Summary Table

	Period	ROR %	(# Cases)	ROE %	(# Cases)	Cap. Struc.	(# Cases)	$ Mil.	(# Cases)
2002	Full Year	8.72	(20)	11.16	(22)	46.27	(19)	-475.4	(24)
2003	Full Year	8.86	(20)	10.97	(22)	49.41	(19)	313.8	(12)
2004	Full Year	8.44	(18)	10.75	(19)	46.84	(17)	1,091.5	(30)
2005	Full Year	8.30	(26)	10.54	(29)	46.73	(27)	1,373.7	(36)
2006	Full Year	8.32	(26)	10.32	(26)	48.54	(25)	1,318.1	(39)
2007	Full Year	8.18	(37)	10.30	(38)	47.88	(36)	1,405.7	(43)
2008	Full Year	8.21	(39)	10.41	(37)	47.94	(36)	2,823.2	(44)
2009	Full Year	8.24	(40)	10.52	(40)	48.57	(39)	4,191.7	(58)
2010	Full Year	8.01	(62)	10.37	(61)	48.63	(57)	4,921.9	(78)
2011	Full Year	8.00	(43)	10.29	(42)	48.26	(42)	2,595.1	(56)
2012	Full Year	7.95	(51)	10.17	(58)	50.69	(52)	3,080.7	(69)
2013	Full Year	7.66	(45)	10.03	(49)	49.25	(43)	3,328.6	(61)
2014	Full Year	7.60	(32)	9.91	(38)	50.28	(35)	2,053.7	(51)
	1st Quarter	7.74	(10)	10.37	(9)	51.91	(9)	203.6	(11)
	2nd Quarter	7.04	(9)	9.73	(7)	47.83	(6)	819.5	(17)
	3rd Quarter	7.85	(3)	9.40	(2)	51.08	(3)	379.6	(5)
	4th Quarter	7.22	(13)	9.62	(12)	48.24	(12)	488.7	(19)
2015	**Full Year**	**7.38**	**(35)**	**9.85**	**(30)**	**49.54**	**(30)**	**1,891.5**	**(52)**
	1st Quarter	7.03	(9)	10.29	(9)	46.06	(9)	311.2	(12)
	2nd Quarter	7.42	(7)	9.60	(7)	49.91	(7)	115.3	(9)
2016	**Year to Date**	**7.20**	**(16)**	**9.99**	**(16)**	**47.74**	**(16)**	**426.5**	**(21)**

Gas Utilities--Summary Table

	Period	ROR %	(# Cases)	ROE %	(# Cases)	Cap. Struc.	(# Cases)	$ Mil.	(# Cases)
2002	Full Year	8.80	(20)	11.03	(21)	48.29	(18)	303.6	(26)
2003	Full Year	8.75	(22)	10.99	(25)	49.93	(22)	260.1	(30)
2004	Full Year	8.34	(21)	10.59	(20)	45.90	(20)	303.5	(31)
2005	Full Year	8.25	(29)	10.46	(26)	48.66	(24)	458.4	(34)
2006	Full Year	8.44	(17)	10.40	(15)	47.24	(16)	392.5	(23)
2007	Full Year	8.11	(31)	10.22	(35)	48.47	(28)	645.3	(43)
2008	Full Year	8.49	(33)	10.39	(32)	50.35	(32)	700.0	(40)
2009	Full Year	8.15	(29)	10.22	(30)	48.49	(29)	438.6	(36)
2010	Full Year	7.99	(40)	10.15	(39)	48.70	(40)	776.5	(50)
2011	Full Year	8.09	(18)	9.92	(16)	52.49	(14)	367.0	(31)
2012	Full Year	7.98	(30)	9.94	(35)	51.13	(32)	264.0	(41)
2013	Full Year	7.39	(20)	9.68	(21)	50.60	(20)	494.9	(38)
2014	Full Year	7.65	(27)	9.78	(26)	51.11	(28)	529.2	(48)
	1st Quarter	6.41	(2)	9.47	(3)	50.41	(2)	168.9	(9)
	2nd Quarter	7.29	(3)	9.43	(3)	50.71	(3)	34.9	(8)
	3rd Quarter	7.35	(1)	9.75	(1)	42.01	(1)	-103.9	(8)
	4th Quarter	7.54	(10)	9.68	(9)	50.40	(10)	186.5	(15)
2015	**Full Year**	**7.34**	**(16)**	**9.60**	**(16)**	**49.93**	**(16)**	**494.1**	**(40)**
	1st Quarter	7.12	(6)	9.48	(6)	50.83	(6)	120.2	(11)
	2nd Quarter	7.38	(6)	9.42	(6)	50.01	(6)	274.8	(15)
2016	**Year to Date**	**7.25**	**(12)**	**9.45**	**(12)**	**50.42**	**(12)**	**395.0**	**(26)**

