

BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of
Long Island Water Corporation
Cases 11-W-0020
September 2011

Prepared Exhibits of:

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Office of Accounting, Finance and
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State of New York
Department of Public Service
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Summary of Exhibits

Case 11-W-0020

Exhibit_KXD-#	No. of Pages	Description
1	60	Staff Interrogatories
2	1	Summary of Staff's Rate of Return
3	4	Public Utilities Fortnightly report on Ring Fencing
4	10	Standard and Poor's Report On Oncor Electric's Goodwill Adjustment
5	3	2010 Common Equity Ratio of Electric utilities and Goodwill Adjusted Common Equity Ratio of Staff Proxy Group
6	49	Standard and Poor's and Moody's Credit Metric Guidelines
7	2	Credit Metrics of LIAW
8	1	Mergent Bond Record, August 2011 Edition
9	1	Rate Year Cost of Debt
10	1	Summary of Staff's Cost of Equity
11	3	Universe used for Staff Proxy Group Selection
12	3	Similarity Analysis
13	1	Staff Proxy Group
14	1	Three Month Prices for the Proxy Companies
15	2	Discounted Cash Flow calculation for Staff Proxy Group
16	1	Capital Asset Pricing Model results
17	5	McKinsey & Company's Recent report on the Inaccuracy of Analysts' Earnings Growth Rate Forecast
18	8	Cited portions of Ms. Ahern's former testimonies in Cases 09-W-0824 and 09- W-0828
19	3	Comparative Risk Analysis of Ms. Ahern's Proxy Groups in Case 09-W-0824
20	4	Fortune Magazine article entitled "9% Forever."
21	8	Annie Wong's Article on Size premium
22	17	Richard Roll's Article on size premium
23	46	Ching-Chih Lu's Article on size premium
24	7	Standard and Poor's report on the effect of size on regulated water companies
25	2	Hypothesis Testing of Size Premium in the Water Sector

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-1 KXD-1
Requested By: Kwaku Duah
Date of Request: May 13, 2011
Response Due: May 23, 2011
Witness: Mrs. Pauline M. Ahern
Subject: Size Premium

- a) Provide any empirical evidence/research work demonstrating that[a] firm size premium is applicable to utility companies
- b) Provide data showing how many regulatory bodies provide size premium for regulated water companies
- c) For the past decade, provide a listing of the Commission's rate case decisions that have accepted the use of a size premium/size adjustment in determining the allowed cost of equity for utilities regulated by the Commission

Response:

a) Please see IR-1 KXD-1 Attachment A and IR-1 KXD-1 Attachment B. The companies in the proxy group of eight water companies trade on either the NYSE or the NDQ as shown below:

- American States Water Co. (NYSE)
- American Water Works Co., Inc. (NYSE)
- Aqua America, Inc. (NYSE)
- California Water Service Group (NYSE)
- Connecticut Water Service, Inc. (NDQ)
- Middlesex Water Company (NDQ)
- SJW Corporation (NYSE)
- York Water Company (NDQ)

Therefore, because Ibbotson Associates size premium study is based upon the "decile portfolios of New York Stock Exchange ("NYSE"), American Stock Exchange ("AMEX") and NASDAQ listed companies," as stated in my Prepared Direct

Testimony at page 70, li. 3-4, a firm size premium is applicable to utility companies.

- b) An exhaustive study has not been conducted as to whether a size premium has been provided by every regulatory body in the United States. However, size premiums have been allowed in California (see Attachment IR-1 KXD-1 - A), Nevada, Delaware, Pennsylvania, Florida, Minnesota, and Kentucky.
- c) I am not personally aware of any decision of the Commission that accepted the use of a size premium / size adjustment in determining the allowed cost of equity for utilities. That is not to say it has never been done.



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The QUARTERLY REVIEW
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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.

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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
<i>t</i> -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
Average difference							0.99
<i>t</i> -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: $k = (D_0/P_0) \times (1 + g) + g$.

^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 estimate 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

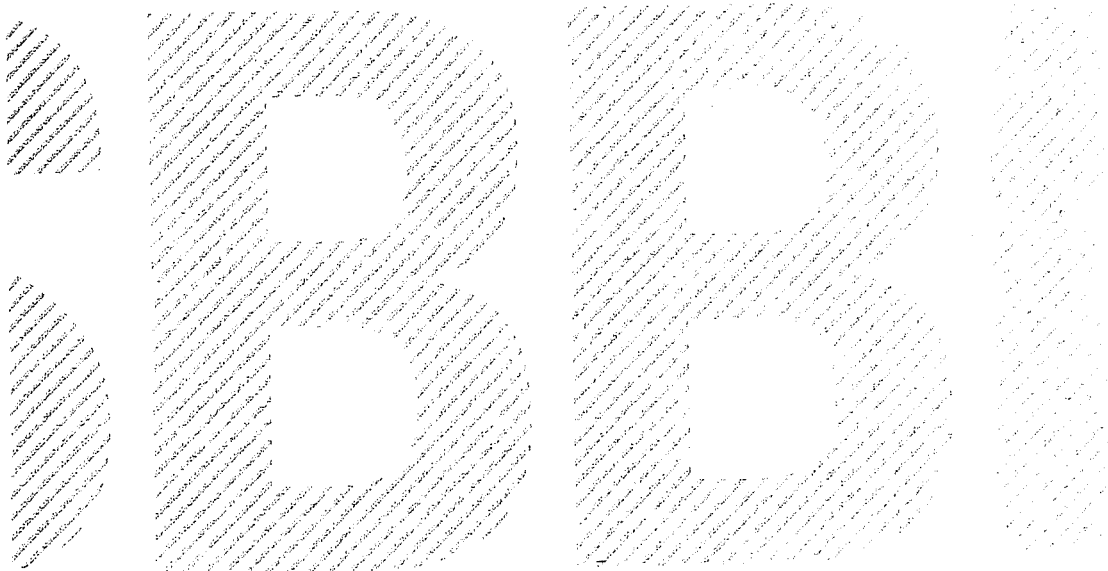
1. Vice President.
2. The small firm effect could also be a proxy for numerous other omitted risk differences between large and small utilities. An obvious candidate is differentials in access to financial markets created by size. Some very small utilities are unable to borrow money without backing of 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.

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Chapter 7

Firm Size and Return

The Firm Size Phenomenon

One of the most remarkable discoveries of modern finance is that of a relationship between firm size and return. The relationship cuts across the entire size spectrum but is most evident among smaller companies, which have higher returns on average than larger ones. Many studies have looked at the effect of firm size on return.¹ In this chapter, the returns across the entire range of firm size are examined.

Construction of the Decile Portfolios

The portfolios used in this chapter are those created by the Center for Research in Security Prices (CRSP) at the University of Chicago's Graduate School of Business. CRSP has refined the methodology of creating size-based portfolios and has applied this methodology to the entire universe of NYSE/AMEX/NASDAQ-listed securities going back to 1926.

The New York Stock Exchange universe excludes closed-end mutual funds, preferred stocks, real estate investment trusts, foreign stocks, American Depository Receipts, unit investment trusts, and Americus Trusts. All companies on the NYSE are ranked by the combined market capitalization of their eligible equity securities. The companies are then split into 10 equally populated groups, or deciles. Eligible companies traded on the American Stock Exchange (AMEX) and the Nasdaq National Market (NASDAQ) are then assigned to the appropriate deciles according to their capitalization in relation to the NYSE breakpoints. The portfolios are rebalanced, using closing prices for the last trading day of March, June, September, and December. Securities added during the quarter are assigned to the appropriate portfolio when two consecutive month-end prices are available. If the final NYSE price of a security that becomes delisted is a month-end price, then that month's return is included in the quarterly return of the security's portfolio. When a month-end NYSE price is missing, the month-end value of the security is derived from merger terms, quotations on regional exchanges, and other sources. If a month-end value still is not determined, the last available daily price is used.

Base security returns are monthly holding period returns. All distributions are added to the month-end prices, and appropriate price adjustments are made to account for stock splits and dividends. The return on a portfolio for one month is calculated as the weighted average of the returns for its individual stocks. Annual portfolio returns are calculated by compounding the monthly portfolio returns.

Size of the Deciles

Table 7-1 reveals that the top three deciles of the NYSE/AMEX/NASDAQ account for most of the total market value of its stocks. Nearly two-thirds of the market value is represented by the first decile, which currently consists of 167 stocks, while the smallest decile accounts for just over one percent of the

¹ Rolf W. Banz was the first to document this phenomenon. See Banz, Rolf W. "The Relationship Between Returns and Market Value of Common Stocks," *Journal of Financial Economics*, Vol. 9, 1981, pp. 3-18.

market value. The data in the second column of Table 7-1 are averages across all 82 years. Of course, the proportion of market value represented by the various deciles varies from year to year.

Columns three and four give recent figures on the number of companies and their market capitalization, presenting a snapshot of the structure of the deciles near the end of 2007.

Table 7-1[†]
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ Size and Composition
 1926 through September 30, 2007

Decile	Historical Average Percentage of Total Capitalization	Recent Number of Companies	Recent Decile Market Capitalization (in thousands)	Recent Percentage of Total Capitalization
1-largest	63.22%	167	\$10,357,817,750	62.34%
2	13.97%	174	2,327,351,920	14.01%
3	7.56%	192	1,111,672,200	6.69%
4	4.73%	184	709,696,610	4.27%
5	3.24%	203	541,399,790	3.26%
6	2.38%	251	411,039,680	2.47%
7	1.75%	275	379,465,160	2.28%
8	1.30%	380	291,182,590	1.75%
9	1.02%	641	284,538,240	1.71%
10-Smallest	0.83%	1775	201,705,150	1.21%
Mid-Cap 3-5	15.53%	579	2,362,768,280	14.22%
Low-Cap 6-8	5.43%	906	1,081,687,170	6.51%
Micro-Cap 9-10	1.85%	2,416	486,243,740	2.93%

Historical average percentage of total capitalization shows the average, over the last 82 years, of the decile market values as a percentage of the total NYSE/AMEX/NASDAQ calculated each month. Number of companies in deciles, recent market capitalization of deciles, and recent percentage of total capitalization are as of September 30, 2007.

Table 7-2 gives the current breakpoints that define the composition of the NYSE/AMEX/NASDAQ size deciles. The largest company and its market capitalization are presented for each decile. Table 7-3 shows the historical breakpoints for each of the three size groupings presented throughout this chapter. Mid-cap stocks are defined here as the aggregate of deciles 3-5. Based on the most recent data (Table 7-2), companies within this mid-cap range have market capitalizations at or below \$9,206,713,000 but greater than \$2,411,794,000. Low-cap stocks include deciles 6-8 and currently include all companies in the NYSE/AMEX/NASDAQ with market capitalizations at or below \$2,411,794,000 but greater than \$723,258,000. Micro-cap stocks include deciles 9-10 and include companies with market capitalizations at or below \$723,258,000. The market capitalization of the smallest company included in the micro-capitalization group is currently \$1,922,000.

[†] Source: ©200801 CRSP®, Center for Research in Security Prices, Graduate School of Business, The University of Chicago used with permission. All rights reserved. www.crsp.chicagogsb.edu

Table 7-2†
**Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Largest Company
 and Its Market Capitalization by Decile**
 September 30, 2007

Decile	Market Capitalization of Largest Company (in thousands)	Company Name
1-Largest	\$472,518,672	Exxon Mobil Corp.
2	20,234,526	General Mills Inc.
3	9,206,713	Reliant Energy Inc.
4	5,012,577	Manitowoc Co. Inc.
5	3,422,743	FMC Corp.
6	2,411,794	Webster Financial Corp.
7	1,633,320	Simpson Manufacturing Co. Inc.
8	1,128,765	Metal Management Inc.
9	723,258	Citadel Broadcasting Corp.
10-Smallest	363,479	Emergency Medical Services Corp.

Presentation of the Decile Data

Summary statistics of annual returns of the 10 deciles over 1926–2007 are presented in Table 7-4. Note from this exhibit that both the average return and the total risk, or standard deviation of annual returns, tend to increase as one moves from the largest decile to the smallest. Furthermore, the serial correlations of returns are near zero for all but the smallest deciles. Serial correlations and their significance will be discussed in detail later in this chapter.

Graph 7-1 depicts the growth of one dollar invested in each of three NYSE/AMEX/NASDAQ groups broken down into mid-cap, low-cap, and micro-cap stocks. The index value of the entire NYSE/AMEX/NASDAQ is also included. All returns presented are value-weighted based on the market capitalizations of the deciles contained in each subgroup. The sheer magnitude of the size effect in some years is noteworthy. While the largest stocks actually declined 9 percent in 1977, the smallest stocks rose more than 20 percent. A more extreme case occurred in the depression-recovery year of 1933, when the difference between the first and tenth decile returns was far more substantial, with the largest stocks rising 46 percent, and the smallest stocks rising 218 percent. This divergence in the performance of small and large company stocks is a common occurrence.

Table 7-3
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 Largest and Smallest Company by Size Group

from 1926 to 1965

Date (Sept 30)	Capitalization of Largest Company (in thousands)			Capitalization of Smallest Company (in thousands)		
	Mid-Cap 3-5	Low-Cap 6-8	Micro-Cap 9-10	Mid-Cap 3-5	Low-Cap 6-8	Micro-Cap 9-10
1926	\$60,103	\$13,795	\$4,213	\$13,800	\$4,263	\$43
1927	\$64,820	\$14,491	\$4,415	\$14,522	\$4,450	\$65
1928	\$80,910	\$18,761	\$5,074	\$18,788	\$5,119	\$135
1929	\$103,054	\$24,328	\$5,862	\$24,480	\$5,873	\$118
1930	\$66,750	\$12,918	\$3,359	\$13,050	\$3,369	\$30
1931	\$42,607	\$8,142	\$1,927	\$8,222	\$1,944	\$15
1932	\$12,212	\$2,208	\$468	\$2,223	\$469	\$19
1933	\$40,298	\$7,210	\$1,830	\$7,280	\$1,875	\$120
1934	\$38,019	\$6,638	\$1,673	\$6,669	\$1,691	\$69
1935	\$37,631	\$6,549	\$1,350	\$6,605	\$1,383	\$38
1936	\$46,963	\$11,505	\$2,754	\$11,526	\$2,800	\$98
1937	\$51,750	\$13,635	\$3,539	\$13,793	\$3,563	\$68
1938	\$35,019	\$8,372	\$2,195	\$8,400	\$2,200	\$60
1939	\$35,409	\$7,478	\$1,819	\$7,500	\$1,854	\$75
1940	\$29,903	\$7,990	\$1,861	\$8,007	\$1,872	\$51
1941	\$30,362	\$8,316	\$2,086	\$8,336	\$2,087	\$72
1942	\$26,037	\$6,868	\$1,770	\$6,870	\$1,779	\$82
1943	\$42,721	\$11,403	\$3,847	\$11,475	\$3,903	\$395
1944	\$46,221	\$13,066	\$4,812	\$13,068	\$4,820	\$309
1945	\$55,125	\$17,325	\$6,413	\$17,575	\$6,428	\$225
1946	\$77,784	\$24,192	\$10,149	\$24,199	\$10,168	\$829
1947	\$57,830	\$17,719	\$6,373	\$17,735	\$6,380	\$508
1948	\$67,238	\$19,632	\$7,329	\$19,651	\$7,348	\$683
1949	\$56,082	\$14,549	\$5,037	\$14,577	\$5,108	\$379
1950	\$66,143	\$18,675	\$6,225	\$18,700	\$6,243	\$303
1951	\$82,517	\$22,750	\$7,598	\$22,860	\$7,600	\$668
1952	\$95,636	\$25,405	\$8,428	\$25,452	\$8,480	\$480
1953	\$98,218	\$25,340	\$8,156	\$25,374	\$8,168	\$459
1954	\$125,834	\$29,707	\$8,488	\$29,791	\$8,502	\$463
1955	\$170,829	\$41,445	\$12,366	\$41,681	\$12,444	\$553
1956	\$183,792	\$46,805	\$13,524	\$46,886	\$13,623	\$1,122
1957	\$194,300	\$47,658	\$13,844	\$48,509	\$13,848	\$925
1958	\$195,536	\$46,774	\$13,789	\$46,871	\$13,816	\$550
1959	\$256,283	\$64,110	\$19,548	\$64,221	\$19,701	\$1,804
1960	\$252,292	\$61,485	\$19,293	\$61,529	\$19,344	\$831
1961	\$296,261	\$77,983	\$23,562	\$77,996	\$23,613	\$2,455
1962	\$250,786	\$58,785	\$18,952	\$58,866	\$18,968	\$1,018
1963	\$308,903	\$71,846	\$23,927	\$71,971	\$24,056	\$296
1964	\$349,675	\$79,508	\$25,595	\$79,937	\$25,607	\$223
1965	\$365,675	\$84,600	\$28,483	\$85,065	\$28,543	\$250

Table 7-3 (continued)

Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
Largest and Smallest Company by Size Group

from 1966 to 2007

Date (Sept 30)	Capitalization of Largest Company (in thousands)			Capitalization of Smallest Company (in thousands)		
	Mid-Cap 3-5	Low-Cap 6-8	Micro-Cap 9-10	Mid-Cap 3-5	Low-Cap 6-8	Micro-Cap 9-10
1966	\$403,137	\$99,960	\$34,884	\$100,107	\$34,966	\$381
1967	\$459,438	\$118,988	\$42,188	\$119,635	\$42,237	\$381
1968	\$531,306	\$150,893	\$60,543	\$151,260	\$60,719	\$592
1969	\$518,485	\$146,792	\$54,353	\$147,311	\$54,503	\$2,119
1970	\$382,884	\$94,754	\$29,916	\$94,845	\$29,932	\$822
1971	\$551,690	\$147,426	\$45,570	\$147,810	\$45,571	\$865
1972	\$557,181	\$143,835	\$46,728	\$144,263	\$46,757	\$1,031
1973	\$431,354	\$96,699	\$29,352	\$96,710	\$29,430	\$561
1974	\$356,876	\$79,878	\$23,355	\$80,280	\$23,400	\$444
1975	\$477,054	\$102,313	\$30,353	\$103,283	\$30,394	\$540
1976	\$566,296	\$121,717	\$34,864	\$121,992	\$34,901	\$564
1977	\$584,577	\$139,196	\$40,700	\$139,620	\$40,765	\$513
1978	\$580,881	\$164,093	\$47,927	\$164,455	\$48,038	\$830
1979	\$665,019	\$177,378	\$51,197	\$177,769	\$51,274	\$948
1980	\$762,195	\$199,312	\$50,496	\$199,315	\$50,544	\$549
1981	\$962,397	\$264,690	\$72,104	\$264,783	\$72,450	\$1,446
1982	\$770,517	\$210,301	\$55,336	\$210,630	\$55,423	\$1,060
1983	\$1,209,911	\$353,889	\$104,382	\$356,238	\$104,588	\$2,025
1984	\$1,075,436	\$315,965	\$91,004	\$316,103	\$91,195	\$2,093
1985	\$1,440,436	\$370,224	\$94,875	\$370,729	\$94,887	\$760
1986	\$1,857,621	\$449,015	\$110,617	\$449,462	\$110,953	\$706
1987	\$2,059,143	\$468,948	\$113,419	\$470,662	\$113,430	\$1,277
1988	\$1,957,926	\$421,340	\$94,449	\$421,675	\$94,573	\$696
1989	\$2,145,947	\$480,975	\$100,285	\$483,623	\$100,384	\$96
1990	\$2,171,217	\$474,065	\$93,750	\$474,477	\$93,790	\$132
1991	\$2,129,863	\$457,958	\$87,586	\$458,853	\$87,733	\$278
1992	\$2,428,671	\$500,327	\$103,352	\$500,346	\$103,500	\$510
1993	\$2,705,192	\$603,588	\$137,105	\$607,449	\$137,137	\$602
1994	\$2,470,244	\$596,059	\$148,104	\$597,975	\$148,216	\$598
1995	\$2,789,938	\$647,210	\$155,386	\$647,253	\$155,532	\$89
1996	\$3,142,657	\$751,316	\$193,001	\$751,680	\$193,016	\$1,043
1997	\$3,484,440	\$813,923	\$228,900	\$814,355	\$229,058	\$585
1998	\$4,216,707	\$925,688	\$252,553	\$926,215	\$253,031	\$1,671
1999	\$4,251,741	\$875,309	\$220,397	\$875,582	\$220,456	\$1,502
2000	\$4,143,902	\$840,000	\$192,083	\$840,730	\$192,439	\$1,393
2001	\$5,156,315	\$1,108,224	\$265,734	\$1,108,969	\$265,736	\$443
2002	\$4,930,326	\$1,116,525	\$308,980	\$1,124,331	\$309,245	\$501
2003	\$4,744,580	\$1,163,369	\$329,060	\$1,163,423	\$329,529	\$332
2004	\$6,241,953	\$1,607,854	\$505,437	\$1,607,931	\$506,410	\$1,393
2005	\$7,187,244	\$1,728,888	\$586,393	\$1,729,364	\$587,243	\$1,079
2006	\$7,777,183	\$1,946,588	\$626,955	\$1,947,240	\$627,017	\$2,247
2007	\$9,206,713	\$2,411,794	\$723,258	\$2,413,583	\$725,267	\$1,922

Table 7-4[‡]
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Summary Statistics of Annual Returns
 1926–2007

Decile	Geometric Mean	Arithmetic Mean	Standard Deviation	Serial Correlation
1-Largest	9.6	11.3	18.91	0.08
2	10.9	13.2	21.62	0.04
3	11.3	13.7	23.31	-0.03
4	11.1	14.1	25.68	-0.01
5	11.7	14.8	26.49	-0.02
6	11.7	15.1	27.10	0.03
7	11.6	15.5	29.47	0.01
8	11.8	16.6	34.18	0.05
9	11.9	17.3	36.45	0.04
10-Smallest	13.6	21.0	44.58	0.16
Mid-Cap, 3–5	11.3	14.0	24.42	-0.02
Low-Cap, 6–8	11.7	15.5	29.03	0.03
Micro-Cap, 9–10	12.5	18.5	38.84	0.08
NYSE/AMEX/NASDAQ	10.1	12.0	19.94	0.03
Total Value-Weighted Index				

Aspects of the Firm Size Effect

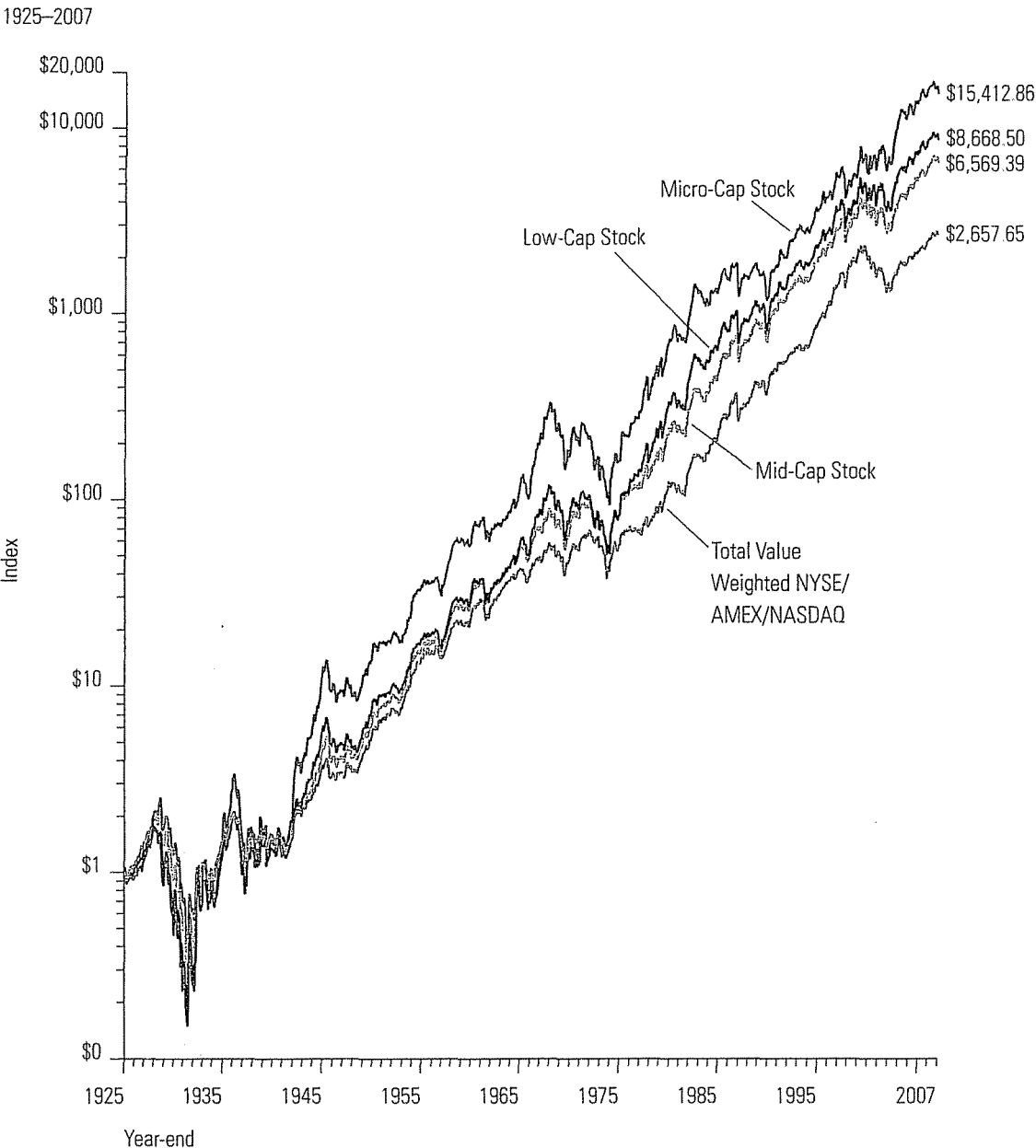
The firm size phenomenon is remarkable in several ways. First, the greater risk of small stocks does not, in the context of the capital asset pricing model (CAPM), fully account for their higher returns over the long term. In the CAPM only systematic, or beta risk, is rewarded; small company stocks have had returns in excess of those implied by their betas.

Second, the calendar annual return differences between small and large companies are serially correlated. This suggests that past annual returns may be of some value in predicting future annual returns. Such serial correlation, or autocorrelation, is practically unknown in the market for large stocks and in most other equity markets but is evident in the size premia.

Third, the firm size effect is seasonal. For example, small company stocks outperformed large company stocks in the month of January in a large majority of the years. Such predictability is surprising and suspicious in light of modern capital market theory. These three aspects of the firm size effect—long-term returns in excess of systematic risk, serial correlation, and seasonality—will be analyzed thoroughly in the following sections.

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Graph 7-1*
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ: Wealth Indices of Investments in Mid-, Low-, Micro- and Total Capitalization Stocks
Year-end 1925 = \$1.00



Long-Term Returns in Excess of Systematic Risk

The capital asset pricing model (CAPM) does not fully account for the higher returns of small company stocks. Table 7-5 shows the returns in excess of systematic risk over the past 82 years for each decile of the NYSE/AMEX/NASDAQ. Recall that the CAPM is expressed as follows:

$$k_s = r_f + (\beta_s \times ERP)$$

Table 7-5 uses the CAPM to estimate the return in excess of the riskless rate and compares this estimate to historical performance. According to the CAPM, the expected return on a security should consist of the riskless rate plus an additional return to compensate for the systematic risk of the security. The return in excess of the riskless rate is estimated in the context of the CAPM by multiplying the equity risk premium by β (beta). The equity risk premium is the return that compensates investors for taking on risk equal to the risk of the market as a whole (systematic risk).² Beta measures the extent to which a security or portfolio is exposed to systematic risk.³ The beta of each decile indicates the degree to which the decile's return moves with that of the overall market.

A beta greater than one indicates that the security or portfolio has greater systematic risk than the market; according to the CAPM equation, investors are compensated for taking on this additional risk. Yet, Table 7-5 illustrates that the smaller deciles have had returns that are not fully explained by their higher betas. This return in excess of that predicted by CAPM increases as one moves from the largest companies in decile 1 to the smallest in decile 10. The excess return is especially pronounced for micro-cap stocks (deciles 9–10). This size-related phenomenon has prompted a revision to the CAPM, which includes a size premium. Chapter 4 presents this modified CAPM theory and its application in more detail.

This phenomenon can also be viewed graphically, as depicted in the Graph 7-2. The security market line is based on the pure CAPM without adjustment for the size premium. Based on the risk (or beta) of a security, the expected return lies on the security market line. However, the actual historic returns for the smaller deciles of the NYSE/AMEX/NASDAQ lie above the line, indicating that these deciles have had returns in excess of that which is appropriate for their systematic risk.

² The equity risk premium is estimated by the 82-year arithmetic mean return on large company stocks, 12.26 percent, less the 82-year arithmetic mean income-return component of 20-year government bonds as the historical riskless rate, in this case 5.21 percent. (It is appropriate, however, to match the maturity, or duration, of the riskless asset with the investment horizon.) See Chapter 5 for more detail on equity risk premium estimation.

³ Historical betas were calculated using a simple regression of the monthly portfolio (decile) total returns in excess of the 30-day U.S. Treasury bill total returns versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2007. See Chapter 6 for more detail on beta estimation.

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Table 7-5[†]
Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ
 1926–2007

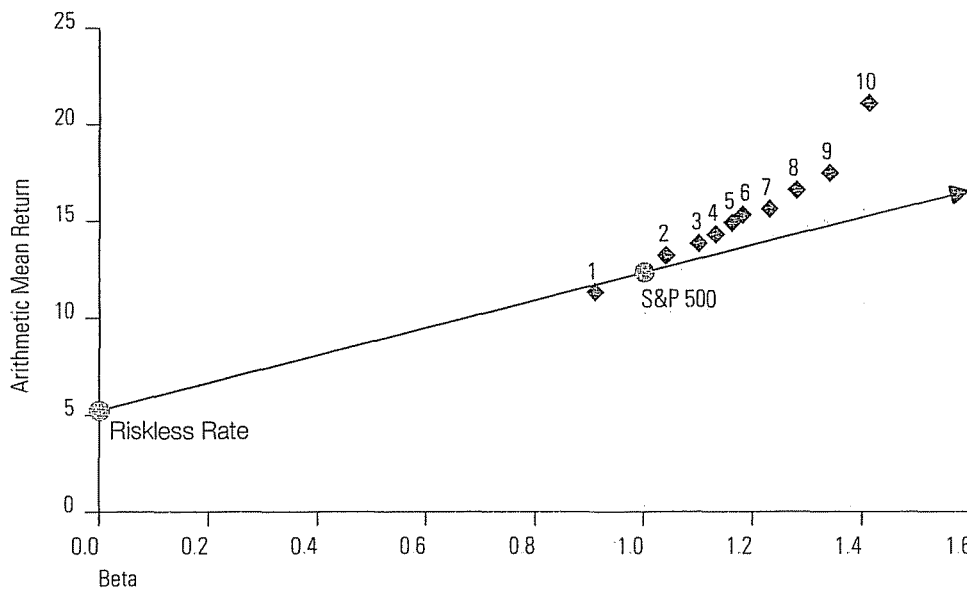
Decile	Beta*	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate**	Estimated Return in Excess of Riskless Rate†	Size Premium (Return in Excess of CAPM)
1-Largest	0.91	11.31%	6.10%	6.45%	-0.34%
2	1.03	13.16%	7.95%	7.27%	0.68%
3	1.10	13.72%	8.51%	7.75%	0.76%
4	1.12	14.07%	8.86%	7.93%	0.93%
5	1.16	14.85%	9.64%	8.17%	1.47%
6	1.18	15.14%	9.93%	8.33%	1.60%
7	1.24	15.46%	10.26%	8.76%	1.50%
8	1.30	16.58%	11.38%	9.18%	2.20%
9	1.35	17.28%	12.07%	9.51%	2.56%
10-Smallest	1.41	20.98%	15.77%	9.95%	5.82%
Mid-Cap, 3–5	1.12	14.01%	8.81%	7.88%	0.92%
Low-Cap, 6–8	1.22	15.49%	10.29%	8.64%	1.65%
Micro-Cap, 9–10	1.36	18.46%	13.25%	9.59%	3.65%

*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2007.

**Historical riskless rate is measured by the 82-year arithmetic mean income return component of 20-year government bonds (5.21 percent)

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (12.26 percent) minus the arithmetic mean income return component of 20-year government bonds (5.21 percent) from 1926–2007.

Graph 7-2[†]
Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 1926–2007



Further Analysis of the 10th Decile

The size premia presented thus far do a great deal to explain the return due solely to size in publicly traded companies. However, by splitting the 10th decile into two size groupings we can get a closer look at the smallest companies. This magnification of the smallest companies will demonstrate whether the company size to size premia relationship continues to hold true.

As previously discussed, the method for determining the size groupings for size premia analysis was to take the stocks traded on the NYSE and break them up into 10 deciles, after which stocks traded on the AMEX and NASDAQ were allocated into the same size groupings. This same methodology was used to split the 10th decile into two parts: 10a and 10b, with 10b being the smaller of the two. This is equivalent to breaking the stocks down into 20 size groupings, with portfolios 19 and 20 representing 10a and 10b.

Table 7-7 shows that the pattern continues; as companies get smaller their size premium increases. There is a noticeable increase in size premium from 10a to 10b, which can also be demonstrated visually in Graph 7-3. This can be useful in valuing companies that are extremely small. Table 7-6 presents the size, composition, and breakpoints of deciles 10a and 10b. First, the recent number of companies and total decile market capitalization are presented. Then the largest company and its market capitalization are presented.

Breaking the smallest decile down lowers the significance of the results compared to results for the 10th decile taken as a whole, however. The same holds true for comparing the 10th decile with the Micro-Cap aggregation of the 9th and 10th deciles. The more stocks included in a sample the more significance can be placed on the results. While this is not as much of a factor with the recent years of data, these size premia are constructed with data back to 1926. By breaking the 10th decile down into smaller components we have cut the number of stocks included in each grouping. The change over time of the number of stocks included in the 10th decile for the NYSE/AMEX/NASDAQ is presented in Table 7-8. With fewer stocks included in the analysis early on, there is a strong possibility that just a few stocks can dominate the returns for those early years.

While the number of companies included in the 10th decile for the early years of our analysis is low, it is not too low to still draw meaningful results even when broken down into subdivisions 10a and 10b. All things considered, size premia developed for deciles 10a and 10b are significant and can be used in cost of capital analysis. These size premia should greatly enhance the development of cost of capital analysis for very small companies.

Table 7-6[†]
Size-Decile Portfolios 10a and 10b of the NYSE/AMEX/NASDAQ,
Largest Company and Its Market Capitalization
 September 30, 2007

Decile	Recent Number of Companies	Recent Decile Market Capitalization (in thousands)	Market Capitalization of Largest Company (in thousands)	Company Name
10a	386	108,458,780	363,479	Emergency Medical Services Corp
10b	1,405	143,681,297	211,590	Miller Industries Inc., Tenn.

Note: These numbers may not aggregate to equal decile 10 figures

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Table 7-7†
Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split
 1926–2007

	Beta*	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate**	Estimated Return in Excess of Riskless Rate†	Size Premium (Return in Excess of CAPM)
1-Largest	0.91	11.31%	6.10%	6.45%	-0.34%
2	1.03	13.16%	7.95%	7.27%	0.68%
3	1.10	13.72%	8.51%	7.75%	0.76%
4	1.12	14.07%	8.86%	7.93%	0.93%
5	1.16	14.85%	9.64%	8.17%	1.47%
6	1.18	15.14%	9.93%	8.33%	1.60%
7	1.24	15.46%	10.26%	8.76%	1.50%
8	1.30	16.58%	11.38%	9.18%	2.20%
9	1.35	17.28%	12.07%	9.51%	2.56%
10a	1.42	19.22%	14.01%	10.02%	3.99%
10b-Smallest	1.39	24.71%	19.50%	9.77%	9.73%
Mid-Cap, 3–5	1.12	14.01%	8.81%	7.88%	0.92%
Low-Cap, 6–8	1.22	15.49%	10.29%	8.64%	1.65%
Micro-Cap, 9–10	1.36	18.46%	13.25%	9.59%	3.65%

*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2007.

**Historical riskless rate is measured by the 82-year arithmetic mean income return component of 20-year government bonds (5.21 percent)

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (12.26 percent) minus the arithmetic mean income return component of 20-year government bonds (5.21 percent) from 1926–2007.

Graph 7-3†
Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split
 1926–2007

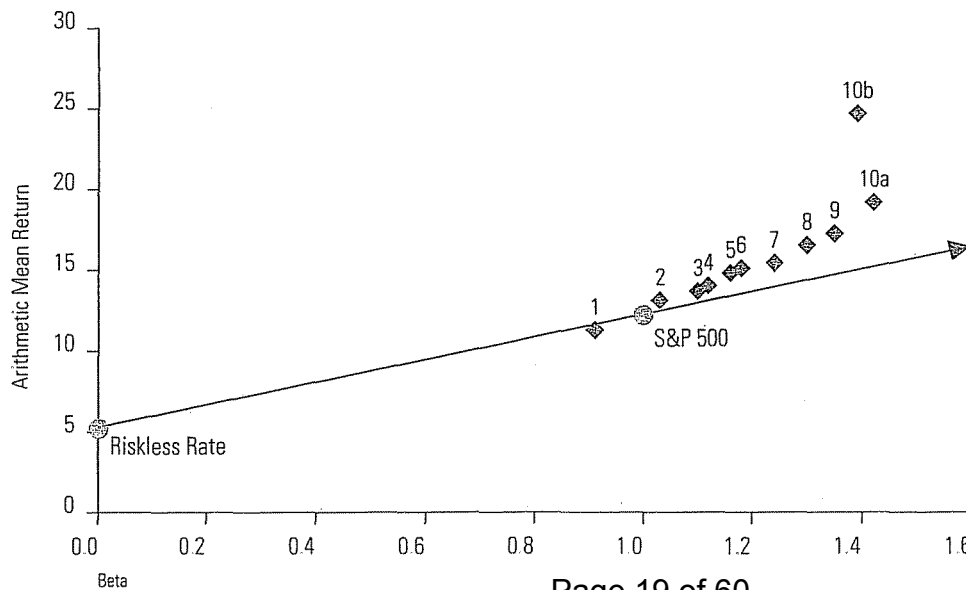


Table 7-8[†]
Historical Number of Companies for NYSE/AMEX/NASDAQ Decile 10

Sept.	Number of Companies
1926	52*
1930	72
1940	78
1950	100
1960	109
1970	865
1980	685
1990	1,814
2000	1,927
2005	1,746
2006	1,744
2007	1,775

*The fewest number of companies was 49 in March, 1926

Alternative Methods of Calculating the Size Premia

The size premia estimation method presented above makes several assumptions with respect to the market benchmark and the measurement of beta. The impact of these assumptions can best be examined by looking at some alternatives. In this section we will examine the impact on the size premia of using a different market benchmark for estimating the equity risk premia and beta. We will also examine the effect on the size premia study of using sum beta or an annual beta.⁴

Changing the Market Benchmark

In the original size premia study, the S&P 500 is used as the market benchmark in the calculation of the realized historical equity risk premium and of each size group's beta. The NYSE total value-weighted index is a common alternative market benchmark used to calculate beta. Table 7-9 uses this market benchmark in the calculation of beta. In order to isolate the size effect, we require an equity risk premium based on a large company stock benchmark. The NYSE deciles 1-2 large company index offers a mutually exclusive set of portfolios for the analysis of the smaller company groups: mid-cap deciles 3-5, low-cap deciles 6-8, and micro-cap deciles 9-10. The size premia analyses using these benchmarks are summarized in Table 7-9 and depicted graphically in Graph 7-4.

For the entire period analyzed, 1926-2007, the betas obtained using the NYSE total value-weighted index are higher than those obtained using the S&P 500. Since smaller companies had higher betas using the NYSE benchmark, one would expect the size premia to shrink. However, as was illustrated in Chapter 5, the equity risk premium calculated using the NYSE deciles 1-2 benchmark results in a value of 6.35, as opposed to 7.05 when using the S&P 500. The effect of the higher betas and lower equity risk premium cancel each other out, and the resulting size premia in Table 7-9 are slightly higher than those resulting from the original study.

⁴ Sum beta is the method of beta estimation described in Chapter 6 that was developed to better account for the lagged reaction of small stocks to market movements. The sum beta methodology was developed for the same reason that the size premia were developed; small company betas were too small to account for all of their excess returns.

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Table 7-9*
Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with NYSE Market Benchmarks
 1926-2007

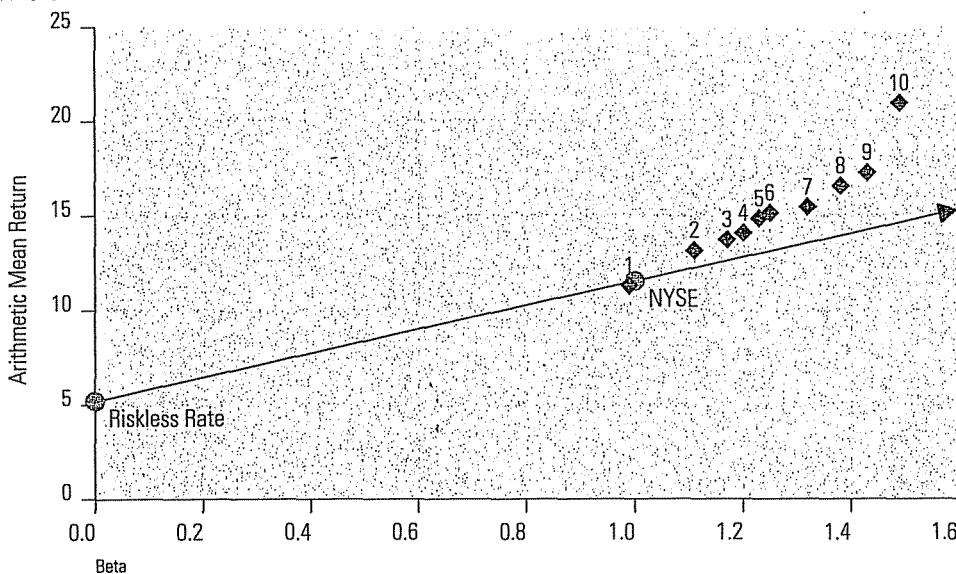
Decile	Beta*	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate**	Estimated Return in Excess of Riskless Rate†	Size Premium (Return in Excess of CAPM)
1-Largest	0.99	11.31%	6.10%	6.27%	-0.16%
2	1.11	13.16%	7.95%	7.05%	0.90%
3	1.17	13.72%	8.51%	7.45%	1.07%
4	1.20	14.07%	8.86%	7.63%	1.23%
5	1.23	14.85%	9.64%	7.82%	1.82%
6	1.25	15.14%	9.93%	7.97%	1.96%
7	1.32	15.46%	10.26%	8.38%	1.88%
8	1.38	16.58%	11.38%	8.78%	2.60%
9	1.43	17.28%	12.07%	9.07%	3.00%
10-Smallest	1.49	20.98%	15.77%	9.44%	6.33%
Mid-Cap, 3-5	1.19	14.01%	8.81%	7.57%	1.23%
Low-Cap, 6-8	1.30	15.49%	10.29%	8.26%	2.02%
Micro-Cap, 9-10	1.44	18.46%	13.25%	9.13%	4.12%

*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the NYSE total capitalization-weighted index total returns in excess of the 30-day U.S. Treasury bill, January 1926-December 2007.

**Historical riskless rate is measured by the 82-year arithmetic mean income return component of 20-year government bonds (5.21 percent).

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the NYSE deciles 1-2 (11.56 percent) minus the arithmetic mean income return component of 20-year government bonds (5.21 percent) from 1926-2007.

Graph 7-4*
Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ with NYSE Market Benchmarks
 1926-2007



Measuring Beta with Sum Beta

The sum beta method attempts to provide a better measure of beta for small stocks by taking into account their lagged price reaction to movements in the market. [See Chapter 6.] Table 7-10 shows that using this method of beta estimation results in larger betas for the smaller size deciles of the NYSE/AMEX/NASDAQ while those of the larger size deciles remain relatively stable. From these results, it appears that the sum beta method corrects for possible errors that are made when estimating small company betas without adjusting for the lagged price reaction of small stocks. However, the sum beta, when applied to the CAPM, still does not account for all of the returns in excess of the riskless rate historically found for small stocks. Table 7-10 demonstrates that a size premium is still necessary to estimate the expected returns using sum beta in conjunction with the CAPM, though the premium is smaller than that needed when using the typical calculation of beta.

Graph 7-5 compares the 10 deciles of the NYSE/AMEX/NASDAQ to the security market line. There are two sets of decile portfolios—one set is plotted using the single variable regression method of calculating beta, as in Graph 7-2, and the second set uses the sum beta method. The portfolios plotted using sum beta more closely resemble the security market line. Again, this demonstrates that the sum beta method results in the desired effect: a higher estimate of returns for small companies. Yet the smaller portfolios still lie above the security market line, indicating that an additional premium may be required.

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Table 7-10*
Long-Term Returns in Excess of CAPM for Decile Portfolios of the NYSE/AMEX/NASDAQ, with Sum Beta 1926-2007

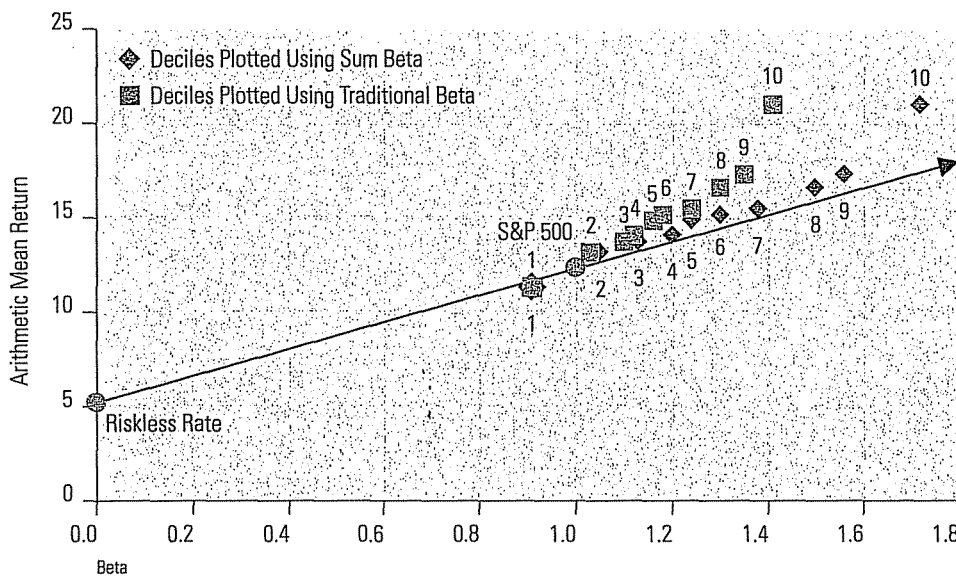
Decile	Sum Beta*	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate**	Estimated Return in Excess of Riskless Rate†	Size Premium (Return in Excess of CAPM)
1-Largest	0.91	11.31%	6.10%	6.44%	-0.33%
2	1.05	13.16%	7.95%	7.41%	0.54%
3	1.13	13.72%	8.51%	7.98%	0.54%
4	1.20	14.07%	8.86%	8.47%	0.40%
5	1.24	14.85%	9.64%	8.73%	0.91%
6	1.30	15.14%	9.93%	9.15%	0.78%
7	1.38	15.46%	10.26%	9.77%	0.49%
8	1.50	16.58%	11.38%	10.61%	0.77%
9	1.56	17.28%	12.07%	11.03%	1.04%
10-Smallest	1.72	20.98%	15.77%	12.10%	3.68%
Mid-Cap, 3-5	1.17	14.01%	8.81%	8.26%	0.55%
Low-Cap, 6-8	1.37	15.49%	10.29%	9.64%	0.64%
Micro-Cap, 9-10	1.61	18.46%	13.25%	11.33%	1.92%

*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 index total returns in excess of the 30-day U.S. Treasury bill, January 1926-December 2007.