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Electric Average Authorized ROEs: 2006 — 2016 YTD

Settled versus Fully Litigated Cases

	All Cases		Settled Cases		Fully Litigated Cases	
Year	ROE %	(# Cases)	ROE %	(# Cases)	ROE %	(# Cases)
2006	10.32	(26)	10.26	(11)	10.37	(15)
2007	10.30	(38)	10.42	(14)	10.23	(24)
2008	10.41	(37)	10.43	(17)	10.39	(20)
2009	10.52	(40)	10.64	(16)	10.45	(24)
2010	10.37	(61)	10.39	(34)	10.35	(27)
2011	10.29	(42)	10.12	(16)	10.39	(26)
2012	10.17	(58)	10.06	(29)	10.28	(29)
2013	10.03	(49)	10.12	(32)	9.85	(17)
2014	9.91	(38)	9.73	(17)	10.05	(21)
2015	9.85	(30)	10.07	(14)	9.66	(16)
2016 YTD	9.99	(16)	9.55	(5)	10.19	(11)

General Rate Cases versus Limited Issue Riders

	All Cases		General Rate Cases		Limited Issue Riders	
Year	ROE %	(# Cases)	ROE %	(# Cases)	ROE %	(# Cases)
2006	10.32	(26)	10.34	(25)	9.80	(1)
2007	10.30	(38)	10.31	(37)	9.90	(1)
2008	10.41	(37)	10.37	(35)	11.11	(2)
2009	10.52	(40)	10.52	(38)	10.55	(2)
2010	10.37	(61)	10.29	(58)	11.87	(3)
2011	10.29	(42)	10.19	(40)	12.30	(2)
2012	10.17	(58)	10.01	(52)	11.57	(6)
2013	10.03	(49)	9.81	(42)	11.34	(7)
2014	9.91	(38)	9.75	(33)	10.96	(5)
2015	9.85	(30)	9.60	(24)	10.87	(6)
2016 YTD	9.99	(16)	9.52	(8)	10.46	(8)

Vertically Integrated Cases versus Delivery Only Cases

	All Cases		Vertically Integrated Cases		Delivery Only Cases	
Year	ROE %	(# Cases)	ROE %	(# Cases)	ROE %	(# Cases)
2006	10.32	(26)	10.63	(15)	9.91	(10)
2007	10.30	(38)	10.50	(26)	9.86	(11)
2008	10.41	(37)	10.48	(26)	10.04	(9)
2009	10.52	(40)	10.66	(28)	10.15	(10)
2010	10.37	(61)	10.42	(41)	9.98	(17)
2011	10.29	(42)	10.33	(28)	9.85	(12)
2012	10.17	(58)	10.10	(39)	9.73	(13)
2013	10.03	(49)	9.95	(31)	9.41	(11)
2014	9.91	(38)	9.94	(19)	9.50	(14)
2015	9.85	(30)	9.75	(17)	9.23	(7)
2016 YTD	9.99	(16)	9.65	(4)	9.39	(4)

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Gas Average Authorized ROEs: 2006 — 2016 YTD

Settled versus Fully Litigated Cases

	All Cases		Settled Cases		Fully Litigated Cases	
Year	ROE %	(# Cases)	ROE %	(# Cases)	ROE %	(# Cases)
2006	10.40	(15)	10.26	(7)	10.53	(8)
2007	10.22	(35)	10.24	(22)	10.20	(13)
2008	10.39	(32)	10.34	(20)	10.47	(12)
2009	10.22	(30)	10.43	(13)	10.05	(17)
2010	10.15	(39)	10.30	(12)	10.08	(27)
2011	9.92	(16)	10.08	(8)	9.76	(8)
2012	9.94	(35)	9.99	(14)	9.92	(21)
2013	9.68	(21)	9.80	(9)	9.59	(12)
2014	9.78	(26)	9.51	(11)	9.98	(15)
2015	9.60	(16)	9.60	(11)	9.58	(5)
2016 YTD	9.45	(12)	9.36	(7)	9.57	(5)

General Rate Cases versus Limited Issue Riders

	All Cases		General Rate Cases		Limited Issue Riders	
Year	ROE %	(# Cases)	ROE %	(# Cases)	ROE %	(# Cases)
2006	10.40	(15)	10.40	(15)	—	(0)
2007	10.22	(35)	10.22	(35)	—	(0)
2008	10.39	(32)	10.39	(32)	—	(0)
2009	10.22	(30)	10.22	(30)	—	(0)
2010	10.15	(39)	10.15	(39)	—	(0)
2011	9.92	(16)	9.91	(15)	10.00	(1)
2012	9.94	(35)	9.93	(34)	10.40	(1)
2013	9.68	(21)	9.68	(21)	—	(0)
2014	9.78	(26)	9.78	(26)	—	(0)
2015	9.60	(16)	9.60	(16)	—	(0)
2016 YTD	9.45	(12)	9.45	(12)	—	(0)

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Electric Utility Decisions

Date	Company	State	ROR %	ROE %	Common Equity as % of Capital Structure	Test Year	Rate Base	Amt. $ Mil.	Footnotes
1/5/16	MDU Resources Group	ND	7.95	10.50	50.27	12/16	—	15.1	(B,LIR,1)
1/6/16	Avista Corporation	WA	7.29	9.50	48.50	9/14	—	-8.1	(B)
1/28/16	Northern India-- Public Service Company	IN	—	—	—	—	—	0.0	(LIR,2)
2/2/16	Kentucky Utilities Company	VA	—	—	—	12/14	—	5.5	(B)
2/23/16	Entergy Arkansas	AR	4.52	9.75	28.46	3/15	—	219.7	(B,*)
2/29/16	Virginia Electric and Power Company	VA	7.90	11.60	49.99	3/17	Average	21.0	(LIR,3)
2/29/16	Virginia Electric and Power Company	VA	7.40	10.60	49.99	3/17	Average	-9.3	(LIR,4)
2/29/16	Virginia Electric and Power Company	VA	7.40	10.60	49.99	3/17	Average	6.6	(LIR,5)
2/29/16	Virginia Electric and Power Company	VA	7.40	10.60	49.99	3/17	Average	-16.8	(LIR,6)
3/16/16	Indianapolis Power & Light Company	IN	6.51	9.85	37.33	6/14	Year-end	29.6	(*)
3/25/16	MDU Resources Group	MT	—	—	—	12/14	—	7.4	(B,Z)
3/29/16	Virginia Electric and Power Company	VA	6.90	9.60	49.99	3/17	Average	40.4	(LIR,7)
2016	**1ST QUARTER: AVERAGES/TOTAL**		**7.03**	**10.29**	**46.06**			**311.2**	
	OBSERVATIONS		**9**	**9**	**9**			**12**	
4/29/16	Fitchburg Gas and Electric Light Company	MA	8.46	9.80	52.17	12/14	Year-end	2.1	(D)
6/3/16	Baltimore Gas and Electric Company	MD	7.28	9.75	51.90	11/15	Average	41.7	(D)
6/8/16	El Paso Electric Company	NM	7.67	9.48	49.29	12/14	Year-end	1.1	
6/15/16	New York State Electric & Gas Corporation	NY	6.68	9.00	48.00	4/17	Average	29.6	(B,D,Z,8)
6/15/16	Rochester Gas and Electric Corporation	NY	7.55	9.00	48.00	4/17	Average	3.0	(B,D,Z,8)
6/23/16	San Diego Gas & Electric Co.	CA	—	—	—	12/16	Average	3.0	(B,Z,9)
6/30/16	Appalachian Power Company	WV	—	—	—	—	—	55.1	(B,LIR,10)
6/30/16	Virginia Electric and Power Company	VA	7.40	10.60	49.99	8/17	Average	-25.7	(LIR,11)
6/30/16	Virginia Electric and Power Company	VA	6.90	9.60	49.99	8/17	Average	5.4	(LIR,12)
2016	**2ND QUARTER: AVERAGES/TOTAL**		**7.42**	**9.60**	**49.91**			**115.3**	
	OBSERVATIONS		**7**	**7**	**7**			**9**	
2016	**YEAR-TO-DATE: AVERAGES/TOTAL**		**7.20**	**9.99**	**47.74**			**426.5**	
	OBSERVATIONS		**16**	**16**	**16**			**21**	