**Historical riskless rate is measured by the 82-year arithmetic mean income return component of 20-year government bonds (5.21 percent).

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (12.26 percent) minus the arithmetic mean income return component of 20-year government bonds (5.21 percent) from 1926-2007.

Graph 7-5*
Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Sum Beta (with Lag) versus Unadjusted Beta (without Lag) 1926-2007



Annual Data versus Monthly Data

Another potential way to correct for the low beta estimates of small company stocks is to calculate the long-term beta with annual data instead of monthly data. Using annual data may eliminate the infrequent trading argument because of the long period of time covered. However, Table 7-11 and Graph 7-6 illustrate that the size premium is still present when estimating beta with annual data.

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Table 7-11[†]
Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with Annual Beta
 1926–2007

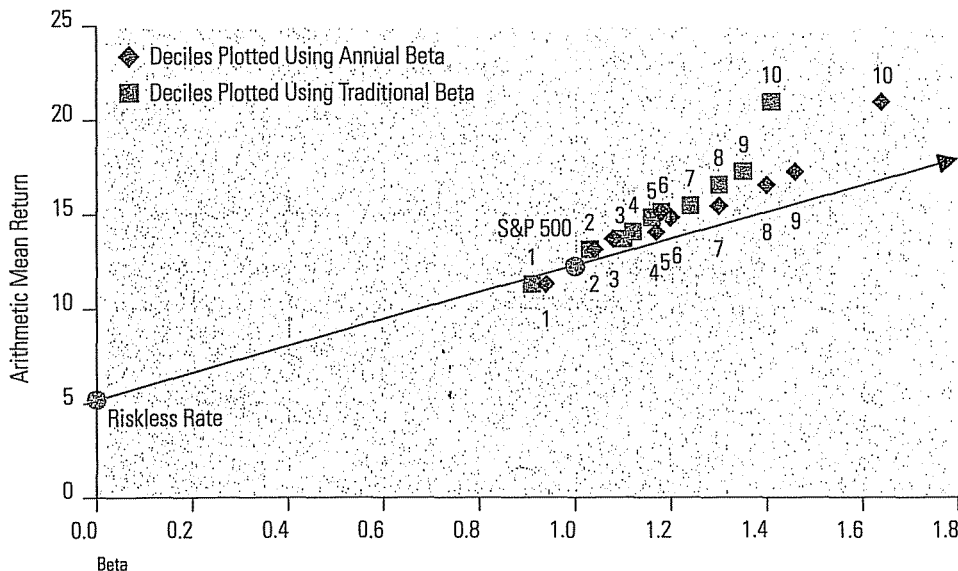
Decile	Annual Beta*	Arithmetic Mean Return	Realized Return in Excess of Riskless Rate**	Estimated Return in Excess of Riskless Rate†	Size Premium (Return in Excess of CAPM)
1-Largest	0.94	11.31%	6.10%	6.61%	-0.51%
2	1.04	13.16%	7.95%	7.35%	0.60%
3	1.08	13.72%	8.51%	7.63%	0.88%
4	1.17	14.07%	8.86%	8.22%	0.64%
5	1.20	14.85%	9.64%	8.48%	1.16%
6	1.18	15.14%	9.93%	8.36%	1.57%
7	1.30	15.46%	10.26%	9.17%	1.08%
8	1.40	16.58%	11.38%	9.84%	1.54%
9	1.46	17.28%	12.07%	10.32%	1.75%
10-Smallest	1.64	20.98%	15.77%	11.54%	4.23%
Mid-Cap, 3–5	1.13	14.01%	8.81%	7.96%	0.84%
Low-Cap, 6–8	1.26	15.49%	10.29%	8.92%	1.37%
Micro-Cap, 9–10	1.52	18.46%	13.25%	10.69%	2.56%

*Betas are estimated from annual portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 index total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2007.

**Historical riskless rate is measured by the 82-year arithmetic mean income return component of 20-year government bonds (5.21 percent).

†Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (12.26 percent) minus the arithmetic mean income return component of 20-year government bonds (5.21 percent) from 1926–2007.

Graph 7-6[†]
Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ Annual Beta versus Monthly Beta
 1926–2007



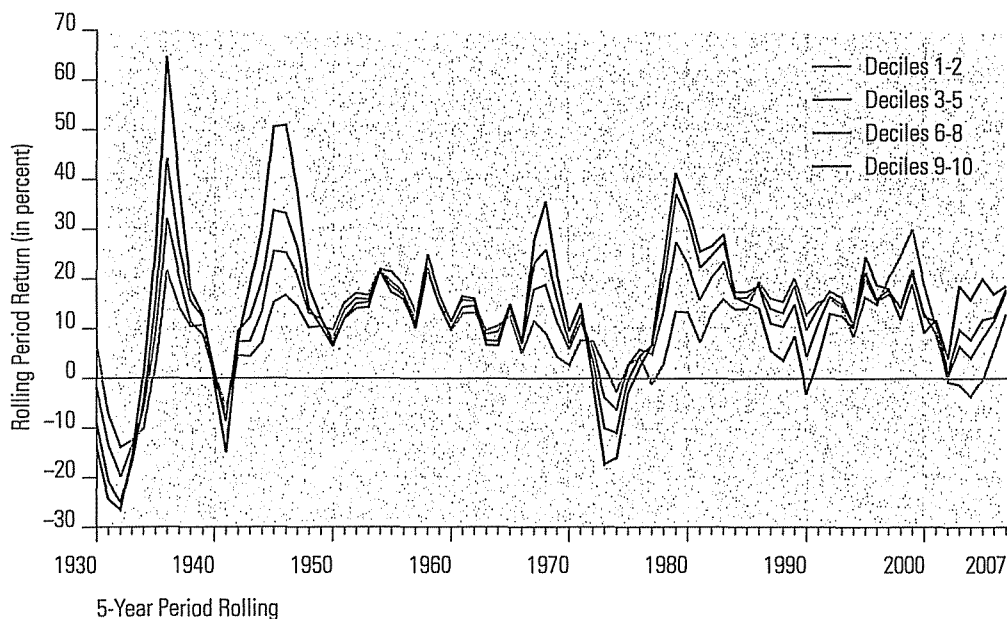
Serial Correlation in Small Company Stock Returns

In four of the last ten years, large-capitalization stocks have outperformed small-capitalization stocks. This has led some to speculate that there is no size premium, but statistical evidence suggests that periods of underperformance should be expected. For instance, since 1926, large-capitalization stocks have outperformed small-capitalization stocks nearly 50 percent of the time. It should be noted, however, that large-capitalization stocks' average historical outperformance has been less than the average historical outperformance of small-capitalization stocks.

History tells us that small companies are riskier than large companies. Table 7-4 shows the standard deviation (a measure of risk) for each decile of the NYSE/AMEX/NASDAQ. As one moves from larger to smaller deciles, the standard deviation of return grows. Investors are compensated for taking on this additional risk by the higher returns provided by small companies. It is important to note, however, that the risk/return profile is over the long term. If small companies did not provide higher long-term returns, investors would be more inclined to invest in the less risky stocks of large companies.

The increased risk faced by investors in small stocks is quite real. The long-term expected return for any asset class is quite different than short-term expected returns, and investors in small-capitalization stocks should expect losses and periods of underperformance. Graph 7-7 shows five-year rolling period returns of four size groups: large-cap (deciles 1-2), mid-cap (deciles 3-5), low-cap (deciles 6-8), and micro-cap (deciles 9-10). There have been a number of five-year periods in which the large-cap group outperformed some or all of the small-cap groups.

Graph 7-7[‡]
Five-Year Rolling Period Returns for the Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 1926–2007



Serial correlation, or first-order autocorrelation, measures the degree to which the return of a given series is related from period to period. Serial correlation, like cross-correlation, ranges from positive one to negative one. A positive serial correlation can be an indicator of a trend in a return series. A serial correlation of positive one indicates that returns from one period have a perfectly positive relationship to the returns of the next period; returns are therefore perfectly predictable from one period to the next. A negative serial correlation can be an indicator of a cycle in a return series. A serial correlation of negative one indicates that returns from one period have a perfectly negative relationship to the next period. A serial correlation near zero indicates that returns are random or unpredictable.

If stock returns have a positive or a negative serial correlation, one can gain some information about future performance based on prior period returns. The serial correlation of returns on large-capitalization stocks is near zero. [See Table 7-4.] For the smallest deciles of stocks, the serial correlation is near or above 0.1. This observation bears further examination.

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To remove the randomizing effect of the market as a whole, the returns for decile 1 are geometrically subtracted from the returns for each decile 2 through 10. The result illustrates that these series in excess of decile 1 exhibit greater serial correlation than the individual decile series themselves. Table 7-12 presents the serial correlations of the excess returns for deciles 2 through 10. These serial correlations suggest some predictability of smaller company excess returns; however, caution is necessary. The serial correlation of small company excess returns for non-calendar years (February through January, etc.) do not always confirm the results shown here for calendar years (January through December). Therefore, predicting small company excess returns may not be easy.

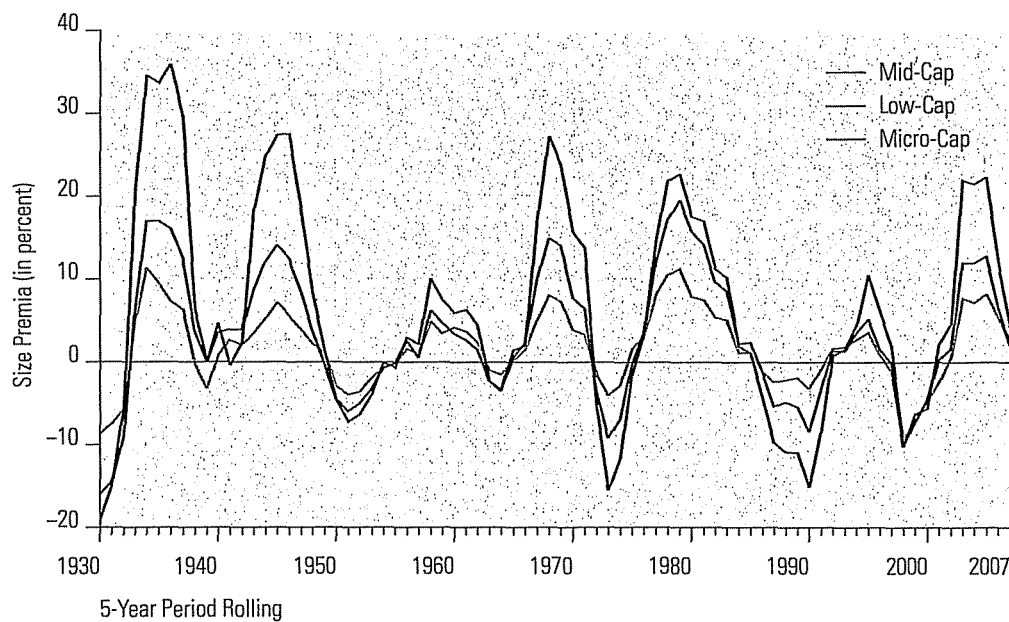
Table 7-12[‡]
**Size-Decile Portfolios of the NYSE/AMEX/NASDAQ,
 Serial Correlation of Annual Returns
 in Excess of Decile 1 Returns
 1926–2007**

Decile	Serial Correlation of Annual Returns in Excess of Decile 1 Returns
2	0.26
3	0.29
4	0.25
5	0.26
6	0.34
7	0.28
8	0.34
9	0.30
10	0.41

The size premia developed in this chapter also remove the randomizing effect of the market as a whole and appear to be serially correlated. Graph 7-8 shows the size premia for rolling five-year periods for each of the three size groups: mid-cap, low-cap, and micro-cap. (A five-year period is necessary to calculate the beta for each portfolio, which is then used to calculate the size premia.) There are periods in which the size premia are positive and periods in which they are negative. However, none of these periods appears to continue for an extended time. Basing a long-term estimate of the size premia on the most recent periods would therefore be inappropriate.

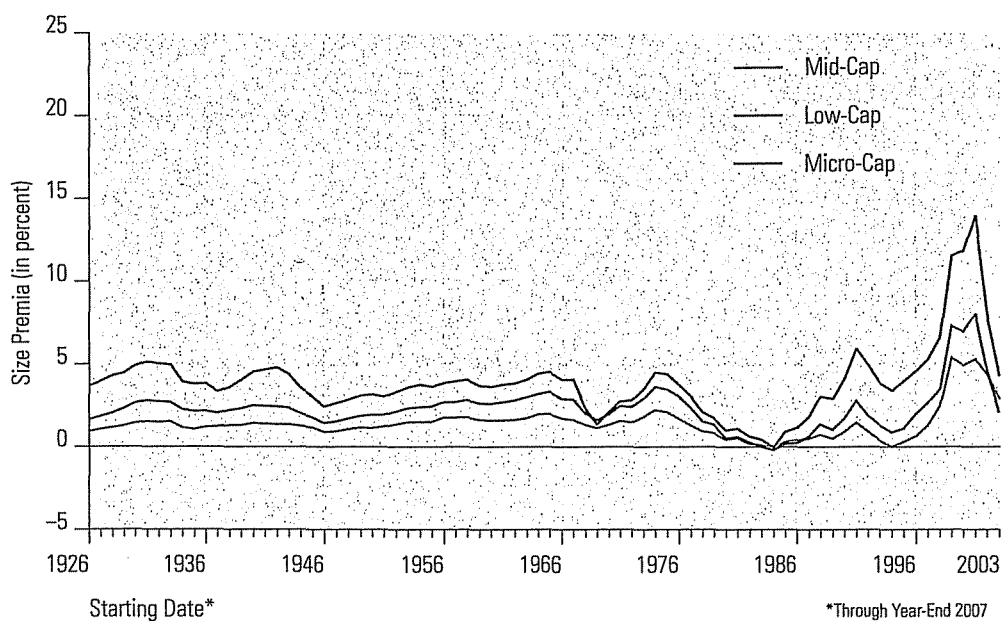
[‡] Source: © 200801 CRSP®, Center for Research in Security Prices. Graduate School of Business, The University of Chicago used with permission. All rights reserved. www.crsp.chicagogsb.edu

Graph 7-8[†]
Five-Year Rolling Period Size Premia for Decile Portfolios of the NYSE/AMEX/NASDAQ
 1926–2007



The logic behind using a long history to estimate the size premia is similar to the argument for using a long history in estimating the equity risk premium (see Chapter 5). Longer historical periods provide more stable estimates of the size premia because unique events are not weighted heavily, and the probability of such events occurring is better represented by an average that covers a long period of time. Graph 7-9 demonstrates the calculation of the size premia using different starting dates. It shows the realized size premia for a series of time periods through 2007. In other words, the first value on the graph represents the average realized size premium over the period 1926–2007. The next value on the graph represents the average realized size premium over the period 1927–2007, and so on, with the last value representing the average over the most recent five years, 2002–2007. Concentrating on the left side of Graph 7-9, one notices that the realized size premia, when measured over long periods of time, are relatively stable. The increased volatility of the size premia in more recent periods is due to their cyclical nature.

Graph 7-9*
Size Premia for Decile Portfolios of the NYSE/AMEX/NASDAQ Calculated with Different Starting Dates 1926–2007



Seasonality

Unlike the returns on large company stocks, the returns on small company stocks appear to be seasonal. The January effect denotes the empirical regularity with which rates of return for small stocks have historically been higher in January than in the other months of the year. Small company stocks often outperform larger stocks by amounts in January far greater than in any other month.

Table 7-13 shows the returns of capitalization deciles 2 through 10 in excess of the return on decile 1; the excess returns are segregated into months. For each decile and for each month, the exhibit shows both the average excess return and the number of times the excess return was positive. These two statistics measure the seasonality of the excess return in different ways—the average excess return illustrates the size of the seasonality effect, while the number of positive excess returns shows its reliability.

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Table 7-13^a
Returns in Excess of First Decile, Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 1926–2007

Decile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (Jan–Dec)
2	0.85%	0.51%	-0.01%	-0.32%	0.07%	-0.09%	-0.07%	0.18%	0.06%	-0.25%	0.15%	0.34%	1.47%
	62	54	39	29	41	41	36	43	43	39	47	44	
3	1.14%	0.33%	0.07%	-0.12%	-0.15%	-0.13%	-0.08%	0.34%	-0.06%	-0.29%	0.53%	0.27%	1.89%
	60	51	39	29	36	36	41	48	39	35	47	46	
4	1.34%	0.60%	-0.05%	-0.34%	0.05%	-0.07%	-0.12%	0.28%	0.09%	-0.74%	0.37%	0.44%	1.96%
	59	52	39	32	39	40	36	47	42	30	44	46	
5	2.20%	0.62%	-0.05%	-0.30%	-0.15%	0.01%	-0.11%	0.28%	0.05%	-0.72%	0.35%	0.30%	2.60%
	60	50	38	34	37	39	40	46	41	33	47	44	
6	2.57%	0.46%	-0.11%	-0.18%	0.28%	-0.06%	-0.24%	0.52%	0.17%	-1.17%	0.29%	0.19%	2.86%
	62	51	43	33	39	38	40	47	44	35	44	43	
7	3.20%	0.66%	-0.14%	-0.21%	0.11%	-0.27%	-0.14%	0.22%	0.22%	-0.99%	0.22%	-0.04%	2.87%
	63	53	41	35	35	34	36	39	44	31	44	39	
8	4.34%	0.69%	-0.32%	-0.46%	0.37%	-0.40%	0.00%	0.19%	0.00%	-0.98%	0.21%	-0.31%	3.69%
	61	47	36	32	33	37	38	38	42	34	38	36	
9	5.67%	0.95%	-0.15%	-0.30%	0.21%	-0.39%	-0.10%	0.12%	-0.09%	-1.14%	0.11%	-0.99%	4.20%
	63	45	41	32	34	33	35	42	38	33	36	33	
10	9.03%	0.95%	-0.76%	-0.19%	0.53%	-0.61%	0.50%	-0.17%	0.55%	-1.31%	-0.40%	-1.64%	7.27%
	75	41	34	34	35	34	38	30	40	29	31	29	

First row: average excess return in percent.

Second row: number of times excess return was positive (in 82 years)

Virtually all of the small stock effect occurs in January, as the excess outcomes for small company stocks are mostly negative in the other months of the year. Excess returns in January relate to size in a precisely rank-ordered fashion, and the January effect seems to pervade all size groups. Yet, simply demonstrating that the size premium is largely produced by the January effect does nothing to refute the existence of such a premium.

Possible Explanations for the January Effect

There is no generally accepted explanation of the January effect. One potential explanation is that it results from year-end window dressing by portfolio managers. Window dressing is the process of dumping money-losing stocks just before year-end so that such stocks are not included in the portfolio managers' annual reports.

Another explanation of the January effect is that it results from tax-loss selling at year-end, whereby money-losing stocks are sold at the end of the year for tax purposes. They are then repurchased in the market in January. Investors who have earned a capital loss on a security may be motivated to sell their shares shortly before the end of December in order to realize the capital loss for income tax purposes. This creates a preponderance of sellers in need of willing buyers at year-end. Amid such selling pressure, transactions will generally occur at the bid price, or the price a buyer is willing to pay for a particular stock, which is generally lower than the ask price. Therefore, a preponderance of sell orders will register more transactions at lower bid prices, which may create some temporary downward pressure on the prices of these stocks. They will only appear to recover in January, when trading returns to a more balanced mix of buy and sell orders, though there may be some actual recovery of prices as money generated by tax-loss selling returns to the market, driving up demand.

How does this cause "small" stocks to have higher apparent returns? Stocks that are "losers" will tend to have depressed stock prices. Also, stocks whose prices are quoted at the "bid" price will tend to have lower apparent market values than stocks quoted at the "ask" price. These two effects may lead to a bias when we use the market value of equity as our measure of "size." If losing stocks have both depressed prices and a tendency to sell at the "bid" at year-end, then they will likely be pushed down in the rankings according to market value. At the same time, winners will be pushed up. Thus, portfolios composed of "small" market value companies will tend to have more "losers" whose returns in January are distorted by tax-loss selling.

This argument vanishes if one uses a non-value criterion (such as net sales, total assets, or number of employees) to measure "size." As long as the "size" measure is not based on market value, there will be no tendency for firms with depressed stock prices to be ranked lower than other firms or for "small" stock portfolios to include a preponderance of "bid" prices at year-end. One study that corroborates the effect of different size measures is the PricewaterhouseCoopers study.⁵ The PricewaterhouseCoopers study focused on different measures of size and calculated size premia using these different measures. The measures of size considered by the study are market value of equity, book value of equity, five-year average net income, market value of invested capital, total assets, five-year average EBITDA, sales, and number of employees. This study is updated annually and now sold as the Duff & Phelps, L.L.C. Risk Premium Report.⁶

5 Grabowski, Roger, and David W. King. "New Evidence on Size Effects and Rates of Return," *Business Valuation Review*, September 1996, p. 103.

6 For more information on the "Duff & Phelps, L.L.C. Risk Premium Report", visit our Cost of Capital Resources page at <http://global.morningstar.com/RiskPremiaReports>.

The Size Phenomena Across Industries

One question regularly raised concerning the size premium is whether it is relevant for specific industries. In the past there has been no concrete evidence to counter the contention that a size effect exists for the economy as a whole but may not be relevant to a specific industry. The problem of supporting a size premia for a specific industry has been made difficult by a lack of data for companies in individual industries.

We have attempted to answer this question by performing an industry-specific size effect study. The study uses the Center for Research in Security Prices (CRSP) database and the following methodology:

1. Industries are defined at the two-digit SIC (Standard Industrial Classification) code level. Companies are sorted into industries using the CRSP SIC code classification system. In order to be included in the study, an industry must have a minimum of ten companies for all periods. Any industry containing less than 30 years of data was not included in the study.
2. On a calendar year-end basis, companies are ranked by market capitalization within each industry from largest to smallest. Each industry is split into a "large" and a "small" portfolio with an equal number of companies.
3. A capitalization-weighted return series is calculated for each "large" and "small" portfolio. The excess return for each industry is represented by the "small" portfolio arithmetic return less the "large" portfolio arithmetic return.

The results of the study can be found in Table 7-14. Note that a large majority of industries exhibit returns where small company stocks outperform large company stocks over extended periods.

The excess returns presented in this table should not be construed as size premia. Due to limited data, we have defined size in rather general terms. In addition, the population of companies in most industries is very small. Table 7-14 only provides evidence that smaller companies have generally outperformed larger companies across industries. The size premium study presented earlier in this chapter provides more reliable statistics as they relate to the size premium. In addition, measures of industry risk for use in the buildup model are presented in Table 3-5.

Table 7-14
Size Effect within Industries
 Summary Statistics and Excess Returns

(Through Year-end 2007)

SIC Code	Description	Years	Large Company Group		
			Geometric Mean	Arithmetic Mean	Standard Deviation
10	Metal Mining	82	8.57%	12.18%	29.09%
13	Oil and Gas Extraction	45	11.90%	14.78%	25.84%
15	Building Construction-General Contractors & Op. Builders	36	9.26%	16.60%	40.95%
16	Hvy. Construction Other than Bldg. Construction-Contractors	37	9.17%	13.15%	32.18%
20	Food and Kindred Spirits	82	11.05%	12.65%	18.77%
22	Textile Mill Products	82	6.74%	11.50%	32.34%
23	Apparel & other Finished Products Made from Fabrics & Similar	48	7.54%	12.10%	32.52%
24	Lumber and Wood Products, Except Furniture	45	8.72%	11.34%	25.24%
25	Furniture and Fixtures	38	10.26%	12.49%	21.76%
26	Paper & Allied Products	77	11.53%	14.41%	26.75%
27	Printing, Publishing and Allied Products	47	9.62%	11.70%	20.98%
28	Chemicals and Allied Products	82	11.75%	13.83%	22.17%
29	Petroleum Refining & Related Industries	82	11.80%	13.88%	21.21%
30	Rubber & Miscellaneous Plastics Products	61	11.06%	13.69%	24.93%
31	Leather & Leather Products	45	11.86%	16.29%	33.11%
32	Stone, Clay, Glass & Concrete Products	78	9.08%	12.77%	31.09%
33	Primary Metal Industries	82	8.83%	12.79%	30.46%
34	Fabricated Metal Products, Except Machinery & Trans. Equip.	82	9.86%	12.34%	22.87%
35	Industrial & Commercial Machinery & Computer Equipment	82	10.85%	14.20%	27.38%
36	Electrical Equipment & Components, Except Computer	82	9.86%	13.49%	28.19%
37	Transportation Equipment	82	11.13%	15.28%	31.66%
38	Measuring, Analyzing & Controlling Instruments	71	12.12%	14.16%	21.64%
39	Miscellaneous Manufacturing Industries	46	8.15%	11.94%	28.35%
40	Railroad Transportation	82	9.76%	12.71%	24.55%
42	Motor Freight Transportation & Warehousing	44	9.20%	12.53%	27.81%
45	Transport by Air	62	6.76%	11.11%	32.15%
48	Communications	45	9.48%	11.76%	21.92%
49	Electric, Gas & Sanitary Services	82	9.03%	11.10%	21.25%
50	Wholesale Trade-Durable Goods	62	10.07%	12.35%	22.98%
51	Wholesale Trade-Nondurable Goods	40	9.80%	12.60%	24.31%
53	General Merchandise Stores	82	9.66%	12.81%	26.32%
54	Food Stores	51	11.12%	13.54%	22.99%
56	Apparel & Accessory Stores	61	13.56%	17.59%	31.88%
57	Home Furniture, Furnishings, and Equipment Stores	35	11.95%	22.64%	58.73%
58	Eating and Drinking Places	39	10.99%	15.29%	32.29%
59	Miscellaneous Retail	45	12.53%	15.65%	26.36%
60	Depository Institutions	39	10.89%	13.04%	21.41%
61	Nondepository Credit Institutions	58	11.94%	14.84%	26.63%
62	Security and Commod. Brokers, Dealers, Exchanges	35	17.50%	23.99%	42.13%
63	Insurance Carriers	39	10.70%	12.48%	19.78%
65	Real Estate	45	7.07%	11.46%	30.33%
67	Holding & Other Investment Offices	78	10.00%	13.11%	24.98%
70	Hotels, Rooming Houses, Camps, & Other Lodging	38	10.95%	16.53%	34.89%
72	Personal Services	38	8.26%	12.73%	30.17%
73	Business Services	45	10.31%	14.91%	31.82%
78	Motion Pictures	57	11.65%	16.18%	32.97%
79	Amusement and Recreation Services	35	12.72%	16.29%	26.95%
80	Health Services	36	12.73%	18.18%	34.89%

Firm Size and Return

Table 7-14 (continued)

Size Effect within Industries

Summary Statistics and Excess Returns

(Through Year-end 2007)

SIC Code	Description	Small Company Group			Excess Return
		Geometric Mean	Arithmetic Mean	Standard Deviation	
10	Metal Mining	8.74%	16.57%	45.51%	4.38%
13	Oil and Gas Extraction	12.37%	20.28%	45.67%	5.50%
15	Building Construction-General Contractors & Op. Builders	3.58%	13.35%	44.06%	-3.25%
16	Hvy. Construction Other than Bldg. Construction-Contractors	18.60%	23.37%	36.44%	10.22%
20	Food and Kindred Spirits	12.57%	16.09%	29.80%	3.44%
22	Textile Mill Products	9.25%	14.76%	34.44%	3.26%
23	Apparel & other Finished Products Made from Fabrics & Similar	5.69%	11.38%	37.52%	-0.72%
24	Lumber and Wood Products, Except Furniture	10.80%	20.58%	52.46%	9.24%
25	Furniture and Fixtures	7.83%	11.94%	29.50%	-0.55%
26	Paper & Allied Products	15.10%	20.45%	41.47%	6.04%
27	Printing, Publishing and Allied Products	14.94%	17.85%	25.20%	6.15%
28	Chemicals and Allied Products	12.85%	18.29%	39.37%	4.45%
29	Petroleum Refining & Related Industries	13.53%	17.93%	31.63%	4.05%
30	Rubber & Miscellaneous Plastics Products	12.28%	16.74%	32.90%	3.06%
31	Leather & Leather Products	10.50%	15.46%	34.02%	-0.83%
32	Stone, Clay, Glass & Concrete Products	10.01%	14.75%	32.84%	1.98%
33	Primary Metal Industries	13.63%	19.32%	38.17%	6.52%
34	Fabricated Metal Products, Except Machinery & Trans. Equip.	11.88%	17.40%	36.99%	5.06%
35	Industrial & Commercial Machinery & Computer Equipment	12.20%	17.47%	35.22%	3.26%
36	Electrical Equipment & Components, Except Computer	11.83%	19.64%	45.39%	6.15%
37	Transportation Equipment	12.04%	18.20%	37.94%	2.92%
38	Measuring, Analyzing & Controlling Instruments	12.90%	17.73%	34.61%	3.57%
39	Miscellaneous Manufacturing Industries	7.59%	11.92%	31.37%	-0.02%
40	Railroad Transportation	8.80%	15.02%	35.94%	2.31%
42	Motor Freight Transportation & Warehousing	6.48%	12.32%	38.44%	-0.21%
45	Transport by Air	8.67%	16.87%	47.63%	5.76%
48	Communications	17.00%	24.85%	45.23%	13.10%
49	Electric, Gas & Sanitary Services	10.56%	14.11%	29.34%	3.02%
50	Wholesale Trade-Durable Goods	10.97%	16.01%	35.70%	3.66%
51	Wholesale Trade-Nondurable Goods	8.34%	11.86%	28.05%	-0.74%
53	General Merchandise Stores	8.92%	16.26%	42.81%	3.45%
54	Food Stores	10.42%	14.11%	28.99%	0.58%
56	Apparel & Accessory Stores	11.13%	17.31%	38.88%	-0.27%
57	Home Furniture, Furnishings, and Equipment Stores	14.63%	24.80%	50.41%	2.16%
58	Eating and Drinking Places	1.72%	7.50%	36.30%	-7.79%
59	Miscellaneous Retail	11.59%	16.97%	35.97%	1.32%
60	Depository Institutions	14.21%	16.90%	25.13%	3.86%
61	Nondepository Credit Institutions	12.74%	16.67%	29.94%	1.83%
62	Security and Commod. Brokers, Dealers, Exchanges	14.85%	21.70%	41.62%	-2.29%
63	Insurance Carriers	12.77%	15.56%	23.78%	3.08%
65	Real Estate	6.42%	11.22%	34.37%	-0.24%
67	Holding & Other Investment Offices	11.07%	15.24%	30.91%	2.13%
70	Hotels, Rooming Houses, Camps, & Other Lodging	6.16%	12.03%	36.49%	-4.50%
72	Personal Services	17.90%	22.10%	31.96%	9.36%
73	Business Services	13.84%	23.17%	58.64%	8.26%
78	Motion Pictures	5.38%	13.10%	45.16%	-3.08%
79	Amusement and Recreation Services	10.03%	13.85%	31.27%	-2.44%
80	Health Services	14.76%	20.93%	39.89%	2.75%

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Other Criticisms of the Size Premium

Bid/Ask Spread

All stocks have a bid/ask spread that represents the differential between the highest price a prospective buyer is prepared to pay (bid) and the lowest price a seller is willing to accept (ask). Market makers in a particular security make their money off of this spread. The spread is a form of transaction cost and is a function of the liquidity of a particular security; the greater the liquidity, the lower the bid/ask spread. In general, larger companies have more trading activity and therefore have greater liquidity and a lower bid/ask spread.

Some argue that the existence of such a spread adds a bias to all stock returns but particularly so to portfolios comprised of less liquid (generally smaller) companies that have higher bid/ask spreads. The bias arises because the movement from a bid price to an ask price creates a measured rate of return that is higher in absolute value than a movement from one ask price to another ask price. Since trades occur randomly at either the bid or the ask price, some bias may slip into the measured returns. This bias can be especially pronounced if one is measuring rates of return on a daily basis. Most studies (e.g., Ibbotson Associates and PricewaterhouseCoopers) calculate returns at the portfolio level on a monthly basis and then compound the portfolio returns for each of the 12 months of the year to obtain an annual rate of return.

The "bid/ask bias" is a valid concern that deserves some consideration. Most studies of the small stock effect use the Center for Research in Security Prices (CRSP) database to measure rates of return. CRSP generally uses the closing price, which will be either a "bid" or an "ask," to measure the rates of return. If there are no trades on a given day, CRSP will use the average of the "bid" and "ask" prices. Note that the most illiquid stocks (those with the highest bid/ask spreads) will be the least likely to trade on a given day. For these stocks, CRSP uses the bid/ask average, which automatically rectifies the "bias" to some extent.

The "bid/ask bias" has only a trivial impact on the observed size/return relationship. Average bid/ask spreads are less than four percent of the underlying stock price for all but the very smallest portfolios of stocks.⁷ Spreads of under four percent could give rise to biases in measured returns that are at most 50 basis points (assuming that annual returns are being compounded from monthly portfolio results, as in the Ibbotson and PricewaterhouseCoopers studies), yet the size/return relationship is manifest even for mid-sized public companies.

Geometric versus Arithmetic Averages

It has been suggested that using geometric averages to formulate discount rates will correct for the alleged "bid/ask bias." This argument is completely spurious. The difference between the geometric and arithmetic averages has nothing whatsoever to do with the bid/ask bounce. Both measures are built up from the same underlying monthly return measurements. Geometric averages are always less than arithmetic averages as a matter of mathematical law, not as a result of the bid/ask spread. Though using geometric averages produces a lower discount rate, the lower rate cannot be attributed to a correction of the bid/ask spread.

⁷ Amihud, Yakov, and Haim Mendelson. "Asset Pricing and the Bid-Ask Spread," *Journal of Financial Economics*, Vol. 17, 1986, pp. 223-249.

Infrequent Trading and Small Stock Betas

It has been argued that betas for smaller, less frequently traded stocks are mismeasured; in particular, they tend to be too low. If small stock betas were sufficiently high to measure their true systematic risk, then the small stock premium might disappear. This possibility has been offered as an argument against the use of a small stock premium in calculating discount rates.

With a little bit of thought, one should come to a very different conclusion. If small stocks have high returns because they have high betas, and if methods of measuring betas for smaller companies produce betas that are too low, then in the context of the CAPM some sort of adjustment is necessary in order to produce a discount rate of the right magnitude. A small stock premium is one such adjustment.

The Ibbotson Associates size premia study presented earlier in this chapter demonstrates this concept. Beta is calculated for each decile for the entire history back to 1926. These betas are then plugged into the capital asset pricing model to produce decile costs of equity under CAPM, which are then compared to the actual returns that the deciles achieved over this period of history. For all but the largest decile, CAPM underestimates the cost of equity. The amount of this underestimation is termed the size premium.

As was noted earlier in this chapter, it is possible to estimate beta with a different regression equation to take into account the infrequent trading of small-capitalization stocks. One can accomplish this either by using the sum beta technique or by measuring beta with annual data. As seen in Tables 7-10 and 7-11, these techniques increase the cost of equity as predicted by CAPM, but fail to completely eradicate the size premium.

Transaction Costs

It has been argued that, because of high bid/ask spreads and other transaction costs, an investor in publicly traded small stocks is not able to realize returns as high as those we observe in the historical record. According to one theory, small stocks earn high returns in order to compensate investors for high transaction costs. However, in valuing a business, one typically applies to cash flows a discount rate that does not reflect the buyer's or the seller's transaction costs. It would be inconsistent to also use a discount rate that reflects a rate of return on a "net of transaction cost" basis.

Delisted Return Bias

Tyler Shumway published some evidence that the CRSP database omits delisting returns for a large number of companies.⁸ This creates a potential bias because stocks generally experience negative returns upon delisting. Since delisting is concentrated in firms with small market values, this has been offered as a partial explanation of the observed size effect.

Shumway's data revealed that the possible bias is trivial for all but the very smallest companies, yet the historical size effect is still evident in mid-cap companies. Therefore, this bias would explain little of the observed historical relationship.

PricewaterhouseCoopers revised its methodology to take into account the Shumway evidence. Shumway reported that the average delisting rate of return for companies for which he could find data

⁸ Shumway, Tyler. "The Delisting Bias in CRSP Data," *Journal of Finance*, Vol. 52, 1997, pp. 327-340.

was approximately minus 30 percent. The PricewaterhouseCoopers calculations thus assumed a rate of return upon delisting of minus 30 percent for any company for which CRSP lacks delisting return data. This adjustment did not greatly affect the results of the 25 size portfolios in the *Original PricewaterhouseCoopers Risk Premia Study*. Even for the very smallest (25th) portfolio, the adjustment lowered the observed average return by only 22 basis points (less than one percent). For the rest of the portfolios, the adjustment was even smaller or non-existent.

CRSP questions, in its CRSP Delisting Returns Study, “whether or not using one replacement value for all missing delisting returns associated with poor performance delists is the most appropriate solution.” CRSP further implies that using one single replacement value may create more bias in the data than would otherwise have existed because of the “significant variation in the average delisting returns for individual delist codes...” The “codes” represent groupings of firms that were delisted from an exchange for the same reason.

In the table below borrowed from the study, geometric annual returns of the 10 deciles are calculated over the 1926–2000 period in three ways: (1) Without Replacements—calculated without any substitution of the missing returns, as outlined on page 129 of this chapter, (2) Treating partial-month returns as delisting returns; partial-month returns are calculated by using the last daily trade price or bid-ask spread for the month in which the security delisted, if no post-delist value can be found, and (3) Using one of the three single-replacement values, based on the assumption “that all issues with missing delisting returns lost an additional 30, 55, or 100 percent of their pre-delist value after leaving the exchange.”

Table 7-15[†]

**Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Geometric Annual Returns
With or Without Single-replacement Values
1926–2000**

	Without Replacements	Partial	-30%	-55%	-100%
1 – Largest	10.31%	10.31%	10.31%	10.31%	10.31%
2	11.28	11.27	11.27	11.27	11.27
3	11.58	11.58	11.58	11.58	11.57
4	11.53	11.53	11.53	11.53	11.53
5	11.81	11.81	11.81	11.81	11.81
6	11.82	11.84	11.83	11.83	11.82
7	11.57	11.57	11.57	11.56	11.55
8	11.65	11.66	11.65	11.64	11.63
9	11.75	11.75	11.74	11.74	11.72
10 – Smallest	13.11	13.11	13.05	13.00	12.92

The highest difference between the returns calculated using a single-replacement value and no replacement value is 19 basis points in the case of the smallest decile portfolio (Decile 10: 13.11%–12.92%); hence, single-replacement values have little impact on the overall decile portfolios. Consequently, the potential upward bias in the size premia—constructed by applying

† Source: © 200801 CRSP®, Center for Research in Security Prices, Graduate School of Business, The University of Chicago used with permission. All rights reserved. www.crsp.chicagosgb.edu

Ibbotson Associates' methodology to CRSP's NYSE/AMEX/NASDAQ Size-Decile Portfolios—is not evident, since the bias of the missing delisting returns (discussed by Shumway) does not manifest when decile portfolio returns are calculated with and without single-replacement values. For more information on delisting returns, visit CRSP's web site at <http://www.crsp.chicagogsb.edu/>.

Small Stock Returns Are Unpredictable

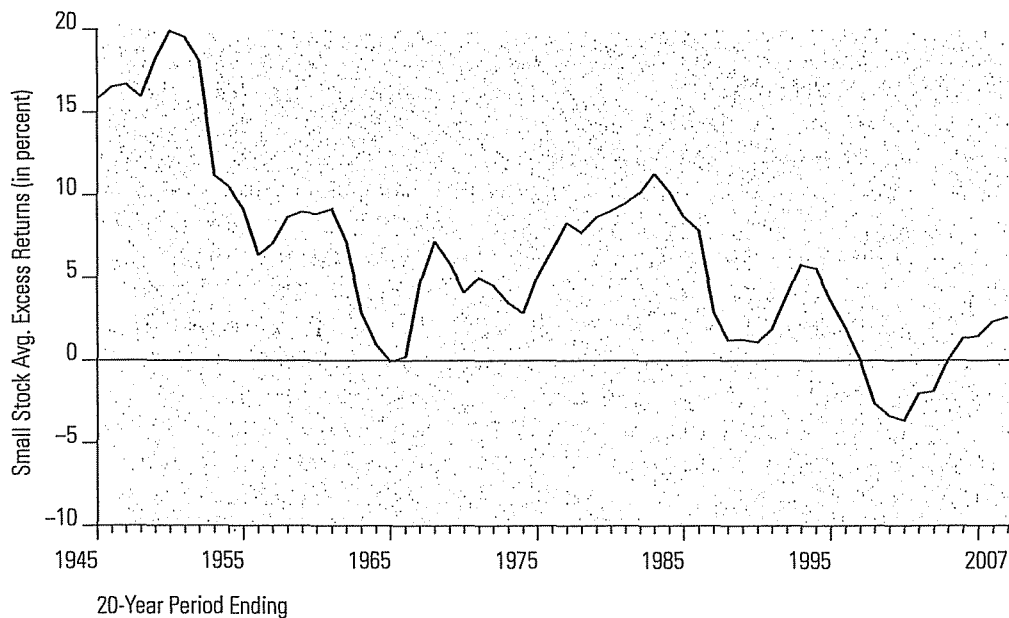
Since investors cannot predict when small stock returns will be higher than large stock returns, it has been argued that they do not expect higher rates of return for small stocks. As was illustrated earlier in this chapter, even over periods of many years, investors in small stocks do not always earn returns that are higher than those of investors in large stocks. By simple definition, one cannot expect risky companies to always outperform less risky companies; otherwise they would not be risky. Over the long-term, however, investors do expect small stocks to outperform large stocks.

The unpredictability of small stock returns has given rise to another argument against the existence of a size premium: the argument that markets have changed so that there is no longer such a thing as a size premium. As evidence, one might observe the last 20 years of market data to see that the performance of large-capitalization stocks was basically equal to that of small-capitalization stocks. In fact, large-capitalization stocks have outperformed small-capitalization stocks in four of the last ten years.

While the 20-year returns of small-capitalization stocks currently seem low in comparison to large-capitalization stocks, the same relationship has been true in the past. Graph 7-10 shows the average excess returns of small stocks versus large stocks over historical rolling 20-year time periods. (Small stocks are represented by the CRSP NYSE/AMEX/NASDAQ deciles 9 and 10. The S&P 500 represents large stocks. The excess return is calculated by subtracting the large stock returns from the small ones.) The graph shows that over the most recent 20-year rolling periods, small-capitalization stocks have not always outperformed large-capitalization stocks.

As was noted earlier in this chapter, one thing that we do know about the size premium is that it is cyclical in nature. Most market returns (including those of large- and small-capitalization stocks) have no historical pattern; however, this is not true of the size premium. It is not unusual for the size premium to follow several years of consistently positive values with several years of consistently negative values. Given the cyclical nature of the size premium, it is therefore not surprising that in recent years large-capitalization stocks have dominated small-capitalization stocks. We should actually expect periods of small stock underperformance as well as overperformance in the future.

Graph 7-10[†]
Small Stock Average Excess Returns over 20-year Rolling Periods
 1926–2007



Conclusion

Most criticisms of the use of size premia do not address the underlying reason for the existence of size premia. Small-capitalization stocks are still considered riskier investments than large company stocks. Investors require an additional reward, in the form of additional return, to take on the added risk of an investment in small-capitalization stock. It is unlikely that in the future investors will require no compensation for taking on this additional risk.

The size premium will undoubtedly continue to be questioned in some quarters. The goal of this section was to review the most common arguments against its existence. Most criticisms presented to date, however, have not provided sufficient evidence to disprove the existence of a size premium.