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

Gas Utility Decisions

Date	Company	State	ROR %	ROE %	Common Equity as % of Capital Structure	Test Year	Rate Base	Amt. $ Mil.	Footnotes
1/6/16	Oklahoma Natural Gas Company	OK	7.31	9.50	60.50	3/15	Year-end	30.0	(B)
1/6/16	Avista Corporation	WA	7.29	9.50	48.50	09/14	—	10.8	(B)
1/28/16	SourceGas Arkansas	AR	5.33	9.40	39.46	3/15	Year-end	8.0	(B,*)
2/10/16	Liberty Utilities (New England Natural Gas)	MA	7.99	9.60	50.00	12/14	Year-end	7.8	(B)
2/16/16	Public Service Company of Colorado	CO	7.33	9.50	56.51	12/14	Average	39.2	(I,Z,R)
2/25/16	Black Hills Kansas Gas Utility Company	KS	—	—	—	10/15	Year-end	0.8	(LIR,13)
2/29/16	Avista Corporation	OR	7.46	9.40	50.00	12/16	Average	4.5	
3/17/16	Atmos Energy Corporation	KS	—	—	—	3/15	—	2.2	(B)
3/30/16	Indiana Gas Company, Inc.	IN	—	—	—	6/15	Year-end	7.0	(LIR,14)
3/30/16	Northern Indiana Public Service Company	IN	—	—	—	6/15	Year-end	7.6	(LIR,15)
3/30/16	Southern Indiana Gas and Electric Company	IN	—	—	—	6/15	Year-end	2.3	(LIR,14)
2016	1ST QUARTER: AVERAGES/TOTAL		**7.12**	**9.48**	**50.83**			**120.2**	
	OBSERVATIONS		**6**	**6**	**6**			**11**	
4/21/16	Consumers Energy Company	MI	—	—	—	12/16	—	40.0	(I,B)
4/29/16	Fitchburg Gas and Electric Light Company	MA	8.46	9.80	52.17	12/14	Year-end	1.6	
5/5/16	CenterPoint Energy Resources Corp.	MN	7.07	9.49	50.00	9/16	Average	27.5	(I)
5/11/16	Liberty Utilities (Midstates Natural Gas) Corp	MO	—	—	—	1/16	—	0.2	(LIR,16)
5/19/16	Laclede Gas Company	MO	—	—	—	2/16	Year-end	5.4	(LIR,17)
5/19/16	Missouri Gas Energy	MO	—	—	—	2/16	Year-end	3.6	(LIR,17)
6/1/16	Maine Natural Gas	ME	7.28	9.55	50.00	9/14	Average	2.5	(B,Z)
6/3/16	Baltimore Gas and Electric Company	MD	7.23	9.65	51.90	11/15	Average	47.8	
6/15/16	New York State Electric & Gas Corporation	NY	6.68	9.00	48.00	4/17	Average	13.1	(B,Z,7)
6/15/16	Rochester Gas and Electric Corporation	NY	7.55	9.00	48.00	4/17	Average	8.8	(B,Z,7)
6/22/16	Northern Indiana Public Service Company	IN	—	—	—	12/15	Year-end	6.7	(LIR,E,18)
6/23/16	San Diego Gas & Electric Co.	CA	—	—	—	12/16	Average	-1.6	(B,Z,19)
6/23/16	Southern California Gas Company	CA	—	—	—	12/16	Average	106.9	(B,Z,9)
6/29/16	Indiana Gas Company, Inc.	IN	—	—	—	12/15	Year-end	10.2	(LIR,20)
6/29/16	Southern Indiana Gas and Electric Company	IN	—	—	—	12/15	Year-end	2.1	(LIR,20)
2016	**2ND QUARTER: AVERAGES/TOTAL**		**7.38**	**9.42**	**50.01**			**274.8**	
	OBSERVATIONS		**6**	**6**	**6**			**15**	
2016	**YEAR TO DATE: AVERAGES/TOTAL**		**7.25**	**9.45**	**50.42**			**395.0**	
	OBSERVATIONS		**12**	**12**	**12**			**26**	

Source: Regulatory Research Associates, an offering of S&P Global Market Intelligence

FOOTNOTES

A- Average
B- Order followed stipulation or settlement by the parties. Decision particulars not necessarily precedent-setting or specifically adopted by the regulatory body.
CWIP- Construction work in progress
D- Applies to electric delivery only
DCt Date certain rate base valuation
E- Estimated
F- Return on fair value rate base
Hy- Hypothetical capital structure utilized
I- Interim rates implemented prior to the issuance of final order, normally under bond and subject to refund.
LIR Limited-issue rider proceeding
M- "Make-whole" rate change based on return on equity or overall return authorized in previous case.
R- Revised
Te- Temporary rates implemented prior to the issuance of final order.
U- Double leverage capital structure utilized.
W- Case withdrawn
YE- Year-end
Z- Rate change implemented in multiple steps.
* Capital structure includes cost-free items or tax credit balances at the overall rate of return.

(1) Rate increase approved in renewable resource cost recovery rider.
(2) Case represents the company's transmission, distribution, and storage system improvement charge, or TDSIC rate adjutment mechanism. The case was dismissed by the Commission, with no rate change authorized.
(3) Proceeding determines the revenue requirement for Rider B, which is the mechanism through which the company recovers costs associated with its plan to convert the Altavista, Hopewell, and Southampton Power Stations to burn biomass fuels.
(4) Represents rate decrease associated with the company's Rider R proceeding, which is the mechanism through which the company recovers the investment in the Bear Garden generating facility.
(5) This proceeding determines the revenue requirement for Rider S, which recognizes in rates the company's investment in the Virginia City Hybrid Energy Center.
(6) Decrease authorized through a surcharge, Rider W, which reflects in rates investment in the Warren County Power Station.
(7) Proceeding involves a new gas-fired generation facility, the Greensville County project, and creation of a new rider mechanism, Rider GV, to reflect the related revenue requirement in rates.
(8) Rate increase effective 5/1/16; additional increases to be effective 5/1/17 and 5/1/18.
(9) Settlement adopted with modifications. Rate increase effective retroactive to 1/1/16; additional increases to be effective 1/1/17 and 1/1/18.
(10) Represents the company's joint expanded net energy cost, or ENEC, proceeding.
(11) Represents rate decrease associated with the company's Rider BW proceeding, which is the mechanism through which the company recovers the investment in its Brunswick County Power Station.
(12) Represents the rate increase associated with the company's Rider US-2, which is the mechanism through which the company recovers the revenue requirement associated with three new solar generation facilities.
(13) Case involves the company's gas system reliabillity surcharge, or GSRS, rider and reflects investments made from July 1, 2014 through Oct. 31, 2015.
(14) Case involves company's "compliance and system improvement adjustment" mechanism, and includes compliance-related investments made between Jan. 1 and June 30, 2015, and certain other investments made between July 1, 2014 and June 30, 2015.
(15) Case establishes the rates to be charged to customers under the company's transmission, distribution and storage system improvement charge rate adjustment mechanism, and reflects investments made between July 1, 2014 and June 30, 2015.
(16) Case involves the company's infrastructure system replacement surcharge, or ISRS, rider and reflects incremental investments made from 6/1/15 through 1/31/16.
(17) Case involves the company's infrastructure system replacement surcharge, or ISRS, rider and reflects incremental investments made from 9/1/15 through 2/29/16.
(18) Case establishes the rates to be charged to customers under the company's transmission, distribution and storage system improvement charge rate adjustment mechanism, and reflects investments made between 7/1/15 and 12/31/15.

(19) Settlement adopted with modifications. Rate decrease effective retroactive to 1/1/16; rate increases to be effective 1/1/17 and 1/1/18.

(20) Case involves company's "compliance and system improvement adjustment" mechanism, and includes compliance-related investments made between 7/1/15 and 12/31/15.

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stable.[17] Furthermore, because an average of the realized equity risk premia is quite volatile when calculated using a short series, using a long series makes it less likely that the analyst can justify any number he or she wants.

Some analysts calculate the expected equity risk premium over a shorter, more recent time period on the basis that more recent events are more likely to be repeated in the near future; furthermore, the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain unusual events. Some of the most "unusual" events of this century took place quite recently. These events include the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high yield bond market, the major contraction and consolidation of the thrift industry, and the collapse of the Soviet Union—all of which happened in the past 10 years. Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. More generally, the 70-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time and their return expectations reflect this.

Calculating the Expected Equity Risk Premium

Arithmetic Versus Geometric Differences

For use as the expected equity risk premium in the CAPM, the *arithmetic* or *simple difference* of the *arithmetic means* of stock market returns and riskless rates is the relevant number. This is because the CAPM is an additive model