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Firm Size and Return

Table 7-16[†]
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 Year-by-Year Returns

from 1926 to 1970

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
1926	0.1359	0.0598	0.0248	0.0226	-0.0236	0.0522	-0.0143	-0.1085	-0.0815	-0.0567
1927	0.3407	0.3051	0.3150	0.3890	0.3434	0.2558	0.3468	0.2833	0.2567	0.2619
1928	0.3920	0.3764	0.3843	0.3471	0.5520	0.2718	0.3520	0.3174	0.3983	0.6895
1929	-0.1080	-0.0793	-0.2184	-0.3431	-0.2510	-0.4096	-0.3725	-0.4019	-0.4973	-0.5266
1930	-0.2452	-0.3743	-0.3527	-0.3488	-0.3578	-0.3643	-0.3624	-0.4931	-0.4463	-0.4807
1931	-0.4141	-0.5115	-0.4628	-0.4609	-0.4696	-0.5174	-0.4881	-0.4928	-0.5029	-0.4942
1932	-0.1094	0.0252	-0.0374	-0.1264	-0.1378	0.0726	-0.1440	0.0246	-0.0093	0.3981
1933	0.4601	0.7625	1.0089	1.1243	0.9510	1.0247	1.1046	1.7322	1.7477	2.1844
1934	0.0208	0.0583	0.0864	0.1845	0.0929	0.1951	0.1434	0.3076	0.2156	0.3489
1935	0.4170	0.5630	0.3705	0.3751	0.6525	0.5091	0.6671	0.6459	0.5849	0.8226
1936	0.2990	0.3437	0.2736	0.4170	0.4952	0.4927	0.5413	0.5036	0.8772	0.8523
1937	-0.3188	-0.3699	-0.3812	-0.4371	-0.4852	-0.4664	-0.4984	-0.5300	-0.5230	-0.5643
1938	0.2494	0.3401	0.3423	0.3512	0.5040	0.4189	0.3574	0.4344	0.3388	0.0540
1939	0.0480	-0.0388	-0.0279	0.0042	0.0173	0.0603	0.0482	-0.0425	-0.0526	0.1737
1940	-0.0702	-0.0884	-0.0844	-0.0405	-0.0079	-0.0580	-0.0574	-0.0632	-0.0491	-0.3114
1941	-0.1069	-0.0778	-0.0590	-0.0984	-0.1197	-0.0990	-0.0890	-0.0893	-0.1253	-0.1798
1942	0.1337	0.2365	0.2026	0.2031	0.2097	0.2463	0.2915	0.2971	0.4429	0.8021
1943	0.2344	0.3526	0.3343	0.4049	0.4949	0.4129	0.7226	0.7146	0.8725	1.3764
1944	0.1719	0.2539	0.2299	0.3309	0.4004	0.4405	0.3841	0.4888	0.5649	0.7055
1945	0.2950	0.4764	0.5448	0.6366	0.5341	0.6117	0.6509	0.6896	0.7690	0.9559
1946	-0.0446	-0.0439	-0.0794	-0.1267	-0.0896	-0.0615	-0.1484	-0.1533	-0.0972	-0.1833
1947	0.0578	0.0079	-0.0013	0.0207	0.0341	-0.0335	-0.0217	-0.0323	-0.0356	-0.0053
1948	0.0371	0.0016	0.0253	-0.0206	-0.0252	-0.0344	-0.0329	-0.0659	-0.0741	-0.0520
1949	0.1846	0.2518	0.2595	0.1953	0.1861	0.2329	0.2177	0.1652	0.1979	0.2489
1950	0.2879	0.2892	0.2672	0.3137	0.3703	0.3387	0.3786	0.3995	0.4132	0.5514
1951	0.2141	0.2286	0.2116	0.1663	0.1439	0.1372	0.1812	0.1511	0.1125	0.0685
1952	0.1428	0.1294	0.1213	0.1190	0.1107	0.1012	0.1039	0.0767	0.0852	0.0230
1953	0.0115	0.0169	0.0033	-0.0136	-0.0293	-0.0095	-0.0241	-0.0772	-0.0464	-0.0818
1954	0.4850	0.4815	0.5892	0.5083	0.5673	0.5956	0.5738	0.5287	0.6366	0.6863
1955	0.2846	0.1877	0.1834	0.1933	0.1770	0.2267	0.1843	0.2024	0.2055	0.2556
1956	0.0795	0.1108	0.0741	0.0902	0.0806	0.0594	0.0830	0.0523	0.0590	-0.0072
1957	-0.0931	-0.0869	-0.1285	-0.1079	-0.1384	-0.1821	-0.1677	-0.1855	-0.1423	-0.1685
1958	0.4073	0.4969	0.5407	0.5965	0.5583	0.5629	0.6817	0.6527	0.7145	0.6975
1959	0.1236	0.0967	0.1363	0.1523	0.1994	0.1517	0.1988	0.1799	0.2011	0.1542
1960	0.0037	0.0548	0.0482	0.0128	-0.0165	-0.0087	-0.0586	-0.0507	-0.0378	-0.0690
1961	0.2627	0.2710	0.2893	0.2934	0.2856	0.2699	0.3042	0.3378	0.3021	0.3201
1962	-0.0878	-0.0959	-0.1194	-0.1296	-0.1634	-0.1793	-0.1641	-0.1474	-0.1701	-0.1456
1963	0.2249	0.2141	0.1647	0.1712	0.1273	0.1853	0.1782	0.1997	0.1280	0.1117
1964	0.1599	0.1428	0.1997	0.1625	0.1623	0.1666	0.1597	0.1714	0.1532	0.2094
1965	0.0893	0.1925	0.2483	0.2425	0.3217	0.3776	0.3373	0.3190	0.3194	0.4315
1966	-0.1027	-0.0574	-0.0507	-0.0623	-0.0721	-0.0452	-0.0955	-0.0864	-0.0589	-0.1008
1967	0.2197	0.2079	0.3169	0.4564	0.5145	0.5343	0.6472	0.8133	0.9064	1.1416
1968	0.0753	0.1654	0.1979	0.1829	0.2759	0.3047	0.2673	0.4047	0.3711	0.6136
1969	-0.0584	-0.1295	-0.1172	-0.1662	-0.1808	-0.1871	-0.2445	-0.2471	-0.3158	-0.3290
1970	0.0231	0.0182	0.0330	-0.0699	-0.0601	-0.0593	-0.0973	-0.1614	-0.1526	-0.1785

Table 7-16 (continued)
Size-Decile Portfolios of the NYSE/AMEX/NASDAQ
 Year-by-Year Returns

from 1971 to 2007

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
1971	0.1484	0.1328	0.2011	0.2472	0.1890	0.2244	0.2018	0.1735	0.1647	0.1853
1972	0.2212	0.1278	0.0938	0.0881	0.0863	0.0695	0.0632	0.0205	-0.0229	-0.0057
1973	-0.1274	-0.2266	-0.2278	-0.2680	-0.3217	-0.3191	-0.3702	-0.3534	-0.3897	-0.4203
1974	-0.2803	-0.2441	-0.2458	-0.2834	-0.2167	-0.2694	-0.2558	-0.2423	-0.2635	-0.2715
1975	0.3169	0.4573	0.5363	0.6168	0.5966	0.5675	0.6326	0.6579	0.6649	0.7579
1976	0.2073	0.3045	0.3811	0.4008	0.4363	0.4808	0.5018	0.5690	0.5101	0.5516
1977	-0.0884	-0.0367	0.0109	0.0376	0.1126	0.1408	0.1754	0.2261	0.2022	0.2310
1978	0.0637	0.0229	0.1084	0.0974	0.1207	0.1637	0.1705	0.1632	0.1605	0.2815
1979	0.1519	0.2871	0.3061	0.3516	0.3557	0.4888	0.4206	0.4638	0.4594	0.4158
1980	0.3275	0.3442	0.3186	0.3043	0.3193	0.3141	0.3623	0.3233	0.3823	0.3071
1981	-0.0833	0.0059	0.0372	0.0403	0.0484	0.0677	-0.0040	0.0055	0.0802	0.0856
1982	0.1964	0.1749	0.2081	0.2566	0.3076	0.2940	0.2919	0.2955	0.2608	0.2855
1983	0.2057	0.1686	0.2662	0.2633	0.2626	0.2589	0.2727	0.3721	0.3130	0.3690
1984	0.0840	0.0770	0.0253	-0.0458	-0.0269	0.0248	-0.0426	-0.0745	-0.0896	-0.1951
1985	0.3137	0.3770	0.2910	0.3390	0.3115	0.3097	0.3255	0.3651	0.3077	0.2582
1986	0.1801	0.1810	0.1636	0.1732	0.1512	0.0871	0.1250	0.0387	0.0572	0.0040
1987	0.0504	0.0036	0.0393	0.0167	-0.0402	-0.0509	-0.0843	-0.0804	-0.1269	-0.1488
1988	0.1486	0.1982	0.2126	0.2237	0.2138	0.2336	0.2394	0.2854	0.2285	0.2105
1989	0.3295	0.3008	0.2629	0.2308	0.2423	0.2107	0.1785	0.1788	0.1058	0.0550
1990	-0.0088	-0.0853	-0.1015	-0.0875	-0.1409	-0.1849	-0.1532	-0.1979	-0.2460	-0.3128
1991	0.3039	0.3463	0.4140	0.3883	0.4811	0.5326	0.4421	0.4707	0.5066	0.4807
1992	0.0474	0.1577	0.1387	0.1249	0.2613	0.1878	0.1920	0.1287	0.2495	0.3398
1993	0.0732	0.1319	0.1614	0.1562	0.1694	0.1726	0.1900	0.1853	0.1658	0.2558
1994	0.0174	-0.0174	-0.0423	-0.0098	-0.0166	0.0034	-0.0252	-0.0308	-0.0309	-0.0298
1995	0.3940	0.3526	0.3533	0.3275	0.3324	0.2692	0.3264	0.2935	0.3500	0.3047
1996	0.2375	0.1962	0.1714	0.1883	0.1366	0.1737	0.1965	0.1720	0.2064	0.1722
1997	0.3486	0.3012	0.2512	0.2611	0.1565	0.2864	0.3003	0.2538	0.2554	0.2204
1998	0.3515	0.1272	0.0758	0.0724	0.0054	0.0116	-0.0090	0.0098	-0.0503	-0.1155
1999	0.2450	0.1976	0.3433	0.3006	0.2595	0.3492	0.2570	0.3886	0.3430	0.2809
2000	-0.1362	-0.0030	-0.0620	-0.0997	-0.0710	-0.1028	-0.1068	-0.1300	-0.1336	-0.1295
2001	-0.1529	-0.0882	-0.0411	-0.0095	-0.0214	0.0952	0.1226	0.2111	0.3168	0.3672
2002	-0.2246	-0.1736	-0.1934	-0.1771	-0.1778	-0.2122	-0.2298	-0.1997	-0.1870	-0.0550
2003	0.2568	0.3738	0.4029	0.4438	0.4090	0.4877	0.5079	0.5775	0.6825	0.9232
2004	0.0794	0.2013	0.1796	0.1874	0.1734	0.2205	0.1888	0.2189	0.1518	0.1857
2005	0.0371	0.1215	0.1237	0.1059	0.1011	0.0306	0.1057	0.0751	0.0211	0.0591
2006	0.1561	0.1559	0.1453	0.1164	0.1557	0.1504	0.1627	0.1773	0.1723	0.1947
2007	0.0715	0.0745	0.0362	0.0436	0.0798	0.0502	-0.0181	-0.0574	-0.0655	-0.0988

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STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-2 KXD-2

Requested By: Kwaku Duah

Date of Request: May 13, 2011

Response Due: May 23, 2011

Witness: John M. Watkins

Subject: Parent's Capital Structure

- a. Provide the parent company's (AWW) actual capital structure as of December 31 for each of the years 2007 to 2010.
- b. Provide the parents' pro-forma capital structure for the calendar years 2011 and 2012

Response:

- a. Please refer to the attachment for AWW capital structure.
- b. Because AWW is a publicly traded company, and due to securities law restrictions (for example restrictions on forward-looking information) AWW considers this information extremely proprietary and does not disclose such forecasted information.

American Water Works Company, Inc.
 Parent Company (AWK)
 Consolidated Capital Structure
 (Dollars in thousands)

	At December 31, 2007	At December 31, 2008
Common stock	\$1,600	\$1,600
Paid-in-capital	5,637,947	5,888,253
Accumulated deficit	(1,079,118)	(1,705,594)
Accumulated other comprehensive loss	(18,383)	(82,251)
Treasury stock	-	(7)
Common stockholders' equity	<u>4,542,046</u>	<u>4,102,001</u>
Preferred stock of subsidiary companies without mandatory redemption requirements	<u>4,568</u>	<u>4,557</u>
Total stockholders' equity	<u>4,546,614</u>	<u>4,106,558</u>
Long-term debt	4,674,837	4,624,063
Redeemable Preferred stock	24,296	24,150
Total capitalization excluding current portion of long-term debt	<u>\$9,245,747</u>	<u>\$8,754,771</u>
Short-term debt	\$220,514	\$479,010
Current-portion of long-term debt	96,455	175,822

At December 31, 2009	At December 31, 2010
<u>\$1,746</u>	<u>\$1,750</u>
6,140,077	6,156,675
(2,076,287)	(1,959,235)
(64,677)	(71,446)
-	(19)
<u>4,000,859</u>	<u>4,127,725</u>
<u>4,557</u>	<u>4,547</u>
<u>4,005,416</u>	<u>4,132,272</u>
5,288,180	5,410,271
23,946	23,271
<u>\$9,317,542</u>	<u>\$9,565,814</u>
\$119,497	\$229,699
54,068	44,760

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-3 KXD-3

Requested By: Kwaku Duah

Date of Request: May 13, 2011

Response Due: May 23, 2011

Witness: John M. Watkins

Subject: Confirm interest rate on \$9.0 million debt

Reference page 12, lines 6 thru 7 of Mr. Watkins direct testimony that states, "In 2011, the Company proposes to reissue \$9.0 million of long-term debt and issue \$6 million of new long-term debt at an all-in rate of 6.45% and 6.60%, respectively." Reference line no.9 in page 3 of Mr. Watkins' Exhibit 7 showing an interest rate of 6.3% for long-term debt of \$9 million due in 6/30/2041.

Please confirm if the 6.3% interest rate is a current rate on the \$9.0 million debt to be reissued at an estimated higher rate of 6.45%. If not, please explain why there are two different interest rates of 6.45% and 6.3% for the same \$9 million debt in 2011.

Response:

The actual coupon rate on the \$9.0 million debt which was issued on May 19, 2011 is 5.90%. The all-in rate is projected to be 6.04% based on the actual coupon rate of 5.90% and the Issuance Expense information shown in the fifth column of Exhibit 7, page 4.

The all-in rate is calculated by taking the coupon times the principal amount divided by the principal amount less the issuance expense. Please see the below calculation for the proposed financing on line 10 of Exhibit 7, page 4.

$$(6.30\% \times \$9,000,000) / (\$9,000,000 - \$208,794)$$

=

$$(\$567,000) / (\$8,791,206) = 6.45\%$$

The Company also received a bill late in April for issuance expense related to the \$10 million bond issued on 12/15/2010. The issuance expense on line line 9 of Exhibit 9, page 4 should be \$424,644 with an all in rate of 6.27% (originally filed at \$402,144 and an all-in rate of 6.25%). Attached to this response are the revised pages 4-5 of Exhibit 7. The only number on page 5 that changed was on line 10 under the Cost Rate column. This change did not impact the overall cost rate or the weighted cost rate.

Proposed Cost of Capital
Long Island American Water Stand-Alone

Base Year: Twelve Months Ended: 12/31/10
Exhibit 7
Page 5 of 5

Long Island American Water
Case 11-W-
Witness Responsible: J. M. Watkins

Line No.	Pro Forma	Cost Rate	Weighted Cost
1			
2	Long-Term Debt		
3			
4	General Mortgage Bonds:		
5	8.46 % Series Due 12/01/2022	8.73%	0.00%
6	5.25 % Series Due 08/01/2027	5.72%	19.47%
7	4.9% Series Due 10/01/2034	5.31%	22.62%
8	6.0% Series Due 12/31/39	6.22%	14.10%
9	6.0% Series Due 12/31/40	6.27%	14.13%
10	5.9% Series Due 10/15/2037	6.04%	12.72%
11	6.6% Series Due 10/31/2041	6.60%	8.48%
12	7.0% Series Due 10/31/2042	7.00%	8.48%
13	Total Long-Term Debt	6.00%	100.00%
14			55.73%
15	Short-Term Debt		
16			
17	Notes Pending Issuance of Securities		0.00%
18			
19	Preferred Stock		
20			
21	4.50 % Series	4.50%	0.89%
22			
23			
24	Common Equity		
25			
26	Common Stock		
27	Proposed Issue		
28	Paid-In Capital		
29	Retained Earnings		
30			
31	Total Common Equity	11.50%	43.38%
32			
33			
34	Total Capitalization		100.00%
35			

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-4 KXD-4

Requested By: Kwaku Duah

Date of Request: May 13, 2011

Response Due: May 23, 2011

Witness: Mrs. Pauline Ahern

Subject: Comparable Earnings Approach

Reference Mrs. Ahern's direct testimony page 4, line 16 through page 4 line 2 that reads "...my recommendation results from the application of four well tested market-based cost of common equity models, the Discounted Cash Flow ("DCF") approach, the Risk Premium Model ("RPM"), the Capital Asset Pricing, Model ("CAPM"), and the Comparable Earnings Model ("CEM")."

For the last five years, provide a listing of the Commission's rate case decisions that have accepted the use of the Comparable Earnings Approach in determining the allowed cost of equity for utilities regulated by the Commission.

Response:

The witness is not aware of any decision of the Commission which accepted the use of the Comparable earnings Approach in determining the allowed cost of equity for utilities regulated by the Commission. This is not to say the Commission has not utilized this approach.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-11 KXD-11

Requested By: Kwaku Duah

Date of Request: May 13, 2011

Response Due: May 23, 2011

Witness: Mr. John M. Watkins

Subject: Basis for Projected Debt Cost Rates

In page 12, line 5 through 11, Mr. Wilkins stated that "In 2011, the Company proposes to reissue \$9.0 million of long-term debt and issue \$6 million of new long-term debt at an all-in rate of 6.45% and 6.60%, respectively. In 2012, the Company proposes to issue \$6.0 million of long-term debt at an all-in rate of 7.00%."

Please provide the basis for the projected debt cost rates of 6.45%, 6.60%, and 7.00% indicated above.

Response:

Determining the projected all-in rate of 6.45% had two components. The projected coupon rate of 6.30% was an indicative rate based on the market condition at the time the rate was provided and was subject to change due to market volatility. Please refer to the response to IR-3 KXD-3 for the actual coupon rate of the debt issued on May 19, 2011. The second component is the issuance expense which includes the call premium and the unamortized issuance expense of the previous bond. The two components combined determine the all-in rate of 6.45%.

Determining the projected coupon rates of 6.60% and 7.00% for the future debt issuances in 2011 and 2012 was also based on the market conditions at the time the rates were provided and are subject to change due to market volatility.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-43 KXD-14
Requested By: Kwaku Duah
Date of Request: May 31, 2011
Response Due: June 11, 2011
Witness: Ms. Pauline Ahern
Subject: Proxy Group

Did Ms. Ahern used two proxy groups consisting of 8-water company proxy group and a 9-LDCs Gas proxy group in recommending the companies' ROEs in cases 09-W-0824 and 09-W-0828 for United Water New Rochelle and United Water Westchester, Inc,[sic] respectively? If so, explain why in this current case, she used only the 8-water company proxy group.

Response:

A proxy group of six (6) water companies and a proxy group of eight (8) natural gas distribution companies (LDCs) were used in Case 09-W-0824 (United Water New Rochelle, Inc.) and Case 09-W-0828 (United Water Westchester, Inc.). Since the filing of these two cases in November 2009, I have reviewed the relative risk of the water, electric, combination electric, gas and natural gas distribution industries and have concluded that the investment risk of water utilities has increased over the most recent ten years and water utilities currently face greater investment risk relative to electric, combination electric and gas and natural gas utilities. Please see pages 7 through 20 of my Prepared Direct Testimony and Schedules PMA-2 and PMA-3 of the accompanying exhibits. Therefore, in this witness' opinion, it is not appropriate to use electric, combination electric and gas or natural gas distribution utilities when estimating the cost rate of common equity for a water utility.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-44 KXD-15
Requested By: Kwaku Duah
Date of Request: May 31, 2011
Response Due: June 11, 2011
Witness: Ms. Pauline Ahern
Subject: Electric Proxy Group

In page 43, line 5-8, Ms. Ahern stated that "I have assessed the market-based common equity cost rates of companies of relatively similar, but not necessarily identical risk, i.e., proxy group(s) for insight into a recommended common equity cost rate applicable to LIAW and suitable for cost of capital purposes."

State whether the company (LIWC) has ever used an electric proxy group or a combination of electric and water proxy groups in recommending its return on equity in any rate case proceedings over the past 25 years

Your response should include the year and the case number for any rate case you identify.

Response:

It is my understanding that Long Island American Water Company's rate of return witness in Case 07-W-0508 and Case 04-W-0577 used an electric utility proxy group. Since prior to 1999, Long Island American Water Company was not a wholly-owned subsidiary of American Water Works Company, neither I, nor the Company has information relative to prior rate cases.

Please refer to the response to IR-43 KXD-14 for my position regarding the use of non-water utilities in the estimation of a cost rate of common equity for a water utility company.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-78 KXD-26
Requested By: Kwaku Duah
Date of Request: June 10, 2011
Response Due: June 20, 2011
Witness: John M. Watkins
Subject: Ring-fencing

Please simply answer either "Yes" or "No" to each of the following questions.

1. Is the regulated utility placed in a Special Purpose Entity, which is legally separate from the non-regulated affiliates of the parent?
2. Is the utility managed separately from its parent with a separate Board of Directors?
3. Are there any limits imposed by the Commission on the LIWC's capital structure, e.g. a minimum common equity percentage in the capital structure?
4. Are there any limits imposed by the Commission or the parent on inter-company guarantees and loans—including loans to money pools from AWW and its many regulated and unregulated subsidiaries?
5. Are there limits imposed on LIWC by the Commission on dividends payments from the subsidiary, LIWC, to the parent company, AWW?
6. Is there a written Affiliate Code of Conduct in place for AWW and its many regulated and unregulated subsidiaries?
7. Has the parent, AWW, implemented a "Golden Share" of a new class of preferred stock with a bankruptcy veto right controlled by an independent party to prevent LIWC from being forced into bankruptcy as a result of AWW's financial condition?

Response:

1. LIAW is a separate legal entity apart from its parent. It is not in a Special Purpose Entity.
2. Yes.
3. No. The Company is not aware of any limits imposed by the Commission applicable specifically to LIAW's capital structure.
4. No, there are no limits imposed by AWW to its subsidiaries. However, each state has a short-term borrowing limit with

American Water Capital Corp. ("AWCC") that is renewed annually and may be adjusted throughout the year if necessary. AWW does not guarantee any of the regulated subsidiaries.

5. No. There are no known dividend payment restrictions imposed by the Commission specifically on LIAW.
6. There is no such single document regarding affiliate transactions with respect to AWW, American Waterworks Service Company, Inc., and LIAW.
7. No.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-86 KXD-29

Requested By: Kwaku Duah

Date of Request: June 16, 2011

Response Due: June 26, 2011

Witness: John M. Watkins

Subject: Financing Option of Planned Security Issuances

Reference page 12, lines 5 through 11 of Mr. Watkins direct testimony that states, "In 2011, the Company proposes to reissue \$9.0 million of long-term debt and issue \$6 million of new long-term debt at an all-in rate of 6.45% and 6.60%, respectively... In 2012, the Company proposes to issue \$6.0 million of long-term debt at an all-in rate of 7.00%."

- a) Has the company considered using tax-exempt financing for the aggregate long-term debt of \$12 million (The \$6 million in 2011 and another \$6 million in 2012)?
- b) If yes, what are the estimated interest rates associated with those debt issuances? If no, please explain why the company did not consider the tax-exempt financing option.
- c) In the past, has the company ever relied on American Water Capital Corporation (AWCC), the affiliate company, to raise debt securities?
- d) If yes, to the best of your knowledge, is it likely that the Company will rely on American Water American Water Capital Corporation (AWCC) to raise, either in part or whole, the aggregate long-term debt of \$12 million debt security? If no, please explain.

Response:

- a) Yes, the Company considered using tax-exempt financing and traditionally considers qualification for the tax-exempt issuance and associated all-in costs first before exploring the taxable market.
- b) Based on current market conditions, a tax-exempt long-term debt issuance in May 2012 would have an estimated all-in rate of 6.40% and a taxable issuance would have an

estimated all-in rate of 6.35%. Based on capital market volatility, these rates change daily.

- c) LIAW traditionally relies on its financing subsidiary, AWCC, to raise its debt thereby benefiting from AWCC's strong credit rating and economy of scale.
- d) It is very likely that LIAW will rely on AWCC to raise the \$12 million debt as that will lower LIAW's funding cost.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-104 KXD-35
Requested By: Kwaku Duah
Date of Request: June 27, 2011
Response Due: July 8, 2011
Witness: Mr. John M. Watkins
Subject: Expenses on Equity Infusions

Reference page 12, lines 17 to 20 of your direct testimony in which you stated, "The Company intends to maintain its capital structure and is prepared to receive an infusion of \$3.0 million from its parent, AWW, in 2011. The Company is prepared to receive an infusion of \$3.25 million in 2012."

- a. Please state whether the amount of equity infusion for the rate year is \$3.25 million or \$6.25 million.
- b. To the best of your knowledge, what are the estimated dollar values of the costs/expenses to be borne by LIWC due to the \$3.0 million and \$3.25 million equity infusions?

Response:

- a. The rate year is for the period 4/1/2012 through 3/31/2013, therefore the projected equity infusion for the rate year is \$3.25 million.
- b. No costs/expenses are to be borne by LIAW due to the \$3.0 million and \$3.25 million equity infusions, please also see the response to IR-102 KXD-33.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE
INTERROGATORY/DOCUMENT REQUEST
LONG ISLAND AMERICAN WATER

Request No.: IR-122 KXD-36
Requested By: Kwaku Duah
Date of Request: July 6, 2011
Response Due: July 16, 2011
Witness: Mr. John M. Watkins
Subject: Derivation of Taxable and Non-Taxable Debt Rates

Reference your response to Staff IR-86 (KXD-29) in which you stated, "Based on current market conditions, a tax-exempt long-term debt issuance in May 2012 would have an estimated all-in rate of 6.40% and a taxable issuance would have an estimated all-in rate of 6.35%."

Please provide the calculations, assumptions, and work papers supporting the derivation of the estimated all-in rate of 6.40% for the tax-exempt debt and 6.35% for the taxable debt.

Response:

Please see attachment, the Bloomberg screen shot of US Utility BBB+ forward curve for May 2012 at 5.95%, to which we added 40 bps in premium to arrive at 6.35% for taxable debt. Upon guidance by investment bankers that the rate in the tax-exempt bond market would be approximately the same as the taxable rate, we added 5 bps to adjust for additional issuance cost such as bond counsel fees to arrive at 6.40% for tax-exempt debt.

<HELP> for explanation.

Muni FWCV



FORWARD CURVE ANALYSIS
USD US Utility BBB+

BASE CURVE DEFAULTS - BGN		TERM	YIELD	5/30/12	P
Curve Dated:	6/21/11	1 Wk	0.7125	1.7615	R
Settlement Date:	6/21/11	D 1 Mo	0.7161	1.7908	O
Coupon/Spot:	C	E R 2 Mo	0.7284	1.8279	J
Bid/Ask/Mid:	B	P A 3 Mo	0.7476	1.8636	E
FMC #38 or SWDF #		O T 4 Mo	0.7744	1.8961	C
		S E 5 Mo	0.8107	1.9307	T
		I S 6 Mo	0.8545	1.9631	E
		T 9 Mo	1.0212	2.0507	D
		1 Yr	1.1910	2.1296	
		2 Yr	1.6904	2.4094	
		B E 3 Yr	2.0262	2.7899	
		O Q 4 Yr	2.4181	3.2552	
		N U 5 Yr	2.8562	3.5369	
		D I 7 Yr	3.4963	4.2996	
		V 10Yr	4.3228	4.9088	
		15Yr	5.0933	5.5886	
		20Yr	5.6041	5.9542	
		30Yr	5.5709	n/a	

- 1 Graph
- 2 Update Curve
- 3 Forwards Analysis
- 4 FWCM <GO>
- 5 Enhanced Swap Curve

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LONG ISLAND AMERICAN WATER
Summary of Staff's Rate of Return

Proposed Capital Structure and Costs For Rate Year Ending March 31, 2013

	<u>Percent of Capital</u>	<u>Cost Rate</u>	<u>Weighted Cost</u>
Long Term Debt	56.19%	5.68%	3.19%
Preferred Stock	0.05%	4.50%	0.00%
Common Equity	<u>43.76%</u>	8.90%	3.89%
	<u>100.0%</u>		<u>7.09%</u>

Capital Structure Of American Water Works Less Goodwill

	<u>Amount (\$000)</u>	<u>Percent of Capital</u>	<u>Cost Rate</u>	<u>Weighted Cost</u>
Long Term Debt	\$ 5,478,302	65.53%	5.93%	3.89%
Preferred Stock	\$ 4,547	0.05%	4.50%	0.00%
Goodwill	\$ 1,250,692			
Common Equity with Goodwill	\$ 4,127,725			
Common Equity less Goodwill	<u>\$ 2,877,033</u>	<u>34.41%</u>	0.00%	0.00%
	<u>\$ 8,359,882</u>	<u>100.0%</u>		<u>3.89%</u>

Business & Money

Texas Ring Fence

TXU's buyout structure creates a potential model for utility M&A and refinancing deals

TERRY A. PRATT

Few electric utilities have experienced more change in one year than TXU Corp. did in 2007.

In February, TXU was a publicly held company, whose shareholders were well rewarded by the stock price movement over the previous year. The company was engaged in a \$11 billion program to build 11 new coal-fired power plants totaling 8,600 MW to solidify its competitive position in the unregulated Texas electricity markets — a goal that made it a prime target of environmental groups at that time. TXU had \$12 billion in debt and a BBB- rating.

By November, TXU was privately

held by a Kohlberg Kravis Roberts & Co. (KKR) and TPG Capital (TPG)-led consortium. It had cancelled eight of the 11 coal plants — or about 6,400 MW — and thereby gained the alliance of several environmental groups to endorse the KKR- and TPG-led buyout. The new company, Energy Future Holdings Corp. (EFH), had about \$39 billion in debt and a B- rating.

What a difference ten months can make.

Private equity has had mixed results in acquiring utility assets, with success measured by getting regulators to agree a deal is in the public interest — mainly a question of keeping rates low and providing reliable service. With TXU, regulators had a different role, because about 75 percent of cash came from unregulated operations. Regulated T&D service provided the rest. EFH and its private-equity sponsors developed successful strategies to deal with opposition to the overall buyout of the firm and to deal effectively with Texas regulators on the profitable T&D unit.

Many of the measures they adopted for EFH's regulated T&D unit could prove highly

influential in supporting more private-equity buyouts of utility assets in the years to come, or in adding leverage to utility ownership structures without harming ratings at regulated units.

Buying Different Future Value

Recent private-equity deals for utility assets offer some contrast to the TXU buyout. Examples include the \$3 billion Duquesne Light Holdings acquisition by a consortium of Macquarie Infrastructure Partners and publicly listed fund Diversified Utility and Energy Trusts; and the failed \$2.2 billion buyout of North Western Corp. by Babcock & Brown Infrastructure Ltd. (BBI), which is owned by Australia-based Babcock & Brown.

The Macquarie-led consortium bought into Duquesne to benefit from steady, largely regulated cash flow. Duquesne Light Holdings' main subsidiary, Duquesne Light Co. (BBB-/Stable), makes money through regulated T&D operations serving nearly 600,000 customers in and around Pittsburgh, Pa. BBI's interest in North Western Corp. was driven by similar factors — primarily cash-flow stability. The utility provides electric and gas T&D service to about 640,000 customers in Montana, South Dakota and Nebraska.

By contrast, the former TXU's unregulated operations involve wholesale and retail electric-generation supply in Texas, while regulated T&D operations serve about 2.7 million customers in Northern Texas. EFH's wholesale unit has a large asset position in base-load coal-fired units and is planning to place two new coal-fired plants totaling 2,200 MW into service by mid-2010. These new assets should benefit EFH in the near term due to a declining reserve margins in ERCOT. KKR, TPG and other investors in EFH are not looking just for stable cash flow: They are »



betting the wholesale and retail operations will be worth a lot more a few years down the road.

Overcoming Regulatory Concerns

Regulators make or break utility mergers and acquisitions in which they have jurisdiction. Macquarie succeeded in developing a favorable regulatory strategy in Pennsylvania. The investing consortium agreed to several commitments, including no requests for rate increases until 2010; no recovery of the acquisition costs in rates; and keeping the headquarters in Pittsburgh, among other things. With these and other commitments, as well as Macquarie's long-term vision, the Pennsylvania PUC determined the deal was in the public interest and approved it in March 2007.

The flip side of this success is BBI's failure to gain regulatory approval to buy NorthWestern. While regulators in Nebraska approved the deal and those in South Dakota cited a lack of jurisdiction, the regulators in Montana unanimously voted to reject it in May 2007. Among key reasons cited by Montana PUC commissioners were the potential for a deteriorating capital structure resulting from an expected high debt burden and the potential for excessive distributions and inadequate retained earnings. BBI sweetened the deal to satisfy some concerns, including making the Montana utility bankruptcy-remote from the parent, putting it under local control, and restricting distributions. However, Montana regulators again rejected the acquisition in July, which resulted in BBI's immediate termination of the buyout.

In Texas, KKR and TPG argued originally that the Texas PUC had no approval rights over the TXU buyout. The law seemed a little murky on this point based on the reading of numerous

RING-FENCING AND S&P RATINGS

Standard & Poor's rated the EFH's credit on a consolidated basis — that is, analysts included the parent and all subsidiaries (including Oncor) as a single entity, and then examined the single entity's business and financial risk to determine the rating. The consolidated rating was about B.

However, S&P also examined Oncor on a stand-alone basis, and concluded it could be rated BBB+ on its own merits. Because Oncor was adequately ring-fenced from the parent company, Energy Future Holdings (EFH), it will be more difficult to make distributions from Oncor to EFH. Since EFH relies on distributions from Oncor to meet its debt-service obligations, and such distributions are more risky due to the ring-fencing at Oncor, the rating on EFH should be below the B consolidated rating to reflect its greater credit risk.

Ring-fencing is not a free lunch: To the extent a subsidiary's rating is improved, the parent's rating suffers.

S&P's rating criteria usually require that subsidiaries of a weak parent be rated no higher than the parent, unless there are strong economic and structural features — such as ring-fencing — to support a higher rating. Normally, with ring-fencing, the firm can rate a subsidiary up to three notches higher than the consolidated rating of the parent and its subsidiary.

To achieve a greater rating separation, S&P needs more comfort that the subsidiary will not be consolidated into the parent's bankruptcy. Such comfort can be obtained by having more than one parent, provided that each has a meaningful interest and, in S&P's view, will make decisions based on their own self interest and will enforce their rights. These entities obviously cannot be related to each other. A meaningful share is at least 20 percent, but the minority owner approval must be required to undertake material changes to the business and begin insolvency proceedings.

How can Oncor achieve its BBB+ standalone rating? Since it is wholly owned by EFH and adequately ring-fenced, S&P can rate it up to BB, three rating notches above the consolidated B rating. If EFH sells at least 20 percent of Oncor to an unaffiliated third party in a structure discussed above, Oncor's rate could reach BBB+.

The sponsors have said they will soon sell 20 percent of Oncor to a third party, and if the ownership is adequately structured, S&P would rate Oncor at BBB+. If the sponsors don't sell this stake, Oncor's rating will be lowered to BB. S&P hasn't set a firm date for this sale from a ratings perspective, but expects it will occur soon.

These potential rating outcomes are the reason Oncor's rating remains BBB-/CreditWatch developing, at press time. The CreditWatch "developing" listing means the rating could go up or down. —TAP

opinions on the matter. Regardless, there was always the possibility for the Texas legislature to change the law to give the Texas PUC or legislature such rights over the deal, and the commission still regulated the T&D unit, a very large cash-flow provider.

The company adopted several measures to support the deal and appease the regulators and other parties. At the wholesale unit, EFH's decision to cancel eight new coal plants was crucial.

This strategic U-turn — which cost big money to cancel equipment purchases — along with pledges for large demand-side management investment and other environmentally favorable positions, helped gain support from key environmental groups. At the retail operations, EFH offered price cuts to certain customers through September 2008. To address governance issues, the buyers named some high-profile Texans to the EFH board of directors (such as



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- How regulation works and how it impacts market participants
- Various market models and how they create more or less competition
- Who the key industry participants are and the strategies they employ for success
- How physical and financial strategies are used to make money and manage risk
- The key forces driving future evolution in the electric business

UPCOMING DATES / LOCATIONS:

February 12-13, New York, NY
March 5-6, Los Angeles, CA
April 23-24, Chicago, IL



Visit www.enerdynamics.com/EBU
or call 866-765-5432.

Don Evans, once the U.S. Secretary of Commerce) and increased the separation among the wholesale, retail, and regulated T&D subsidiaries — each of which now has its own board.

The buyers adopted several notable structural features and financial commitments to support the creditworthiness of the T&D unit, now known as Oncor Electric Delivery LLC (previously TXU Electric Delivery), and reduce the Texas PUC's concerns for ratepayers. These structural features should help Oncor maintain a moderately leveraged capital structure and limit its distributions to the equity owners, which helps support overall financial strength — features the Montana PUC initially found lacking in the NorthWestern deal. The structural features also limit Oncor's

exposure to EFH creditworthiness and potential bankruptcy events.

Bankruptcy Remote

Foremost, the structural features sought to reduce Oncor's exposure to EFH's credit risk and help it maintain an investment-grade rating. When the buyout was announced, Standard & Poor's concluded EFH's rating would fall from BBB- to the single-B category based on the proposed capital plan, which included a large amount of new debt. To separate Oncor's credit risk from EFH's, the sponsors decided to ring-fence it from EFH — that is, to make Oncor bankruptcy-remote from EFH.

The credit issue is one of preventing substantive consolidation — *i.e.*, if EFH goes bankrupt, it could pull

Oncor into its bankruptcy proceeding.

Legal ring-fencing is a common practice when a parent tries to achieve a rating on a subsidiary higher than its own. The parent attempts to create a separate identity for the subsidiary — a different board of directors, management, business plan, accounts, records, liquidity facilities, corporate name and so on. But this is not enough. Additionally, the subsidiary directors will include at least one who is independent, that is, one who has not had a material commercial or ownership relations to the subsidiary or its parent for a long time — usually five years. This independent director has a fiduciary responsibility to the company and also its lenders. That director's approval is required to make material changes to the subsidiary, such

as a change in business plan, material agreements, liquidity facilities, and, most importantly, for filing the subsidiary into bankruptcy or agreeing to such a filing by another entity. Therefore, without the independent director's approval, the subsidiary cannot file for bankruptcy.

Another requirement of separateness is that the parent must be able to secure a non-consolidation opinion from legal counsel, which concludes that if the parent did file for bankruptcy, the court would view the subsidiary as a separate entity and not consolidate it into the parent's bankruptcy. Of course, nothing is foolproof, so this is why people talk about being bankruptcy-remote but not bankruptcy-proof.

S&P analysts view Oncor's structure as bankruptcy-remote from the parent company. The company will have nine directors, six of which will be independent by rules established under the New York Stock Exchange. Two of these six will be independent under the more stringent criteria S&P has established for such directors in relation to legal ring-fencing structures. Analysts also reviewed the non-consolidation opinion regarding Oncor and EFH and found it acceptable.

Financial Commitments

In addition to the ring-fencing structure, Oncor and its holding company will be bound by a number of financial commitments to help support their financial integrity and at least maintain the current regulatory construct. Oncor has a good arrangement, with an ROE of 10.75 percent and efficient capital recovery features that support stable cash flow and low liquidity usage.

Oncor filed with the Texas PUC in April 2007 to be bound by a number of commitments. In the same month the regulator required Oncor to file a rate

case by August 2007. Since then, Oncor and a number of parties have reached a settlement that would be favorable to credit if and when the Texas PUC approves it. Foremost, the Texas PUC

Private equity buyers will have to show that their deals shield ratepayers from financial and operational risk. TXU's structure may well be adopted by others.

would scrap the rate filing and require Oncor to file a new system-wide rate case by July 1, 2008, using the 2007 calendar year as the test period.

Putting it all together, Oncor has agreed to meet these and other commitments that have factored into ratings assessments for Oncor and EFH:

- Limit debt leverage to no more than 60 percent. Even though their regulators might view them as having such a capital structure when examining rates, almost no utilities would agree to maintain such an exact capital structure;

- Allow independent directors, acting on a majority, to stop equity distributions if they conclude Oncor needs the cash to support its operations or reduce debt leverage;

- Limit distributions to no more than 100 percent of net income (subject to certain adjustments) through 2012;

- Commit to at least \$3.6 billion in capital spending over the next five

years, under certain situations, such as continued demand growth;

- Commit to meeting certain system-reliability and customer-service standards;

- Report to the Texas PUC annually on compliance with commitments;

- Forgo rate recovery of any acquisition costs;

- Forgo debt issuance to help finance the buyout. Oncor's holding company will not have any debt or other liabilities; and

- Transact with EFH and its subsidiaries through arm's-length agreements.

More to Come

Private equity interest in the utility business is probably here to stay. Just after the TXU deal closed in October, Puget Energy Inc. (BBB-) headquartered in Bellevue, Wash., agreed to sell itself to Macquarie Infrastructure Partners for \$7.4 billion. Puget Energy's electric and gas utility subsidiary, Puget Sound Energy Inc., (BBB-) has about 1 million electricity and about 720,000 natural gas customers.

At the same time, however, given that almost all utilities are regulated and a number of states have increased their ability to approve such acquisitions, private-equity buyers will have to show that their deals shield ratepayers from financial and operational risk. The structural and financial commitments TXU's buyers adopted for Oncor may well be adopted by others to receive regulatory approval for their deals — while still achieving their required returns for investors, even after paying substantial acquisition premiums. ■

Terry A. Pratt is a director, utilities and infrastructure, with Standard & Poor's Rating Services in New York. Email him at terry_pratt@sandp.com.

STANDARD
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Global Credit Portal[®]

RatingsDirect[®]

August 10, 2011

Oncor Electric Delivery Co. LLC

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Oncor Electric Delivery Co. LLC

Major Rating Factors

Strengths:

- Low-operating-risk electricity transmission and distribution operations with no commodity exposure;
- Effective management of regulatory relations, leading to generally constructive regulatory outcomes;
- A large service territory with generally attractive demographics; and
- Adequate liquidity and proactive management of debt maturities.

Corporate Credit Rating

BBB+/Stable/NR

Weaknesses:

- Aggressive debt leverage;
- A large capital spending program for transmission projects; and
- The ongoing need to maintain separateness undertakings from majority owner Energy Future Holdings Corp.

Rationale

Standard & Poor's Ratings Services' ratings on Oncor Electric Delivery Co. LLC reflect the company's stand-alone business and financial risk profiles. Oncor Electric Delivery Holdings Co., a wholly owned subsidiary of Energy Future Holdings Corp. (EFH; CCC/Negative/--), owns 80.033% of Oncor, and Texas Transmission Investment LLC owns 19.75%. Texas Transmission is indirectly owned by a private investment group led by the Ontario Municipal Employees Retirement Service Administration Corp., acting through its infrastructure investment entity, Borealis Infrastructure Management Inc.; and by the Government of Singapore Investment Corp., acting through its private-equity and infrastructure arm, GIC Special Investments Pte. Ltd.

The ratings on Oncor incorporate, in addition to the stand-alone business and financial risk profiles, a number of structural, legal, and regulatory provisions that allow Standard & Poor's to view the company separately from its majority owner, EFH. These provisions include:

- The sale of 19.75% of Oncor to Texas Transmission, which is a third-party, unaffiliated investor with sufficient rights and board representation to prevent EFH from harming Oncor's credit profile--namely, the ability to veto changes in Oncor's dividend policy, requirement to consent to the institution of bankruptcy or insolvency proceeding against Oncor, approval over material transactions between Oncor and its non-ring-fenced affiliates, approval over the annual budget if it is reduced by 10% or more from the prior year's amount, and the ability to prevent dividend distributions if it is in the best interests of Oncor to retain such amounts for future capital requirements;
- Legal ring-fencing, including a non-consolidation opinion and separateness undertakings (such as arm's-length transactions between Oncor and EFH, and the inability of Oncor to extend financial support to or receive financial support from EFH), and six independent directors who are required by law to consider only the interests of Oncor and its creditors when acting or voting on any material action, two of whom are special independent directors;
- Limitations on distributions (equal to net income) combined with a limitation on the capital structure (60% debt

and 40% equity); and

- Commitments to the Public Utility Commission of Texas (PUCT) to maintain the 60% debt and 40% equity capital structure, incur a certain amount of capital spending by 2012, and maintain certain reliability standards.

Oncor is an electric transmission and distribution company operating in north central, eastern, and western Texas, including Dallas. Oncor has an excellent business risk profile and an aggressive financial risk profile. (For more on business risk and financial risk, see "Business Risk/Financial Risk Matrix Expanded," published May 27, 2009, on RatingsDirect on the Global Credit Portal.)

Oncor's excellent business risk profile reflects the company's electric distribution and transmission business, which has low operating risk, no commodity exposure, and a large service territory with generally attractive demographics. The excellent business risk profile also accounts for the company's efforts to reach regulatory outcomes that are generally supportive of credit quality. In May 2011, Oncor reached a settlement in the rate case it filed in January 2011, which requested a \$353 million base rate increase based on a return on equity (ROE) of 10.25% and a capital structure of 55% debt and 45% equity. The settlement, which awaits final approval from the PUCT, provides for a base rate increase of \$137 million (\$93 million effective July 2011, with the balance effective from January 2012) based on a 10.25% ROE and a capital structure of 60% debt and 40% equity.

Although Oncor owns the transmission and distribution systems that deliver electricity to retail and commercial users, its customers actually consist of more than 75 retail electricity providers (REPs) that operate within its service territory. Of these REPs, Texas Competitive Energy Holdings Co. LLC (TCEH), an EFH affiliate, accounted for 36% of Oncor's 2010 revenues, while subsidiaries of a non-affiliated REP accounted for 12%. Of the remaining REPs, no other entity accounted for more than 10% of Oncor's 2010 revenues. Oncor relies on these REPs to remit timely payments for distribution services rendered; a default by a REP would cause delays in payment and could pressure Oncor's liquidity. As of June 30, 2011, Oncor's trade accounts receivable from TCEH were \$168 million, or about 11% of revenues for the period. If a REP declares bankruptcy, Oncor can recover the amounts not received by deferring such amounts as a regulatory assets and then requesting recovery through a rate case filing, although this rule applies only to non-affiliated REPs and not to TCEH. In case of any default in the payments of accounts receivable by TCEH, Oncor can recover any claims by withholding distributions to the two owners until it is made whole. Additionally, if TCEH were to delay or stop payments, Oncor would have a senior unsecured claim against TCEH. However, our recovery analysis on EFH suggests that recovery on senior unsecured claims against EFH or its affiliates would be very small, if not zero, because EFH and its subsidiaries have large amounts of senior secured debt.

In January 2009, the PUCT awarded Oncor 17 transmission projects relating to competitive renewable energy zones (CREZ), which will provide load areas with access to wind-generated electricity. The total cost of these transmission projects is now estimated to be \$2 billion. At June 30, 2011, the PUCT had approved all 17 projects and had issued 14 Certificate of Convenience and Necessity amendments. Oncor has spent \$538 million as cumulative capital expenditures on the CREZ projects and expects to incur capital expenditures of about \$600 million in 2011 (out of which, \$222 million had been incurred during the six months ended June 30, 2011). Oncor recovers the related capital costs and return under a transmission cost recovery mechanism once the projects are in service. The transmission cost recovery mechanism adjusts semiannually. In June 2011, Oncor filed for an increase in its transmission cost recovery factor, which the company expects will increase revenues by about \$48 million, effective in September 2011.

Oncor's financial risk profile is aggressive. The company projects that its capital spending program will total \$3.6 billion from 2011 to 2013, with about \$1.4 billion incurred in 2011. Given the lag in recovering the related investment, we expect the financial profile to weaken from current levels, while still remaining sufficient to support current ratings, but with a reduced cushion. As CREZ investments peak in 2012 and funding needs increase, Standard & Poor's expects that Oncor will materially decrease distributions to its two owners to preserve the stated capital structure and provide some financing flexibility during this period. For the six months ended June 30, 2011, Oncor distributed about \$40 million to its owners, compared to \$108 million last year during the same period.

For the 12 months ended June 30, 2011, adjusted funds from operations (FFO) were \$972.9 million, and adjusted total debt was \$6.48 billion, excluding \$611 million of securitized debt. Adjusted FFO interest coverage was 3.5x, adjusted FFO to total debt was 15.0%, and adjusted total debt to total capital was 66%. Oncor's cash flow generation benefited from a change in bonus depreciation rules that resulted in lower cash taxes for the six months ended June 30, 2011. In computing debt leverage, Standard & Poor's deducts the entire amount of goodwill contributed to Oncor by EFH as a result of purchase accounting rules; this totaled \$3.7 billion as of Dec. 31, 2010. In addition, Standard & Poor's computes adjusted debt leverage by including both long- and short-term debt, unlike the regulatory computation, which incorporates only long-term debt. As of June 30, 2011, short-term debt increased to \$580 million, as compared to \$377 million as of Dec. 31, 2010.