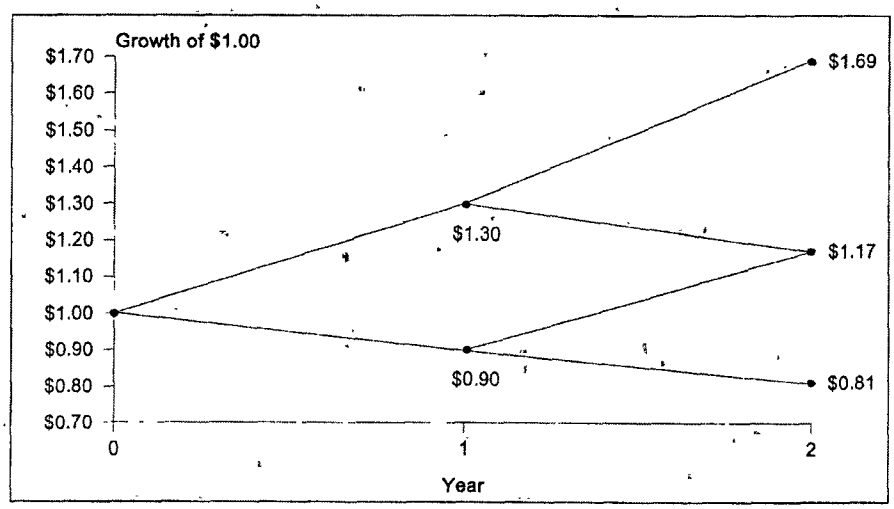
17 This assertation is further corroborated by data presented in *Global Investing: The Professional's Guide to the World Capital Markets* (by Roger G. Ibbotson and Gary P. Brinson and distributed by Ibbotson Associates, Chicago). Ibbotson and Brinson constructed a stock market total return series back to 1790. Even with some uncertainty about the accuracy of the data before the mid-19th century, the results are remarkable in that the real (adjusted for inflation) returns that investors received during the three 50-year periods and one 51-year period between 1790 and 1990 did not differ greatly (that is, in a statistically significant amount) from one another, nor did they differ greatly from the overall 201-year average. This finding implies that because real stock market returns have been reasonably consistent over time, investors can use these past returns as reasonable bases for forming their expectations of future returns.

where the cost of capital is the sum of its parts. Therefore, the CAPM expected equity risk premium must be derived by arithmetic, *not geometric*, subtraction.

Arithmetic Versus Geometric Means

The expected equity risk premium should always be calculated using the arithmetic mean. The arithmetic mean is the rate of return which, when compounded over multiple periods, gives the mean of the probability distribution of ending wealth values. (A simple example given below shows that this is true.) This makes the arithmetic mean return appropriate for computing the cost of capital. The discount rate that equates expected (mean) future values with the present value of an investment is that investment's cost of capital. The logic of using the discount rate as the cost of capital is reinforced by noting that investors will discount their expected (mean) ending wealth values from an investment back to the present using the arithmetic mean, for the reason given above. They will, therefore, require such an expected (mean) return prospectively (that is, in the present looking toward the future) to commit their capital to the investment.

For example, assume a stock has an expected return of +10 percent in each year and a standard deviation of 20 percent. Assume further that only two outcomes are possible each year— + 30 percent and -10 percent (that is, the mean plus or minus one standard deviation), and that these outcomes are equally likely. (The arithmetic mean of these returns is 10 percent, and the geometric mean is 8.2 percent.) Then the growth of wealth over a two-year period occurs as shown below:



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Short communication

Utility stocks and the size effect—revisited

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Abstract

Wong concluded there is weak empirical support that firm size is a missing factor from the capital asset pricing model for industrial stocks but not for utility stocks. Her weak results, however, do not rule out the possibility of a small firm effect for utilities. The issue she addressed has important financial implications in regulated proceedings that set rates of return for utilities. New studies based on different size water utilities are presented that do support a small firm effect in the utility industry.

Keywords: Utility stocks; Beta risk; Firm size

Annie Wong concludes there is some weak evidence that firm size is a missing factor from the capital asset pricing model ("CAPM") for industrial stocks but not for utility stocks (Wong, 1993, p. 98). This "firm size effect" is an observation that small firms tend to earn higher returns than larger firms after controlling for differences in estimates of beta risk in the CAPM. Wong notes that if the size effect exists, it has important implications and should be considered by regulators when they determine fair rates of return for public utilities. This paper re-examines the basis for her conclusions and presents new information that indicates there is a small firm effect in the utility sector.

1. Reconsideration of the evidence provided by Wong

Wong relies on Barry and Brown (1984) and Brauer (1986) to suggest the small firm effect may be explained by differences in information available to investors of small and large firms.

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She states that requirements to file reports and information generated during regulatory proceedings indicate the same amount of information is available for large and small utilities and thus, if the differential information hypothesis explains the small firm effect, then the uniformity of information available among utility firms would suggest the size effect should not be observed in the utility industry. But contrary to the facts she assumes, there are differences in information available for large and small utilities. More parties participate in proceedings for large utilities and thus generate more information. Also, in some jurisdictions smaller utilities are not required to file all of the information that is required of larger firms. Thus, if the small firm effect is explained by differential information, contrary to Wong's hypothesis, differences in available information suggests there is a small firm effect in the utility industry. Wong did not discuss other potential explanations of the small firm effect for utilities.[2]

Wong's empirical results are not strong enough to conclude that beta risks of utilities are unrelated to size. In the period 1963–1967, when monthly data were used to estimate betas, her estimates of utility betas as well as industrial betas increased as the size of the firms decreased, but she did not find the same inverse relationship between size and beta risk for utilities in other periods. Being unable to demonstrate a relationship between size and beta in other periods may be the result of Wong using monthly, weekly and daily data to make those beta estimates. Roll (1980) concluded trading infrequency seems to be a powerful cause of bias in beta risk estimates when time intervals of a month or less are used to estimate betas for small stocks. When a small stock is thinly traded, its stock price does not reflect the movement of the market, which drives down the apparent covariance with the market and creates an artificially low beta estimate.