Liquidity

Oncor has adequate liquidity to cover its needs over the next 12 months, even if FFO declines. (For more on liquidity, see "Standard & Poor's Standardizes Liquidity Descriptors For Global Corporate Issuers," published July 2, 2010.) We base our liquidity assessment on the following factors and assumptions:

- We expect the company's liquidity sources (including cash, FFO, and credit facility availability) over the next 12 to 18 months to exceed its uses by more than 1.2x.
- Even if FFO declines by 15%, we believe sources of cash would still exceed uses by more than 1.2x.
- Oncor has no debt maturities in 2011 and has a \$376 million debt maturity in 2012 followed by a \$524 million maturity in 2012.

In our analysis, we have assumed liquidity of about \$2.5 billion over the next 12 months, primarily consisting of cash on hand, FFO, and availability under the revolving credit facilities. We estimate the company will use about \$1.5 billion over the same period, mainly for capital spending, debt maturities, working-capital needs, and distributions to the two owners.

Oncor has a \$2 billion revolving credit facility that matures in October 2013 and had \$1.292 billion undrawn as of June 30, 2011. The current availability excludes \$122 million in commitments that a subsidiary of Lehman Brothers Inc. provides. The credit facility is secured and is *pari passu* with Oncor's other secured debt obligations.

The company has good relationships with its banks, in our assessment, and has a good standing in the credit markets, having successfully issued debt in late 2010 and effectively managed the debt maturity schedule during the same time.

Given majority owner EFH's weak financial condition and speculative-grade rating, a key rating factor for the company is prudent management of Oncor's liquidity position, including timely renewal of the revolving credit facility, because events that may pressure liquidity will pressure the current ratings.

Recovery analysis

We assign recovery ratings to first-mortgage bonds (FMBs) issued by investment-grade U.S. utilities, which can result in higher issue ratings than a utility's corporate credit rating (CCR) depending on the CCR category and the extent of the collateral coverage. We base the investment-grade FMB recovery methodology on the ample historical record of nearly 100% recovery for secured bondholders in utility bankruptcies and our view that the factors that supported those recoveries (limited size of the creditor class, and the durable value of utility rate-based assets during and after a reorganization, given the essential service provided and the high replacement cost) will persist in the future.

Under our notching criteria, we consider the limitations of FMB issuance under the utility's indenture relative to the value of the collateral pledged to bondholders, management's stated intentions on future FMB issuance, and the regulatory limitations on bond issuance. FMB ratings can exceed a utility's CCR by up to one notch in the 'A' category, two notches in the 'BBB' category, and three notches in speculative-grade categories. (See "Changes To Collateral Coverage Requirements For '1+' Recovery Ratings On U.S. Utility First Mortgage Bonds," published Sept. 6, 2007.)

Oncor's FMBs benefit from a first-priority lien on substantially all of the utility's real property owned or subsequently acquired. Collateral coverage of less than 1.5x supports a recovery rating of '1' and an issue rating one notch above the CCR.

Outlook

The stable outlook on the rating incorporates expectations of generally stable, albeit modestly weakening, financial performance over the next 12 to 24 months stemming in large part from the company's planned investment in the CREZ projects. We expect that the CREZ investments will peak in 2012, thereby placing pressure on the consolidated financial profile during that time. Standard & Poor's base case projections for Oncor incorporate an aggressive financial risk profile over the next 12 to 24 months such that adjusted FFO to interest coverage consistently exceeds 3x, adjusted FFO to total debt is more than 14%, and adjusted total debt to total capital is less than 65%, including short-term debt and excluding the impact of purchase accounting. Absent such credit protection measures over the next few years, Oncor's credit quality will deteriorate and we will lower the ratings on Oncor.

Standard & Poor's also expects that Oncor will continue to proactively manage its refinancing needs to maintain its adequate levels of liquidity. We view adequate liquidity as very important for Oncor because, despite the existing separateness undertakings with majority owner EFH, adverse developments at EFH may make it difficult for Oncor to access the capital markets when it needs to. We would also lower the ratings on Oncor if the company fails to effectively manage regulatory risk and is unable to recover its investments in a timely manner, if there is pressure from majority owner EFH to make excess distributions that would weaken Oncor's credit profile, or if any of the separateness undertakings currently in place are compromised. Given Oncor's aggressive financial risk profile and the level of debt leverage we expect, we do not contemplate a higher rating, despite the company's excellent business risk profile.

Financial Risk Profile

Accounting

Oncor's financial statements are prepared in accordance with U.S. generally accepted accounting principles and are audited by Deloitte & Touche LLP, which provided an unqualified opinion on 2010 results.

Oncor securitized stranded costs relating to its generation assets. Because this debt is nonrecourse to the company and the bondholders have a claim only on the transition charges collected through rates, in 2010, Standard & Poor's made analytical adjustments to remove the following:

- \$667.3 million of securitized debt from total reported debt;
- \$107.8 million of securitization-related principal from revenues and depreciation; and
- \$37.3 million of securitization-related interest expense from revenues and interest expense.

Standard & Poor's also adjusts Oncor's financial statements for certain off-balance-sheet obligations. For 2010, Standard & Poor's added \$979.6 million as a debt-like obligation for the pension-funding shortfall that relates to Oncor's portion of EFH's total pension obligations. In addition, we added \$35.6 million relating to the capitalization of operating leases and \$108 million in accrued interest not reported as debt.

In computing debt leverage, Standard & Poor's reduces the amount of equity on the balance sheet by an amount that is primarily equal to the goodwill resulting from the leveraged buyout of Oncor's majority owner, EFH. As of Dec. 31, 2010, this amount was \$3.78 billion.

Related Criteria And Research

- Standard & Poor's Standardizes Liquidity Descriptors For Global Corporate Issuers, July 2, 2010
- Business Risk/Financial Risk Matrix Expanded, May 27, 2009
- Changes To Collateral Coverage Requirements For '1+' Recovery Ratings On U.S. Utility First Mortgage Bonds, Sept. 6, 2007

Table 1

Oncor Electric Delivery Co. LLC -- Peer Comparison				
Industry Sector: Electric				
	Oncor Electric Delivery Co. LLC	CenterPoint Energy Inc.	NSTAR	Consolidated Edison Inc.
Rating as of Aug. 10, 2011	BBB+/Stable/--	BBB/Positive/A-2	A+/Watch Neg/A-1	A-/Stable/A-2
--Average of the past three fiscal years--				
(Mil. \$)				
Revenues	2,582.9	9,124.3	2,953.9	13,313.3
EBITDA	1,313.8	1,730.8	806.8	2,729.0
Net income from continuing operations	61.7	420.3	239.2	934.7
Funds from operations (FFO)	908.7	1,207.1	552.6	2,093.1
Capital expenditures	975.8	1,202.0	397.8	2,189.1
Free operating cash flow	(94.1)	(39.9)	137.6	(202.7)
Discretionary cash flow	(782.7)	(320.2)	(22.1)	(820.6)

Table 1

Oncor Electric Delivery Co. LLC -- Peer Comparison (cont.)				
Cash and short-term investments	62.0	663.7	59.5	224.0
Debt	5,811.7	8,025.9	3,198.0	13,471.0
Equity	3,131.0	2,624.7	1,886.6	10,442.5
Adjusted ratios				
EBITDA margin (%)	50.9	19.0	27.3	20.5
EBITDA interest coverage (x)	4.0	3.4	5.3	4.4
EBIT interest coverage (x)	2.8	2.3	3.9	3.2
Return on capital (%)	8.9	9.1	9.7	7.0
FFO/debt (%)	15.6	15.0	17.3	15.5
Free operating cash flow/debt (%)	(1.6)	(0.5)	4.3	(1.5)
Debt/EBITDA (x)	4.4	4.6	4.0	4.9
Total debt/debt plus equity (%)	65.0	75.4	62.9	56.3

Table 2

Oncor Electric Delivery Co. LLC -- Financial Summary					
Industry Sector: Electric					
--Fiscal year ended Dec. 31--					
	2010	2009	2008	2007	2006
Rating history	BBB+/Stable/--	BBB+/Stable/--	BBB+/Stable/--	BBB-/Watch Dev/--	BBB-/Negative/--
(Mil. \$)					
Revenues	2768.9	2544.9	2434.9	2354.1	2305.1
EBITDA	1483.3	1243.1	1215	1144.3	1104.9
Net income from continuing operations	352	320	(487)	327	344
Funds from operations (FFO)	1014.3	921.1	790.8	774.4	753.2
Capital expenditures	1022.4	1010.9	894.1	700.1	835.8
Dividends paid	211	272	1583	326	340
Debt	6278.8	5732.5	5423.7	4502.6	3732.7
Preferred stock	0	0	0	0	0
Equity	3237	3091	3064.9	3049.1	2975
Debt and equity	9515.8	8823.5	8488.6	7551.8	6707.7
Adjusted ratios					
EBITDA margin (%)	53.6	48.8	49.9	48.6	47.9
EBIT interest coverage (x)	2.7	2.6	3	3	3
FFO interest coverage (x)	3.6	3.6	4	3.8	4.1
FFO/debt (%)	16.2	16.1	14.6	17.2	20.2
Discretionary cash flow/debt (%)	(3.8)	(7.2)	(31.2)	(8.6)	(17.2)
Net cash flow/capital expenditures (%)	78.6	64.2	(88.6)	64	49.4
Debt/debt and equity (%)	66	65	63.9	59.6	55.6
Return on capital (%)	9	8.5	9.2	9.5	9.4
Return on common equity (%)	5.1	4.7	(6.8)	6	11.4
Common dividend payout ratio (unadjusted) (%)	59.9	85	(67.8)	99.7	98.8

Table 3

Reconciliation Of Oncor Electric Delivery Co. LLC Reported Amounts With Standard & Poor's Adjusted Amounts (Mil. \$)										
--Fiscal year ended Dec. 31, 2010--										
Oncor Electric Delivery Co. LLC reported amounts										
	Debt	Shareholders' equity	Revenues	EBITDA	Operating income	Interest expense	Cash flow from operations	Cash flow from operations	Dividends paid	Capital expenditures
Reported	5,823.0	6,988.0	2,914.0	1,521.0	848.0	347.0	1,098.0	1,098.0	211.0	1,020.0
Standard & Poor's adjustments										
Operating leases	35.6	--	--	2.3	2.3	2.3	10.7	10.7	--	4.4
Postretirement benefit obligations	979.6	--	--	105.0	105.0	46.0	(6.5)	(6.5)	--	--
Capitalized interest	--	--	--	--	--	2.0	(2.0)	(2.0)	--	(2.0)
Securitized utility cost recovery	(667.3)	--	(145.1)	(145.1)	(37.3)	(37.3)	(107.8)	(107.8)	--	--
Reclassification of nonoperating income (expenses)	--	--	--	--	66.0	--	--	--	--	--
Reclassification of working-capital cash flow changes	--	--	--	--	--	--	--	22.0	--	--
Accrued interest not included in reported debt	108.0	--	--	--	--	--	--	--	--	--
Equity -- other	--	(3,751.0)	--	--	--	--	--	--	--	--
Total adjustments	455.8	(3,751.0)	(145.1)	(37.7)	136.1	13.1	(105.7)	(83.7)	--	2.4
Standard & Poor's adjusted amounts										
	Debt	Equity	Revenues	EBITDA	EBIT	Interest expense	Cash flow from operations	Funds from operations	Dividends paid	Capital expenditures
Adjusted	6,278.8	3,237.0	2,768.9	1,483.3	984.1	360.1	992.3	1,014.3	211.0	1,022.4

Table 4

Oncor Electric Delivery Co. LLC -- Operating Data					
	2011 (Q1)	2010	2009	2008	2007
Electric energy billed volumes (gigawatt-hour)	26,717	109,323	103,376	107,828	105,429
Change from prior period	N/A	5.8%	(4.1%)	2.3%	N/A
Electricity distribution points of delivery	3,181	3,171	3,145	3,123	3,093
Change from prior period	1.1%	0.8%	0.7%	1.0%	N/A
System average interruption duration index*	92.9	96.6	84.5	85.4	77.9
System average interruption frequency index†	1.2	1.1	1.1	1.1	1.1
Customer average interruption duration index‡	80.9	77.2	77.2	74.7	70.6

Table 4

Oncor Electric Delivery Co. LLC -- Operating Data (cont.)

*The average number of minutes electric service is interrupted per consumer in a year. †The average number of electric service interruptions per consumer in a year. §The average duration in minutes per electric service interruption in a year. N/A -- Not applicable.

Table 5

Oncor Electric Delivery Co. LLC -- Credit Metrics

	2011	2012	2013
With imputed pension debt			
Adjusted debt (mil. \$)	\$6,676.2	\$7,033.9	\$7,293.8
FFO/debt (%)	13.4	14	14
FFO interest coverage (x)	3.4	3.5	3.5
Debt/capital (%)	65.8	65.2	64.7
Debt/EBITDA (x)	4.4	4.2	4.1
Without imputed pension debt			
Adjusted debt (mil. \$)	\$5,696.7	\$6,054.3	\$6,314.3
FFO/debt (%)	14.5	15.1	15.1
FFO interest coverage (x)	3.6	3.8	3.8
Debt/capital (%)	62.2	61.7	61.3
Debt/EBITDA (x)	4.1	3.8	3.8

Ratings Detail (As Of August 10, 2011)***Oncor Electric Delivery Co. LLC**

Corporate Credit Rating	BBB+/Stable/NR
Senior Secured (11 Issues)	A-

Corporate Credit Ratings History

13-Aug-2008	BBB+/Stable/NR
09-Oct-2007	BBB-/Watch Dev/NR
26-Feb-2007	BBB-/Watch Neg/NR

Business Risk Profile

Excellent

Financial Risk Profile

Aggressive

Related Entities**EFIH Finance Inc**

Senior Secured (1 Issue)	CC
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Energy Future Competitive Holdings Co.

Issuer Credit Rating	CCC/Negative/NR
Senior Secured (1 Issue)	CC
Senior Unsecured (1 Issue)	CC
Subordinated (2 Issues)	CC

Energy Future Holdings Corp.

Issuer Credit Rating	CCC/Negative/NR
Senior Secured (2 Issues)	B-
Senior Unsecured (3 Issues)	CC
Senior Unsecured (3 Issues)	D

Ratings Detail (As Of August 10, 2011)*(cont.)**Energy Future Intermediate Holding Company LLC**

Issuer Credit Rating	CCC/Negative/--
Senior Secured (2 Issues)	B-
Senior Secured (1 Issue)	CC

Texas Competitive Electric Holdings Co. LLC

Issuer Credit Rating	CCC/Negative/NR
Senior Secured (2 Issues)	CC
Senior Secured (5 Issues)	CCC
Senior Unsecured (22 Issues)	CC
Senior Unsecured (2 Issues)	D

*Unless otherwise noted, all ratings in this report are global scale ratings. Standard & Poor's credit ratings on the global scale are comparable across countries. Standard & Poor's credit ratings on a national scale are relative to obligors or obligations within that specific country.

STAFF PROXY GROUP COMMON EQUITY RATIO ADJUSTED FOR GOODWILL

Company	Ticker	Goodwill 2010	(\$M)	Common Equity \$M	Total Capital (\$M)	Common Equity adjusted for goodwill	Common Equity Ratio (%) adjusted for Goodwill
1 ALLETE Inc.	ALE	\$0		\$976	\$1,771	\$976	55.11
2 Alliant Energy Corp	LNT	\$3		\$2,894	\$5,892	\$2,891	49.06
3 Ameren Corp.	AEE	\$411		\$7,730	\$15,621	\$7,319	46.85
4 American Electric Power Co. Inc.	AEP	\$76		\$13,622	\$32,376	\$13,546	41.84
5 American States Water	AWR	\$1		\$378	\$739	\$376	50.96
6 Avista Corp.	AVA	\$26		\$1,126	\$2,494	\$1,100	44.09
7 Black Hills Corp.	BKH	\$355		\$1,100	\$2,616	\$745	28.49
8 CenterPoint Energy Inc.	CNP	\$1,696		\$3,198	\$12,681	\$1,502	11.84
9 Cleco Corp.	CNL	\$0		\$1,317	\$2,882	\$1,317	45.71
10 Consolidated Edison Inc.	ED	\$429		\$11,061	\$21,967	\$10,632	48.40
11 DTE Energy Co.	DTE	\$2,020		\$6,722	\$14,931	\$4,702	31.49
12 Edison International	EIX	\$0		\$10,583	\$24,255	\$10,583	43.63
13 Entergy Corp.	ETR	\$377		\$8,496	\$20,623	\$8,119	39.37
14 Great Plains Energy Inc.	GXP	\$169		\$2,886	\$6,751	\$2,717	40.25
15 Hawaiian Electric Industries Inc.	HE	\$82		\$1,484	\$3,148	\$1,401	44.52
16 IDACORP Inc.	IDA	\$0		\$1,532	\$3,214	\$1,532	47.67
17 Madison Gas & Electric Co.	MGEE	\$0		\$525	\$884	\$525	59.43
18 Pepco Holdings Inc.	POM	\$1,407		\$4,230	\$8,915	\$2,823	31.67
19 PG&E Corp.	PCG	\$0		\$11,282	\$25,211	\$11,282	44.75
20 Portland General Electric Co.	POR	\$0		\$1,592	\$3,426	\$1,592	46.47
21 SCANA Corp.	SCG	\$230		\$3,702	\$8,694	\$3,472	39.94
22 Sempra Energy	SRE	\$87		\$9,027	\$18,840	\$8,940	47.45
23 Southern Co.(The)	SO	\$0		\$16,202	\$38,037	\$16,202	42.60
24 TECO Energy Inc.	TE	\$55		\$2,170	\$5,409	\$2,114	39.09
25 UIL Holdings Corp.	UIL	\$299		\$1,076	\$2,750	\$777	28.27
26 Vectren Corporation ¹	VVC	\$242		\$1,439	\$3,273	\$1,197	36.57
27 Westar Energy Inc.	WR	\$0		\$2,383	\$5,446	\$2,383	43.76
28 Wisconsin Energy Corp.	WEC	\$442		\$3,802	\$8,896	\$3,360	37.77
29 Xcel Energy Inc.	XEL	\$0		\$8,084	\$17,973	\$8,084	44.97
Average		\$290		\$4,849	\$11,025	\$4,559	41.79
Median		\$76		\$2,894	\$6,751	\$2,717	43.76

Source
CapitalIQ

**STAFF PROXY GROUP COMMON EQUITY RATIO ADJUSTED FOR GOODWILL
& SHORT-TERM DEBT**

Company	2010 Common Equity Ratio Value Line)	Total Capital (\$M) (from Value Line	Common Equity \$M(Value Line)	Goodwill (\$M) 2010	Short-Term Borrowings (\$M)	Common Equity adjusted for Goodwill & Short- term debt	Common Equity Ratio (%) adjusted for Goodwill
ALLETE Inc.	55.80%	\$1,747.60	\$975.16	\$0.00	\$1.00	\$974	55.74
Alliant Energy Corp	49.50%	\$5,841.00	\$2,891.30	\$3.00	\$47.40	\$2,841	48.64
Ameren Corp.	50.90%	\$15,185.00	\$7,729.17	\$411.00	\$269.00	\$7,049	46.42
American Electric Power Co. Inc.	46.70%	\$29,184.00	\$13,628.93	\$76.00	\$1,346.00	\$12,207	41.83
American States Water	55.70%	\$677.40	\$377.31	\$1.12	\$60.90	\$315	46.54
Avista Corp.	48.40%	\$677.40	\$327.86	\$25.94	\$110.00	\$192	28.33
Black Hills Corp.	48.10%	\$2,286.30	\$1,099.71	\$354.83	\$249.00	\$496	21.69
CenterPoint Energy Inc.	26.20%	\$12,199.00	\$3,196.14	\$1,696.00	\$53.00	\$1,447	11.86
Cleco Corp.	48.50%	\$2,717.90	\$1,318.18	\$0.00	\$150.00	\$1,168	42.98
Consolidated Edison Inc.	50.90%	\$21,732.00	\$11,061.59	\$429.00	\$0.00	\$10,633	48.93
DTE Energy Co.	48.70%	\$13,811.00	\$6,725.96	\$2,020.00	\$150.00	\$4,556	32.99
Edison International	44.30%	\$23,861.00	\$10,570.42	\$0.00	\$115.00	\$10,455	43.82
Entergy Corp.	42.10%	\$20,166.00	\$8,489.89	\$377.17	\$154.14	\$7,959	39.47
Great Plains Energy Inc.	49.20%	\$5,867.60	\$2,886.86	\$169.00	\$368.00	\$2,350	40.05
Hawaiian Electric Industries Inc.	54.30%	\$2,732.90	\$1,483.96	\$82.19	\$197.24	\$1,205	44.08
IDACORP Inc.	50.70%	\$3,020.40	\$1,531.34	\$0.00	\$66.90	\$1,464	48.49
Madison Gas & Electric Co.	61.10%	\$859.40	\$525.09	\$0.00	\$22.50	\$503	58.48
Pepco Holdings Inc.	51.00%	\$8,292.00	\$4,228.92	\$1,407.00	\$534.00	\$2,288	27.59
PG&E Corp.	49.30%	\$22,863.00	\$11,271.46	\$0.00	\$853.00	\$10,418	45.57
Portland General Electric Co.	47.00%	\$3,390.00	\$1,593.30	\$0.00	\$19.00	\$1,574	46.44
SCANA Corp.	47.10%	\$7,854.00	\$3,699.23	\$230.00	\$420.00	\$3,049	38.82
Sempra Energy	49.60%	\$18,186.00	\$9,020.26	\$87.00	\$158.00	\$8,775	48.25
Southern Co.(The)	45.70%	\$35,438.00	\$16,195.17	\$0.00	\$1,297.00	\$14,898	42.04
TECO Energy Inc.	40.80%	\$5,317.80	\$2,169.66	\$55.40	\$12.00	\$2,102	39.53
UIL Holdings Corp.	41.60%	\$2,587.90	\$1,076.57	\$298.89	\$7.00	\$771	29.78
Vectren Corporation ¹	50.10%	\$2,874.00	\$1,439.87	\$242.00	\$118.30	\$1,080	37.56
Westar Energy Inc.	46.40%	\$5,180.80	\$2,403.89	\$0.00	\$226.70	\$2,177	42.02
Wisconsin Energy Corp.	49.00%	\$7,764.50	\$3,804.61	\$441.90	\$657.90	\$2,705	34.84
Xcel Energy Inc.	46.30%	\$17,452.00	\$8,080.28	\$0.00	\$466.40	\$7,614	43.63
Average	48.10%	10,336.76	4,820.76	289.91	280.32	4,250.53	40.57
Median	48.70%	5,867.60	2,891.30	76.00	150.00	2,287.92	42.04

Capitalization Structure of US Shareholders-Owned Electric Utilities

Case 11-W-0020

Exhibit__KXD-5
Page 3 of 3

\$ Billions

Capitalization Structure	3/31/2011	12/31/2010	12/31/2009	12/31/2008	12/31/2007
Common Equity	304.3	300.0	285.2	255.5	270.1
Preferred Equity & Noncontrolling Interests	4.7	4.5	6.6	6.7	0.6
<u>Long-Term Debt</u>	<u>399.6</u>	<u>400.0</u>	<u>394.4</u>	<u>374.9</u>	<u>350.2</u>
Total	708.7	704.5	686.2	637.0	620.9
Common Equity %	42.9%	42.6%	41.6%	40.1%	43.5%
Preferred Equity %	0.7%	0.6%	1.0%	1.0%	0.1%
<u>Long-term Debt %</u>	<u>56.4%</u>	<u>56.8%</u>	<u>57.5%</u>	<u>58.8%</u>	<u>56.4%</u>
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: SNL Financial and EEI Finance Department.

Rating Methodology

Moody's Global Infrastructure Finance

December 2009

Global Regulated Water Utilities

Summary

This Rating Methodology explains Moody's approach to rating privately financed¹ regulated water utilities and provides guidance as to how the different analytical factors are combined.

Privately financed regulated water utilities are still relatively rare in the overall global water utility universe. Given the importance of water supply and the health risks related to its service provision, the sector maintains strong links to national, regional or local governments. Full privatisation of the entire value chain of water and wastewater services remains rare, with the UK being the main exception.

There are a variety of business models, with varying degrees of private sector involvement. In the rated universe, companies have also adopted a range of funding options. The most innovative financing structures have been developed in the UK, where a number of water companies have overlaid structural enhancements on typical long-dated capital market funding, incorporating features seen in other infrastructure sectors.

In this Rating Methodology, we discuss the four key rating factors that constitute Moody's analytical framework for rating regulated water utilities and additional considerations.

The key factors are:

- Regulatory Environment & Asset Ownership Model
- Operational Characteristics & Asset Risk
- Stability of Business Model & Financial Structure
- Key Credit Metrics

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¹ This methodology does not apply to water utilities financed under the US public finance model or to privately financed, public infrastructure projects ("PFI" or "PPP"), for which Moody's has published separate Rating Methodologies: "Analytical Framework for Water and Sewer System Ratings", published in August 1999; "Operating Risk in Privately-Financed Public Infrastructure (PFI/PPP/P3) Projects", published in December 2007; and "Update: Privately-Financed Public Infrastructure (PFI/PPP/P3) Projects with Partial Market Revenue Risk", published in November 2008.



Global Regulated Water Utilities

Each of these rating factors encompasses a number of sub-factors, which we discuss in detail in this report. We also provide a rating grid that maps each of the factors, sub-factors and financial metrics, to broad letter-rating categories.

The purpose of this methodology and grid is to provide a tool to gauge approximate credit profiles within the regulated water sector. While the factors and sub-factors within the grid are designed to capture the fundamental rating drivers for the sector, this grid does not include every rating consideration and will not fit every business model perfectly. Furthermore, most of the sub-factor mappings use historical financial results while ratings also consider forecast results. As such, the grid-indicated rating is not expected to always match the actual rating of each company; our objective is for users of this methodology to be able to estimate a company's rating (senior unsecured ratings for investment-grade issuers and corporate family ratings for speculative-grade issuers) within two alpha-numeric notches.

Furthermore, certain more generic factors (including corporate governance, management strength, financial disclosure and liquidity arrangements) remain important inputs into our ratings. Importantly, given continued government involvement and ownership in many regulated water utilities, we also apply our rating methodology for Government-Related Issuers ("GRIs"), as appropriate, to the water sector.² However, all these considerations apply to all rated corporate sectors; as a result, we have chosen not to cover these issues in depth within this Rating Methodology.

This publication includes the following sections:

- About the Rated Universe: An overview of the rated regulated water utilities.
- About this Rating Methodology: A description of our rating methodology, including a detailed explanation of each of the key rating factors.
- Structural Considerations and Sources of Rating Uplift from Creditor Protection: A discussion of potential additional rating uplift through credit-enhancing features and covenants in a company's financing structure.
- Assumptions & Limitations: A comment on the rating methodology's assumptions and limitations, including a discussion of other rating considerations that are not included in the grid.

Appendix I of this report provides a summary of the rating grid and key rating factors.

In the appendices, we also provide tables that illustrate the application of the methodology grid to 23 of the 26 publicly rated regulated water utilities with explanatory comments on some of the more significant differences between the grid-implied rating and our actual rating (Appendix II), a brief industry overview (Appendix III), and a discussion of key rating issues for the regulated water sector over the medium term (Appendix IV).

About the Rated Universe

For the purposes of this methodology, we define regulated water utilities as issuers whose principal line of business is the provision of water and/or wastewater³ services along the entire value chain of the process (as explained in Appendix III). Services may be provided under contract or concession agreements or direct licensing arrangements with the relevant governmental authority, and the assets may be owned outright by the issuer or operated under the terms of a concession or licence. For clarification, the methodology intends to capture only water companies that are responsible for funding the water and/or wastewater infrastructure assets indefinitely or for the duration of the concession or operational contract. It does not capture pure service operators. Issuers that are owned by a government authority are captured by this methodology if they can be considered separate legal entities and not an integral part of the government administration.

² See Moody's Rating Methodology: "The Application of Joint Default Analysis to Government Related Issuers", April 2005; Special Comment: "The Incorporation of Joint-Default Analysis into Moody's Corporate, Financial and Government Rating Methodologies", February 2005; and Special Comment: "Rating Government-Related Issuers in European Corporate Finance", June 2005.

³ Depending on the jurisdiction or the industry set-up, different terminology for the wastewater services may be used, including (but not limited to) sewerage or sanitation services. For simplicity we will refer to wastewater services throughout this report.

Global Regulated Water Utilities

This methodology encompasses different types of financing for water utilities, e.g. general corporate funding structures as well as more highly leveraged financing structures with credit enhancing features. However, privately financed, public infrastructure projects are not subject to this rating methodology, but would fall under Moody's rating methodology for PPP and PFI transactions. For further discussion of the rating implications of financing sources, please refer to "Structural Considerations and Sources of Rating Uplift from Creditor Protection" below.

This methodology does not capture larger multi-utilities, whose activities may include the provision of regulated, monopoly-based water and wastewater services, but do not represent the vast majority of overall group activities. The credit quality of the relevant business segment, however, can be scored under this methodology. For example, Sociedad General de Aguas de Barcelona, S.A. (AGBAR) and United Waterworks, Inc are both covered by the methodology whilst the parent company, Suez Environnement, is not.

Moody's currently rates 26 water utilities (including five holding companies) that we regard as separate legal corporate entities, i.e. detached from the relevant government administration. These issuers currently account for around US\$44 billion of total debt instruments rated. Figure 1 provides a list of all rated regulated water utilities, showing their locations, ratings and amount of rated debt.

Figure 1

Rated Regulated Water Utilities					
Issuer	Country		Current Rating *	Outlook	Amount of Rated Debt in US\$ 'millions **
Europe					
Acquedotto Pugliese S.p.A.	Italy	GRI	Baa3 [12]	Negative	268
Bratislavská vodarenska spoločnosť, a.s.	Slovakia	GRI	Baa2 [11]	Stable	0
Sociedad General de Aguas de Barcelona, S.A. (AGBAR)	Spain		A2	UR-D	0
Anglian Water Services Limited	UK	CFR	Baa1	Stable	7,132
Dwr Cymru Cyfyngedig	UK	CFR	A3	Stable	2,603
Northumbrian Water Limited	UK		Baa1	Stable	1,071
Severn Trent Water Limited	UK		A3	Stable	4,458
Severn Trent Plc	UK		Baa1	Stable	*** 4,598
South East Water Limited	UK		Baa2	Stable	594
South Staffordshire Water Plc	UK		Baa2	Stable	57
Southern Water Services Limited	UK	CFR	Baa1	Stable	4,196
Sutton & East Surrey Water Plc	UK		Baa1	Stable	162
Thames Water Utilities Limited	UK	CFR	Baa1	Stable	7,770
Veolia Water Central Limited (formerly Three Valleys Water Plc)	UK		A3	Negative	325
United Utilities Water Plc	UK		A3	Stable	5,664
United Utilities Plc	UK		Baa1	Stable	*** 6,695
Wessex Water Services Limited	UK		A3	Stable	1,704
Yorkshire Water Services Limited	UK	CFR	Baa1	Stable	3,883
North America					
American Water Works Company, Inc.	US		Baa2	Stable	*** 2,215
New Jersey American Water Company, Inc.	US		Baa1	Stable	200
Pennsylvania American Water Company	US		Baa1	Stable	412
Golden State Water Company	US		A2	Stable	125
Pennichuck Water Works, Inc.	US		Baa3	Stable	50
United Waterworks, Inc.	US		Baa1	Negative	88
Latin America					
Companhia de Saneamento do Parana - SANEPAR	Brazil	GRI	Ba3 [13]	Negative	94

Global Regulated Water Utilities

Rated Regulated Water Utilities					
Issuer	Country		Current Rating *	Outlook	Amount of Rated Debt in US\$ millions **
Asia					
Korea Water Resources Corp.	Korea	GRI	A2	Stable	300
Total Rated Debt					43,930

Note: * senior unsecured issuer or corporate family rating; number in brackets reflects BCA, where applicable

** as at 15 December 2009

*** rated consolidated group debt

We note that the ratings for the five holding companies, namely AGBAR, Severn Trent Plc, United Utilities Plc, American Water Works Company, Inc. and United Waterworks, Inc., may reflect notching for structural subordination and their actual ratings therefore do not necessarily match the grid-indicated outcomes, which relate to the consolidated credit quality of their groups, before taking into account any structural subordination. For this reason, two of these holding companies, Severn Trent Plc and United Utilities Plc, are excluded from the detailed mapping of the factors in Appendix II, and only the relevant operating entity is captured.

Four of the rated water utilities are considered GRIs, as they remain wholly or partly owned by national or regional governments. Therefore, their ratings reflect the application of Moody's joint default analysis under our rating methodology for GRIs. In these cases, the methodology presented in this report serves to assess the baseline credit risk of the issuer, over which our assessments of government support and default dependence are subsequently layered in accordance with our GRI methodology. We exclude Korea Water Resources Corp. from the tables in Appendix II, which provides the detailed scoring of the water companies under this rating methodology, given that – despite the relevance of the general factors addressed within this rating methodology – the company's final rating is driven primarily by its strong linkage to the A2-rated Korean government.

As shown above, the majority of rated issuers are located in Europe, principally in the UK, which accounts for around 93% of the rated debt in the universe of rated regulated water utilities. The UK (more specifically England and Wales) remains the only market in Europe where the entire value chain of water and wastewater services has been fully privatised. This fact combined with the substantial scale of operators and a well-established and transparent regulatory framework for the UK water sector resulted in significant investor interest in the sector. It also somewhat explains the high use of capital market funding compared to other regions.⁴

Given the prominence of the UK water sector in the debt capital markets, we have provided and will continue to provide extensive detailed research for this geographical market. Such specific regional research will remain relevant for the analysis of key rating drivers as part of the assessment of the relevant issuers' credit quality.

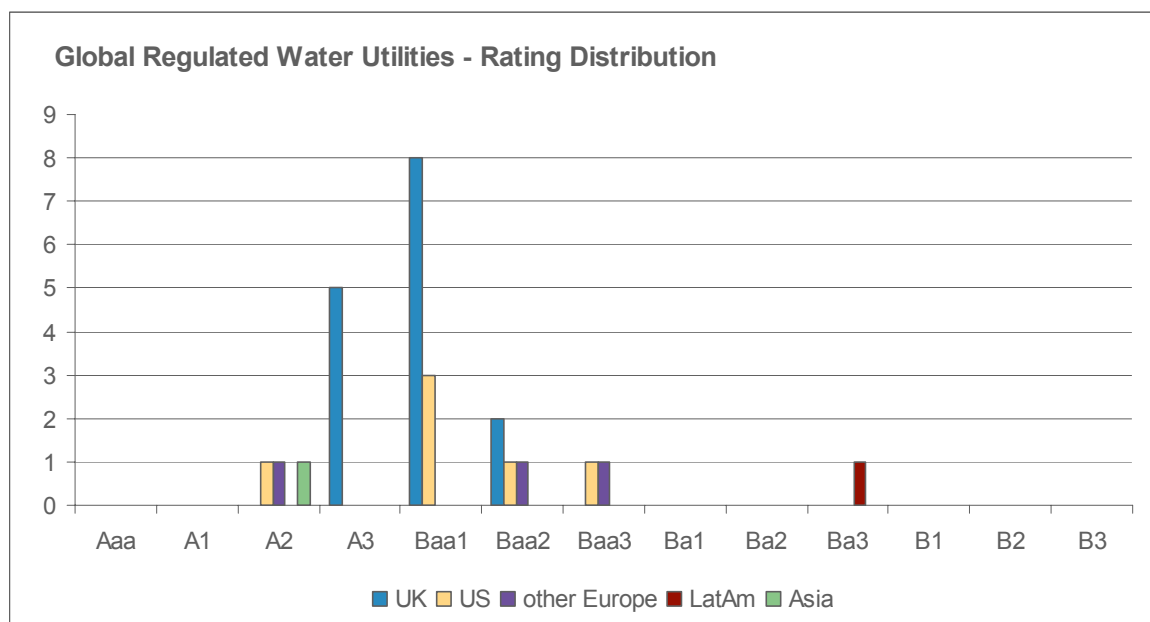
Within the rated universe AGBAR is the only regulated water utility that not only operates assets held under licence or long-term concessions, but is also active as an operational service provider. AGBAR's vast portfolio of concession activities includes asset ownership arrangements in relation to the water and wastewater services provided to Barcelona, its most important service area, as well as AGBAR's international operations in the UK and Chile, which altogether account for around 75% of the group's EBITDA (generated in the water segment).

Figure 2 summarises the rating distribution in the sector:

⁴ We note that the above summary excludes around US\$1.5 billion of debt in relation to the UK water sector, which has been issued by monoline-guaranteed funding vehicles.

Global Regulated Water Utilities

Figure 2 – Rating Distribution



The rating distribution is largely driven by the UK water sector. Based on the senior unsecured issuer and corporate family ratings assigned and included in the graphic distribution shown above, the average sector rating globally is Baa1. However, the average debt rating is A3.⁵

About this Rating Methodology

Moody's rating methodology for regulated water utilities incorporates the following steps.

IDENTIFYING KEY RATING FACTORS

This rating methodology focuses on four broad rating factors:

- I) Regulatory Environment & Asset Ownership Model
- II) Operational Characteristics & Asset Risk
- III) Stability of Business Model & Financial Structure
- IV) Key Credit Metrics

The first two factors relate to the fundamental business characteristics of a water utility. The third factor aims to capture the dimension of credit risk associated with potential changes to an issuer's business or capital structure, which may result from its strategy on corporate activity, diversification and/or financial policies. The fourth rating factor comprises four key financial metrics that we most commonly employ when examining regulated water utilities.

Finally, we consider whether the final rating should be adjusted to incorporate uplift from structural enhancements that may be incorporated in the company's financial arrangements. The effectiveness of any such enhancements is graded to determine the appropriate uplift as described in the section "Structural Considerations and Sources of Rating Uplift from Creditor Protection" below.

⁵ A corporate family rating is an opinion of a corporate family's ability to honour all of its financial obligations and is assigned to a corporate family as if it had a single class of debt and a single consolidated legal entity structure. A corporate family rating does not reference an obligation or class of debt and thus does not reflect priority of claim. It applies to all affiliates under the management control of the entity to which it is assigned. We note that the majority of rated highly leveraged financing transactions that have been executed in the UK achieve a corporate family rating of Baa1, which incorporates the benefit from a number of structural credit enhancements. Under these funding structures issuers typically issue two classes of debt with differing levels of seniority and priority of claim. The majority of rated debt is issued within the more senior tranche of debt, which benefits from additional credit-enhancement. Therefore, the majority of rated debt within the UK is at the A3 rating level rather than the Baa1 level.

Global Regulated Water Utilities

MAPPING FACTORS TO THE RATING CATEGORIES

The four broad rating factors are broken down into 13 sub-factors (9 sub-factors underlying the first three factors plus four credit metrics). Under the methodology, an issuer's characteristics are scored for each sub-factor according to qualitative and quantitative measures defined for each broad rating category (i.e. Aaa, Aa, A, Baa, Ba, B and Caa).

With respect to the first three key factors, we have determined what we consider appropriate ranges for each broad rating category. The methodology aims to capture the characteristics of all potential corporate issuers, and thus also ranks theoretical features not actually yet encountered within the rated universe. Features that we associate with a very low degree of credit risk are classified in the Aaa or Aa categories, whilst characteristics that we believe imply a very high degree of credit risk and could cause an issuer to default are classified in the single-B or Caa categories.

The ranges of credit metrics that represent the fourth key factor have been mapped to broad rating categories for an issuer that presents moderate investment-grade characteristics in all other key factors (i.e. principally in the A-Baa range). Thus, utilities with stronger business risk characteristics than those commensurate with a rating in the A or Baa range can sustain lower credit metrics and still achieve a solid investment-grade rating.

Recognising the stability and predictability of a water utility's cash flow generation, thresholds of credit metrics required for each broad rating category are less demanding than for many corporate issuers in other industries. They are, however, similar to ratio thresholds used in rating methodologies for other infrastructure issuers, which show a similarly low risk profile, e.g. regulated electric and gas networks, operational toll roads or airports.

WEIGHTING FACTORS AND RATING SCORES

The following table shows the weightings applied to each key factor.

Key Factor	Weighting
Regulatory Environment & Asset Ownership Model	40%
Operational Characteristics & Asset Risk	10%
Stability of Business Model & Financial Structure	10%
Key Credit Metrics	40%

As credit metrics are already adjusted to reflect a generally high degree of debt capacity of a regulated water utility, they are assigned a relatively high weighting, accounting for 40% of the final score. However, this is balanced by an equivalent 40% weighting of the first factor, Regulatory Environment & Asset Ownership Model. This factor recognises the fundamental characteristics of the regulatory regime and its cost recovery provisions as well as the business model applied by the relevant utility, considering the different risk proposition of asset ownership and management contracts. These aspects are of paramount importance in determining the utility's overall business risk and thus debt capacity.

As shown below, within each key factor, individual sub-factors have received an individual weighting depending on their deemed importance for the assessment of a water utility's credit quality.

Global Regulated Water Utilities

Factor	Weighting
1. Regulatory Environment & Asset Ownership Model	40%
1. a) Stability & Predictability of Regulatory Environment	15%
1. b) Asset Ownership Model	10%
1. c) Cost and Investment Recovery (Ability & Timeliness)	12%
1. d) Revenue Risk	3%
2. Operational Characteristics & Asset Risk	10%
2. a) Operational Efficiency	5%
2. b) Scale & Complexity of Capital Programme & Asset Condition Risk	5%
3. Stability of Business Model & Financial Structure	10%
3. a) Ability & Willingness to Pursue Opportunistic Corporate Activity	3.33%
3. b) Ability & Willingness to Increase Leverage	3.33%
3. c) Targeted Proportion of Revenues Outside Core Water and Wastewater Activities	3.33%
4. Key Credit Metrics	40%
4. a) Adjusted Interest Coverage OR FFO Interest Coverage	15%
4. b) Net Debt to Regulated Asset Base OR Debt/Capitalisation	15%
4. c) FFO / Net Debt	5%
4. d) RCF / Capex	5%

A further weighting is applied by rating category as shown in the table below.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa
Weighting	1	1	1	1.15	2	3	5

We weight lower rating scores more heavily than higher scores for two reasons. In the first instance, we need to adjust for those situations where an issuer exhibits weak characteristics across the first three factors, which are not typically encountered within the rated universe and which would require more demanding thresholds for the credit metrics. Secondly, we recognise that a serious weakness in one area often cannot be completely offset by a strength in another area and that the lack of flexibility normally associated with high degrees of leverage can heighten risk.

DETERMINING THE FINAL RATING

The steps outlined above produce a final distribution of scores by rating category. The percentage score in each category is then multiplied by a value from 1 for Aaa to 18 for Caa to map to a final rating (before adjustment for creditor protection), as shown in the following table.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa
Value	1	3	6	9	12	15	18

This weighted average score is mapped to the table below, and an overall alpha-numeric rating is assigned based on where the score falls in the range.

Global Regulated Water Utilities

Indicated Rating	Overall Score
Aaa	< 1.50
Aa1	1.50 ≤ x < 2.50
Aa2	2.50 ≤ x < 3.50
Aa3	3.50 ≤ x < 4.50
A1	4.50 ≤ x < 5.50
A2	5.50 ≤ x < 6.50
A3	6.50 ≤ x < 7.50
Baa1	7.50 ≤ x < 8.50
Baa2	8.50 ≤ x < 9.50
Baa3	9.50 ≤ x < 10.50
Ba1	10.50 ≤ x < 11.50
Ba2	11.50 ≤ x < 12.50
Ba3	12.50 ≤ x < 13.50
B1	13.50 ≤ x < 14.50
B2	14.50 ≤ x < 15.50
B3	15.50 ≤ x < 16.50
Caa1	16.50 ≤ x < 17.50
Caa2	17.50 ≤ x < 18.50
Caa3	≥ 18.50

Finally, we consider whether the final rating should be adjusted to incorporate uplift from structural enhancements that may be incorporated in the company's financial arrangements. The effectiveness of any such enhancements is graded to determine the appropriate uplift, as described in the section "Structural Considerations and Sources of Rating Uplift from Creditor Protection" below. This allows us to apply the methodology to regulated water utilities that have adopted certain credit-enhancing structural features typical of highly-g geared financing structures.

APPLYING THIS RATING METHODOLOGY / OUTLIER DISCUSSION

Appendix II provides a table showing how each company maps for the specific sub-factors. We also highlight issuers whose grid-indicated performance for a specific factor or sub-factor is higher or lower by two or more broad rating categories from the actual rating and discuss general reasons for such outliers within a given factor or sub-factor.

Rating Factor #1: Regulatory Environment & Asset Ownership Model

WHY IT MATTERS

Regulated water utilities typically provide monopoly-type, price-inelastic services that lend themselves to high levels of business visibility and revenue stability. As a result, regulated water utilities – in line with other infrastructure operators – are likely to have a longer-term strategic and financial horizon than most other corporate sectors. Accordingly, assessing the historical and expected stability of the regulated water utility's business and cash flow generation is a critical component of our analysis. Generally speaking, revenues and cash flows are a function of tariff levels and the tariff-setting mechanisms. Tariffs are embedded in the broader framework of the applicable regulatory environment and/or a utility's concession agreement or lease contract. As such, the characteristics and track record of the regulatory regime or concession framework are key in assessing the overall stability of a water utility's business profile.

However, while this rating factor examines the extent to which mechanisms are in place to ensure the relative stability of a regulated water utility's cash flows, the question of whether the utility makes strategic decisions that may change its business conditions to the detriment of creditors is covered later in this methodology, in Rating Factor #3.

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HOW DO WE MEASURE IT?

We examine four sub-factors to assess a water utility's regulatory environment and business model, which are qualitative rank-orderings of risk based on Moody's examination of the relevant information and precedents:

- a. Stability & Predictability of Regulatory Environment
- b. Asset Ownership Model
- c. Cost and Investment Recovery (Ability & Timeliness)
- d. Revenue Risk

(a) Stability & Predictability of Regulatory Environment

This sub-factor captures the level of credit strength that derives from the regulatory and/or concession framework under which the water utility operates.

The essentiality of water and wastewater services usually means that services are provided on a monopoly or quasi-monopoly basis. Therefore the provision of water and wastewater services is commonly regulated on a national or regional basis. The stability and predictability of such regulatory regime is a key determinant in assessing a water utility's business risk profile, which is why this sub-factor has been assigned a weighting of 15%.

We assign the highest score of Aaa to the regulatory regime applied to the UK water sector (i.e. the water companies in England and Wales), which has a history of around 20 years and relies on clearly defined risk allocation principles, which have been consistently applied and transparently disclosed to the public.

Consequently, the lowest possible score will be assigned in a case where the jurisdiction of the issuer has not implemented a defined regulatory framework and/or has a track record of unilateral changes being made to the terms and conditions of the concessions in the water or similar infrastructure sectors that are relevant precedents, without suitable compensation being made to the concessionaire.

Concerns about the independence of the regulatory authorities and the risk of politically motivated intervention in the regulatory process will also result in a lower score.

For example, we assigned a single-B score to the regulatory framework applying to Bratislavská vodárenská spoločnosť, a.s. (BVS) of Slovakia, reflecting a history of political interference, which affected tariff decisions.

When assessing the scores for this sub-factor Moody's also takes into account the general rule of law within the jurisdiction in which the relevant utility operates, and whether an independent judiciary exists that allows for legal rights to be enforceable in practice. For a water company that is located in a country with generally poor institutional strength, the assigned score may be lower than the theoretical regulatory framework may imply.

(b) Asset Ownership Model

This Rating Methodology is designed to cover companies that own their assets outright in perpetuity or for a defined time horizon under a concession or other contractual agreement.⁶

In those cases where the water and wastewater assets are owned outright, Moody's assesses the implication of ownership rights that are subject to a licence and the risk of licence termination. Moody's also considers whether the right to operate the assets is long term in nature or may only be granted over a short-term period. If the time horizon of asset exploitation is limited, Moody's will also take into account the recovery mechanism in relation to any residual asset value at the end of a concession or other contractual arrangement when scoring this sub-factor.

A water company that owns all its key water and wastewater assets outright in perpetuity and has ultimate control over them would score the highest rating (i.e. Aaa). On the other end of the spectrum, a utility that holds the assets under a concession, which may be relatively short term or does not provide clear principles for the recovery of the residual asset value at the termination of the concession, would score relatively low (i.e. Ba or lower).

⁶ Please refer to Appendix III for further details on the water industry sector and the different business models applied.

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Most of the rated regulated water utilities own their key assets under a licence regime or long-term concessions. This is reflected in the relatively high scores achieved under this sub-factor. Outright ownership in perpetuity is less common, with the exception of Spain (e.g. AGBAR's Barcelona concession) and certain jurisdictions in Central and Eastern Europe.

If the assets are held under a concession, a utility's exploitation rights may be limited to the term of the concession, which will be reflected in the scoring. For example, Acquedotto Pugliese, an Italian municipal water utility, operates its assets on the basis of a concession that expires in 2018. Although, the legal framework protects the company from losing its concession without compensation, the mechanism for compensation is untested. This degree of uncertainty is reflected in the score of Baa for this sub-factor.

Similarly, SANEPAR operates pursuant to long-term concession agreements with various municipalities in the Brazilian state of Paraná, which own the related infrastructure assets. The Baa rating for this subfactor reflects the fact that over 60% of its concession agreements expire in the long term, with the average concession life between 20 and 30 years. These concession contracts have written provisions that entitle the company to the recovery of the assets' residual value at termination; however, these provisions have not been tested as, to date, the majority of the terminated concessions have been renewed. The company could score higher, once it has established a long-term track-record of concession renewal at termination.

Similar to the sub-factor above on the Regulatory Environment, also for this Asset Ownership Model sub-factor, we will consider the general rule of law, and the value and enforcement of asset property rights. For example, if there is a heightened risk of expropriation of assets for political reasons, we would score a company lower, even though it may own its assets. Moody's notes that the expropriation risk may be higher for water and wastewater assets than for other infrastructure assets, given the significance of the services provided.

In the US, this type of risk is generally seen as very limited, but could develop if the local government resorts to claiming "eminent domain" over the water system. This is currently the position Pennichuck Water Works faces in its service area. Although the long legal battle has certainly absorbed management's time and resources, Moody's has not taken any rating action because we believe any "fair value" proceeds paid for the system must be directed to debt repayment as per the terms of the outstanding obligations. However, we score the US water utilities as Aa instead of Aaa on the basis of this precedent.

(c) Cost and Investment Recovery (Ability & Timeliness)

As part of our assessment of the overall regulatory or concession regime, the ability of a regulated water utility to recover the cost of its operations and/or investment in a timely manner is another key determinant for the evaluation of the relative stability of cash flow generation. Whilst the first sub-factor under this Rating Factor #1 addresses the overall stability and predictability of the regulatory and/or concessionary framework, this sub-factor looks at the risk allocation between the water utility and its customers based on the tariff regime.

The most flexible arrangement is one where the water utility is free to adjust its tariffs as required, without any approvals or reviews by the relevant regulator or government. As a result, this type of arrangement would score Aaa for this sub-factor. This is clearly a situation unlikely to be encountered in practice. At the other end of the spectrum are mechanisms that do not adequately cover the operator's costs, potentially implying politically motivated low tariffs and hindering the viability of the utility in the absence of government support.

In general, most tariff formulas are designed to achieve a balance between reliability and quality of service standards, a degree of operational efficiency, protecting consumers from monopoly-overcharging and other social considerations, as well as allowing an adequate return for companies to satisfy their stakeholders (debt and equity capital providers).

The tariff formula applied under the UK regulatory framework, for example, allows for the recovery of operating expenditure and depreciation, which broadly resembles capital maintenance requirements, as well as a return on the regulated asset base set to cover the cost of funding through a combination of debt and equity. The return on capital thereby also reflects the funding cost of capital investments that grow the asset base. There is a moderate degree of risk allocation to the water utilities as cost recovery (both operational and financial) is based on ex-ante allowances set by the regulator at five-yearly price reviews.

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We score the tariff regime in England and Wales at single-A reflecting the fact that there is strict regulatory oversight of tariff increases and that operators can be subject to challenging efficiency targets.

In the US, Moody's views each state individually and considers the various factors that affect the utilities' profitability, including the type of fixed- versus variable-rate design allowed, historically authorised ROEs, and the existence of riders or other mechanisms that permit recovery of operating and capital costs outside of a general rate case. Furthermore, we will take into account contractual obligations that restrict a water utility's ability to submit a rate case within a defined period of time. For example, in the rating of American Water Works, we previously took into consideration that following its purchase by RWE in 2001, it would agree not to seek rate increases in a number of states for a defined period of years. This led to some delay in the ability to request rate increases based on investments made in the interim period.

At the lower end of the spectrum we score the tariff formula and its application in single-B for BVS, based in Slovakia, and SANEPAR, based in Brazil.

In case of BVS, the application of a price cap formula based on an unclear efficiency factor resulted in flat water tariffs in recent years. The tariff setting is effectively largely politically driven, which depresses this score for BVS. Furthermore, the tariff formula applied for Slovakian water companies in general does not allow remuneration of maintenance expenditure for assets that had initially been funded through EU subsidies. Effectively, this keeps tariffs artificially low and inadequate to cover for the cost of asset consumption. Whilst revenues should in theory be sufficient to cover operating expenditure, which may support a Ba-score, there have been limited tariff increases in the recent past.

SANEPAR's concession contracts lack provisions for tariff adjustments, so water rates are set by the state government, leaving ample room for politically driven decisions. The company is rated at the lower end for cost and investment recovery because tariffs have been frozen since 2005.

In scoring this sub-factor we also consider whether the tariffs can actually be afforded by the users of the water and wastewater services. This could be measured for example through the level of unpaid bills. If the level of unpaid bills is very high we would score a water utility's ability to recover its costs lower than the theoretical tariff formula may imply. Acquedotto Pugliese is such an example: the tariff formula applied to the company, in theory, follows similar principles as the UK regime and allows for adequate investment recovery. However, in addition to the lack of transparency, which is captured by a lower score in the sub-factor on the Regulatory Environment, the Baa-score for Acquedotto Pugliese under this sub-factor reflects a very high level of bad debt outstanding more than 12 months, which effectively constraints its ability to fully recover its costs.

(d) Revenue Risk

Under this sub-factor we intend to assess the potential volatility of revenues generated by a regulated water utility. We assess this risk by taking into account such factors as a company's exposure to fluctuations in the volume of water used. Volume of usage may be affected by different weather patterns from year to year or a company's customer structure and reliance on a particular revenue stream. For example, if a water utility relies on one particular customer to generate a large proportion of its revenues and this customer decides to choose a different service provider or closes its operations, a significant portion of revenues could be lost. Similarly, a higher exposure to industrial customers or revenues generated from new housing developments may have a negative impact on demand patterns and therefore revenues in a recession scenario.

When scoring this sub-factor we also consider whether a regulatory regime may provide a certain element of protection, whereby companies may be allowed to adjust tariffs within a regulatory period or at the next price review to reflect the divergence of collected versus allowed revenues due to fluctuating volumes.

Issuers that are effectively immune from volume or other revenue volatility risks will score Aaa. Water companies that are not immune but subject to regulatory safeguards that allow them to adjust tariffs under a tested and transparent procedure will score Aa or single-A, depending on the degree of protection provided. Water utilities that are exposed to seasonality or weather effects and/or change in demand patterns, which result in revenue volatility in excess of high single-digit percentages would generally score lower than Baa for this sub-factor. Furthermore, water utilities with a generally higher reliance on new connections and or revenue concentration risk to particular customers or vulnerable industry sectors will generally score Baa to Caa, depending on the potential volatility of revenues.

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For pure asset owners, which may have subcontracted the operations of the water and/or wastewater assets to a different party. However, we will shade the scoring based on the estimated credit quality of the operating counterparty, given that the asset owner may rely solely on a lease payment from one single contract party.

RATING GRID MAPPING

The following table shows the full mapping of each sub-factor to a broad rating category and the weighting of each sub-factor within Rating Factor #1.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(a) Stability and Predictability of Regulatory Environment	Regulation is independent, well established (>15 years of being predictable and stable) and transparent (published methodologies clearly define risk allocation between companies and customers and are consistently applied, with public or shared financial model)	Regulation is independent, reasonably well established (>10 years of being predictable and stable) and transparent (published methodologies clearly define risk allocation between companies and customers and are generally consistently applied) Regulatory framework has been mostly predictable and stable in recent years and is supportive of utilities	Regulation is generally independent and developed (published methodologies set out principles of risk allocation between companies and customers and are based on established precedents in the same jurisdiction), and has above average predictability and reliability, although regulatory regime may be sometimes less supportive of utilities Utility regulatory body may be a state commission or national, state, provincial or independent regulator	Regulatory framework is well developed, with evidence of some inconsistency or unpredictability in the framework's application OR Regulatory framework is relatively new and untested, but methodologies are based on established precedents and jurisdiction has history of independent and transparent regulation for other utility services Regulatory Environment may sometimes be challenging or politically charged	Regulatory framework is defined but there is a high degree of inconsistency or unpredictability in its application; tariff setting is subject to negotiation and political interference; there has been a history of difficult or less supportive regulatory decisions; some precedents in the country of predictable regulation for other utility services	Regulatory framework is unclear, untested or undergoing significant change, with a history of political interference Utility regulatory body lacks a consistent track record and appears unsupportive, uncertain or highly unpredictable	Regulatory framework is not defined, unpredictable or politically driven	15.00%
(b) Asset Ownership Model	All key water and/or sewerage assets held outright in perpetuity	All key water and/or sewerage assets held outright under licence which can be terminated for underperformance, failure to meet certain financial parameters or insolvency OR held under long-term concession with clearly	All key water and/or sewerage assets held under long-term concession with clearly defined right to recover value of residual assets at termination/end of concession underpinned by highly rated entity but with undefined timeframe	All key water and/or sewerage assets held under long-term concession with entitlement to recover value of residual assets at termination/end of concession but procedures untested/undefined OR	All key water and/or sewerage assets held under concession with recovery of residual asset value at termination/end of concession subject to negotiation OR held under short-term operating leases or mgmt	All key water and/or sewerage assets held under concession with no recovery of residual asset value at termination/end of concession OR held under short-term operating leases or mgmt contract	Issuer is in default under its licence, concession or lease/contract, likely to lead to termination Expropriation highly likely, no prospect of compensation	10.00%

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Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
		defined right to timely recovery of residual asset value at termination/end of concession underpinned by highly rated entity; clear track record of consistently applying concession termination / recovery regime	OR held under medium-/ long-term operating leases or mgmt contract with very substantial portfolio diversification, very established market position and very high renewal rate (>95%)	held under medium-/ long-term operating leases or mgmt contract with substantial portfolio diversification, established market position and high renewal rate (>90%)	contract with good degree of portfolio diversification and renewal rate (>80%) Expropriation possible, but some prospect of compensation	(limited portfolio diversification) Expropriation likely, little or no prospect of compensation		
(c) Cost and Investment Recovery (Ability & Timeliness)	No regulatory or contractual impediment to adjust tariffs (no approval or reviews required)	Tariff formula allows for timely recovery of operating expenditure including depreciation and a fair return on all investment Depreciation allowance fairly reflects asset consumption All capital expenditure is included in asset base as incurred or fully covered by specific riders/surcharges prior to the next rate case Minimal challenges by regulators to companies' cost assumptions	Tariff formula allows for recovery of operating expenditure including depreciation based on allowances set at frequent price reviews (5-yearly intervals or shorter) and a fair return on all efficient investment Depreciation allowance fairly reflects asset consumption Capital expenditure is included in asset base as incurred or partially covered by specific riders/surcharges prior to the next rate case Opex and capex can be subject to efficiency tests Limited instances of regulatory challenges; limited delays to rate or tariff increases or cost recovery	Tariff formula allows for recovery of operating expenditure including depreciation and return on investment but subject to retrospective regulatory approval or infrequent price reviews (> 5-yearly intervals) Some instances of revenue back-loading (e.g. depreciation allowance set below asset consumption or operating expenditure is capitalised) OR Rate/tariff reviews and cost recovery outcomes are usually predictable, although application of tariff formula may be unclear; potentially greater tendency for regulatory intervention and/or to disallow or delay costs	Tariff formula does not take into account all cost components and depreciation is set below asset consumption Revenues allow coverage of most operating expenditure But investment is not clearly or fairly remunerated OR Rate/tariff reviews are inconsistent, with some history of unwillingness to make timely rate changes	Tariff formula does not take into account all cost components and depreciation is set below asset consumption Revenues only cover cash operating expenditure OR Highly uncertain rate reviews and cost recovery outcomes; regulators may engage in second guessing or spending decisions or deny rate increases to fund ongoing operations	Revenues only partially cover cash operating costs	12.00%

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Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(d) Revenue Risk	No exposure to volume or customer concentration risk	Little exposure to volume risk and/or timely recovery mechanism Little concentration of volumes and revenues to one particular customer	Some exposure to volume risk but recovery mechanism with some delay through regulatory price review; generally limited volatility expected Some concentration of volumes and revenues to one particular customer	Moderate exposure to volume risk but recovery mechanism with some delay through regulatory price review; moderate volatility expected AND/OR Moderate concentration of volumes and revenues to one particular customer and/or industry sector	Significant exposure to volume risk but recovery mechanism, which may not follow regular intervals; significant volatility expected OR Significant concentration of volumes and revenues to one particular customer and/or industry sector	High exposure to volume risk with no clear recovery mechanism OR High concentration of volumes and revenues to one particular customer and/or industry sector	Very high exposure to volume risk with no existing recovery mechanism OR Very high concentration of volumes and revenues to one particular customer and/or industry sector	3.00%

Rating Factor #2: Operational Characteristics & Asset Risk

WHY IT MATTERS

The regulatory framework and business model are important; however, a water utility's overall credit quality is also influenced by its operational performance and by the size and complexity of its capital programme. This second rating factor focuses on those factors related to the operational efficiency and asset quality of a regulated water utility that are most likely to influence its future financial position.

HOW DO WE MEASURE IT?

In assessing the operational characteristics and asset risk of a water utility, we use the following sub-factors:

- Operational Efficiency
- Scale & Complexity of Capital Programme & Asset Condition Risk

The first sub-factor is a qualitative assessment based on public information or discussions with management. The second sub-factor is a quantitative measure based on publicly available information (where public information may be limited, Moody's will base its assessment on our own estimates), supported by qualitative data on the absolute asset condition of a company.

(a) Operational Efficiency

This sub-factor is designed to measure the degree of efficiency in operational performance in the context of the relevant indicators assessed by the regulatory bodies in the country or area of operation. We do not intend to measure the operational performance in terms of absolute standards, as a company's cost structure and asset base may be the result of historically embedded characteristics.⁷

Examples of performance standards are water quality, water pressure, level of leakage, number and length of service interruptions, sewer flooding or the general level of customer service. Furthermore, we take into account (where such information is available) the amount of operational and/or capital expenditure in comparison with the regulatory allowances, and a company's track record in out- or underperforming such

⁷ For example, at the time of their privatisation in 1989 the water utilities operating in England and Wales inherited a relatively old asset base, which could be considered of a comparatively low standard and condition due to years of underinvestment in maintenance. However, under the regulatory regime the water companies have been set clear targets to improve asset and service quality. Therefore, these companies are judged on their relative performance in achieving these goals through comparative competition with their industry peers, and not on their absolute performance.

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allowances. We would expect that all water utilities are monitored in respect of specific performance measures either by regulators or other supervisory authorities, such as environmental agencies or government ministries. However, if we were to encounter a case where no such monitoring is conducted, we would score the respective company in the single-B category for this sub-factor to reflect the limited insight into the company's operational performance.

Consistent profitability with strong operating margins despite a challenging tariff model may also indicate efficient operations, although this would have to be viewed in light of the company's overall asset condition.

The grid is designed so that utilities that are performing in line with regulatory assumptions or the general national average would score Baa, whilst out- or underperforming companies would score higher or lower, respectively.

(b) Scale & Complexity of Capital Programme & Asset Condition Risk

This sub-factor considers the risk associated with a substantial capital programme, which may expose a water utility to execution risks and potential cost overruns. It is meant to capture the general operational risk of dealing with an extensive capex programme and/or very complex investment projects. The financing risk that a significant capex programme may pose, if it cannot be funded out of operating cash flows, is addressed as part of Factor #4 Key Credit Metrics.

This sub-factor is a quantitative assessment of capital expenditure in the context of the relevant asset base. This would be either a Regulated Asset Base where this concept is applied or the Fixed Assets (tangible and intangible)⁸ as reported in a company's statutory accounts.

For the purpose of this sub-factor, capital expenditure is measured before any government grants, construction subsidies or developers' contributions, to assess the full scale of the investment programme and potential execution risk.

Overall, water utilities with a relatively low capital investment requirement compared to their existing asset base would be considered less risky and would likely achieve a high score for this sub-factor. On the other hand, companies facing a very large investment programme compared to their asset base and/or projects of high technical complexity would score at the lower end of the spectrum.

We note that it is not uncommon in the water sector for subsidies from governmental authorities to customers to be embedded in the economic model of water utilities, particularly if these utilities rely only on customer tariffs to cover their costs and earn a return on their invested capital.

For example, the asset value of companies that have been privatised may not reflect the actual replacement costs of such assets and companies may be required to undertake very large capital investment programmes to maintain and upgrade their infrastructure compared to a relatively small regulatory asset base. These companies would score lower under this sub-factor. The operational leverage of these water utilities is effectively higher, notwithstanding the fact that water utilities may still be compensated for the embedded replacement costs as part of the water tariffs to enable them to achieve a fair market return on their investment.

Some regulatory frameworks or concession regimes may limit a company's exposure to capex-related risks, such as cost overruns. In these instances, the score under this subfactor may be adjusted to reflect regulatory arrangements that limit the water utility's exposure to cost overrun risks.

When scoring this sub-factor we will also take into account the underlying asset condition and the related risk of potential asset failure. A functioning asset base is paramount for the water and wastewater utilities to comply with their regulatory duties and ensure stability of future cash flow generation. Therefore, if a water utility has a history of serious asset failures or exhibits a significant deterioration in asset performance, it will achieve a score of Ba or lower under this sub-factor, depending on the severity of failures. Low scores for this sub-factor would primarily be expected for water utilities in emerging markets, whilst we would expect water utilities in developed countries to have a reasonably high asset quality.

⁸ We include intangible assets in the equation as companies may report their concession assets as intangibles. However, we do not include Goodwill as part of the Fixed Assets, on which the company will earn a return.

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RATING GRID MAPPING

The following table shows the full mapping of each sub-factor to a broad rating category and the weighting of each sub-factor within Rating Factor #2.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(a) Operational Efficiency	Consistently achieves maximum results on all relevant performance measures (both cost efficiency and service levels)	Track record of very high performance (consistently at the efficiency frontier and in the top 10% on relevant key performance measures)	Consistent track record of outperforming regulatory opex and capex targets; above national average on relevant key performance measures	Performance in line with national average; no history of material opex and/or capex overruns	Some history of material opex and/or capex overruns; below national average on relevant key performance measures	Currently experiencing serious capex and/or opex overruns; poor track record on relevant key performance measures	Very serious cost overruns or service failures could put issuer in default under its licence, concession or lease/contract	5.00%
(b) Scale and Complexity of Capital Programme & Asset Condition Risk	Annual total capital expenditure (maintenance & enhancement) \leq 4% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 4% \leq 6% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 6% \leq 8% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 8% \leq 12% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 12% \leq 20% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 20% \leq 30% of total fixed assets or regulated asset base	Annual total capital expenditure (maintenance & enhancement) $>$ 30% of total fixed assets or regulated asset base	5.00%
	AND/OR	AND/OR	AND/OR	AND/OR	OR	OR	OR	
	No asset condition risk (i.e. full and immediate cost pass-through)	Well-developed asset base under tight regulatory supervision; asset performance is generally stable or improving	Well-developed asset base and no history of serious asset failure; asset performance is generally stable or improving	Company has a reasonably developed asset base; may have some precedents of serious asset failures but asset performance is now broadly stable	Small number of large and complex projects accounts for majority of capital programme	One large and complex project accounts for majority of capital programme	Capital programme includes one or more large projects of extreme technical complexity	
					AND/OR	AND/OR	AND/OR	
					Asset base not fully developed; average asset performance is gradually deteriorating or there is some uncertainty about asset condition	Performance of most assets is materially deteriorating, with serious assets failures likely or ongoing	Rapidly deteriorating asset performance or condition could put issuer in default under licence, concession or lease/contract likely to lead to termination	

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Rating Factor #3: Stability of Business Model and Financial Structure

WHY IT MATTERS

This rating factor is intended to identify the likelihood that event risk could add uncertainty to future cash flow levels and divert resources away from creditors. Such decisions are a function of the ability and willingness of management and shareholders to change the business focus and the financial structure of the company. The ways in which a company will choose to address the needs of its different investors (e.g. shareholders and creditors) has a material impact on its overall credit quality.

HOW DO WE MEASURE IT?

Our assessment of shareholder and company strategy hinges on three sub-factors:

- a. Ability and Willingness to Pursue Opportunistic Corporate Activity (M&A, Disposals and Investments)
- b. Ability and Willingness to Increase Leverage
- c. Targeted Proportion of Operating Profit Outside Core Water and Wastewater Activities

(a) Ability and Willingness to Pursue Opportunistic Corporate Activity

This sub-factor allows us to score the risk that corporate activity, in the form of mergers and acquisitions, major disposals and investments, will impact future credit quality. We consider whether restrictions exist on management's discretion to pursue opportunistic investments, business combinations and other significant corporate initiatives that would alter the issuer's credit profile. Such restrictions can be regulatory, e.g. through licence conditions as is the case for the UK water sector, or contractual, e.g. through ring-fencing covenants.

In the absence of formal restrictions, we consider management's and shareholders' track record and objectives to gauge the future likelihood and potential impact of corporate activity. In essence, we assess how future cash flows are likely to be applied, and what the balance will be between cash flows applied to repay creditors and those applied to make investments to bolster shareholder returns.⁹

Based on the above considerations, the highest possible score for this sub-factor (which we deem commensurate with the Aaa category) entails a prohibition on the water utility from engaging in any form of corporate activity, either because of the specific mandate incorporated in the licence / concession agreement, the company's bylaws or other binding agreements (e.g. a contract with the state), or because of explicit covenant restrictions in financing agreements. We will score all other situation Aa through to single-B or Caa, depending on management's appetite for opportunistic corporate activity.

(b) Ability and Willingness to Increase Leverage

This sub-factor addresses the likelihood that a company may change its capital structure, based, again, on the degree of discretion available to management and shareholders, their strategy and track record.

A water utility with a conservative financial strategy that, in incurring additional indebtedness, would not compromise minimum financial parameters would score as a Baa for this sub-factor.

There is a distinction between the risk characteristics captured under this Rating Factor #3 and those considered in Rating Factor #4: Key Credit Metrics. Under Rating Factor #4, we assess an issuer's prospective financial profile based on its stated business plan and financial policies and on our views of the main variables affecting future cash flow generation (e.g. revenues, costs, capital expenditure). Any specific transaction that an issuer is committed or very likely to execute would be factored into our financial projections. Conversely, under Rating Factor #3, we assess the risk that future corporate activity, not identifiable yet, may alter an

⁹ The nature of the water utility's shareholders does not have a direct impact on credit quality, except in situations where GRI or other similar considerations apply. Rather, the intentions and priorities of shareholders may affect how we score this particular sub-factor. This sub-factor can be particularly important in situations where shareholder structures are in flux. For example, a shift towards private ownership may also entail a shift towards an increasing focus on shareholder value resulting in more shareholder friendly policies. However, a government-owned water utility may also be subject to high event risk if the government is seeking to extract dividends from the utility to apply to national budget considerations (e.g. investments in other types of infrastructure).

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operator's current business and financial risk profile and the risk that current financial policies will be abandoned in pursuit of higher financial leverage.

Also considered is an issuer's willingness to issue equity to maintain its credit profile and mitigate the effects of increasing leverage. As the water utility sector is very capital intensive, negative free cash flows due to construction programmes are sometimes financed with short-term debt and then refinanced with longer-term debt offerings and common equity. Issuers that delay issuing equity (or holding companies that delay the "down-streaming" of equity to an operating subsidiary) to avoid dilution or concerns over book value per share may see pressure on the rating over time, particularly if the dividend policy is viewed as aggressive.

(c) Targeted Proportion of Operating Profit Outside the Core Water and Wastewater Activities

Shareholder returns may be enhanced by investing in businesses outside the core concession, with higher return expectations (e.g. a water technology service or construction & engineering business built on the expertise of the utility in the water and wastewater sector). Such investments typically entail higher risk than the usually regulated core water and wastewater activities and we generally view substantial investments outside the core concession area as a credit negative. This sub-factor is designed to adjust for the influence that contributions from higher-risk non-regulated business may have on a utility's financial performance and credit metrics.

Within the rating grid, the lowest possible score is attributed to an operator targeting over 20% of Operating Profit originating outside its core regulated activities (when the credit analysis may require a "blended" approach of the different businesses to assess the company's consolidated credit profile).

It is important to define the "core" water and wastewater activities. Generally, we would regard all regulated activities related to the abstraction, treatment, distribution and supply of water, as well as the collection and treatment of wastewater as core. These activities could be conducted under a licence or concession regime. For the avoidance of doubt, where a utility holds a number of different licences, concessions or contracts for separate regions or service areas, we would view the aggregate activities under such arrangements as being a single core business activity for the purposes of this rating grid.

A NOTE ON APPLYING RATING FACTOR #3 TO FINANCING STRUCTURES WITH CREDIT-ENHANCING FEATURES

Where we deem that the event risk protection included in a financing structure is strong, the score for the sub-factors in Rating Factor #3 would usually be higher than for a utility that does not benefit from such protection. Therefore, the scoring would automatically add a degree of uplift to the final rating outcome. In other words, the rating uplift generated by event risk protection is achieved through the scoring of sub-factors in Rating Factor #3.

This is discussed in greater detail below in the section on Structural Considerations and Rating Uplift.

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RATING GRID MAPPING

The following table shows the full mapping of each sub-factor to a broad rating category and the weighting of each sub-factor within Rating Factor #5.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(a) Ability and Willingness to Pursue Opportunistic Corporate Activity (M&A, Disposals & Investments)	Covenants prohibit all corporate activity OR Corporate activity is outside of management mandate	Covenants or licence/concession largely limit corporate activity, with exception of certain defined permitted investments	Strong track record of no material corporate activity and stated intention to refrain from M&A and major investments	Moderate, may impact credit metrics for 18-24 months only	Track record of repetitive, sizeable transactions	Highly likely to conduct frequent and very large opportunistic investments		3.33%
(b) Ability and Willingness to Increase Leverage	No additional indebtedness allowed without debt holders' consent	Additional indebtedness only allowed for capex under debt covenants and/or licence/concession terms	Financial covenants in principal debt instruments limit management ability to materially increase leverage	Conservative financial strategy, unlikely to compromise minimum financial parameters	Limited track record of consistent financial policies; likely to target high leverage	Track record of aggressive financial policies and very high leverage; likely to pay out creditors' financial cushion ahead of business pressures		3.33%
(c) Targeted Proportion of Operating Profit outside Core Water and Wastewater Activities	0% (=exclusive focus on core water and wastewater services) OR Covenants prohibit all other businesses	0-5% OR Covenants largely limit non-concession businesses, with exception of certain defined and low risk permitted businesses	5-10%	10-15%	15-20%	>20%		3.33%

Rating Factor #4: Key Credit Metrics**WHY IT MATTERS**

The first three rating factors aim to capture the credit strengths and weaknesses afforded by the water utility's fundamental business and its financial policies. However, a company's ultimate credit profile must also incorporate its financial metrics. Two otherwise identical water utilities may exhibit radically different credit profiles due to different financial metrics.

When examining credit metrics, there is no single measure that invariably predicts the likelihood of default. We utilise metrics that measure both (i) the absolute capacity of the issuer to service its debt and (ii) the size of its debt burden relative to those of its peers. Leverage ratios aim to capture different measures of how easily an issuer can repay its debt; coverage ratios focus more on the ability to service the debt prior to repayment but may also take into account the necessary maintenance investments to ensure that the future cash flow generation is not impaired.

HOW DO WE MEASURE IT?

We use four key credit metrics when examining a water utility. Importantly, when examining credit metrics, our ratings also incorporate our "expected case", i.e. how we believe the metrics will evolve over the foreseeable future. The three credit metrics are:

- Adjusted Interest Coverage OR FFO Interest Coverage
- Net Debt to Regulated Asset Base (or Fixed Assets) OR Debt to Capitalisation
- FFO to Net Debt
- Retained Cash Flow (RCF) to Capex

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These credit metrics will be calculated after making Moody's standard adjustments,¹⁰ including for off-balance sheet debt and debt-like obligations and certain other re-classifications in the income statement and cash flow statement.

(a) Adjusted Interest Coverage OR FFO Interest Coverage

We use an interest coverage ratio that reflects that a proportion of the water tariffs, and therefore a water utility's cash flows, may not be available for debt service as it needs to be reinvested in the ongoing maintenance of the asset base.

As such, the Adjusted Interest Coverage ratio resembles more an EBIT Coverage or Debt Service Coverage ratio (assuming debt service consists primarily of interest payments). It aims to measure the amount of "headroom" afforded by the company's cash flows in servicing its debt burden after taking into account the cost of maintaining a stable asset base.

For water utilities whose regulatory tariff regime includes an allowance for depreciation in the revenue building block, we believe that EBITDA- or FFO-based interest coverage may limit the comparability of companies coverage, as the cash-flow generation to some extent depends on depreciation policies.¹¹ However, where the tariff formula is not based on consideration of Capital Charges, Moody's will use its standard FFO Interest Coverage Ratio with alternative banding.

The formula for the Adjusted Interest Coverage ratio is a variation on the FFO Interest Coverage used by Moody's for many corporate sectors. The standard FFO Interest Cover is adjusted for (i) the regulatory Capital Charges funded through revenues, and (ii) Non-Cash Interest expense where appropriate. It is also calculated on a net interest basis as follows:

$$\frac{\text{FFO} + (\text{Net Interest Expense} - \text{Non-Cash Interest}) - \text{Capital Charges}}{(\text{Net Interest Expense} - \text{Non-Cash Interest})}$$

Funds from Operations ("FFO"), which reflects Cash Flows from Operations ("CFO") excluding working capital movements, is a relevant measure of cash flows for water utilities, since working capital movements are typically not material; any unusual movements in working capital tend to be small one-off movements tied more to normal operating activities than to any strategic decisions.¹² FFO is net of the interest expense from the income statement, whether or not such interest expense translates fully into a cash payment, with adjustments made to issuers' financial statements as necessary if non-cash interest is material.

Net Interest Expense, based on the issuer's reported figures, incorporates our standard adjustments to interest expense (for example, re-classifying the interest component of operating lease rental expense). We use the amount of interest expense net of interest income, as many of the rated water companies tend to pre-fund their capital programme and hold significant amounts of cash on-balance sheet. Non-Cash Interest is deducted from Net Interest Expense only when appropriate in the context of the regulatory financial model. In the UK, for example, the regulatory regime provides a real rate of return so revenues and the regulatory asset base are adjusted for inflation and Moody's excludes the indexation element of index-linked debt in calculating the Net Interest Expense. The indexation is however captured by the leverage ratio as it increases the outstanding debt amount.

The regulatory Capital Charges represent the portion of revenues (and thus FFO) that is not available to cover a utility's debt service because it needs to be allocated to the replenishment of the asset base. The

¹⁰ See Moody's Rating Methodology: "Moody's Approach to Global Standard Adjustments in the Analysis of Financial Statements for Non-Financial Corporations – Part II Standardized Adjustments to Enable Global Consistency for Issuers Reporting under International Financial Reporting Standards ('IFRS')", February 2006, and Rating Methodology: "Moody's Approach to Global Standard Adjustments in the Analysis of Financial Statements for Non-Financial Corporations – Part I Standardized Adjustments to Enable Global Consistency for US and Canadian GAAP Issuers", February 2006.

¹¹ For further details, please see Moody's Special Comment: "UK Water Sector: Key Ratios Used by Moody's in Assessing Companies' Credit Strength", March 2006.

¹² For example water companies in the UK historically had fairly negligible working capital movements due to (i) the changes in the water charges (K-factor) being small or negative resulting in limited turnover growth, and (ii) small debtor balances at the year-end as the domestic customer base was largely billed in advance on the basis of unmeasured supplies. However, as customers switch from unmeasured to measured supply payment patterns may change. Measured water supplies are invoiced every six months in arrears, with the billing date being a function of the date when the meter is installed. Consequently, the effect of customers switching to measured supplies is a significant delay in the receipt of payments for the same supply (i.e. from up to 12 months in advance to up to 8-9 months in arrears). These dynamics lead to additional cash requirements and an increase in the working capital (debtors) of the water companies (i.e. negative cash movement). However, this negative effect on working capital is normally expected to reverse once measured customers start to pay their bills via direct debit.

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maintenance of a stable asset base will ensure that the earned return does not fall due to a decline in the asset base. Depending on the regulatory financial model (for example, whether it is based on statutory historic cost financial statements or regulatory current cost financial statements), Capital Charges could correspond to regulatory depreciation,¹³ accounting depreciation, maintenance expenditure or an equivalent concept.

(b) Net Debt to Regulated Asset Base (or Fixed Assets) OR Debt to Capitalisation

For regulated water utilities we measure leverage as Net Debt to Regulated Asset Base (or Fixed Assets, if applicable), reflecting a loan-to-value ratio. The denominator for this ratio can be the Regulated Asset Base or similar concept, if regulatory financial statements are used for the analysis, or it can be total Fixed Assets, if statutory financial statements are used. Fixed Assets would include tangible and intangible assets, but not Goodwill, given that companies would usually only earn a return on the actual water and wastewater assets. This ratio is designed to measure the leverage as a proportion to the capital invested, on which the company is allowed to earn a return. As such the Regulated Asset Base also resembles the net present value of the future cash flow earnings potential of a water utility.

We use Net Debt given the sector's propensity to pre-fund the significant capital investments which can result in substantial cash amounts held on balance sheet and also recognising the requirements under certain financing structures to maintain liquidity and debt service reserves.

Rating committees may also consider the ratio of Total Debt to Total Capitalisation, as an alternative measure of the issuer's leverage relative to its total capital base.

(c) FFO to Net Debt

This ratio is one of Moody's most commonly used measures of dynamic leverage. We note that this measure does not take into account the need of maintenance investments when comparing cash flows to future debt repayments. However, it also allows a wider comparison across industries on a global basis and can be a useful indicator of a company's ability to generate cash flows if monitored over a period of time.

The numerator for this ratio is FFO as defined above. Again, we use Net Debt for the calculation of this ratio. However, in situations where our assumptions on pre-funding may prove incorrect or the cash reported on the balance sheet is restricted for a specific purpose and unavailable to service the debt, Gross Debt may be applied. Discretion is given to the analyst and to the rating committee to consider Gross Debt instead of Net Debt. For example, for issuers that are near speculative or speculative grade, Net Debt may not be used to calculate this metrics, as the cash on the issuer's balance sheet may be used for collateral postings. Furthermore, where the debt position of a company may be overstated or understated by the debt figures as reported in the financial statements, we would also make the appropriate adjustments.¹⁴

(d) RCF to Capex

This ratio shows the extent to which a water utility is able to fund capital expenditure internally. Moody's does not regard capital expenditure undertaken by a utility to upgrade its network as a negative rating factor in itself, as additional investments may be remunerated through tariff increases. However, we view positively the financial flexibility enjoyed by a utility with limited capex requirements easily funded by internally generated cash flows. Such a company would not need to access the markets to raise additional finance and may have a wider range of options to react to changing economic circumstances.

However, we would also caution that a company that generates large financial surpluses that are paid out to shareholders may not actually retain a high degree of flexibility in downturns if management is unwilling to cut distributions. Thus this ratio takes into account the magnitude of dividend payments.

The formula for the RCF to Capex ratio is the following:

¹³ For example, under the UK regulatory regime, the regulatory capital charges are Infrastructure Renewals Charge (IRC) and Current Cost Depreciation (CCD). Both IRC and CCD form part of the allowed revenue that the regulator determines, and are thus an integral part of companies' cash flows. The IRC represents the cost of maintaining underground assets at a constant level of functionality and as such is based on an average of infrastructure renewals expenditure calculated by the regulator Ofwat over a period of 15 years. The CCD relates to above-ground assets with a limited life and is, in principle, calculated in line with accounting depreciation criteria. However, for the majority of CCD that relates to the original assets transferred at privatisation and thus acquired with a large discount to the asset replacement value, the standard accounting approach cannot be applied and CCD is calculated with reference to the current replacement cost. Ofwat follows the principle that over the long term (approximately 28 years), for a pool of assets which is stable in terms of outputs generated, the CCD charged should be comparable to the capital expenditure required to maintain and replace the assets.

¹⁴ The most common instances where the need for this type of debt adjustments may arise are linked to derivative transactions.

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FFO – Dividends Paid
Capex

Capex comprises additions to both tangible and intangible fixed assets, but will be net of any government grants, subsidies or developers' contributions received for the purpose of calculating this ratio. We use Capex net of subsidies when scoring this sub-factor, as it is meant to address the financing risk related to the investment programme, which only refers to the portion that needs to be funded by the company.

Other metrics that are considered in rating committees include Debt to Capitalisation, which as mentioned above can be used as a proxy for the sub-factor ratio described in 4(b). To assess the impact of the level of dividend payments on a company's financial profile, Moody's may also consider RCF to (Net) Debt or dividend payout ratios.

ASSUMPTIONS FOR FINANCIAL RATIO CALCULATIONS

Given that the economic model of the water and wastewater industry generally offers good medium-term visibility, financial projections typically provide a useful tool to enhance credit analysis. In mapping a company's credit metrics to broad rating categories as indicated in the grid below, we could focus exclusively on historical credit metrics or exclusively on projected metrics, or use a mixture of both. In fact, we use historic credit metrics in situations where we believe that these are representative of the financial structure pursued by management (based on a track record), or where we believe that forecast improvements are uncertain. For companies that have a history of using financial headroom to make new investments or to increase distributions to shareholders, we map using historic credit metrics, without factoring in the benefit of any reduction in leverage and associated improvement in credit metrics that may be shown in the financial projections based on current operations. Conversely, in cases where we believe that there is a high probability that a company's credit metrics will improve or deteriorate, we map using the prospective ratios.

For the purpose of this report, we have generally used a three-year average of the latest historical information. However, if updated information is publicly available, e.g. in relation to potential changes in a company's capital structure as has been the case for Veolia Water Central Limited (formerly Three Valleys Water Plc), we have already reflected this in the scoring for the credit metrics. Furthermore, for water utilities funded under a highly leveraged capital structure, as is the case for a number of the UK issuers, which form the largest group of rated issuers, we have taken into account certain cash-trapping financial covenants when assessing the utilities' positioning, particularly with respect to the Adjusted Interest Coverage and the Net Debt to Regulated Asset Base.

RATING GRID MAPPING

The following table shows the full mapping of each sub-factor to a broad rating category and the weighting of each sub-factor within Rating Factor #4.

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(a) Adjusted Interest Cover	>8.0x	4.5-8.0x	2.5-4.5x	1.5-2.5x	1.2-1.5x	1.0-1.2x	<1.0x	15.00%
OR	>10.0x	7.0-10.0x	4.5-7.0x	2.5-4.5x	1.8-2.5x	1.5-1.8x	<1.5x	
FFO Interest Cover								
(b) Net Debt / Regulated Asset Base (or Fixed Assets)	<25%	25-40%	40-55%	55-70%	70-85%	85-100%	>100%	15.00%
OR								
Debt/Cap								
(c) FFO / Net Debt	>40%	25-40%	15-25%	10-15%	6-10%	4-6%	<4%	5.00%
(d) RCF / Capex	>3.5x	3.5-2.5x	1.5-2.5x	1.0-1.5x	0.5-1.0x	0.25-0.5x	<0.25x	5.00%

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Structural Considerations and Sources of Rating Uplift from Creditor Protection

Regulated water utilities are financed under different financing structures. In particular, large regulated water utilities are becoming more highly leveraged as a result of changes in ownership and other corporate activity and may have to agree to creditor protection arrangements. Such arrangements are most common in the UK. A transition from a publicly listed model to private ownership by infrastructure, pension and other specialist funds has led to the adoption of financing structures that incorporate structural enhancements, which are often seen in project finance transactions in various infrastructure sectors.

Moody's believes that in the water sector structural enhancements may provide valuable creditor protection and be a source of rating uplift. We have classified the sources of rating uplift from creditor protection into three categories:

- Event risk protection
- Debt structure and liquidity protection
- Control afforded to creditors

For each category, we look at specific concessions made to creditors and score their effectiveness on a scale of five grades: "none", "low", "medium", "high" and "very high".

Legal considerations are typically important to determine the value of protective arrangements in the jurisdiction(s) that are relevant to a toll road operator's specific financial arrangements.

(i) Event Risk Protection

In this category, we typically review restrictive covenants including:

- Restrictions on permitted business outside the core water and wastewater activities
- Restrictions on acquisitions/disposals
- Restrictions on investments
- Restrictions on additional indebtedness

As we have discussed above, if these and similar restrictions are effective to remove event risk, the sub-factors under Rating Factor #3: Stability of Business Model & Financial Structure for Creditors will be scored higher (between Aaa and A), thus effectively giving some rating uplift compared to a generic benchmark assumed to be in the mid-point Baa range.

Moody's notes that certain funding arrangements may incorporate structural features designed to insulate the credit quality of the water utility from that of its wider corporate family, sponsors or sub-contractors. These features may be crucial for the rating of a regulated water utility to reflect exclusively its credit quality, assessed as described in this rating methodology. However, they do not enhance the water utility's stand-alone credit quality and therefore are not listed as a source of rating uplift.

(ii) Debt Structure and Liquidity Protection

Structural enhancements in this category address financial risks associated with liquidity, interest rate and refinancing risk. Typical arrangements include:

- Dedicated cash reserves to cover all costs for at least next 12 months under base case
- Timing reserves to cover future "lumpy" payments (e.g. maintenance)
- No material refinancing risk (e.g. benefits of amortising debt or restrictions on debt concentration)
- Covenanted hedging policies

The different arrangements may have more or less bearing in our assessment of how effective creditor protection in this category is, depending on the specific circumstances of the company. If we regard the overall

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effectiveness of creditor protection for risks relating to debt structure and liquidity as very high, the rating would be raised by one notch.

We highlight that a fully amortising debt structure, typical of project financings and typically associated with adequate reserving and hedging arrangements, is generally regarded as necessary to achieve a score of “very high” in this category. However, we consider it very unlikely for a utility to adopt an amortising debt structure, given the ongoing capital investment programmes, which usually require constant additional funding. Refinancing risk thus tends to be a constant feature of regulated water utilities’ financing structures.

(iii) Control Afforded to Creditors

Among the most typical structural features, financial covenants and security arrangements are included in this category, as they provide creditors with a degree of control over a company’s financial and business decisions in downturns, which are not enjoyed in respect of a typical corporate issuer. Specific arrangements that we classify in this category include:

- Step-in rights and remedies to delay concession termination or insolvency (e.g. direct agreements, security and intercreditor agreements, warning system).
- Restrictions on payments and distribution lock-ups (e.g. if metrics deteriorate below minimum required parameters).
- Frequent and regular reports of creditors’ technical advisers to sanction base case validity and compliance with contractual and financial obligations.

Again, if the overall effectiveness of arrangements in this category is scored as very high, a one-notch rating uplift is applied. As for the previous category, the whole package of structural enhancements is assessed to gauge the overall effectiveness. For example, independent validation of compliance with financial ratio covenants may be an important consideration for the purpose of assessing the effectiveness of such covenants.¹⁵ Creditor step-in rights should be specifically permitted under the regulatory, licence or concession frameworks as well as the finance documents.

We give value to security arrangements – typically in respect of the shares in the regulated water company – only as one element, although generally a critical element, of a wider package of concessions designed to improve creditors’ ability to detect early potential problems and rectify them if possible (in the first instance by retaining cash surpluses within the company), or, if remedial action is not possible or fails, to maximise recovery prospects. As normally security is not allowed or is not enforceable on the regulated or concession assets, a rating uplift is not generally achievable simply by the granting of security.

In conclusion, Moody’s believes that structural enhancements can deliver up to three notches of uplift to the rating if they are very comprehensive and effective. In the regulated water utilities universe, actual rating uplift tends to range between one and two notches.

Rating Methodology Assumptions and Limitations, and other Rating Considerations

The rating methodology grid incorporates a trade-off between simplicity that enhances transparency and greater complexity that would enable the grid to map more closely to actual ratings. The four rating factors in the grid do not constitute an exhaustive treatment of all considerations that are important for ratings of companies in the regulated water and wastewater sector. In addition, our ratings incorporate expectations for future performance, while the financial information that is used to illustrate the mapping in the grid is mainly historical. In some cases, our expectations for future performance may be informed by confidential information that we cannot publish. In other cases, we estimate future results based upon past performance, industry trends, competitor actions and other factors. In either case, predicting the future is subject to the risk of substantial inaccuracy.

¹⁵ A test to assess the effectiveness of financial covenants, in terms of definition and threshold levels, that we often use is to run increasingly negative downside sensitivities and see (i) whether and when distribution lock-ups are activated, and (ii) whether trapped cash provides material support to the company’s credit metrics at meaningful levels.