Ibbotson Associates (2002) found that when annual data are used to estimate betas, beta estimates for the smaller firms increase more than beta estimates for larger firms. Table 1 compares Value Line (2000) beta estimates for three relatively small water utilities that are made with weekly data and an adjusted beta estimated with pooled annual data for the utilities for the 5-year period ending in December 2000. In making the latter estimate, it is assumed that the underlying beta for each of water utilities is the same. The *t*-statistics for the unadjusted beta

Table 1
Beta estimates reported by Value Line and estimated with pooled annual returns for relatively small water utilities

	Value Line[a]	Estimated with annual data[b]
Connecticut Water Service	0.45	
Middlesex Water	0.45	
SJW Corporation	0.50	
Average	0.47	0.78
t-statistic		2.72[c,d]

[a] As reported in Value Line (2000). Betas estimated with 5 years of weekly data.

[b] Estimated with pooled annual return premiums for the 5-year period ending December 2000. Proxy market returns are total returns for the S&P 500 index. Dummy variable in 1999 to reflect the proposed acquisition of SJW Corporation included in analysis.

[c] Significant at the 95% level.

[d] The *t*-statistic for the null hypothesis that the true beta is 0.18 (the derived unadjusted Value Line beta) when the estimated betas is 0.65 (the unadjusted estimated beta) is 1.97. It is significant at the 95% level.

estimate is reported in parentheses. As was found by Ibbotson Associates (2002) for stocks in general, when annual data are used to estimate betas for small utility stocks, the beta estimate increases.

Wong used the Fama and MacBeth (1973) approach to estimate how well firm size and beta explain future returns in four periods. She reports weak empirical results for both the industrial and utility sectors. In every one of the statistical results reported for utilities, the coefficient for the size effect has a negative sign as would be expected if there is a size effect in the utility industry but only one of the results was found to be statistically significant at the 5% level. With the industrial sector, though she found two cases to have a significant size effect, a negative sign for the size coefficient occurred only 75% of the time. What is puzzling is that with these weak results, Wong concludes the analysis provides support for the small firm effect for the industrial industry but no support for a small firm effect for the utility industry.

2. New evidence on risk premiums required by small utilities

Two other studies support a conclusion that small utilities are more risky than larger ones. A study made by Staff of the Water Utilities Branch of the California Public Utilities Commission Advisory and Compliance Division (CPUC Staff, 1991) used proxies for beta risk and determined small water utilities were more risky than larger water utilities. Part of the difficulty with examining the question of relative risk of utilities is that the very small utilities are not publicly-traded. This CPUC Staff study addressed that concern by computing proxies for beta risk estimated with accounting data for the period 1981–1991 for 58 water utilities. Based on that analysis, CPUC Staff concluded that smaller water utilities were more risky and required higher equity returns than larger water utilities. Following 8 days of hearings and testimony by 21 witnesses regarding this study, it was adopted by the California Public Utilities Commission in CPUC Decision 92-03-093, dated March 31, 1992.

Table 2 provides the results of another study of differences in required returns estimated from discounted cash flow ("DCF") model estimates of the costs of equity for water utilities of different sizes. The study compares average estimates of equity costs for two smaller water utilities, Dominguez Water Company and SJW Corporation, with equity cost estimates for two larger companies, California Water Service and American States Water, for the period 1987–1997. All four utilities operated primarily in the same regulatory jurisdiction during that period. Estimates of future growth are required to make DCF estimates. Gordon, Gordon, and Gould (1989) found that a consensus of analysts' forecasts of earnings per share for the next 5 years provides a more accurate estimate of growth required in the DCF model than three different historical measures of growth. Unfortunately, such analysts' forecasts are not generally available for small utilities and thus this study assumes, as was assumed by staff at the regulatory commission, that investors relied upon past measures of growth to forecast the future. The results in Table 2 show that the smaller water utilities had a cost of equity that, on average, was 99 basis points higher than the average cost of equity for the larger water utilities. This result is statistically significant at the 90% level. In terms of the issues being addressed by Wong, the 99 basis points could be the result of differences in beta risk, the small firm effect or some combination of the two.