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Although the rating factors described in this methodology cover the principal drivers of our rating analysis, the analytical process also includes a number of important considerations that are consistently examined for fundamental issuers in general. Such factors include liquidity, notching practices for debt subordination, management quality and corporate governance, legal and environmental matters, financial reporting and overall disclosure, as well as the extent of likely government support. These matters are dealt with by Moody's in the form of overriding rating methodologies and practices that are applied in accordance with general credit policy guidelines. In situations where a water utility's rating is materially influenced by any such factor so as to diverge from the rating resulting from the application of Moody's industry methodology, we explain the relevant rating factors in company-specific research.

Regional Differences

UK

Moody's currently rates nine of the ten water and sewerage companies (WaSCs) operating in England and Wales as well as four of the eleven water only companies (WoCs). The WoCs are generally smaller in size and provide only water services within the overall franchise area of the larger WaSCs, which also undertake sewerage services.

The average rating of the UK water sector based on the credit quality of the relevant corporate family is around A3-Baa1, with most of the debt rated at A3. This reflects regulatory constraints that may restrict the ability of companies to position themselves lower in the rating scale, but also the industry's fundamental characteristics.

Overall, Moody's regards the risk profile of the UK regulated water utilities as one of the lowest amongst all industry sectors rated. In particular, we consider the UK regulatory framework as one of the most transparent and well-established, thus determining the high predictability of cash flows for the sector.

Based on the low business risk characteristics that are inherent in the generally monopolistic water sector as a whole, but are further enhanced through the strong regulatory framework applied in England and Wales, the UK water companies can sustain a relatively high level of leverage and maintain an investment-grade profile.

The UK water sector has recently completed the regulatory review process to determine prices for the five-year period 2010-15. The final price determination, published in November 2009, includes challenging assumptions for the UK water companies. Whilst we believe that the price review is overall neutral for credit ratings in the sector, we expect that shareholder returns will decline. Dividend policies that do not reflect the realities of both the new price limits and the size of each company's capital investment programme may lead to downward rating pressure for individual companies.

Over the long term, the sector may face challenges from the possible introduction of competition to certain elements of the value chain. Several recommendations have been made, including the vertical separation of the activities of the companies and proposals for developing upstream competition. Moody's does not believe that the proposed changes will adversely affect the business risk profiles of the water companies over the medium term. Furthermore, we expect that certain segments of the industry, such as the infrastructure networks, will retain natural monopoly characteristics over the very long term.

Rest of Western Europe

Unlike in the UK, water services in the rest of Western Europe remain largely in public hands. In particular, the water and wastewater infrastructure usually remains in the ownership of local or regional governments. The assets and/or their operations could be transferred to a government-related corporate entity, as is the case for Acquedotto Pugliese S.p.A., a regional water utility that is owned by the regional government of the Italian region of Puglia where the company operates. However, very few of these entities have accessed the debt capital markets to date.

In a number of cases, local or regional governments have outsourced the operations of their water and wastewater infrastructure to the private sector, mainly through short-term management contracts, e.g. in France. However, such pure asset operators are outside of the scope of this methodology. For example, major water contractors, such as Suez Environnement or Veolia Environnement are not covered in this methodology, given that their credit profile is subject to different assumptions due to the competitive element of their operations.

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On the other hand, the methodology captures AGBAR of Spain, whose activities combine the operation of assets under short-to-medium-term contracts with long-term concessions and licensed operations.

Central and Eastern Europe – Example: Slovakia

Although Moody's views favourably the historically strong balance sheet structure and strong cash flow generation of water companies in Slovakia, our rating assessment includes a forward looking assumption of increasing leverage and consequent weakening of credit metrics due to anticipated sizable investment expenditures necessary to comply with EU directives. For example, the European Water Framework Directive 2000/60/EC stipulates that all towns or villages of 2,000 or more citizens will need to have sewage system coverage by 2015. Although these EU requirements represent an obligation of the Slovak Republic, designated government support or EU funding for water companies has not yet been specifically defined. Moody's notes that fulfilling these requirements will require significant investments, thereby increasing the risk of deterioration in the companies' financial profiles. Unless the future capital investment needs are partially accommodated by state or EU funds or supported by a more benign regulatory regime, the companies (including BVS) would need to raise significant external debt. Moody's views the companies' current debt capacity as sufficient to absorb such debt, but cautions that the level of the debt capacity might be significantly constrained in case the pressure to maintain low water and sewage tariffs further escalates, preventing companies from preserving their financial profiles.

United States

In the US, there are federal guidelines related to water quality but utilities are also subject to regulation at the state level for quality, service, and, importantly, rate-setting. Moody's views each state individually and considers the various factors that affect the utilities profitability including, the type of fixed- versus variable-rate design allowed, historically authorised ROEs, and the existence of riders or other mechanism's that permit recovery of operating and capital costs outside of a general rate case. Additionally, we analyse the strength of any regulatory ring-fencing provisions that could limit the level of financial leverage the utility can operate at or restrictions on upstream dividends to parent companies or shareholders.

Latin America – Example: Brazil

Ratings for Brazilian water utilities are constrained by the lack of a consolidated regulatory framework to ensure stable and predictable levels of income and cash flows supportive of its capital-intensive activities. Water and wastewater services in Brazil are subject to several laws at federal, state and municipal levels. In general, the companies operate at the state or municipal level, pursuant to long-term concession agreements with the various municipalities, which own the underlying concession assets. Concession contracts often lack provisions for tariff adjustments, so rates are set by the state government, leaving ample room for politically driven decisions. Such political interference has been a primary factor driving deterioration in operating margins in the sector. The concession contracts often have written provision clauses that entitle the company for the recovery of the assets' residual value at termination; however, because the municipalities lack sufficient financial resources to fund investments or to reimburse past investments themselves, the terminated concessions tend to be renewed.

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Conclusion: Summary of the Grid-Indicated Rating Outcomes

For the 23 regulated water companies scored in detail under the methodology (excluding Severn Trent Plc and United Utilities Plc as pure holding companies; as well as Korea Water Resources Corp.), the methodology grid-indicated ratings map to current assigned ratings (or BCAs where relevant) as follows (please see Appendix II for further details):

- 52% or 12 companies map to their assigned rating (or BCA where relevant)
- 44% or 10 companies have grid-indicated ratings that are within one alpha-numeric notches of their assigned ratings (or BCAs where relevant)
- 4% or 1 company has grid-indicated ratings that are within two alpha-numeric notches of their assigned ratings (or BCAs where relevant)

Overall, all of the grid-indicated rating outcomes are within two alpha-numeric notches of their assigned ratings (or BCAs where relevant) and 96% of the grid-indicated ratings are within one alpha-numeric notch of their assigned ratings (or BCAs where relevant). We note that some of the multi-notch differentials relate to issuers, whose ratings are notched for structural subordination, which is not reflected in the rating methodology grid.

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Appendix I – Regulated Water Utilities Rating Grid

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
Rating Factor 1 – Regulatory Environment & Asset Ownership Model								
(a) Stability and Predictability of Regulatory Environment	Regulation is independent, well established (>15 years of being predictable and stable) and transparent (published methodologies clearly define risk allocation between companies and customers and are consistently applied, with public or shared financial model)	Regulation is independent, reasonably well established (>10 years of being predictable and stable) and transparent (published methodologies clearly define risk allocation between companies and customers and are generally consistently applied) Regulatory framework has been mostly predictable and stable in recent years and is supportive of utilities	Regulation is generally independent and developed (published methodologies set out principles of risk allocation between companies and customers and are based on established precedents in the same jurisdiction); and has above average predictability and reliability, although regulatory regime may be sometimes less supportive of utilities Utility regulatory body may be a state commission or national, state, provincial or independent regulator	Regulatory framework is well developed, with evidence of some inconsistency or unpredictability in the framework's application OR Regulatory framework is relatively new and untested, but methodologies are based on established precedents and jurisdiction has history of independent and transparent regulation for other utility services	Regulatory framework is defined but there is a high degree of inconsistency or unpredictability in its application; tariff setting is subject to negotiation and political interference; there has been a history of difficult or less supportive regulatory decisions; some precedents in the country of predictable regulation for other utility services	Regulatory framework is unclear, untested or undergoing significant change, with a history of political interference Utility regulatory body lacks a consistent track record and appears unsupportive, uncertain or highly unpredictable	Regulatory framework is not defined, unpredictable or politically driven	15.00%
(b) Asset Ownership Model	All key water and/or sewerage assets held outright in perpetuity	All key water and/or sewerage assets held outright under licence which can be terminated for underperformance, failure to meet certain financial parameters or insolvency OR held under long-term concession with clearly defined right to timely recovery of residual asset	All key water and/or sewerage assets held under long-term concession with clearly defined right to recover value of residual assets at termination/end of concession underpinned by highly rated entity but with undefined timeframe OR held under medium-/	All key water and/or sewerage assets held under long-term concession with entitlement to recover value of residual assets at termination/end of concession but procedures untested/undefined OR held under medium-/long-term operating leases or mgmt	All key water and/or sewerage assets held under concession with recovery of residual asset value at termination/end of concession subject to negotiation OR held under short-term operating leases or mgmt contract with good degree of portfolio diversification and renewal	All key water and/or sewerage assets held under concession with no recovery of residual asset value at termination/end of concession OR held under short-term operating leases or mgmt contract (limited portfolio diversification) Expropriation	Issuer is in default under its licence, concession or lease/contract, likely to lead to termination Expropriation highly likely, no prospect of compensation	10.00%

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Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
		value at termination/end of concession underpinned by highly rated entity; clear track record of consistently applying concession termination / recovery regime	long-term operating leases or mgmt contract with very substantial portfolio diversification, very established market position and very high renewal rate (>95%)	contract with substantial portfolio diversification, established market position and high renewal rate (>90%)	rate (>80%) Expropriation possible, but some prospect of compensation	likely, little or no prospect of compensation		
(c) Cost and Investment Recovery (Ability & Timeliness)	No regulatory or contractual impediment to adjust tariffs (no approval or reviews required)	Tariff formula allows for timely recovery of operating expenditure including depreciation and a fair return on all investment Depreciation allowance fairly reflects asset consumption All capital expenditure is included in asset base as incurred or fully covered by specific riders/surcharges prior to the next rate case Minimal challenges by regulators to companies' cost assumptions	Tariff formula allows for recovery of operating expenditure including depreciation based on allowances set at frequent price reviews (5-yearly intervals or shorter) and a fair return on all efficient investment Depreciation allowance fairly reflects asset consumption Capital expenditure is included in asset base as incurred or partially covered by specific riders/surcharges prior to the next rate case Opex and capex can be subject to efficiency tests Limited instances of regulatory challenges; limited delays to rate or tariff increases or cost recovery	Tariff formula allows for recovery of operating expenditure including depreciation and return on investment but subject to retrospective regulatory approval or infrequent price reviews (> 5-yearly intervals) Some instances of revenue back-loading (e.g. depreciation allowance set below asset consumption or operating expenditure is capitalised) OR Rate/tariff reviews and cost recovery outcomes are usually predictable, although application of tariff formula may be unclear; potentially greater tendency for regulatory intervention and/or to disallow or delay costs	Tariff formula does not take into account all cost components and depreciation is set below asset consumption Revenues allow coverage of most operating expenditure But investment is not clearly or fairly remunerated OR Rate/tariff reviews are inconsistent, with some history of unwillingness to make timely rate changes	Tariff formula does not take into account all cost components and depreciation is set below asset consumption Revenues only cover cash operating expenditure OR Highly uncertain rate reviews and cost recovery outcomes; regulators may engage in second guessing or spending decisions or deny rate increases to fund ongoing operations	Revenues only partially cover cash operating costs	12.00%

Global Regulated Water Utilities

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
(d) Revenue Risk	No exposure to volume or customer concentration risk	Little exposure to volume risk and/or timely recovery mechanism Little concentration of volumes and revenues to one particular customer	Some exposure to volume risk but recovery mechanism with some delay through regulatory price review; generally limited volatility expected Some concentration of volumes and revenues to one particular customer	Moderate exposure to volume risk but recovery mechanism with some delay through regulatory price review; moderate volatility expected AND/OR Moderate concentration of volumes and revenues to one particular customer and/or industry sector	Significant exposure to volume risk but recovery mechanism, which may not follow regular intervals; significant volatility expected OR Significant concentration of volumes and revenues to one particular customer and/or industry sector	High exposure to volume risk with no clear recovery mechanism OR High concentration of volumes and revenues to one particular customer and/or industry sector	Very high exposure to volume risk with no existing recovery mechanism OR Very high concentration of volumes and revenues to one particular customer and/or industry sector	3.00%

Rating Factor 2 – Operational Characteristics & Asset Risk

(a) Operational Efficiency	Consistently achieves maximum results on all relevant performance measures (both cost efficiency and service levels)	Track record of very high performance (consistently at the efficiency frontier and in the top 10% on relevant key performance measures)	Consistent track record of outperforming regulatory opex and capex targets; above national average on relevant key performance measures	Performance in line with national average; no history of material opex and/or capex overruns	Some history of material opex and/or capex overruns; below national average on relevant key performance measures	Currently experiencing serious capex and/or opex overruns; poor track record on relevant key performance measures	Very serious cost overruns or service failures could put issuer in default under its licence, concession or lease/contract	5.00%
(b) Scale and Complexity of Capital Programme & Asset Condition Risk	Annual total capital expenditure (maintenance & enhancement) ≤ 4% of total fixed assets or regulated asset base AND/OR No asset condition risk (i.e. full and immediate cost pass-through)	Annual total capital expenditure (maintenance & enhancement) > 4% ≤ 6% of total fixed assets or regulated asset base AND/OR Well-developed asset base under tight regulatory supervision; asset performance is generally stable or improving	Annual total capital expenditure (maintenance & enhancement) > 6% ≤ 8% of total fixed assets or regulated asset base AND/OR Well-developed asset base and no history of serious asset failure; asset performance is generally stable or improving	Annual total capital expenditure (maintenance & enhancement) > 8% ≤ 12% of total fixed assets or regulated asset base AND/OR Company has a reasonably developed asset base; may have some precedents of serious asset failures but asset performance is now broadly stable	Annual total capital expenditure (maintenance & enhancement) > 12% ≤ 20% of total fixed assets or regulated asset base OR Small number of large and complex projects accounts for majority of capital programme AND/OR Asset base not fully developed; average asset performance is gradually deteriorating or there is some uncertainty about asset condition	Annual total capital expenditure (maintenance & enhancement) > 20% ≤ 30% of total fixed assets or regulated asset base OR One large and complex project accounts for majority of capital programme AND/OR Performance of most assets is materially deteriorating, with serious assets failures likely or ongoing	Annual total capital expenditure (maintenance & enhancement) > 30% of total fixed assets or regulated asset base OR Capital programme includes one or more large projects of extreme technical complexity AND/OR Rapidly deteriorating asset performance or condition could put issuer in default under licence, concession or lease/contract likely to lead to termination	5.00%

Global Regulated Water Utilities

Rating Category	Aaa	Aa	A	Baa	Ba	B	Caa	Weighting
Rating Factor 3 – Stability of Business Model & Financial Structure								
(a) Ability and Willingness to Pursue Opportunistic Corporate Activity (M&A, Disposals & Investments)	Covenants prohibit all corporate activity OR Corporate activity is outside of management mandate	Covenants or licence/concession largely limit corporate activity, with exception of certain defined permitted investments	Strong track record of no material corporate activity and stated intention to refrain from M&A and major investments	Moderate, may impact credit metrics for 18-24 months only	Track record of repetitive, sizeable transactions	Highly likely to conduct frequent and very large opportunistic investments		3.33%
(b) Ability and Willingness to Increase Leverage	No additional indebtedness allowed without debt holders' consent	Additional indebtedness only allowed for capex under debt covenants and/or licence/concession terms	Financial covenants in principal debt instruments limit management ability to materially increase leverage	Conservative financial strategy, unlikely to compromise minimum financial parameters	Limited track record of consistent financial policies; likely to target high leverage	Track record of aggressive financial policies and very high leverage; likely to pay out creditors' financial cushion ahead of business pressures		3.33%
(c) Targeted Proportion of Operating Profit outside Core Water and Wastewater Activities	0% (=exclusive focus on core water and wastewater services) OR Covenants prohibit all other businesses	0-5% OR Covenants largely limit non-concession businesses, with exception of certain defined and low risk permitted businesses	5-10%	10-15%	15-20%	>20%		3.33%
Factor 4: Key Credit Metrics								
(a) Adjusted Interest Cover	>8.0x	4.5-8.0x	2.5-4.5x	1.5-2.5x	1.2-1.5x	1.0-1.2x	<1.0x	15.00%
OR		OR	OR	OR	OR	OR	OR	
FFO Interest Cover	>10.0x	7.0-10.0x	4.5-7.0x	2.5-4.5x	1.8-2.5x	1.5-1.8x	<1.5x	
(b) Net Debt / Regulated Asset Base (or Fixed Assets)	<25%	25-40%	40-55%	55-70%	70-85%	85-100%	>100%	15.00%
OR								
Debt/Cap								
(c) FFO / Net Debt	>40%	25-40%	15-25%	10-15%	6-10%	4-6%	<4%	5.00%
(d) RCF / Capex	>3.5x	3.5-2.5x	1.5-2.5x	1.0-1.5x	0.5-1.0x	0.25-0.5x	<0.25x	5.00%

Global Regulated Water Utilities

Appendix II – Indicated Ratings and Results of Mapping

An issuer may score higher or lower for any given factor or sub-factor than its actual or indicated rating implies. This is not in itself a concern, but rather reflects the relative strength and weaknesses of each individual issuer in relation to each of the sub-factors. Indeed, there is a propensity for privately-owned regulated water utilities to utilise their debt service capacity and leverage on their strong business fundamentals to improve shareholder returns. Therefore, it would not be uncommon to see issuers scoring high for fundamental business risk factors and relatively low on the key credit metrics, to achieve a rating comfortably in the investment-grade category, i.e. around low single-A to high-Baa.

On the other hand, issuers in less developed markets may exhibit the reverse as a strong financial profile is required to offset the relative weakness of less transparent and established regulatory regimes.

The full results of the rating mapping and indicated ratings is summarised below. Certain UK issuers, which have been funded under a more structured approach, including credit-enhancing features, receive additional rating uplift, as shown below.

After the main summary table, we discuss individual mappings and outliers for each of the key rating factors separately.

				Factor 1				Factor 2		Factor 3			Factor 4				
Sub-Factor Weights				15.0%	10.0%	12.0%	3.0%	5.0%	5.0%	3.3%	3.3%	3.3%	15.0%	15.0%	5.0%	5.0%	
				Stability and Predictability of Regulatory Environment	Asset Ownership Model	Cost and Investment Recovery	Revenue Risk	Operational Efficiency	Scale and Complexity of Capital Programme & Asset Condition Risk	Ability and Willingness to Pursue Opportunistic Corporate Activity	Ability and Willingness to Increase Leverage	Targeted Proportion of Operating Profit Outside Core Water and Waste-water Activities	Adjusted Interest Cover (or FFO Interest Cover)	Net Debt/RAB (or Debt/Cap)	FFO/Debt	RCF/Capex	
Rating	Factor Indicated Rating	Uplift	Final Indicated Rating														
Europe																	
Acquedotto Pugliese S.p.A.	Baa3 [12]	Ba3	0	Ba3	Ba	Baa	Baa	Aa	Ba	Caa	A	A	Aa	Ba	B	Ba	Caa
Bratislavská vodárenská spoločnosť, a.s.	Baa2 [11]	Baa3	0	Baa3	B	Aa	B	Ba	Ba	Ba	A	Ba	Aa	Aaa	Aaa	Aaa	Ba
Sociedad General de Aguas de Barcelona, S.A. (AGBAR)	A2	A3	0	A3	A	A	Aa	A	A	Baa	Baa	Baa	B	A	A	Aa	Ba
Anglian Water Services Limited	Baa1	Baa2	+1	Baa1	Aaa	Aa	A	A	Baa	A	Aa	A	Aa	Ba	Ba	Ba	Ba
Dwr Cymru Cyfyngedig	A3	Baa1	0	Baa1	Aaa	Aa	A	A	Baa	A	Aa	A	Aa	Baa	Ba	Baa	Ba
Northumbrian Water Limited	Baa1	Baa1	0	Baa1	Aaa	Aa	A	A	Baa	Baa	A	Baa	Aa	Baa	Ba	Baa	Ba
Sewern Trent Water Limited	A3	A3	0	A3	Aaa	Aa	A	A	Baa	A	A	Baa	Aa	Baa	Baa	A	Ba
Southern Water Services Limited	Baa1	Baa2	+1	Baa1	Aaa	Aa	A	A	Baa	Baa	Aa	A	Aa	Ba	Ba	Baa	Ba
Thames Water Utilities Limited	Baa1	Baa2	+1	Baa1	Aaa	Aa	A	A	Baa	Ba	Aa	A	Aa	Ba	Ba	A	B
United Utilities Water Plc	A3	A3	0	A3	Aaa	Aa	A	A	Baa	Baa	A	Baa	Aa	Baa	Baa	A	Ba

Global Regulated Water Utilities

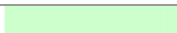
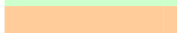
				Factor 1				Factor 2		Factor 3			Factor 4				
Sub-Factor Weights				15.0%	10.0%	12.0%	3.0%	5.0%	5.0%	3.3%	3.3%	3.3%	15.0%	15.0%	5.0%	5.0%	
Rating	Factor Indicated Rating	Uplift	Final Indicated Rating	Stability and Predictability of Regulatory Environment	Asset Ownership Model	Cost and Investment Recovery	Revenue Risk	Operational Efficiency	Scale and Complexity of Capital Programs & Asset Condition Risk	Ability and Willingness to Pursue Opportunistic Corporate Activity	Ability and Willingness to Increase Leverage	Targeted Proportion of Operating Profit Outside Core Water and Wastewater Activities	Adjusted Interest Cover (or FFO Interest Cover)	Net Debt/RAB (or Debt/Cap)	FFO/Debt	RCF/Capex	
Wessex Water Services Limited	A3	A3	0	A3	Aaa	Aa	A	A	Baa	Baa	A	Baa	Aa	Baa	Baa	Baa	Ba
Yorkshire Water Services Limited	Baa1	Baa1	+1	A3	Aaa	Aa	A	A	A	A	Aa	A	Aa	Ba	Ba	Baa	Ba
South East Water Limited	Baa2	Baa2	0	Baa2	Aaa	Aa	A	A	Baa	Baa	Aa	A	Aa	Ba	Ba	Ba	Ba
South Staffordshire Water Plc	Baa2	Baa2	0	Baa2	Aaa	Aa	A	A	A	Ba	Aa	A	Aa	Ba	Ba	A	Ba
Sutton & East Surrey Water Plc	Baa1	Baa2	+1	Baa1	Aaa	Aa	A	Baa	Baa	Ba	Aa	A	Aa	Ba	Ba	A	Ba
Veolia Water Central Ltd (formerly Three Valleys Water)	A3	Baa1	0	Baa1	Aaa	Aa	A	A	Baa	Ba	A	Baa	Aa	Ba	Baa	A	Ba
North America																	
American Waterworks Company, Inc.	Baa2	Baa2	0	Baa2	Baa	A	A	Aa	Baa	Baa	Baa	Baa	Baa	Baa	Baa	Baa	Ba
New Jersey American Water	Baa1	A3	0	A3	A	Aa	A	A	Baa	Baa	A	A	Aa	A	A	A	Ba
Pennsylvania-American Water Company	Baa1	A3	0	A3	A	Aa	Aa	A	Baa	Baa	A	A	Aa	Baa	A	A	Ba
Golden State Water Company	A2	A3	0	A3	A	Aa	A	A	Baa	Baa	A	A	Aa	Baa	A	A	Ba
Pennichuck Water Works, Inc.	Baa3	Baa1	0	Baa1	Baa	Aa	A	Baa	Baa	Baa	A	A	Aa	Baa	A	Baa	B
United Waterworks, Inc.	Baa1	Baa1	0	Baa1	Baa	A	A	A	Baa	A	Baa	Baa	Aa	Baa	A	Baa	B
Latin America																	
Companhia de Saneamento do Parana - SANEPAR	Ba3 [13]	Ba2	0	Ba2	B	Baa	B	Baa	Baa	Ba	Baa	Ba	Aa	Baa	A	A	Ba

Positive Outlier
 Negative Outlier

Global Regulated Water Utilities

Rating Factor #1 – Results of Mapping

Factor 1 - Regulatory Environment and Asset Ownership Model

Sub-Factor Weights				15.00%	10.00%	12.00%	3.00%
				Stability and Predictability of Regulatory Environment	Asset Ownership Model	Cost and Investment Recovery (Ability & Timeliness)	Revenue Risk
Company	Current Rating	Outlook	Final Indicated Rating				
Europe							
Acquedotto Pugliese S.p.A.	Baa3 [12]	Negative	Ba3	Ba	Baa	Baa	Aa
Bratislavská vodárenská spoločnosť, a.s.	Baa2 [11]	Stable	Baa3	B	Aa	B	Ba
Sociedad General de Aguas de Barcelona, S.A. (AGBAR)	A2	UR-D	A3	A	A	Aa	A
Anglian Water Services Limited	Baa1	Stable	Baa1	Aaa	Aa	A	A
Dwr Cymru Cyfyngedig	A3	Stable	Baa1	Aaa	Aa	A	A
Northumbrian Water Limited	Baa1	Stable	Baa1	Aaa	Aa	A	A
Severn Trent Water Limited	A3	Stable	A3	Aaa	Aa	A	A
Southern Water Services Limited	Baa1	Stable	Baa1	Aaa	Aa	A	A
Thames Water Utilities Limited	Baa1	Stable	Baa1	Aaa	Aa	A	A
United Utilities Water Plc	A3	Stable	A3	Aaa	Aa	A	A
Wessex Water Services Limited	A3	Stable	A3	Aaa	Aa	A	A
Yorkshire Water Services Limited	Baa1	Stable	A3	Aaa	Aa	A	A
South East Water Limited	Baa2	Stable	Baa2	Aaa	Aa	A	A
South Staffordshire Water Plc	Baa2	Stable	Baa2	Aaa	Aa	A	A
Sutton & East Surrey Water Plc	Baa1	Stable	Baa1	Aaa	Aa	A	Baa
Veolia Water Central Ltd (formerly Three Valleys Water)	A3	Negative	Baa1	Aaa	Aa	A	A
North America							
American Waterworks Company, Inc.	Baa2	Stable	Baa2	Baa	A	A	Aa
New Jersey American Water	Baa1	Stable	A3	A	Aa	A	A
Pennsylvania-American Water Company	Baa1	Stable	A3	A	Aa	Aa	A
Golden State Water Company	A2	Stable	A3	A	Aa	A	A
Pennichuck Water Works, Inc.	Baa3	Stable	Baa1	Baa	Aa	A	Baa
United Waterworks, Inc.	Baa1	Negative	Baa1	Baa	A	A	A
Latin America							
Companhia de Saneamento do Parana - SANEPAR	Ba3 [13]	Negative	Ba2	B	Baa	B	Baa
<i>Positive Outlier</i>							
<i>Negative Outlier</i>							

Observations & outliers:

Given the fundamentally low business risk of the regulated water sector, it is not surprising that most issuers score strongly on this factor. Most notably are the UK water companies as positive outliers reflecting the transparent, stable and predictable nature of the regulatory framework applied, which is seen as benchmark for the global regulated water sector.

Global Regulated Water Utilities

Rating Factor #2 – Results of Mapping

Factor 2 – Operational Characteristics & Asset Risk

Sub-Factor Weights		5.00%	5.00%		
Company	Current Rating	Outlook	Final Indicated Rating	Operational Efficiency	Scale & Complexity of Capital Programme & Asset Condition Risk
Europe					
Acquedotto Pugliese S.p.A.	Baa3 [12]	Negative	Ba3	Ba	Caa
Bratislavská vodárenská spoločnosť, a.s.	Baa2 [11]	Stable	Baa3	Ba	Ba
Sociedad General de Aguas de Barcelona, S.A. (AGBAR)	A2	UR-D	A3	A	Baa
Anglian Water Services Limited	Baa1	Stable	Baa1	Baa	A
Dwr Cymru Cyfyngedig	A3	Stable	Baa1	Baa	A
Northumbrian Water Limited	Baa1	Stable	Baa1	Baa	Baa
Severn Trent Water Limited	A3	Stable	A3	Baa	A
Southern Water Services Limited	Baa1	Stable	Baa1	Baa	Baa
Thames Water Utilities Limited	Baa1	Stable	Baa1	Baa	Ba
United Utilities Water Plc	A3	Stable	A3	Baa	Baa
Wessex Water Services Limited	A3	Stable	A3	Baa	Baa
Yorkshire Water Services Limited	Baa1	Stable	A3	A	A
South East Water Limited	Baa2	Stable	Baa2	Baa	Baa
South Staffordshire Water Plc	Baa2	Stable	Baa2	A	Ba
Sutton & East Surrey Water Plc	Baa1	Stable	Baa1	Baa	Ba
Veolia Water Central Ltd (formerly Three Valleys Water)	A3	Negative	Baa1	Baa	Ba
North America					
American Waterworks Company, Inc.	Baa2	Stable	Baa2	Baa	Baa
New Jersey American Water	Baa1	Stable	A3	Baa	Baa
Pennsylvania-American Water Company	Baa1	Stable	A3	Baa	Baa
Golden State Water Company	A2	Stable	A3	Baa	Baa
Pennichuck Water Works, Inc.	Baa3	Stable	Baa1	Baa	Baa
United Waterworks, Inc.	Baa1	Negative	Baa1	Baa	A
Latin America					
Companhia de Saneamento do Parana - SANEPAR	Ba3 [13]	Negative	Ba2	Baa	Ba

Positive Outlier

Negative Outlier

Observations & outliers:

There are a few negative outliers on the sub-factor that relates to the scale and complexity of the capital programme, reflecting comparably large investment programmes planned over the medium term.

Global Regulated Water Utilities

Rating Factor # 3 – Results of Mapping

Factor 3 – Stability of Business Model & Financial Structure

Sub-Factor Weights				3.33%	3.33%	3.33%
Company	Current Rating	Outlook	Final Indicated Rating	Ability and Willingness to Pursue Opportunistic Corporate Activity (M&A, Disposals & Investments)	Ability and Willingness to Increase Leverage	Targeted Proportion of Operating Profit Outside Core Water and Waste-water Activities
Europe						
Acquedotto Pugliese S.p.A.	Baa3 [12]	Negative	Ba3	A	A	Aa
Bratislavská vodárenská spoločnosť, a.s.	Baa2 [11]	Stable	Baa3	A	Ba	Aa
Sociedad General de Aguas de Barcelona, S.A. (AGBAR)	A2	UR-D	A3	Baa	Baa	B
Anglian Water Services Limited	Baa1	Stable	Baa1	Aa	A	Aa
Dwr Cymru Cyfyngedig	A3	Stable	Baa1	Aa	A	Aa
Northumbrian Water Limited	Baa1	Stable	Baa1	A	Baa	Aa
Severn Trent Water Limited	A3	Stable	A3	A	Baa	Aa
Southern Water Services Limited	Baa1	Stable	Baa1	Aa	A	Aa
Thames Water Utilities Limited	Baa1	Stable	Baa1	Aa	A	Aa
United Utilities Water Plc	A3	Stable	A3	A	Baa	Aa
Wessex Water Services Limited	A3	Stable	A3	A	Baa	Aa
Yorkshire Water Services Limited	Baa1	Stable	A3	Aa	A	Aa
South East Water Limited	Baa2	Stable	Baa2	Aa	A	Aa
South Staffordshire Water Plc	Baa2	Stable	Baa2	Aa	A	Aa
Sutton & East Surrey Water Plc	Baa1	Stable	Baa1	Aa	A	Aa
Veolia Water Central Ltd (formerly Three Valleys Water)	A3	Negative	Baa1	A	Baa	Aa
North America						
American Waterworks Company, Inc.	Baa2	Stable	Baa2	Baa	Baa	Baa
New Jersey American Water	Baa1	Stable	A3	A	A	Aa
Pennsylvania-American Water Company	Baa1	Stable	A3	A	A	Aa
Golden State Water Company	A2	Stable	A3	A	A	Aa
Pennichuck Water Works, Inc.	Baa3	Stable	Baa1	A	A	Aa
United Waterworks, Inc.	Baa1	Negative	Baa1	Baa	Baa	Aa
Latin America						
Companhia de Saneamento do Parana - SANEPAR	Ba3 [13]	Negative	Ba2	Baa	Ba	Aa

Observations & outliers:


There are a number of positive outliers on this factor, mostly reflecting restrictive licence conditions or additional contractual arrangements that limit a regulated water utility's activity and ensure that it maintains focus on the core regulated activities.

Negative outliers usually relate to utilities that have other activities in addition to the core regulated business. AGBAR, for example, currently still operates a health insurance and hospital management business, although it is in the process of selling it. Upon completion of such sale, the company's score under the sub-factor for targeted proportion of operating profit outside of core activities would likely improve significantly, unless it embarks on activities other than the regulated water and waste water business.

Global Regulated Water Utilities

Rating Factor # 4 – Results of Mapping

Factor 4 – Key Credit Metrics

Sub-Factor Weights			15.00%	15.00%	5.00%	5.00%	
Company	Current Rating	Outlook	Final Indicated Rating	Adjusted Interest Coverage (FFO Interest Coverage)	Net Debt/RAB (or Debt/Cap)	FFO/Net Debt	RCF/ Capex
Europe							
Acquedotto Pugliese S.p.A.	Baa3 [12]	Negative	Ba3	Ba	B	Ba	Caa
Bratislavská vodárenská spoločnosť, a.s.	Baa2 [11]	Stable	Baa3	Aaa	Aaa	Aaa	Ba
Sociedad Geenral de Aguas de Barcelona, S.A. (AGBAR)	A2	UR-D	A3	A	A	Aa	Ba
Anglian Water Services Limited	Baa1	Stable	Baa1	Ba	Ba	Ba	Ba
Dwr Cymru Cyfyngedig	A3	Stable	Baa1	Baa	Ba	Baa	Ba
Northumbrian Water Limited	Baa1	Stable	Baa1	Baa	Ba	Baa	Ba
Severn Trent Water Limited	A3	Stable	A3	Baa	Baa	A	Ba
Southern Water Services Limited	Baa1	Stable	Baa1	Ba	Ba	Baa	Ba
Thames Water Utilities Limited	Baa1	Stable	Baa1	Ba	Ba	A	B
United Utilities Water Plc	A3	Stable	A3	Baa	Baa	A	Ba
Wessex Water Services Limited	A3	Stable	A3	Baa	Baa	Baa	Ba
Yorkshire Water Services Limited	Baa1	Stable	A3	Ba	Ba	Baa	Ba
South East Water Limited	Baa2	Stable	Baa2	Ba	Ba	Ba	Ba
South Staffordshire Water Plc	Baa2	Stable	Baa2	Ba	Ba	A	Ba
Sutton & East Surrey Water Plc	Baa1	Stable	Baa1	Ba	Ba	A	Ba
Veolia Water Central Ltd (formerly Three Valleys Water)	A3	Negative	Baa1	Ba	Baa	A	Ba
North America							
American Waterworks Company, Inc.	Baa2	Stable	Baa2	Baa	Baa	Baa	Ba
New Jersey American Water	Baa1	Stable	A3	A	A	A	Ba
Pennsylvania-American Water Company	Baa1	Stable	A3	Baa	A	A	Ba
Golden State Water Company	A2	Stable	A3	Baa	A	A	Ba
Pennichuck Water Works, Inc.	Baa3	Stable	Baa1	Baa	A	Baa	B
United Waterworks, Inc.	Baa1	Negative	Baa1	Baa	A	Baa	B
Latin America							
Companhia de Saneamento do Parana - SANEPAR	Ba3 [13]	Negative	Ba2	Baa	A	A	Ba
							

Observations & outliers:

There are a number of negative outliers for this factor, reflecting the generally free cash flow negative nature of the industry. Furthermore, a number of issuers have fully utilised the debt capacity provided by the fundamentally low business risk characteristics of regulated water utilities. We note that for those issuers – particularly in the UK – that have executed financing transactions with credit-enhancing features, we have scored the relevant sub-factors (Adjusted Interest Coverage and Net Debt to RAB) in accordance with the cash lock-up triggers embedded in the funding structure. These companies are likely to exhibit a financial profile close to the financial covenants – whose breach would trigger a distribution lock-up – reflecting their generally large capex funding requirements as well as their shareholder structure, particularly the presence of infrastructure and other specialist funds.

Positive outliers under this factor essentially include issuers located in developing countries or other jurisdictions with weaker business fundamentals.

Global Regulated Water Utilities

Appendix III - Industry Overview

Generally, regulated water utilities exhibit significantly lower business risk than other rated corporate sectors, and are considered by Moody's as exhibiting one of the lowest business risk profile even among other infrastructure issuers.¹⁶

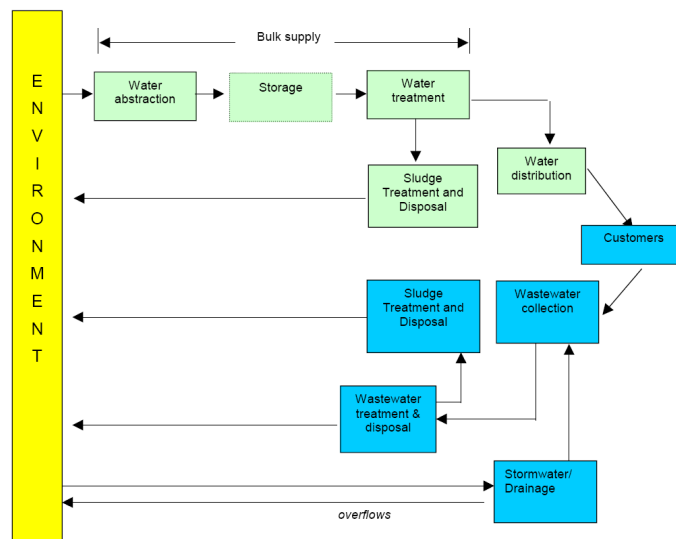
Under developed regulatory frameworks, the very low business risk primarily reflects:

- Monopoly-type activities, most commonly supported by long-term licence or concession agreements.
- Characteristically strong visibility in revenues and profit generation, due to (i) importance of water and wastewater services provided, which results in overall low demand volatility and general resilience to economic fluctuations, and (ii) clear and predictable mechanisms for tariff increases (embedded in the regulatory framework or concession regime), which will sustain revenues over the long term.
- Strong regulatory supervision due to the critical element of health and environmental implications of the water and wastewater services.

The high and sustainable levels of cash flows afforded by these characteristics can also translate into a significant capacity to sustain high debt levels over the long term. This is of particular importance as the sector as a whole has massive infrastructure funding needs to enhance the existing facilities to improve health and environmental standards. Due to the significant investment requirements issuers will need constant access to external funding as the vast amount of investments cannot be solely covered from internal cash flow generation. Although customer bills continue to rise to cover for the additional costs in financing the water and wastewater infrastructure (partly offset by efficiency savings in the operations), the industry also remains heavily subsidised.¹⁷

The graph below shows the main components of the water and wastewater value chain that form part of the overall services provision.

Value Chain of Water and Wastewater Services



Source: Study on the Application of the Competition Rules to the Water Sector in the European Community, Dec 2002, prepared by WRC and Economic for the European Commission

¹⁶ Please see Moody's Special Comment: "Regulated Industries – Q&A on Lending against the Regulated Asset Value", published in November 2007.

¹⁷ Levels and forms of subsidies differ from jurisdiction to jurisdiction. Most countries provide some form of cross subsidisation between customers through the application of average tariffs across any given water supply area compared to the actual cost of delivery to each respective customer. Furthermore, there are a number of explicit or implicit measures by which governments provide subsidies, such as reduced trade taxes for utilities, or income support and/or targeted assistance for customers in need. Subsidies can also be built directly into the tariff system. For example, when the UK water companies (in England and Wales) were privatised, the value of the regulated asset base was set at the amount achieved through privatisation. The privatisation value, however, was significantly lower than the replacement cost of the regulated assets, as it reflected the historically low charges paid by customers for the water and wastewater services. Given that the companies need to incur large amounts of maintenance capex, which has to be spent at the replacement value, the tariffs include a maintenance capex allowance to reflect such higher replacement values, but the return that companies earn is based on the lower regulated asset base. This ensured that customer prices did not rise as much as would otherwise have been the case.

Global Regulated Water Utilities

The combination of water abstraction and treatment is also referred to as bulk supply or wholesale activities. The vertical integration of the water supply chain can stop at this point. This is the case in a number of EU countries, where one large utility may be responsible for the water wholesale activities, whilst a number of smaller – usually municipal-owned – suppliers undertake the distribution to the end customers. Most of the water utilities rated by Moody's are integrated providers of water and/or wastewater services along the entire value chain, which in addition to the bulk supply consisting of water abstraction and treatment also includes the distribution and sale to customers. Among the Moody's rated universe, we only have one rated water wholesaler: Korea Water Resources Group, currently rated A2 with stable outlook.

This rating methodology is meant to cover not only utilities providing services along the value chain of water and wastewater treatment and disposal, but also addresses different business models adopted globally in managing the water and wastewater activities. In many countries around the world, the supply of water and treatment of wastewater are public services and the legal responsibility of municipalities. In these cases the legal ownership of the assets also lies with the municipalities. However, there exist a variety of operational models that are derived from this set-up.

First, the water and wastewater infrastructure assets can be operated under direct management by the municipality itself. In this case, the water and wastewater services would be part of the general regional or local administration. Such instances are not covered under this rating methodology.

Second, the management of the water and wastewater infrastructure can be delegated to another entity. Such entity can be – and in many instances is – partly or wholly owned by the regional or local government that retains the legal responsibility for the provision of water and wastewater services. Only a few countries worldwide have completely privatised the entire value chain of water and/or wastewater provision. The UK (more specifically England and Wales) is the most cited example of a country that has transferred the responsibility of water and wastewater services entirely to the private sector, albeit under stringent regulatory oversight.

With respect to delegated management, a variety of different forms of contracts, concessions or licence arrangements exists, which can be summarised into the following main business models:

Management Contract: This is usually a short-term (3-5 years) arrangement for the management of operational facilities. The assets remain in the public sector, usually with the relevant municipality, which also collects the user charges from the customers. The managing entity is remunerated by the municipality through payment of a management fee. Depending on the contract, it may include a number of performance targets against which the managing entity will be measured. Capital expenditure requirements and their funding remain principally the responsibility of the relevant municipality.

Lease Contract: A lease contract is similar to a management contract in that the asset ownership remains with the municipality. However, the relevant service undertaker, responsible for the operation of the assets will collect the user charges directly from the end customers, and may also be responsible for funding investments in the assets over the life of the contract. Lease contracts commonly apply over periods of 8-15 years.

Concession Contract: This is one of the most wide-ranging options in transferring responsibility for the assets to the relevant service undertaker. Concession arrangements usually cover a period of 25-30 years and transfer the economic benefits and costs of asset ownership to the service undertaker for the time of the concession. The service undertaker therefore also obtains responsibility for capital investments and funding requirements. The terms of the concession are negotiated on a bilateral basis, but may be based on a general legislative and/or regulatory framework applied throughout a jurisdiction. Given the length of the contract, a concession also generally includes tariff reviews at specified intervals. In Europe, concessions contracts are commonly used for water and wastewater operation in France, Italy and Spain. They can also be used in Latin America, e.g. in Brazil.

Licence: The licence approach is usually very similar to a long-term concession. However, the terms of the licence are usually set in law and are commonly applied to all licensed undertakers. Licences may have maturities similar to long-term concession or run in perpetuity, with an option to terminate the for severe performance failures. For example, licences apply for the UK water companies operating in England and Wales; for these companies the licences include a condition that allows licence termination subject to a 25 year notice period.

Global Regulated Water Utilities

Furthermore, for single asset transactions or projects, a number of specific arrangements can be applied, such as Design, Build, Operate (DBO); Build, Own, Operate (BOO); or Build, Operate, Transfer (BOT). These contractual arrangements are generally used in cases of large investment requirements for a specific asset, which can be transferred to the private sector, for example through project finance arrangements. Such contracts are commonly restricted to one particular asset, such as the construction and operation of a treatment work, and can have similar terms as concessions. Contractors that solely operate under this kind of contract arrangement are not covered by this rating methodology.

Generally, all contracts and concessions are initially put out to competitive tender, and will usually require re-tendering at their expiry.

This rating methodology is intended to capture only issuers that for the time horizon of the licence and/or concession or contract are entitled to the exploitation rights of the relevant water and wastewater assets. In many cases, this may not apply to management contracts or lease arrangements. Pure asset operators, whose activities comprise solely of managing and servicing the assets are not captured by this rating methodology.

Asset managers or service providers are subject to different market dynamics, which are highlighted below; therefore, our credit assessment would take into account different rating factors.

- Shorter contract periods under the typical asset operator arrangement increase competitive pressures due to more frequent re-tendering, compared to monopoly or quasi-monopoly operations of an asset owner or a long-term concessionaire.
- Bilateral contracts for asset operation are often negotiated on a case-by-case basis, and may be subject to unilateral amendments. Conversely, long-term asset ownership/concession arrangements follow a more common framework that is based on legislation or jurisdiction-wide regulation that leaves less scope for individual negotiation.
- Tariff adjustments may be less frequent under the asset operator model, whereas the asset ownership arrangements usually require detailed definition of the tariff formula as well as the potential events that will allow the utility to re-set tariffs.
- Asset operation typically involves higher operational leverage and lower margins, leaving an operator's profitability more vulnerable to operational cost shocks. On the other hand, asset ownership embodies execution and funding risks in relation to generally sizeable capital investment requirements.