Table 2
Small firm equity cost differential: case study based on a comparison of DCF equity cost estimates for larger and smaller California water utilities (1987–1997)

	Larger water utilities[a]			Smaller water utilities[b]			Smaller utilities minus larger utilities
	D_0/P_0 (%)	Estimated growth (%)[c]	Equity cost estimate (%)[d]	D_0/P_0 (%)	Estimated growth (%)[c]	Equity cost estimate (%)[d]	
1987	6.60	7.17	14.24	5.38	10.06	15.98	1.74
1988	6.75	6.30	13.48	5.81	9.08	15.42	1.94
1989	7.10	6.30	13.84	6.47	7.00	13.93	0.09
1990	7.24	6.19	13.87	6.96	7.51	14.99	1.11
1991	6.94	6.29	13.67	6.64	6.24	13.30	−0.36
1992	6.18	5.96	12.50	6.50	6.71	13.65	1.14
1993	5.32	5.68	11.30	5.49	6.31	12.15	0.85
1994	6.03	4.40	10.70	5.80	4.86	10.94	0.25
1995	6.44	3.86	10.55	6.44	4.88	11.64	1.09
1996	5.60	4.06	9.88	5.77	5.58	11.67	1.79
1997	4.93	3.31	8.40	4.52	4.89	9.64	1.23
Averarage difference							0.99
t-statistic							1.405[e]

Limited to period for which Dominguez Water Company data were available. 1998 excluded due to pending buyout.

[a] American States Water and California Water Service.

[b] Dominguez Water Company and SJW Corporation.

[c] Average of 5- and 10-year dividends per share growth, 10-year earnings per share growth and estimates of sustainable growth from internal and external sources for the most recent 10-year period when data are available (1991–1997), otherwise most recent 5-year period (1987–1990).

[d] DCF equity cost as computed by California PUC staff: $k = (D_0/P_0) \times (1 + \hat{g}) + g$.

[e] Significant at the 90% level.

3. Concluding remarks

Wong's concluding remarks should be re-examined and placed in perspective. She noted that industrial betas tend to decrease with increases in firm size but the same relationship is not found in every period for utilities. Had longer time intervals been used to estimated betas, as was done in Table 1, she may have found the same inverse relationship between size and beta risk for utilities in other periods. She also concludes "there is some weak evidence that firm size is a missing factor from the CAPM for the industrial but not the utility stocks" (Wong, 1993, p. 98), but the weak evidence provides little support for a small firm effect existing or not existing in either the industrial or utility sector. Two other studies discussed here support a conclusion that smaller water utility stocks are more risky than larger ones. To the extent that water utilities are representative of all utilities, there is support for smaller utilities being more risky than larger ones.

Notes

1. Vice President.
2. The small firm effect could also be a proxy for numerous other omitted risk differences between large and small utilities. An obvious candidate is differentials in access to financial markets created by size. Some very small utilities are unable to borrow money without backing of the owner. Other small utilities are limited to private placements of debt and have no access to the more liquid financial markets available to larger utilities.

References

Barry, C. B., & Brown, S. J. (1984). Differential information and the small firm effect. *Journal of Financial Economics*, 283–294.

Brauer, G. A. (1986, December). Using jump-diffusion return models to measure differential information by firm size. *Journal of Financial and Quantitative Analysis*, 447–458.

Fama, E. F., & MacBeth, J. D. (1973, May/June). Risk return and equilibrium: Empirical tests. *Journal of Political Economy*, 607–636.

Gordon, D. A., Gordon, M. J., & Gould, L. I. (1989, Spring). Choice among methods of estimating share yield. *Journal of Portfolio Management*, 50–55.

Ibbotson Associates. (2002). *Stocks, bonds, bills and inflation valuation edition 2002 yearbook*. Chicago, IL.

Roll, R. (1980, October). *A possible explanation of the small firm effect*. Unpublished manuscript, University of California, Los Angeles.

Staff of the Water Utilities Branch of the California Public Utilities Commission Advisory and Compliance Division. (1991, June 10). *Staff report on issues related to small water utilities phase one*. Commission Advisory and Compliance Division Water Utilities Branch California Public Utilities Commission, Proceeding No. I-909-11-033.

Value Line. (2000, December 29). *The Value Line investment survey—expanded edition*. Summary & Index.

Wong, A. (1993). Utility stocks and the size effect: An empirical analysis. *Journal of the Midwest Finance Association*, 95–101.