Global Regulated Water Utilities

Appendix IV – Rating Issues Over the Next Decade

The main rating issues faced by regulated water companies are as follows:

- **Political and Regulatory Risk:** Moody's notes that given the importance of water and wastewater services, the level of political interference is generally higher than for other infrastructure sectors. This is underpinned by the fact that in most jurisdictions the provision of these services remains in public ownership and/or under government control. Tariff settings can be politically driven, creating the risk, particularly in emerging markets, that the set tariffs may be insufficient to upgrade or maintain the asset base. Affordability of tariffs is therefore more important for the assessment of a water company's credit quality than it is in other infrastructure sectors. Recent regulatory reviews were completed in the UK (for water companies in England and Wales), where the final price determination for water tariffs applicable over the five-year period 2010-15 (AMP5) were published in November 2009. Moody's notes that regular price reviews under a transparent and established framework are generally ratings neutral, but cautions that regulatory frameworks tend to undergo a continuous evolution. However, regulators in jurisdictions with high institutional strength are usually required to ensure that efficient companies remain financeable. On the other hand, regulatory risk is higher where the framework remains relatively new and untested or the rule of law and the relevant institutions in a given jurisdiction are less robust, which tends to be case primarily in emerging markets.
- **Large Capital Expenditures:** Water companies, in general, face large capital investment programmes to upgrade and expand their infrastructure and treatment works to the latest environmental standards and regulation applicable. In addition, many water utilities, for example in the UK, face significant maintenance requirements of an aging network. Despite current unsettled economic and, at times, financial market conditions, Moody's believes that it is unlikely that such investments will be delayed as, in most developed regulatory regimes, investments are driven by regulatory requirements to ensure a stable and reliable provision of quality water and wastewater services. Furthermore, regulated water companies in the developed world tend to earn a fair return – generally with limited or no linkage to demand volume – on new and replacement investments, which ensures that efficient companies can continue to finance their functions.
- **Funding:** As a result of the large capital programmes, as explained above, most regulated water utilities rated by Moody's experience negative free cash flows that are covered by additional debt funding. Whilst regulated water companies have so far demonstrated relatively good access to debt markets even in difficult market conditions, they may face a mismatch (to their detriment) between the pricing of funding and the return they earn on their asset base.
- **Increasing Leverage:** Over the last decade, leverage among the rated water utilities has increased significantly. This development (most visible in the UK) largely reflects shareholders' desire to maximise returns, as well as regulatory constraints that restrict the ability of companies to position themselves lower in the rating scale together with the nature of the industry and the way in which it is regulated. As low risk but highly capital intensive businesses, water companies have sought to optimise their capital structures by balancing the attractions of high leverage in the benign debt markets of recent years with the need to preserve solid investment-grade ratings to retain good access to the range of debt funding available to infrastructure issuers. As part of this development, regulated water companies that have been acquired in the last few years have generally been leveraged materially to re-finance acquisition debt. This trend increases event risk for lower leveraged entities to follow suit.
- **Low Inflation/Deflation:** A number of regulatory models across the world (a prime example being the UK) are designed in real terms (as opposed to nominal terms), where allowed revenues are computed in real terms and subsequently inflated by the Retail Price Index or Consumer Price Index. This is aimed at improving the allocation of the cost of the services across different generations of customers and thereby also providing some protection against cost inflation. However, Moody's notes that water utilities governed by this type of regulatory model generally need to raise a material, if not predominant portion of their debt on a conventional basis (i.e. debt instruments whose coupon is based on nominal interest rates). This may cause a timing mismatch of cash flows and debt service, as well as a potentially higher reliance on continued market access to raise debt. Furthermore, given their often aggressive dividend policy and

Global Regulated Water Utilities

tendency to maintain leverage (measured in relation to the regulated asset base) at constant levels close to the guidelines supporting their rating category, lower-than-expected inflation or deflation could lead certain companies to breach such parameters. Nevertheless, Moody's would expect managements to take actions (e.g. in the form of temporary reduction in shareholder distributions) to ensure that such breaches, if any, are of a temporary nature only.¹⁸

¹⁸ For further discussion on this topic, see our Special Comment: "UK Water Sector: Stable Outlook, But Sustained Deflation Could Cause Negative rating Pressure", June 2009.

Global Regulated Water Utilities

Moody's Related Research**Industry Outlook**

- UK Water Sector, December 2009 (119973)

Special Comment

- UK Water Sector: Key Ratios Used by Moody's in Assessing Companies' Credit Strength, March 2006 (97010)
- UK Water Sector: Q&A on Moody's Approach to New Structured Financings, October 2006 (100343)
- UK Regulated Industries: Q&A on Lending against the Regulated Asset Value, November 2007 (105954)
- UK Water Sector: Moody's Comments on Ofwat's Proposal to Introduce Menu Regulation, March 2008 (108091)
- UK Water Sector: Moody's Comments on Competition Review, December 2008 (113036)
- UK Water Sector: Stable Outlook, But Sustained Deflation Could Cause Negative Rating Pressure, May 2009 (117451)
- UK Water Sector: Moody's Comments on Companies' Final Business Plans, June 2009 (118183)
- UK Water Sector: Moody's Comments on Draft Determination, September 2009 (120015)

Rating Methodologies

- The UK Water Sector: Moody's Approach to Rating Highly-Leveraged Structures for Asset Ownership, February 2001 (64166)
- The UK Water Sector: Financial Parameters and Structural Enhancements for Leveraged Financings, July 2002 (75507)

To access any of these reports, click on the entry above. Note that these references are current as of the date of publication of this report and that more recent reports may be available. All research may not be available to all clients.

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**Moody's Investors Service**

Criteria | Corporates | General:
**Criteria Methodology: Business
Risk/Financial Risk Matrix
Expanded**

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Updated Matrix

Financial Benchmarks

How To Use The Matrix--And Its Limitations

Related Articles

Criteria | Corporates | General:

Criteria Methodology: Business Risk/Financial Risk Matrix Expanded

(Editor's Note: We are republishing this criteria following our periodic review completed on Dec. 8, 2010. In the original version of this article published on May 26, 2009, certain rating outcomes in the table 1 matrix were missated. A corrected version follows.)

Table 1 supersedes tables 1, 2, and 3 in "Key Credit Factors: Business And Financial Risks In The Global Telecommunication, Cable, And Satellite Broadcast Industry," published Jan. 27, 2009, "Key Credit Factors: Business And Financial Risks In The U.S. Investor-Owned Utilities Industry," published Nov. 26, 2008, "Key Credit Factors: Business And Financial Risks In The Global Building Materials And Products Industry," published Nov. 19, 2008, and "Key Credit Factors: Business And Financial Risks In The Commodity And Specialty Chemical Industry," published Nov. 20, 2008, as well as table 1 only in "Key Credit Factors: Business And Financial Risks In The Global High Technology Industry," published Sept. 18, 2008.)

Standard & Poor's Ratings Services is refining its methodology for corporate ratings related to its business risk/financial risk matrix, which we published as part of "2008 Corporate Ratings Criteria" on April 15, 2008, on RatingsDirect at www.ratingsdirect.com and Standard & Poor's Web site at www.standardandpoors.com.

This article amends and supersedes the criteria as published in Corporate Ratings Criteria, page 21, and the articles listed in the "Related Articles" section at the end of this report.

This article is part of a broad series of measures announced last year to enhance our governance, analytics, dissemination of information, and investor education initiatives. These initiatives are aimed at augmenting our independence, strengthening the rating process, and increasing our transparency to better serve the global markets.

We introduced the business risk/financial risk matrix four years ago. The relationships depicted in the matrix represent an essential element of our corporate analytical methodology.

We are now expanding the matrix, by adding one category to both business and financial risks (see table 1). As a result, the matrix allows for greater differentiation regarding companies rated lower than investment grade (i.e., 'BB' and below).

Table 1

Business And Financial Risk Profile Matrix						
Business Risk Profile	--Financial Risk Profile--					
	Minimal	Modest	Intermediate	Significant	Aggressive	Highly Leveraged
Excellent	AAA	AA	A	A-	BBB	--
Strong	AA	A	A-	BBB	BB	BB-
Satisfactory	A-	BBB+	BBB	BB+	BB-	B+
Fair	--	BBB-	BB+	BB	BB-	B
Weak	--	--	BB	BB-	B+	B-
Vulnerable	--	--	--	B+	B	CCC+

Table 1

Business And Financial Risk Profile Matrix (cont.)

These rating outcomes are shown for guidance purposes only. Actual rating should be within one notch of indicated rating outcomes.

The rating outcomes refer to issuer credit ratings. The ratings indicated in each cell of the matrix are the midpoints of a range of likely rating possibilities. This range would ordinarily span one notch above and below the indicated rating.

Business Risk/Financial Risk Framework

Our corporate analytical methodology organizes the analytical process according to a common framework, and it divides the task into several categories so that all salient issues are considered. The first categories involve fundamental business analysis; the financial analysis categories follow.

Our ratings analysis starts with the assessment of the business and competitive profile of the company. Two companies with identical financial metrics can be rated very differently, to the extent that their business challenges and prospects differ. The categories underlying our business and financial risk assessments are:

Business risk

- Country risk
- Industry risk
- Competitive position
- Profitability/Peer group comparisons

Financial risk

- Accounting
- Financial governance and policies/risk tolerance
- Cash flow adequacy
- Capital structure/asset protection
- Liquidity/short-term factors

We do not have any predetermined weights for these categories. The significance of specific factors varies from situation to situation.

Updated Matrix

We developed the matrix to make explicit the rating outcomes that are typical for various business risk/financial risk combinations. It illustrates the relationship of business and financial risk profiles to the issuer credit rating.

We tend to weight business risk slightly more than financial risk when differentiating among investment-grade ratings. Conversely, we place slightly more weight on financial risk for speculative-grade issuers (see table 1, again). There also is a subtle compounding effect when both business risk and financial risk are aligned at extremes (i.e., excellent/minimal and vulnerable/highly leveraged.)

The new, more granular version of the matrix represents a refinement--not any change in rating criteria or standards--and, consequently, holds no implications for any changes to existing ratings. However, the expanded

matrix should enhance the transparency of the analytical process.

Financial Benchmarks

Table 2

Financial Risk Indicative Ratios (Corporates)			
	FFO/Debt (%)	Debt/EBITDA (x)	Debt/Capital (%)
Minimal	greater than 60	less than 1.5	less than 25
Modest	45-60	1.5-2	25-35
Intermediate	30-45	2-3	35-45
Significant	20-30	3-4	45-50
Aggressive	12-20	4-5	50-60
Highly Leveraged	less than 12	greater than 5	greater than 60

How To Use The Matrix--And Its Limitations

The rating matrix indicative outcomes are what we typically observe--but are not meant to be precise indications or guarantees of future rating opinions. Positive and negative nuances in our analysis may lead to a notch higher or lower than the outcomes indicated in the various cells of the matrix.

In certain situations there may be specific, overarching risks that are outside the standard framework, e.g., a liquidity crisis, major litigation, or large acquisition. This often is the case regarding credits at the lowest end of the credit spectrum--i.e., the 'CCC' category and lower. These ratings, by definition, reflect some impending crisis or acute vulnerability, and the balanced approach that underlies the matrix framework just does not lend itself to such situations.

Similarly, some matrix cells are blank because the underlying combinations are highly unusual--and presumably would involve complicated factors and analysis.

The following hypothetical example illustrates how the tables can be used to better understand our rating process (see tables 1 and 2).

We believe that Company ABC has a satisfactory business risk profile, typical of a low investment-grade industrial issuer. If we believed its financial risk were intermediate, the expected rating outcome should be within one notch of 'BBB'. ABC's ratios of cash flow to debt (35%) and debt leverage (total debt to EBITDA of 2.5x) are indeed characteristic of intermediate financial risk.

It might be possible for Company ABC to be upgraded to the 'A' category by, for example, reducing its debt burden to the point that financial risk is viewed as minimal. Funds from operations (FFO) to debt of more than 60% and debt to EBITDA of only 1.5x would, in most cases, indicate minimal.

Conversely, ABC may choose to become more financially aggressive--perhaps it decides to reward shareholders by borrowing to repurchase its stock. It is possible that the company may fall into the 'BB' category if we view its financial risk as significant. FFO to debt of 20% and debt to EBITDA 4x would, in our view, typify the significant financial risk category.

Still, it is essential to realize that the financial benchmarks are guidelines, neither gospel nor guarantees. They can vary in nonstandard cases: For example, if a company's financial measures exhibit very little volatility, benchmarks may be somewhat more relaxed.

Moreover, our assessment of financial risk is not as simplistic as looking at a few ratios. It encompasses:

- a view of accounting and disclosure practices;
- a view of corporate governance, financial policies, and risk tolerance;
- the degree of capital intensity, flexibility regarding capital expenditures and other cash needs, including acquisitions and shareholder distributions; and
- various aspects of liquidity--including the risk of refinancing near-term maturities.

The matrix addresses a company's standalone credit profile, and does not take account of external influences, which would pertain in the case of government-related entities or subsidiaries that in our view may benefit or suffer from affiliation with a stronger or weaker group. The matrix refers only to local-currency ratings, rather than foreign-currency ratings, which incorporate additional transfer and convertibility risks. Finally, the matrix does not apply to project finance or corporate securitizations.

Related Articles

Industrials' Business Risk/Financial Risk Matrix--A Fundamental Perspective On Corporate Ratings, April 7, 2005

Item	¹ Per Company(x1000)	Ratings Category	Per Staff (x1000)	Ratings Category
Net income from continuing operations	\$6,335		\$4,587	
+ Depreciation and amortization	4,373		4,367	
Funds From Operations	\$10,708		\$8,954	
Net income from continuing operations	\$6,335		\$4,587	
+ Interest	4,278		4,050	
+ Income taxes	4,660		3,348	
+ Depreciation and amortization	4,373		4,367	
EBITDA	\$19,646		\$16,352	
CAPEX	\$13,682		\$13,382	
Dividend Payments	\$2,208		\$2,208	
Debt	\$71,874		\$70,749	
Adjusted Debt	\$71,874		\$70,749	
Equity	\$55,076		\$55,076	
Total Capital	\$126,950		\$126,950	
Standard & Poor's Credit Metrics				
Funds from Operations/Debt	14.9%	Aggressive	12.7%	Aggressive
Debt/EBITDA	3.7x	Significant	4.3x	Aggressive
Debt/Capitalization	56.62%	Aggressive	55.73%	Aggressive
Business Risk Profile		Excellent		Excellent
Financial Risk Profile	Aggressive		Aggressive	Aggressive
Implied Rating ²				BBB
Moody's Credit Metrics				
Cash Flow Interest Coverage (x)	3.5x	Baa	3.2x	Baa
Cash Flow/Debt	14.9%	Baa	12.7%	Baa
Retained Cash Flow/CAPEX	0.621	Ba	0.504	Ba
Debt/Capital	56.62%	Baa	55.73%	Baa
Implied Rating				Baa

S&P's Credit Metrics Guidelines

Business And Financial Risk Profile Matrix						
Business Risk Profile	--Financial Risk Profile--					
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Intermediate	30-45	2-3	35-45
Significant	20-30	3-4	45-50
Aggressive	12-20	4-5	50-60
Highly Leveraged	less than 12	greater than 5	greater than 60

	Aaa	Aa	A	Baa	Ba
Cash Flow Interest Coverage (x)	> 10.0	7.0 - 10.0	4.5 - 7.0	2.5 - 4.5	1.8 - 2.5
Cash Flow/Debt	> 40%	25% - 40%	15% - 25%	10% - 15%	6% - 10%
Retained Cash Flow/Capex (x)	> 3.5	3.5 - 2.5	1.5 - 2.5	1.0 - 1.5	0.5 - 1.0
Debt/Capital	<25%	25% - 40%	40% - 55%	55% - 70%	70% - 85%

¹Since the Company's ROR witness did not provide Moody's financial ratios for LIWC, Staff used data in the filing to derive those ratios

²Actual rating can be one notch above or below the Implied Rating

Based on Company's numbers in the filing, the parent's implied rating is BBB. However, the parent's actual rating is BBB+

Corporate Bond Yield Averages

	AV. CORP.	CORPORATE BY RATINGS				CORPORATE BY GROUPS			PUBLIC UTILITY BONDS				INDUSTRIAL BONDS				RAILROAD BONDS						
		Aaa	Aa	A	Baa	P.U.	IND.	R.R.	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa			
2006																							
Jan.	5.75	5.29	5.45	5.79	6.24	5.77	5.73	---	Jan.	---	5.50	5.75	6.06	Jan.	5.29	5.39	5.83	6.41	Jan.	---	---	---	---
Feb.	5.80	5.35	5.51	5.85	6.27	5.83	5.78	---	Feb.	---	5.55	5.82	6.11	Feb.	5.35	5.46	5.87	6.43	Feb.	---	---	---	---
Mar.	5.95	5.52	5.67	5.98	6.41	5.98	5.92	---	Mar.	---	5.71	5.98	6.26	Mar.	5.52	5.64	5.96	6.55	Mar.	---	---	---	---
Apr.	6.26	5.84	6.00	6.27	6.68	6.28	6.23	---	Apr.	---	6.02	6.29	6.54	Apr.	5.84	5.98	6.26	6.82	Apr.	---	---	---	---
May	6.36	5.95	6.13	6.40	6.75	6.39	6.33	---	May	---	6.16	6.42	6.59	May	5.95	6.10	6.37	6.90	May	---	---	---	---
June	6.35	5.89	6.11	6.39	6.78	6.39	6.31	---	June	---	6.16	6.40	6.61	June	5.89	6.05	6.36	6.94	June	---	---	---	---
July	6.33	5.85	6.08	6.36	6.76	6.37	6.28	---	July	---	6.13	6.37	6.61	July	5.85	6.02	6.35	6.91	July	---	---	---	---
Aug.	6.16	5.68	5.91	6.19	6.59	6.20	6.11	---	Aug.	---	5.97	6.20	6.43	Aug.	5.68	5.85	6.18	6.74	Aug.	---	---	---	---
Sept.	5.98	5.51	5.75	5.98	6.43	6.03	5.94	---	Sept.	---	5.81	6.00	6.26	Sept.	5.51	5.68	5.95	6.59	Sept.	---	---	---	---
Oct.	5.97	5.51	5.74	5.94	6.42	6.01	5.93	---	Oct.	---	5.80	5.98	6.24	Oct.	5.51	5.68	5.90	6.60	Oct.	---	---	---	---
Nov.	5.78	5.33	5.57	5.76	6.20	5.82	5.73	---	Nov.	---	5.61	5.80	6.04	Nov.	5.33	5.52	5.72	6.36	Nov.	---	---	---	---
Dec.	5.79	5.29	5.58	5.78	6.22	5.83	5.74	---	Dec.	---	5.62	5.81	6.05	Dec.	5.29	5.53	5.75	6.38	Dec.	---	---	---	---
2007																							
Jan.	5.92	5.40	5.75	5.93	6.34	5.96	5.88	---	Jan.	---	5.78	5.96	6.16	Jan.	5.40	5.71	5.91	6.52	Jan.	---	---	---	---
Feb.	5.88	5.39	5.72	5.88	6.28	5.91	5.85	---	Feb.	---	5.73	5.90	6.10	Feb.	5.39	5.70	5.86	6.44	Feb.	---	---	---	---
Mar.	5.84	5.30	5.66	5.84	6.27	5.87	5.80	---	Mar.	---	5.66	5.85	6.10	Mar.	5.30	5.66	5.83	6.43	Mar.	---	---	---	---
Apr.	5.99	5.47	5.83	5.99	6.39	6.01	5.96	---	Apr.	---	5.83	5.97	6.24	Apr.	5.47	5.82	6.00	6.54	Apr.	---	---	---	---
May	6.00	5.47	5.85	6.01	6.39	6.03	5.97	---	May	---	5.86	5.99	6.23	May	5.47	5.84	6.04	6.54	May	---	---	---	---
June	6.32	5.79	6.17	6.33	6.70	6.34	6.29	---	June	---	6.18	6.30	6.54	June	5.79	6.15	6.36	6.84	June	---	---	---	---
July	6.26	5.73	6.09	6.30	6.65	6.28	6.24	---	July	---	6.11	6.25	6.49	July	5.73	6.07	6.34	6.81	July	---	---	---	---
Aug.	6.26	5.79	6.06	6.29	6.65	6.28	6.23	---	Aug.	---	6.11	6.24	6.51	Aug.	5.79	6.01	6.35	6.79	Aug.	---	---	---	---
Sept.	6.21	5.74	6.02	6.23	6.59	6.24	6.17	---	Sept.	---	6.10	6.18	6.45	Sept.	5.74	5.93	6.28	6.73	Sept.	---	---	---	---
Oct.	6.12	5.66	5.94	6.13	6.48	6.17	6.06	---	Oct.	---	6.04	6.11	6.36	Oct.	5.66	5.84	6.14	6.60	Oct.	---	---	---	---
Nov.	5.97	5.44	5.78	5.97	6.40	6.04	5.90	---	Nov.	---	5.87	5.97	6.27	Nov.	5.44	5.67	5.97	6.51	Nov.	---	---	---	---
Dec.	6.15	5.49	5.91	6.19	6.65	6.23	6.07	---	Dec.	---	6.03	6.16	6.51	Dec.	5.49	5.78	6.22	6.78	Dec.	---	---	---	---
2008																							
Jan.	6.02	5.33	5.78	6.06	6.54	6.08	5.96	---	Jan.	---	5.87	6.02	6.35	Jan.	5.33	5.68	6.10	6.73	Jan.	---	---	---	---
Feb.	6.24	5.53	5.97	6.26	6.82	6.28	6.19	---	Feb.	---	6.04	6.21	6.60	Feb.	5.53	5.90	6.30	7.04	Feb.	---	---	---	---
Mar.	6.24	5.51	5.90	6.24	6.89	6.29	6.17	---	Mar.	---	5.99	6.21	6.68	Mar.	5.51	5.80	6.27	7.10	Mar.	---	---	---	---
Apr.	6.29	5.55	5.93	6.30	6.97	6.36	6.21	---	Apr.	---	5.99	6.29	6.81	Apr.	5.55	5.86	6.31	7.12	Apr.	---	---	---	---
May	6.30	5.57	6.00	6.30	6.92	6.38	6.22	---	May	---	6.07	6.27	6.79	May	5.57	5.93	6.33	7.05	May	---	---	---	---
June	6.42	5.68	6.11	6.43	7.07	6.50	6.35	---	June	---	6.19	6.38	6.93	June	5.68	6.02	6.48	7.22	June	---	---	---	---
July	6.44	5.67	6.05	6.47	7.16	6.50	6.38	---	July	---	6.13	6.40	6.97	July	5.67	5.97	6.54	7.35	July	---	---	---	---
Aug.	6.42	5.64	6.01	6.46	7.15	6.48	6.35	---	Aug.	---	6.09	6.37	6.98	Aug.	5.64	5.92	6.55	7.31	Aug.	---	---	---	---
Sept.	6.50	5.65	6.03	6.55	7.31	6.59	6.41	---	Sept.	---	6.13	6.49	7.15	Sept.	5.65	5.93	6.60	7.47	Sept.	---	---	---	---
Oct.	7.56	6.28	6.79	7.58	8.88	7.70	7.42	---	Oct.	---	6.95	7.56	8.58	Oct.	6.28	6.63	7.60	9.17	Oct.	---	---	---	---
Nov.	7.65	6.12	6.73	7.68	9.21	7.80	7.49	---	Nov.	---	6.83	7.60	8.98	Nov.	6.12	6.63	7.76	9.44	Nov.	---	---	---	---
Dec.	6.73	5.06	5.81	6.70	8.45	6.87	6.59	---	Dec.	---	5.93	6.54	8.13	Dec.	5.06	5.68	6.85	8.76	Dec.	---	---	---	---
2009																							
Jan.	6.59	5.05	5.84	6.46	8.14	6.77	6.41	---	Jan.	---	6.01	6.39	7.90	Jan.	5.05	5.67	6.52	8.39	Jan.	---	---	---	---
Feb.	6.64	5.27	6.02	6.47	8.08	6.72	6.56	---	Feb.	---	6.11	6.30	7.74	Feb.	5.27	5.93	6.62	8.42	Feb.	---	---	---	---
Mar.	6.84	5.50	6.11	6.66	8.42	6.85	6.83	---	Mar.	---	6.14	6.42	8.00	Mar.	5.50	6.07	6.90	8.84	Mar.	---	---	---	---
Apr.	6.85	5.39	6.17	6.70	8.39	6.90	6.79	---	Apr.	---	6.20	6.48	8.03	Apr.	5.39	6.14	6.90	8.74	Apr.	---	---	---	---
May	6.79	5.54	6.24	6.67	8.06	6.83	6.75	---	May	---	6.23	6.49	7.76	May	5.54	6.24	6.84	8.36	May	---	---	---	---
June	6.52	5.61	6.12	6.39	7.50	6.54	6.49	---	June	---	6.13	6.20	7.30	June	5.61	6.11	6.58	7.69	June	---	---	---	---
July	6.17	5.41	5.71	6.09	7.09	6.15	6.18	---	July	---	5.63	5.97	6.87	July	5.41	5.78	6.20	7.30	July	---	---	---	---
Aug.	5.83	5.26	5.45	5.78	6.58	5.80	5.86	---	Aug.	---	5.33	5.71	6.36	Aug.	5.26	5.56	5.84	6.79	Aug.	---	---	---	---
Sept.	5.61	5.13	5.21	5.56	6.31	5.60	5.62	---	Sept.	---	5.15	5.53	6.12	Sept.	5.13	5.27	5.58	6.50	Sept.	---	---	---	---
Oct.	5.63	5.15	5.24	5.57	6.29	5.64	5.61	---	Oct.	---	5.23	5.55	6.14	Oct.	5.15	5.25	5.59	6.44	Oct.	---	---	---	---
Nov.	5.68	5.19	5.29	5.64	6.32	5.71	5.64	---	Nov.	---	5.33	5.64	6.18	Nov.	5.19	5.26	5.64	6.46	Nov.	---	---	---	---
Dec.	5.78	5.26	5.44	5.77	6.37	5.86	5.71	---	Dec.	---	5.52	5.79	6.26	Dec.	5.26	5.36	5.74	6.47	Dec.	---	---	---	---
2010																							
Jan.	5.76	5.26	5.50	5.76	6.25	5.83	5.69	---	Jan.	---	5.55	5.77	6.16	Jan.	5.26	5.44	5.73	6.33	Jan.	---	---	---	---
Feb.	5.86	5.35	5.62	5.84	6.34	5.94	5.79	---	Feb.	---	5.69	5.87	6.25	Feb.	5.35	5.55	5.80	6.43	Feb.	---	---	---	---
Mar.	5.81	5.27	5.57	5.80	6.27	5.90	5.71	---	Mar.	---	5.64	5.84	6.22	Mar.	5.27	5.49	5.75	6.32	Mar.	---	---	---	---
Apr.	5.80	5.29	5.57	5.78	6.25	5.87	5.71	---	Apr.	---	5.62	5.81	6.19	Apr.	5.29	5.50	5.74	6.32	Apr.	---	---	---	---
May	5.52	4.96	5.25	5.49	6.05	5.59	5.44	---	May	---	5.29	5.50	5.97	May	4.96	5.19	5.47	6.13	May	---	---	---	---
June	5.5																						

Corporate Bond Yield Averages**Public Utility Bond Yield Averages By Ratings Categories**

	Moody's: S&P:	Aa2 AA	Aa3 AA-	A1 A+	A2 A	A3 A-	Baa1 BBB+	Baa2 BBB
1	Jan-11	5.29	5.38	5.48	5.57	5.73	5.90	6.06
2	Feb-11	5.42	5.51	5.59	5.68	5.82	5.96	6.10
3	Mar-11	5.33	5.41	5.48	5.56	5.70	5.83	5.97
4	Apr-11	5.32	5.40	5.47	5.55	5.69	5.84	5.98
5	May-11	5.08	5.16	5.24	5.32	5.46	5.60	5.74
6	Jun-11	5.04	5.11	5.19	5.26	5.40	5.53	5.67
7	Jul-11	5.05	5.12	5.20	5.27	5.41	5.56	5.70

Estimated Issuance Expense	0.05
Yield on Baa1/BBB+	5.63
Cost of Debt for AWW (%)	5.68

LONG ISLAND AMERICAN WATER

Summary of Cost of Equity

Proxy Group DCF ROE	8.50%
Traditional CAPM ROE	9.30%
Zero Beta CAPM ROE	9.90%
Generic (Average) CAPM ROE	9.60%
2/3 DCF & 1/3 CAPM Weighting	<u>8.87%</u>
Financial Risk Adjustment	0.00%
Business Risk Adjustment	
Issuance Cost Adjustment	0.00%
Adjusted ROE	8.87%
Recommended ROE	<u>8.90%</u>

LONG ISLAND AMERICAN WATER

Universe of Electric Utilities (Central)

	Company	Moody's Rating	S&P Rating	S&P Business Profile	S&P Numerical Business Risk Weighting	Numerical S&P Financial Profile	S&P Numerical Financial Risk Weighting	2010 % of Utility Revenue
1	ALLETE Inc.	Baa1	BBB+	Strong	2	Significant	4	92%
2	Alliant Energy Corp	Baa1	BBB+	Excellent	1	Significant	4	94%
3	Ameren Corp.	Baa3	BBB-	Satisfactory	3	Significant	4	78%
4	American Electric Power Co. Inc.	Baa2	BBB	Excellent	1	Aggressive	5	95%
5	CMS Energy Corp.	Ba1	BBB-	Excellent	1	Aggressive	5	96%
6	CenterPoint Energy Inc.	Baa3	BBB	Excellent	1	Aggressive	5	75%
7	Cleco Corp.	Baa3	BBB	Excellent	1	Aggressive	5	97%
8	DPL Inc.	Baa1	A-	Excellent	1	Intermediate	3	77%
9	DTE Energy Co.	Baa2	BBB+	Strong	2	Significant	4	78%
10	Empire District Electric Co.	Baa2	BBB-	Excellent	1	Aggressive	5	99%
11	Entergy Corp.	Baa3	BBB	Strong	2	Significant	4	78%
12	Great Plains Energy Inc.	Baa3	BBB	Excellent	1	Aggressive	5	97%
13	ITC Holdings Corp.	Baa2	BBB	Excellent	1	Aggressive	5	100%
14	Integrus Energy Group Inc.	Baa1	BBB+	Strong	2	Significant	4	65%
15	Madison Gas & Electric Co.	A1	AA-	Excellent	1	Intermediate	3	99%
16	OGE Energy Corp.	Baa1	BBB+	Strong	2	Significant	4	57%
17	Otter Tail Corp.	Ba1	BBB-	Satisfactory	3	Significant	4	30%
18	Vectren Corporation ¹	A3	A-	Excellent	1	Significant	4	73%
19	Westar Energy Inc.	Baa3	BBB	Excellent	1	Aggressive	5	75%
20	Wisconsin Energy Corp.	A3	BBB+	Excellent	1	Significant	4	99%

NIAGARA MOHAWK POWER CORPORATION

Universe of Electric Utilities (East)

	Company	Moody's Rating	S&P Rating	S&P Business Profile	Numerical Business Risk Weighting	S&P Financial Profile	Numerical Financial Risk Weighting	2010% of Utility Revenue
1	CH Energy Group Inc. ¹	A3	A	Excellent	1	Significant	4	74%
2	Central Vermont Public Service Corp.	Baa3	NR	NR	NR	NR	NR	86%
3	Consolidated Edison Inc.	Baa1	A-	Excellent	1	Significant	4	86%
4	Constellation Energy Group Inc.	Baa3	BBB-	Satisfactory	3	Significant	4	24%
5	Dominion Resources Inc.	Baa2	A-	Excellent	1	Significant	4	49%
6	Duke Energy Corp.	Baa2	A-	Excellent	1	Significant	4	79%
7	Exelon Corp.	Baa1	BBB	Strong	2	Significant	4	64%
8	FirstEnergy Corp.	Baa3	BBB-	Strong	2	Aggressive	5	74%
9	NextEra Energy Inc.	Baa1	A-	Strong	2	Intermediate	3	68%
10	Northeast Utilities	Baa2	BBB	Excellent	1	Aggressive	5	99%
11	NStar	A2	A+	Excellent	1	Intermediate	3	100%
12	Pepco Holdings Inc.	Baa3	BBB+	Excellent	1	Significant	4	73%
13	PPL Corp.	Baa3	BBB	Excellent	1	Aggressive	5	43%
14	Progress Energy Inc.	Baa2	BBB+	Excellent	1	Aggressive	5	86%
15	Public Service Enterprise Group Inc.	(P)Baa2	BBB	Strong	2	Significant	4	67%
16	SCANA Corp.	Baa2	BBB+	Excellent	1	Aggressive	5	73%
17	Southern Co.(The)	Baa1	A	Excellent	1	Intermediate	3	88%
18	TECO Energy Inc.	Baa3	BBB	Excellent	1	Aggressive	5	77%
19	UIL Holdings Corp.	Baa3	BBB	Excellent	1	Aggressive	5	100%

¹Used Central Hudson ratings as proxy for Central Hudson Energy Group

NIAGARA MOHAWK POWER CORPORATION

Universe of Electric Utilities (West)

	Company	Moody's Rating	S&P Rating	S&P Business Profile	Numerical Business Risk Weighting	S&P Financial Profile	Numerical Financial Risk Weighting	2010% of Utility Revenue
1	Avista Corp.	Baa2	BBB	Excellent	1	Aggressive	5	91%
2	Black Hills Corp.	Baa3	BBB-	Strong	2	Aggressive	5	86%
3	Edison International	Baa2	BBB-	Strong	2	Aggressive	5	80%
4	El Paso Electric Co.	Baa2	BBB	Excellent	1	Aggressive	5	61%
5	Hawaiian Electric Industries Inc.	Baa2	BBB-	Strong	2	Aggressive	5	99%
6	IDACORP Inc.	Baa2	BBB	Excellent	1	Aggressive	5	84%
7	NV Energy Inc.	Ba2	BB+	Excellent	1	Highly leveraged	6	100%
8	PG&E Corp.	Baa1	BBB+	Strong	2	Significant	4	100%
9	Pinnacle West Capital Corp.	Baa3	BBB	Excellent	1	Aggressive	5	97%
10	PNM Resources Inc.	Ba2	BB-	Satisfactory	3	Aggressive	5	73%
11	Portland General Electric Co.	Baa2	BBB	Excellent	1	Aggressive	5	93%
12	Sempra Energy	Baa1	BBB+	Strong	2	Intermediate	3	76%
13	UniSource Energy	Ba1	N/A	N/A	NR	N/A	NR	92%
14	Xcel Energy Inc.	Baa1	A-	Excellent	1	Significant	4	99%

Universe of Water Utilities in the the Value Line Investment Survey - Small and Mid-Cap Edition

	Company	Moody's Rating	S&P Rating	S&P Business Profile	Numerical Business Risk Weighting	S&P Financial Profile	Numerical Financial Risk Weighting	2010% of Utility Revenue
1	American States Water Co.	A2	A+	Excellent	1	Intermediate	3	81.86%
2	American Water Works Co. Inc.	Baa2	BBB+	Excellent	1	Aggressive	5	88.50%
3	Aqua America	NR	NR	NR	NR	NR	NR	98.41%
4	Artesian Resources Corp ¹	NR	NR	NR	NR	NR	NR	91.94%
5	California Water Service Group	NR	NR	NR	NR	NR	NR	100.00%
6	Connecticut Water Service Inc. ²	NR	A	Excellent	1	Intermediate	3	100.00%
7	Middlesex Water Co ³	Baa1	A-	Excellent	1	Intermediate	3	89.35%
8	Pennichuck Corp ⁴	Withdrawn	NR	NR	NR	NR	NR	93.23%
9	SJW Corp	NR	NR	NR	NR	NR	NR	96.19%
10	York Water Co. (The) ⁵	NR	A-	Excellent	1	Intermediate	3	100.00%

Note:

1, 2, 3,4&5 They do not have Value Line projected data for earnings per share (EPS), dividend per share (DPS), book value per share, (BVPS), and common shares

Financial Metrics used in Similarity Analysis						
Proxy Group	Equity Ratio	Value Line Safety Rank	Value Line Beta	Capital Intensity	S&P Credit Rating	S&P Credit Rating
Water	46.57	2.5	0.70	4.23	6.60	A-
Electric and Electric Combo	45.82	2.3	0.70	2.18	8.32	BBB+
Gas	48.94	2.0	0.68	1.25	6.60	A-
Mean	47.11	2.25	0.69	2.55	7.17	
Standard Deviation	1.63	0.25	0.01	1.53	0.99	

Publicly Traded Water Companies							
Company	Safety rank	Capital Intensity	S&P Rating	Score of ratings	Equity Ratio	Beta	
1	SJW Corp	3	3.64	NR		45.88	0.90
2	California Water	3	2.78	NR		46.29	0.70
3	Aqua America	3	4.78	NR		41.59	0.65
4	American Water	3	4.13	BBB+	8	41.99	0.65
5	American States Water	3	2.17	A+	5	51.11	0.75
6	Artesian Resources Corp	2	5.39	NR		41.09	0.60
7	Connecticut Water Services	2	5.22	A	6	45.23	0.80
8	Middlesex Water	2	3.95	A-	7	53.22	0.75
9	Pennichuck Corp	2	4.35	NR		47.92	0.50
10	York Water	2	5.86	A-	7	51.33	0.70
	Average	2.5	4.23	A-	6.6	46.57	0.70

Gas LDCs Group classified by Value Line as Pure-Play Natural Gas Companies							
Company	Safety Rank	Capital Intensity	S&P Rating	Score of ratings	Equity Ratio	Beta	
1	AGL Resources Inc.	2	1.86	A-	7	40.43	0.75
2	Atmos Energy Corporation	2	1.00	BBB+	8	48.69	0.65
3	Laclede Group, Inc	2	0.51	A	6	50.79	0.60
4	New Jersey Resources Corp	1	0.43	NR		54.41	0.65
5	Nicor Inc	3	1.12	AA	3	54.45	0.75
6	NiSource Inc.	3	1.73	BBB-	10	40.10	0.85
7	Northwest Natural Gas Co	1	2.28	A+	5	44.65	0.60
8	Piedmont Natural Gas	2	1.57	A	6	49.77	0.65
9	South Jersey Industries	2	1.29	BBB+	8	44.81	0.65
10	Southwest Gas Corporation	3	1.75	BBB+	8	49.17	0.75
11	UGI Corp.	2	0.55	NR		48.31	0.65
12	WGL Holdings	1	0.87	A+	5	61.65	0.65
	Average	2.0	1.2	A-	6.6	48.94	0.68

Electric Group Typically used by Staff in Recent Cases

	Company	Safety Rank	Capital Intensity	S&P Rating	Score of ratings	Common Equity Ratio	Beta
1	ALLETE Inc.	2	1.99	BBB+	8	55.11	0.70
2	Alliant Energy Corp.	2	1.97	BBB+	8	49.11	0.70
3	Ameren Corp.	3	2.36	BBB-	10	49.48	0.80
4	American Electric Power Co. Inc.	3	2.47	BBB	9	42.07	0.70
5	Avista Corp.	2	1.77	BBB	9	45.13	0.70
6	Black Hills Corp.	3	1.91	BBB-	10	42.05	0.80
7	CH Energy Group Inc	1	1.09	A	6	53.77	0.65
8	Cleco Corp.	3	2.42	BBB	9	45.71	0.65
9	Consolidated Edison Inc.	1	1.79	A-	7	50.35	0.65
10	DTE Energy Co.	3	1.52	BBB+	8	45.02	0.75
11	Duke Energy Corp.	2	2.85	A-	7	54.80	0.65
12	Edison International	3	2.40	BBB-	10	43.63	0.80
13	Empire District Electric Co.	3	2.81	BBB-	10	47.67	0.70
14	Entergy Corp.	2	2.13	BBB	9	41.20	0.70
15	Great Plains Energy Inc.	3	3.02	BBB	9	42.80	0.75
16	Hawaiian Electric Industries Inc.	3	1.19	BBB-	10	47.13	0.70
17	IDACORP Inc.	3	3.05	BBB	9	47.61	0.70
18	Madison Gas & Electric Co.	1	1.82	AA-	4	45.52	0.65
19	PG&E Corp.	2	2.27	BBB+	8	44.75	0.55
20	Pinnacle West Capital Corp.	2	2.85	BBB-	10	49.31	0.70
21	Portland General Electric Co.	3	2.23	BBB	9	46.47	0.75
22	Progress Energy Inc.	2	2.04	BBB+	8	43.96	0.60
23	SCANA Corp.	2	2.09	BBB+	8	42.46	0.70
24	Sempra Energy	2	2.21	BBB+	8	47.91	0.85
25	Southern Co. (The)	1	2.38	A	6	42.60	0.55
26	TECO Energy Inc.	3	1.67	BBB	9	40.11	0.85
27	UIL Holdings Corp.	2	2.33	BBB	9	39.13	0.70
28	Vectren Corp.	2	1.62	A-	7	43.96	0.70
29	Westar Energy Inc.	2	3.03	BBB	9	43.77	0.75
30	Wisconsin Energy Corp.	2	2.28	BBB+	8	42.74	0.60
31	Xcel Energy Inc.	2	1.98	A-	7	44.97	0.65
	Average	2.3	2.18	BBB+	8.32	45.82	0.70

PROXY GROUP STATISTICS													
	Ticker	Ratings Moody's	S&P	% Utility Revenue	Equity Ratio Value Line	S&P Business Profile	Numerical Business Risk Weighting	S&P Financial Profile	Numerical Financial Risk Weighting	Business Category	Moody's	S&P	
1	ALLETE Inc.	ALE	Baa1	BBB+	92	55.80	Strong	2	Significant	4	Electric	8	8
2	Alliant Energy Corp	LNT	Baa1	BBB+	94	49.50	Excellent	1	Significant	4	Electric & Gas Combo	8	8
3	Ameren Corp.	AEE	Baa3	BBB-	78	50.90	Satisfactory	3	Significant	4	Electric & Gas Combo	10	10
4	American Electric Power Co. Inc.	AEP	Baa2	BBB	95	46.70	Excellent	1	Aggressive	5	Electric	9	9
5	American States Water	AWR	A2	A+	82	55.70	Excellent	1	Aggressive	5	Water	6	5
6	Avista Corp.	AVA	Baa2	BBB	91	48.40	Excellent	1	Aggressive	5	Electric & Gas Combo	9	9
7	Black Hills Corp.	BKH	Baa3	BBB-	86	48.10	Strong	2	Aggressive	5	Electric & Gas Combo	10	10
8	CenterPoint Energy Inc.	CNP	Baa3	BBB	75	26.20	Excellent	1	Aggressive	5	Electric & Gas Combo	10	9
9	Cleco Corp.	CNL	Baa3	BBB	97	48.50	Excellent	1	Aggressive	5	Electric	10	9
10	Consolidated Edison Inc.	ED	Baa1	A-	86	50.90	Excellent	1	Significant	4	Electric & Gas Combo	8	7
11	DTE Energy Co.	DTE	Baa2	BBB+	78	48.70	Strong	2	Significant	4	Electric & Gas Combo	9	8
12	Edison International	EIX	Baa2	BBB-	80	44.30	Strong	2	Aggressive	5	Electric	9	10
13	Entergy Corp.	ETR	Baa3	BBB	78	42.10	Strong	2	Significant	4	Electric & Gas Combo	10	9
14	Great Plains Energy Inc.	GXP	Baa3	BBB	97	49.20	Excellent	1	Aggressive	5	Electric & Gas Combo	10	9
15	Hawaiian Electric Industries Inc.	HE	Baa2	BBB-	99	54.30	Strong	2	Aggressive	5	Electric	9	10
16	IDACORP Inc.	IDA	Baa2	BBB	84	50.70	Excellent	1	Aggressive	5	Electric	9	9
17	Madison Gas & Electric Co.	MGEE	A1	AA-	99	61.10	Excellent	1	Intermediate	3	Electric & Gas Combo	5	4
18	Pepco Holdings Inc.	NYSE:POM	Baa3	BBB+	73	51.00	Excellent	1	Significant	4	Electric & Gas Combo	10	8
19	PG&E Corp.	PCG	Baa1	BBB+	100	49.30	Strong	2	Significant	4	Electric & Gas Combo	8	8
20	Portland General Electric Co.	POR	Baa2	BBB	93	47.00	Excellent	1	Aggressive	5	Electric & Gas Combo	9	9
21	SCANA Corp.	SCG	Baa2	BBB+	73	47.10	Excellent	1	Aggressive	5	Electric & Gas Combo	9	8
22	Sempra Energy	SRE	Baa1	BBB+	76	49.60	Strong	2	Intermediate	3	Electric & Gas Combo	8	8
23	Southern Co.(The)	SO	Baa1	A	88	45.70	Excellent	1	Intermediate	3	Electric	8	6
24	TECO Energy Inc.	TE	Baa3	BBB+	77	40.80	Excellent	1	Aggressive	5	Electric & Gas Combo	10	8
25	UIL Holdings Corp.	UIL	Baa3	BBB	100	41.60	Excellent	1	Aggressive	5	Electric	10	9
26	Vectren Corporation ¹	VVC	A3	A-	73	50.10	Excellent	1	Significant	4	Electric & Gas Combo	7	7
27	Westar Energy Inc.	WR	Baa3	BBB	75	46.40	Excellent	1	Aggressive	5	Electric	10	9
28	Wisconsin Energy Corp.	WEC	A3	A-	99	49.00	Excellent	1	Significant	4	Electric & Gas Combo	7	7
29	Xcel Energy Inc.	XEL	Baa1	A-	99	46.30	Excellent	1	Significant	4	Electric & Gas Combo	8	7
	Median					48.70							
	Average of Proxy Group		Baa2	BBB+	87	48.10	Close to Excellent	1.3	Significant	4.4		9	8
	Parent: AWW		Baa2	BBB+	88.5	42.95	Excellent	1	Aggressive	5	Water		
	LIWC Implied Rating		Baa1 to Baa2	² BBB to BBB+	43.38	Excellent	1	Aggressive	5	Water			

Sources

Latest Credit Ratings from Standard & Poor's (July 2011) & Moody's Credit Reports

% Utility Revenue from 2010 Annual reports(10K)

2010 Equity Ratios from Value Line Investment Survey

Business & Financial Profiles From Standard & Poor's Latest Credit Reports

¹ I used Moody's Rating for Vectren Utility Holdings, Inc as a proxy for the parent, Vectren Corporation²Most Probable Ratings of LIWC

LONG ISLAND AMERICAN WATER

Staff Proxy Group 3 Month Average Price Data								
Company	Three-month Price	May-11		Jun-11		Jul-11		
		High	Low	High	Low	High	Low	
ALLETE	\$40.02	41.05	38.75	41.10	38.01	42.10	39.11	1
Alliant Energy Corp.	\$40.38	41.17	38.72	42.14	39.18	42.09	38.98	2
Ameren Corp	\$29.12	30.14	28.69	29.74	27.78	30.11	28.26	3
American Electric Power	\$37.65	38.99	36.07	38.34	36.84	38.98	36.66	4
American States Water	\$34.18	35.19	32.76	34.83	33.03	35.75	33.50	5
Avista Corp	\$25.13	25.50	24.00	25.83	23.89	26.53	25.00	6
Black Hills Corp	\$30.80	34.84	29.92	31.06	28.12	31.08	29.75	7
CenterPoint Energy Inc.	\$19.21	19.39	18.36	19.57	18.44	20.36	19.14	8
Cleco Corp.	\$34.78	35.66	33.73	35.22	33.68	36.08	34.28	9
Con Edison Inc	\$52.99	54.36	52.12	53.31	51.67	54.13	52.33	10
DTE Energy	\$50.76	52.78	50.61	51.58	48.33	51.83	49.44	11
Edison International	\$38.90	40.15	38.53	39.61	38.13	39.25	37.70	12
Entergy Corporation	\$67.99	69.94	66.43	70.05	66.18	69.14	66.20	13
Great Plains Energy	\$20.63	21.21	20.04	21.20	20.22	21.28	19.81	14
Hawaiian Electric	\$24.51	26.38	24.22	24.89	23.25	24.93	23.40	15
IDACORP, Inc.	\$39.28	40.38	37.97	39.62	37.97	40.71	39.04	16
MGE Energy Inc.	\$41.22	42.72	40.59	41.69	39.55	42.24	40.55	17
Peppco Holdings Inc.	\$19.51	20.36	19.19	19.97	18.90	20.04	18.62	18
PG&E Corp	\$43.10	46.71	42.60	43.44	41.18	43.34	41.33	19
Portland General Electric Company	\$25.36	26.00	24.73	26.05	24.78	26.00	24.58	20
SCANA Corp.	\$40.20	42.20	40.16	40.69	38.16	41.00	38.96	21
Sempra Energy	\$53.45	55.97	53.92	55.12	51.53	53.68	50.48	22
Southern Co. (The)	\$39.91	40.87	38.85	40.41	39.05	40.87	39.43	23
TECO Energy Inc.	\$18.87	19.66	18.51	19.18	18.20	19.38	18.31	24
UIL Holdings Corp.	\$32.59	34.34	31.50	33.28	31.13	33.45	31.86	25
Vectren Corp	\$27.78	28.84	27.63	28.37	26.86	28.73	26.26	26
Westar Energy Inc.	\$26.80	27.98	26.66	27.28	26.00	27.29	25.56	27
Wisconsin Energy	\$31.21	31.89	30.82	31.52	30.47	32.05	30.51	28
Xcel Energy	\$24.40	25.39	24.10	24.78	23.74	24.75	23.66	29

Source
CapitalIQ



LONG ISLAND AMERICAN WATER
STAFF DCF APPROACH - GENERIC FINANCE METHOD

Company	Beta	Price	EPS	DPS			BPS			# of Shares		DPS Growth
			2014-16	2011	2012	2014-16	2011	2012	2014-16	2011	2014-16	2014-16
ALLETE	0.70	\$40.02	3.00	1.78	1.80	1.95	28.08	28.75	31.50	36.50	38.50	2.70%
Alliant Energy Corp.	0.70	\$40.38	3.60	1.70	1.80	2.10	26.80	27.90	30.60	112.00	116.00	5.27%
Ameren Corp	0.80	\$29.12	2.50	1.54	1.54	1.54	32.80	33.55	36.00	244.00	256.00	0.00%
American Electric Power	0.70	\$37.65	3.75	1.84	1.90	2.10	29.55	31.00	36.00	485.00	500.00	3.39%
American States Water	0.75	\$34.18	2.60	1.08	1.12	1.25	20.80	20.50	20.75	19.25	20.00	3.73%
Avista Corp	0.70	\$25.13	2.00		1.18	1.40	20.40	21.00	23.00	58.50	60.50	5.86%
Black Hills Corp	0.80	\$30.80	2.25	1.46	1.48	1.55	28.25	28.75	31.00	44.00	45.00	1.55%
CenterPoint Energy Inc.	0.80	\$19.21	1.35	0.79	0.80	0.90	9.85	10.30	11.75	426.00	430.00	4.00%
Cleco Corp.	0.65	\$34.78	2.75	1.09	1.22	1.60	23.50	24.70	28.00	60.70	60.70	9.46%
Con Edison Inc	0.60	\$52.99	3.95	2.40	2.42	2.48	38.45	40.95	42.60	294.00	310.00	0.82%
DTE Energy	0.75	\$50.76	4.25	2.32	2.42	2.70	40.85	42.05	46.00	169.50	174.00	3.72%
Edison International	0.80	\$38.90	3.25	1.29	1.31	1.40	33.85	35.40	40.50	325.81	325.81	2.24%
Entergy Corporation	0.70	\$67.99	7.00	3.32	3.40	3.70	50.65	53.35	64.00	178.00	172.00	2.86%
Great Plains Energy	0.75	\$20.63	1.75	0.86	0.91	1.20	21.70	21.60	23.23	136.00	155.00	9.66%
Hawaiian Electric	0.70	\$24.51	2.00	1.24	1.24	1.30	16.00	16.40	18.75	96.50	110.00	1.59%
IDACORP, Inc.	0.70	\$39.28	3.30	1.20	1.20	1.50	32.50	33.65	39.20	50.00	51.00	7.72%
MG&E Company	0.60	\$41.22	3.00	1.52	1.55	1.64	25.10	27.65	26.30	23.20	23.50	1.90%
Pepco Holdings Inc.	0.80	\$19.51	1.65	1.08	1.08	1.16	18.95	20.00	21.20	227.00	250.00	2.41%
PG&E Corp	0.55	\$43.10	4.50	1.86	1.98	2.30	29.90	32.15	38.25	400.00	420.00	5.12%
Portland General Electric Company	0.75	\$25.36	2.25	1.06	1.08	1.20	22.05	22.95	25.75	75.50	76.50	3.57%
SCANA Corp.	0.65	\$40.20	3.50	1.94	1.98	2.10	30.45	32.50	37.25	129.50	150.00	1.98%
Sempra Energy	0.80	\$53.45	5.50	1.92	2.08	2.50	39.75	42.25	50.75	239.00	245.00	6.32%
Southern Co.(The)	0.55	\$39.91	3.25	1.87	1.94	2.20	20.10	21.20	25.00	857.00	910.00	4.28%
TECO Energy Inc.	0.85	\$18.87	1.75	0.85	0.89	1.05	10.55	11.10	13.00	216.00	220.00	5.67%
UIL Holdings Corp.	0.70	\$32.59	2.35	1.73	1.73	1.73	24.00	24.60	27.00	50.00	50.00	0.00%
Vectren Corp	0.70	\$27.78	2.25	1.39	1.41	1.60	18.20	18.80	21.75	82.50	85.00	4.30%
Westar Energy Inc.	0.75	\$26.80	2.40	1.28	1.32	1.44	21.50	21.60	24.00	115.00	125.00	2.94%
Wisconsin Energy	0.65	\$31.21	2.75	1.04	1.14	1.60	16.95	17.50	19.50	232.00	224.00	11.96%
Xcel Energy	0.65	\$24.40	2.00	1.03	1.06	1.15	17.50	18.35	21.25	486.00	498.00	2.75%

Median Beta

0.70

Data Source

Value Line Investment Survey for May 27, June 24 & August 5, 2011 Editions

Average

0.71

LONG ISLAND AMERICAN WATER

STAFF DCF APPROACH - GENERIC FINANCE METHOD

Company	Retention Return on		Increase in B x R Shares	PBR 2015	S Factor	V Factor	S x V	Sustainable Growth	Long-Form ROE		
	Rate 2015	Equity 2015									
ALLETE	35.00%	9.67%	3.38%	1.34%	1.43	0.02	0.30	0.57%	3.95%	8.30%	1
Alliant Energy Corp.	41.67%	11.95%	4.98%	0.88%	1.51	0.01	0.34	0.45%	5.42%	9.86%	2
Ameren Corp	38.40%	7.03%	2.70%	1.21%	0.89	0.01	-0.13	-0.14%	2.56%	7.50%	3
American Electric Power	44.00%	10.68%	4.70%	0.76%	1.27	0.01	0.22	0.21%	4.91%	9.76%	4
American States Water	51.92%	12.56%	6.52%	0.96%	1.64	0.02	0.39	0.62%	7.14%	10.11%	5
Avista Corp	30.00%	8.83%	2.65%	0.84%	1.23	0.01	0.19	0.20%	2.84%	7.93%	6
Black HillsCorp	31.11%	7.35%	2.29%	0.56%	1.09	0.01	0.08	0.05%	2.34%	7.04%	7
CenterPoint Energy Inc.	33.33%	11.74%	3.91%	0.23%	1.95	0.00	0.49	0.22%	4.14%	8.28%	8
Cleco Corp.	41.82%	10.03%	4.19%	0.00%	1.48	0.00	0.32	0.00%	4.19%	8.22%	9
Con Edison Inc	37.22%	9.33%	3.47%	1.33%	1.38	0.02	0.27	0.50%	3.98%	8.17%	10
DTE Energy	36.47%	9.38%	3.42%	0.66%	1.24	0.01	0.20	0.16%	3.58%	8.36%	11
Edison International	56.92%	8.20%	4.67%	0.00%	1.15	0.00	0.13	0.00%	4.67%	7.81%	12
Entergy Corporation	47.14%	11.27%	5.31%	-0.85%	1.34	-0.01	0.26	-0.29%	5.02%	9.74%	13
Great Plains Energy	31.43%	7.62%	2.40%	3.32%	0.95	0.03	-0.05	-0.16%	2.23%	7.58%	14
Hawaiian Electric	35.00%	10.90%	3.82%	3.33%	1.53	0.05	0.35	1.77%	5.59%	10.14%	15
IDACORP, Inc.	54.55%	8.63%	4.71%	0.50%	1.21	0.01	0.17	0.10%	4.81%	8.11%	16
MG&E Company	45.33%	11.31%	5.13%	0.32%	1.64	0.01	0.39	0.21%	5.33%	8.75%	17
Pepco Holdings Inc.	29.70%	7.86%	2.33%	2.44%	1.03	0.03	0.03	0.07%	2.41%	7.94%	18
PG&E Corp	48.89%	12.11%	5.92%	1.23%	1.44	0.02	0.31	0.54%	6.46%	10.89%	19
Portland General Electric Company	46.67%	8.91%	4.16%	0.33%	1.15	0.00	0.13	0.05%	4.21%	8.39%	20
SCANA Corp.	40.00%	9.61%	3.84%	3.74%	1.32	0.05	0.24	1.20%	5.04%	9.58%	21
Sempra Energy	54.55%	11.17%	6.09%	0.62%	1.34	0.01	0.26	0.21%	6.31%	10.20%	22
Southern Co.(The)	32.31%	13.36%	4.32%	1.51%	1.99	0.03	0.50	1.49%	5.81%	10.47%	23
TECO Energy Inc.	40.00%	13.82%	5.53%	0.46%	1.79	0.01	0.44	0.36%	5.89%	10.58%	24
UIL Holdings Corp.	26.38%	8.84%	2.33%	0.00%	1.36	0.00	0.26	0.00%	2.33%	7.32%	25
Vectren Corp	28.89%	10.60%	3.06%	0.75%	1.53	0.01	0.34	0.39%	3.46%	8.64%	26
Westar Energy Inc.	40.00%	10.18%	4.07%	2.11%	1.25	0.03	0.20	0.52%	4.59%	9.30%	27
Wisconsin Energy	41.82%	14.36%	6.00%	-0.87%	1.84	-0.02	0.46	-0.73%	5.27%	9.60%	28
Xcel Energy	42.50%	9.64%	4.10%	0.61%	1.39	0.01	0.28	0.24%	4.34%	8.50%	29
Average									4.44%	8.87%	
Median									4.59%	8.50%	

LONG ISLAND AMERICAN WATER**INPUTS AND CALCULATIONS FOR STAFF CAPM**

Merril Lynch Cost of Market	Required	Implied
May-11	11.80%	11.60%
Jun-11	11.60%	11.50%
Jul-11	11.80%	12.00%
 Merril Lynch Cost of Market ¹		11.72%
Proxy Group Beta		0.70
Market Risk Premium (5/11-7/11)		8.06%
 <u>Treasury Rates²</u>		
	<u>10 year</u>	<u>30 year</u>
May-11	3.17%	4.29%
Jun-11	3.00%	4.23%
Jul-11	3.00%	4.27%
 Average	3.06%	4.26%
Risk Free Rate (5/11 - 7/11)	3.66%	
 Traditional CAPM Calculation		
Risk Free Rate + (Beta * (Market Return - Risk Free Rate))		
 Traditional CAPM ROE	9.30%	
 Zero Beta CAPM Calculation		
Risk Free Rate + (0.75*Beta * (Market Return - Risk Free Rate))+(0.25*(Market Return - Risk Free Rate))		
 Zero Beta CAPM ROE	9.90%	

¹Merrill Lynch cost of market figure is average of Implied and Required Returns for the 3 months ending November 2010

McKinsey on Finance

Number 35,
Spring 2010

Perspectives on
Corporate Finance
and Strategy

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Why value value?

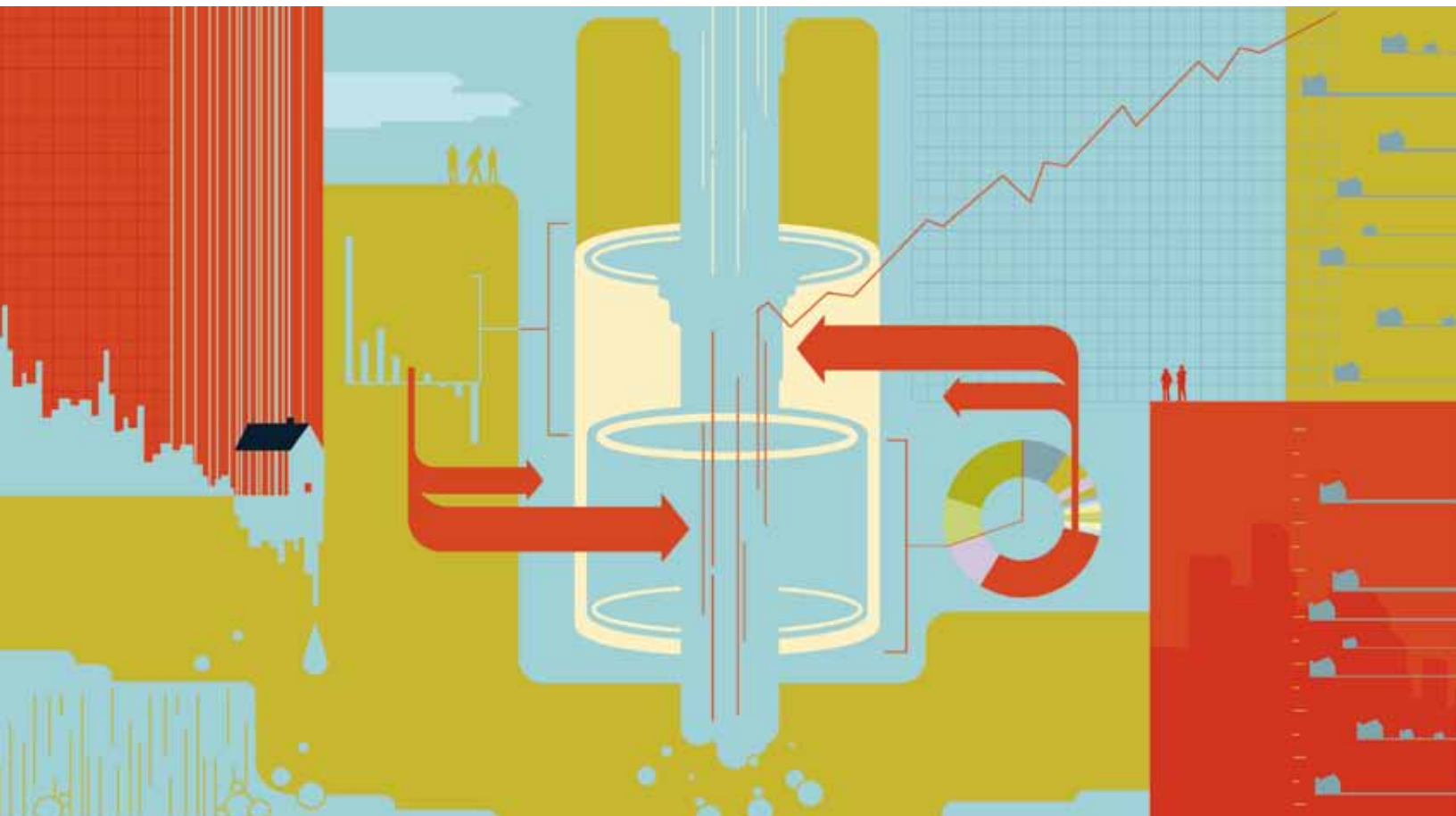
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Thinking longer
term during a
crisis: An interview
with Hewlett
Packard's CFO

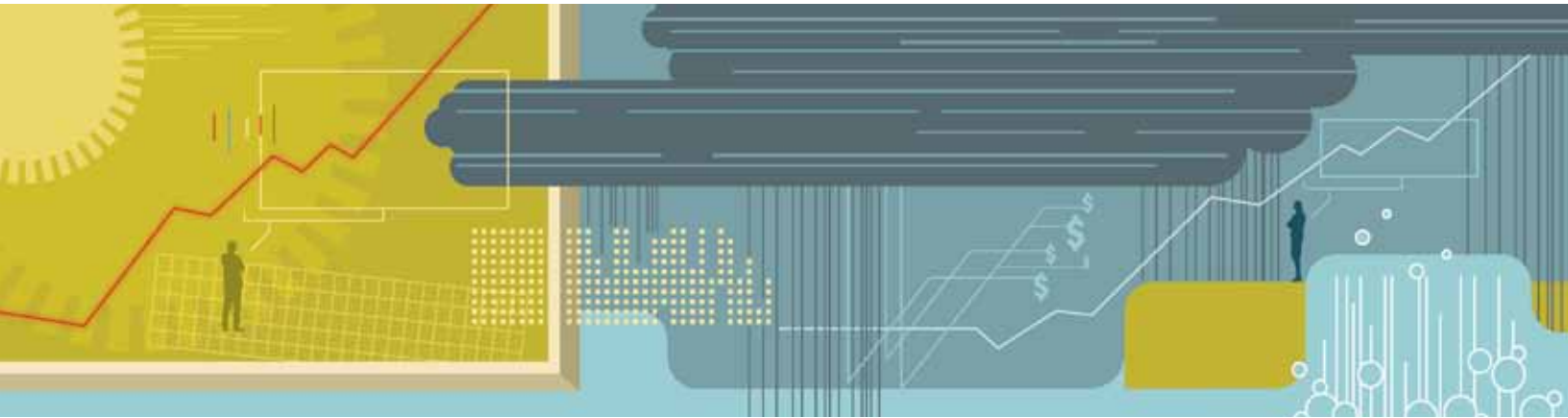
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Equity analysts: Still too bullish

After almost a decade of stricter regulation, analysts' earnings forecasts continue to be excessively optimistic.

**Marc H. Goedhart,
Rishi Raj, and
Abhishek Saxena**

No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typically overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.¹

Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the

analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest.² For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.

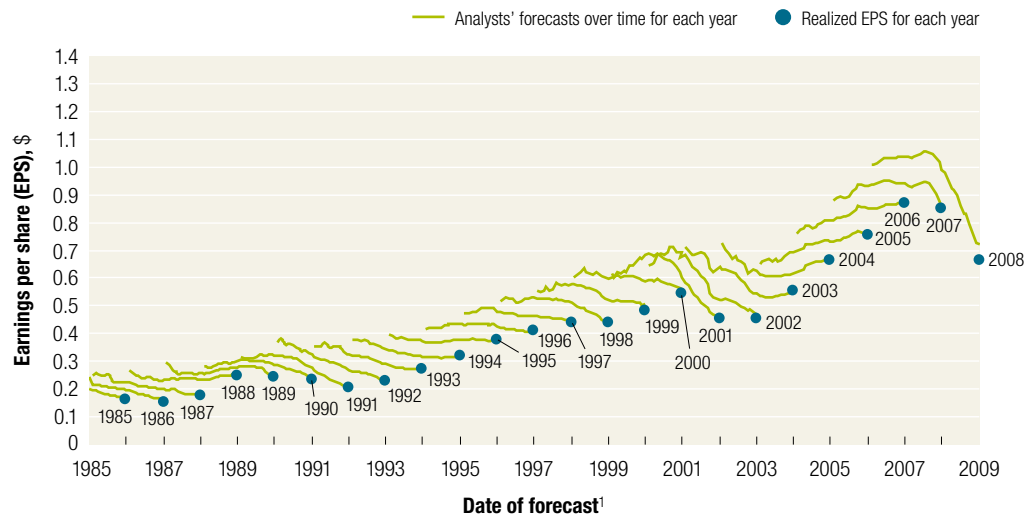
Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark.

Exhibit 1

S&P 500 companies

Off the mark

With few exceptions, aggregate earnings forecasts exceed realized earnings per share.



¹Monthly forecasts.

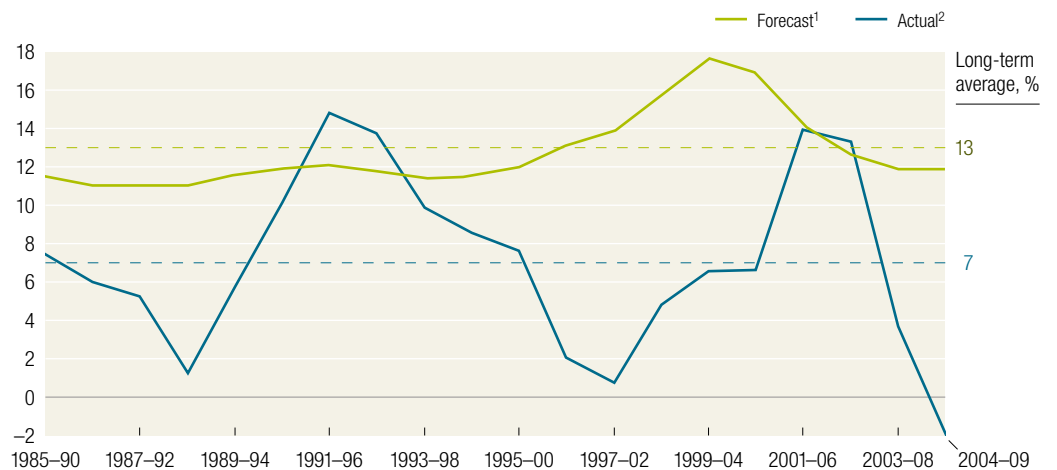
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 2

Earnings growth for S&P 500 companies, 5-year rolling average, %

Overoptimistic

Actual growth surpassed forecasts only twice in 25 years—both times during the recovery following a recession.



¹Analysts' 5-year forecasts for long-term consensus earnings-per-share (EPS) growth rate. Our conclusions are same for growth based on year-over-year earnings estimates for 3 years.

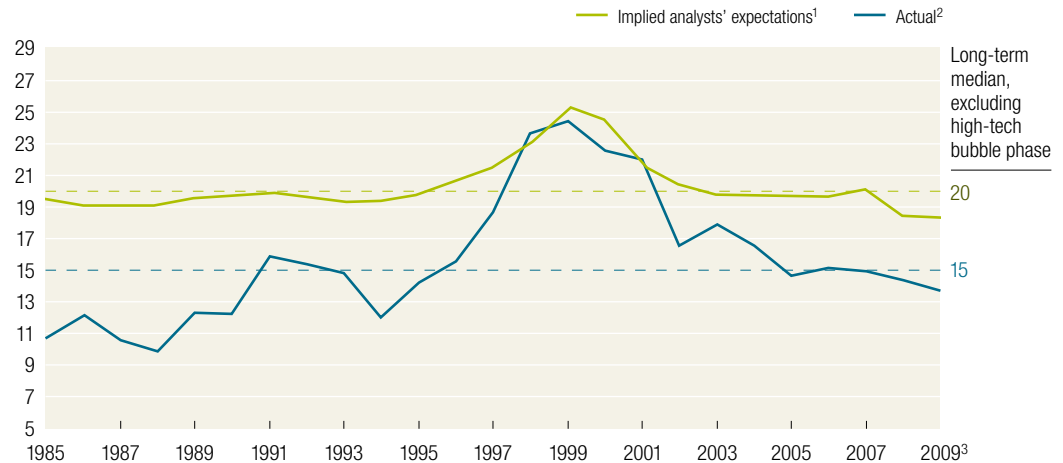
²Actual compound annual growth rate (CAGR) of EPS; 2009 data are not yet available, figures represent consensus estimate as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 3

Less giddy

Capital market expectations are more reasonable.

Actual P/E ratio vs P/E ratio implied by analysts' forecasts, S&P 500 composite index

¹P/E ratio based on 1-year-forward earnings-per-share (EPS) estimate and estimated value of S&P 500. Estimated value assumes: for first 5 years, EPS growth rate matches analysts' estimates then drops smoothly over next 10 years to long-term continuing-value growth rate; continuing value based on growth rate of 6%; return on equity is 13.5% (long-term historical median for S&P 500), and cost of equity is 9.5% in all periods.

²Observed P/E ratio based on S&P 500 value and 1-year-forward EPS estimate.

³Based on data as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases.³ So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006.

Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year,⁴ compared with actual earnings growth of 6 percent.⁵

Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession (Exhibit 2). On average, analysts' forecasts have been almost 100 percent too high.⁶

Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999–2001, actual price-to-earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts (Exhibit 3). What's more, an actual forward P/E ratio⁷ of the S&P 500 as of November 11, 2009—14—is consistent with long-term earnings growth of 5 percent.⁸ This assessment is more

reasonable, considering that long-term earnings growth for the market as a whole is unlikely to differ significantly from growth in GDP,⁹ as prior McKinsey research has shown.¹⁰ Executives, as the evidence indicates, ought to base their strategic decisions on what they see happening in their industries rather than respond to the pressures of forecasts, since even the market doesn't expect them to do so. ○

- ¹ Marc H. Goedhart, Brendan Russell, and Zane D. Williams, "Prophets and profits," mckinseyquarterly.com, October 2001.
- ² US Securities and Exchange Commission (SEC) Regulation Fair Disclosure (FD), passed in 2000, prohibits the selective disclosure of material information to some people but not others. The Sarbanes-Oxley Act of 2002 includes provisions specifically intended to help restore investor confidence in the reporting of securities' analysts, including a code of conduct for them and a requirement to disclose knowable conflicts of interest. The Global Settlement of 2003 between regulators and ten of the largest US investment firms aimed to prevent conflicts of interest between their analyst and investment businesses.
- ³ The correlation between the absolute size of the error in forecast earnings growth (S&P 500) and GDP growth is -0.55.
- ⁴ Our analysis of the distribution of five-year earnings growth (as of March 2005) suggests that analysts forecast growth of more than 10 percent for 70 percent of S&P 500 companies.
- ⁵ Except 1998-2001, when the growth outlook became excessively optimistic.
- ⁶ We also analyzed trends for three-year earnings-growth estimates based on year-on-year earnings estimates provided by the analysts, where the sample size of analysts' coverage is bigger. Our conclusions on the trend and the gap vis-à-vis actual earnings growth does not change.
- ⁷ Market-weighted and forward-looking earnings-per-share (EPS) estimate for 2010.
- ⁸ Assuming a return on equity (ROE) of 13.5 percent (the long-term historical average) and a cost of equity of 9.5 percent—the long-term real cost of equity (7 percent) and inflation (2.5 percent).
- ⁹ Real GDP has averaged 3 to 4 percent over past seven or eight decades, which would indeed be consistent with nominal growth of 5 to 7 percent given current inflation of 2 to 3 percent.
- ¹⁰ Timothy Koller and Zane D. Williams, "What happened to the bull market?" mckinseyquarterly.com, November 2001.

BEFORE THE
NEW YORK PUBLIC SERVICE COMMISSION

PREPARED DIRECT TESTIMONY

OF

PAULINE M. AHERN, CRRA
PRINCIPAL
AUS CONSULTANTS

CONCERNING

FAIR RATE OF RETURN

RE: UNITED WATER WESTCHESTER INC.

NOVEMBER 2009

1 between 2.04 and 3.78 times, averaging 3.32 times, while funds from
2 operations relative to total debt ranged from 16.80% to 21.00%, averaging
3 19.21%.

4 **Q. PLEASE EXPLAIN HOW YOU CHOSE THE PROXY GROUP OF EIGHT AUS**
5 **UTILITY REPORTS NATURAL GAS DISTRIBUTION COMPANIES.**

6 A. Because of the small number of publicly traded water companies available for
7 use as proxies for UWWC as well as the limited availability of comprehensive
8 investment analyst coverage for those companies, I have also utilized a proxy
9 group of gas distribution companies. Like water companies, these gas
10 distribution companies deliver a commodity, i.e., natural gas to customers
11 through a similar distribution system whose service rates of return are set by
12 the regulatory ratemaking process. The basis of selection for the proxy group
13 of eight AUS Utility Reports natural gas distribution companies was to include
14 those companies which meet the following criteria: 1) they are included in the
15 Natural Gas Distribution and Integrated Gas Company Group of AUS Utility
16 Reports (October 2009); 2) they have Value Line or Reuters consensus five-
17 year EPS growth rate projections; 3) they have positive Value Line five-year
18 DPS growth rate projections; 4) they have a Value Line adjusted beta; 5) they
19 have not cut or omitted their common dividends during the five years ending
20 2008 or to the time of the preparation of this testimony; 6) they have 60% or
21 greater of 2008 total net operating income derived from and 60% or greater of
22 2008 total assets devoted to regulated gas distribution operations and 7)
23 which, at the time of the preparation of this testimony, had not publicly

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 09-W-0824 – Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of United Water New Rochelle Inc. for Water Service.

NOTICE OF EVIDENTIARY HEARING

(Issued June 28, 2010)

PLEASE TAKE NOTICE that an evidentiary hearing to consider a Joint Proposal filed by the New York State Department of Public Service Staff and United Water New Rochelle Inc. in this proceeding. The hearing will be held on the record before Administrative Law Judge Eleanor Stein commencing on Wednesday, July 21, 2010, at 10:00 a.m., and continuing through Thursday, July 22, 2010, or as soon as the business of the hearing is concluded.

The evidentiary hearing will be held at the Public Service Commission's Albany offices, Three Empire State Plaza, Third Floor Hearing Room.

The principal purpose of this hearing is to consider issues and hear arguments related to the Joint Proposal of the New York State Department of Public Service Staff and United Water New Rochelle Inc., and to enter into the record the evidence proffered in this proceeding.

Jaclyn A. Brillling

Digitally Signed by Secretary
New York Public Service Commission

JACLYN A. BRILLING
Secretary

BEFORE THE
NEW YORK PUBLIC SERVICE COMMISSION

PREPARED DIRECT TESTIMONY

OF

PAULINE M. AHERN, CRRA
PRINCIPAL
AUS CONSULTANTS

CONCERNING

FAIR RATE OF RETURN

RE: UNITED WATER NEW ROCHELLE INC.

NOVEMBER 2009

1 example, S&P expressly indicates that the bond rating process encompasses a
2 qualitative analysis of business and financial risks (see pages 3 through 9 of
3 Schedule PMA-2). While not a means by which one can specifically quantify
4 the differential in common equity risk between companies, the bond (credit)
5 rating provides a useful means to compare/differentiate investment risk
6 between companies because it is the result of a thorough and comprehensive
7 analysis of all diversifiable business risks, i.e., investment risk.

8 **VI. UNITED WATER NEW ROCHELLE, INC.**

9 **Q. PLEASE DESCRIBE UWNR.**

10 A. UWNR provides water service to approximately 31,000 customers in the
11 eleven municipalities in Westchester County. UWNR is a wholly-owned
12 subsidiary of UWW, which is the sole source of UWNR's external capital.
13 UWW is a wholly-owned subsidiary of United Water Resources, Inc. (UWR).
14 Thus, the Company's common stock is not publicly traded.

15 **VII. PROXY GROUPS**

16 **Q. PLEASE EXPLAIN HOW YOU CHOSE THE PROXY GROUP OF SIX AUS**
17 **UTILITY REPORTS WATER COMPANIES.**

18 A. The basis of selection for the proxy group of six AUS Utility Reports water
19 companies was to select those companies which meet the following criteria: 1)
20 they are included in the Water Company Group of AUS Utility Reports (October
21 2009); 2) they have Value Line or Reuters consensus five-year EPS growth
22 rate projections; 3) they have a positive Value Line five-year DPS growth rate
23 projection; 4) they have a Value Line adjusted beta; 5) they have not cut or

1 omitted their common dividends during the five years ending 2008 or through
2 the time of the preparation of this testimony; 6) they have 60% or greater of
3 2008 total net operating income derived from and 60% or greater of 2008 total
4 assets devoted to regulated water operations; and 7) which, at the time of the
5 preparation of this testimony, had not publicly announced that they were
6 involved in any major merger or acquisition activity.

7 **Q. PLEASE DESCRIBE SCHEDULE PMA-3.**

8 A. Schedule PMA-3 contains comparative capitalization and financial statistics for
9 the six AUS Utility Reports water companies for the years 2004 - 2008. Page 1
10 contains a summary of the comparative data for the years 2004-2008. Page 2
11 contains notes relevant to page 1, as well as the basis of selection and names
12 of the individual companies in the proxy group, while page 3 contains capital
13 structure ratios based upon total permanent capital (excluding short-term debt)
14 by company and on average for the years 2004-2008.

15 During the five-year period ending 2008, the historically achieved average
16 earnings rate on book common equity for the group averaged 9.91%. The
17 average common equity ratio based upon total permanent capital was 50.60%,
18 and the average dividend payout ratio was 69.21%.

19 Total debt as a percent of EBITDA for the years 2004-2008 ranged
20 between 2.04 and 3.78 times, averaging 3.32 times, while funds from
21 operations relative to total debt ranged from 16.80% to 21.00%, averaging
22 19.21%.

23 **Q. PLEASE EXPLAIN HOW YOU CHOSE THE PROXY GROUP OF EIGHT AUS**

1 **UTILITY REPORTS NATURAL GAS DISTRIBUTION COMPANIES.**

2 A. Because of the small number of publicly traded water companies available for
3 use as proxies for UWNR as well as the limited availability of comprehensive
4 investment analyst coverage for those companies, I have also utilized a proxy
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6 distribution companies deliver a commodity, i.e., natural gas to customers
7 through a similar distribution system whose service rates of return are set by
8 the regulatory ratemaking process. The basis of selection for the proxy group
9 of eight AUS Utility Reports natural gas distribution companies was to include
10 those companies which meet the following criteria: 1) they are included in the
11 Natural Gas Distribution and Integrated Gas Company Group of AUS Utility
12 Reports (October 2009); 2) they have Value Line or Reuters consensus five-
13 year EPS growth rate projections; 3) they have positive Value Line five-year
14 DPS growth rate projections; 4) they have a Value Line adjusted beta; 5) they
15 have not cut or omitted their common dividends during the five years ending
16 2008 or to the time of the preparation of this testimony; 6) they have 60% or
17 greater of 2008 total net operating income derived from and 60% or greater of
18 2008 total assets devoted to regulated gas distribution operations and 7)
19 which, at the time of the preparation of this testimony, had not publicly
20 announced that they were involved in any major merger or acquisition activity.

21 **Q. PLEASE DESCRIBE SCHEDULE PMA-4.**

22 A. Schedule PMA-4 contains comparative capitalization and financial statistics for
23 the eight AUS Utility Reports natural gas distribution companies for the years

Comparative Risk of Proxy Groups in Case 09-W-0824

	Company	Water Proxy Group Ticker Symbol	Case 11-W-0020	Case 09-W-0824
1	¹ SJW Corp	NYSE:SJW	0.90	1.00
2	¹ California Water Service Gr	NYSE:CWT	0.70	0.80
3	¹ Aqua America	NYSE:WTR	0.65	0.65
4	¹ American States Water	NYSE:AWR	0.75	0.80
5	¹ Middlesex Water	NasdaqGS:MSEX	0.75	0.80
6	¹ York Water	NasdaqGS:YORW	0.70	0.65
7	American Water Works	NYSE:AWK	0.65	
8	Connecticut Water Service, I	NDQ--CTWS	0.80	
	² Average		0.74	0.78
	³ Average		0.74	
		⁴ Gas LDCs Proxy Group		
1	AGL Resources	NYSE: AGL	0.75	0.75
2	Atmos Energy resources	NYSE: ATO	0.65	0.65
3	Delta Natural Gas	NasdaqGM: DGAS	0.65	0.65
4	Laclede group	NYSE: LG	0.60	0.60
5	N.W. Natural Gas	NYSE: NWN	0.60	0.60
6	Piedmont natural gas	NYSE: PNY	0.65	0.65
7	Southwest Gas corp	NYSE: SWX	0.75	0.75
8	WGL	NYSE: WGL	0.65	0.65
	Average		0.66	0.66

¹Water companies in case 09-W-0824

²Average Average beta of the 6 companies used in case 09-W-0824

³Average Average beta of the 8 companies used in case 11-W-0020

⁴ Gas LDCs Proxy Group Gas companies used in Ms. Ahern's testimony in case 09-W-0824

⁵Electric Proxy Group

			Case 11-W-0020	Case 09-W-0824
1	ALLETE	ALE	0.70	0.70
2	Alliant Energy Corp.	LNT	0.70	0.70
3	Ameren Corp.	AEE	0.80	0.80
4	American Electric Power	AEP	0.70	0.70
5	Avista Corp.	AVA	0.70	0.70
6	Black Hills Corp.	BKH	0.80	0.80
7	Cleco Corp.	CNL	0.65	0.65
8	Consolidated Edison	ED	0.60	0.65
9	DPL Inc.	DPL	0.60	0.60
10	DTE Energy Co.	DTE	0.75	0.75
11	Duke Energy Corp.	DUK	0.65	0.65
12	Edison International	EIX	0.80	0.80
13	Empire District Electric	EDE	0.70	0.75
14	Entergy Corp.	ETR	0.70	0.70
15	FPL Group,Inc./NextEra	NEE	0.75	0.75
16	Great Plains Energy	GXP	0.75	0.75
17	Hawaiian Electric	HE	0.70	0.70
18	IDACORP,Inc.	IDA	0.70	0.70
19	MGE Energy Inc.	MGEE	0.60	0.65
20	Northeast Utilities	NU	0.70	0.70
21	NSTAR	NST	0.65	0.65
22	PG&E Corp.	PCG	0.55	0.55
23	Pinnacle West Capital	PNW	0.70	0.75
24	Portland General Electric	POR	0.75	0.70
25	Progress Energy	PGN	0.60	0.60
26	Sempra Energy	SRE	0.80	0.85
27	Southern Co.	SO	0.55	0.55
28	Teco Energy,Inc.	TE	0.85	0.85
29	UIL Holdings	UIL	0.70	0.70
30	Vectren Corp.	VVC	0.70	0.75
31	Westar Energy	WR	0.75	0.75
32	Wisconsin Energy	WEC	0.65	0.65
33	Xcel Energy,Inc.	XEL	0.65	0.70
	Average		0.70	0.70

⁵ Electric Proxy Group Electric companies used in Staff's testimony in case 09-W-0824

SUMMARY RESULTS
Average Value Line Beta

Proxy Group	Year 2009	Year 2011
⁶ Gas LDCs	0.66	0.66
⁷ Water	0.78	0.74
⁸ Electric	0.70	0.70

⁶ Gas Proxy Group Gas companies used in Ms. Ahern's testimony in case 09-W-0824

⁷ Water Proxy Group Water companies used in Ms. Ahern's testimonies in cases 09-W-0824 and 11-W-0020

⁸ Electric Proxy Group Electric companies used in Staff's testimony in case 09-W-0824

FORTUNE **9% Forever?**

That's economist Roger Ibbotson's forecast for stock market returns. HE'S BEEN RIGHT--very right--in the past. So how come some people think we shouldn't believe him anymore?

By **JUSTIN FOX**
December 26, 2005

(FORTUNE Magazine) – In May 1974, in the depths of the worst bear market since the 1930s, two young men at a University of Chicago conference made a brash prediction: The Dow Jones industrial average, floundering in the 800s at the time, would hit 9,218 at the end of 1998 and get to 10,000 by November 1999.

You probably have a good idea how things turned out: At the end of 1998, the Dow was at 9,181, just 37 points off the forecast. It hit 10,000 in March 1999, seven months early. Those two young men in Chicago in 1974 had made one of the most spectacular market calls in history.

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What became of them after that? One, Rex Sinquefeld, went on to found a mutual fund company that now manages more than \$80 billion. The other, Roger Ibbotson, kept making market forecasts, forecasts of long-run stock and bond returns that have become deeply woven into the fabric of American life. Simply put, if you believe that stocks are fated to return 10% on average over the long haul, Ibbotson is probably the reason why.

It's hard to overestimate the influence of those numbers. The forecasts and historical return data churned out by Ibbotson Associates transformed the pension fund business in the late 1970s and 1980s, leading managers to make an epic shift out of bonds and into stocks. They formed the inescapable backdrop to the 1990s personal investing boom, as brokers, financial planners, and journalists endlessly repeated the Ibbotson mantra of double-digit stock market returns as far as the eye could see. Lately the Ibbotson forecasts have been finding their way into 401(k)s, as Ibbotson and other firms using similar methods build portfolios for those who opt not to build their own. Ibbotson even sells hundreds of thousands of charts each year showing how stocks build wealth over time--and beat the crap out of bonds.

All this means it's of more than academic interest that an academic debate has been raging for years now over the theories upon which Ibbotson and Sinquefeld based their forecast in 1974, and which Ibbotson has followed since. Ibbotson, now 62, has taken some of the criticism to heart, and in the process ratcheted down his long-run forecast for stock returns from more than 10% a year to 9.27%. That alone was something of a shock for many of his clients, Ibbotson says. But a few critics think the real number may turn out to be just 5% or 6%. In that case stocks would barely outperform government bonds--an eventuality that would entirely rearrange the investing world yet again.

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The most important thing to understand about the forecast that Roger Ibbotson and Rex Sinquefeld churned out in 1974 is that it wasn't an attempt to outsmart or outguess the market as Wall Street seers had traditionally done. Instead, Ibbotson and Sinquefeld were simply trying to use the information already embedded in stock prices to, as they put it, "uncover the market's 'consensus' forecast." Their tools were a half-century of historical data and the bold new philosophy of stock market behavior that they had internalized as students at the University of Chicago's Graduate School of Business.

They did it at a time when theories batted about in Chicago classrooms really were changing the world, or were about to. In the early 1970s, Ibbotson says, "everything was going on at the University of Chicago." The professors on his Ph.D. dissertation committee included two future Nobel Prize winners (Merton Miller and Myron Scholes), another who would have won if he hadn't died before the Nobel committee got to him (Fischer Black), yet another whom many colleagues think should win the Nobel (Eugene Fama), and a father of Reagan-era supply-side economics (Arthur Laffer).

Not counting the Black-Scholes options-pricing formula and the Laffer curve, which don't have major roles in this drama, the biggest ideas at the Chicago Business School in the early 1970s were the efficient-market hypothesis and the capital asset pricing model. The gist of the efficient-market idea, as articulated in the 1960s by Eugene Fama, is that today's price is the best possible measure of a stock's value, and that nobody can reliably predict which way prices will be headed tomorrow. The capital asset model says that you nonetheless can predict long-run stock returns because they are a reward for taking risks, and those risks can be measured. While CAPM, as it is known, was devised elsewhere, Chicago's Fischer Black was among its most fervent adherents.

Ibbotson arrived on campus in 1968. He was a kid from the Chicago suburbs who studied math and physics at Purdue and got an MBA at Indiana University. After struggling in the workforce, he went to Chicago to earn a Ph.D. in finance and hit his stride. While still a student, he got a job managing the university's bond portfolio. Meanwhile his friend Sinquefeld, a 1972 MBA working at a Chicago bank, was launching one of the first S&P 500 index funds for institutional investors (this when Vanguard was still but a gleam in Jack Bogle's eye). Chicago really was a heady place for young finance geeks in those days.

Ibbotson and Sinquefeld both needed up-to-date historical data on security prices for their work, and both knew that the professors who ran the Chicago business school's Center for Research in Security Prices (CRSP) were in no hurry to repeat the epic number-crunching exercise they had undertaken in the early 1960s to build a database of stock prices going back to 1925. So the two men took on the job of updating the CRSP (pronounced "crisp") stock database and assembling a similar price history for bonds and Treasury bills.

They presented their preliminary findings in May 1974 at one of the twice-yearly seminars that CRSP hosted to share the latest academic research with bankers, mutual fund managers, and the like. "Just getting the data was a coup," Ibbotson says. Then there was the forecast, suggested to them by Fischer Black. Black thought of using the data to calculate the additional return that investors had historically received for investing in risky stocks rather than in relatively safe government bonds. According to CAPM theory, this "risk premium" reflects something real and durable about the rewards investors demand for taking the chance of losing money. Real and durable enough, it seemed in 1974, to build a stock market prediction on.

Once Ibbotson and Sinquefeld figured out the historical risk premium, all they had to do was add it to the prevailing risk-free interest rate (Treasury bonds or bills, depending on one's planning horizon) to get the "consensus" forecast of market returns. Actually they made it a little more complicated than that: When they finally published their work in 1976, they presented their forecast as the middle point of a wide range of different possible results. The mean forecast for the 25 years through 2000 was for 13% annual stock market returns, with 95% confidence that the return would be between 5.2% and 21.5%. (The actual return was 15%.)

"In some ways it was the first scientific forecast of the market," Ibbotson says proudly. Not everyone saw it that way at the time; some skeptics complained it was just a gussied-up extrapolation of the past into the future. But there turned out to be a ravenous hunger for such data. Both researchers were swamped with requests for more information and advice. For a while Ibbotson, by this time a very junior professor of finance at Chicago, just let the letters pile up unopened in a drawer in his office. In 1977 he decided to make a business out of his research project and started Ibbotson Associates. He also kept teaching at Chicago--until 1984, when his wife, health economist Jody Sindelar, got a job at Yale and he wangled an appointment there as a finance professor. Since then he's left the day-to-day management of the company, still based in Chicago, in the hands of others, while he remains its public face and chief researcher. Sinquefeld, meanwhile, launched small-cap index fund manager Dimensional Fund Advisors with another Chicago finance graduate, David Booth, in 1981.

While Ibbotson Associates grew and prospered in the 1980s and 1990s, however, the theories upon which its forecasts are based began to crumble in the face of contradictory evidence. The initial onslaught came from skeptics of the efficient-market hypothesis like Ibbotson's Yale colleague Robert Shiller, who argued that investor mood swings drove stock prices too high or too low for years on end. The experience of the late 1990s confirmed to many that there was something to this. But Ibbotson says he can't base his forecasts on such arguments. "It's not that I believe markets are so efficient," Ibbotson says. "It's just that I don't want to use a mispricing to make predictions." He's trying to divine a middle-of-the-road consensus, not trot out a CNBC-style market call. Fair enough.

A harder-to-dismiss critique came from Mr. Efficient Markets himself, Ibbotson's dissertation advisor Eugene Fama. In a series of papers written with Dartmouth's Kenneth French, Fama has argued that the capital asset pricing model, or at least its 1970s corollary that the risk premium is constant, doesn't match the facts. "My own view is that the risk premium has gone down over time basically because we've convinced people that it's there," Fama says. Ibbotson's stock market forecasting model is thus a victim of its own success.

Ibbotson agrees that Fama has a point, and that he can no longer bank on the historical equity premium to predict future returns. The alternative he has come up with is an estimate based on fundamentals. He takes the 10.31% annual return on stocks from 1925 through the present and strips out the tripling of the market's price/earnings ratio that's occurred since then. "We think of that as a windfall that you shouldn't get again," he says. The drivers of stock returns that remain are dividends, earnings growth, and inflation. Make a forecast of future inflation using current bond yields, assume that dividend and earnings growth history will repeat themselves, and you get a long-run equity-return forecast of 9.27%. When Ibbotson and his company's director of research, Peng Chen, first ran the numbers in 2001, the gap between the new forecast and the one using the equity premium method was more than a percentage point. Because P/Es have dropped since then, the gap has

shrunk. But Ibbotson's revised forecasting method doesn't insulate him from criticism any more than the old way. In fact, it invites new criticism.

The most persistent challenger has been Rob Arnott, a Pasadena money manager and editor of the Financial Analysts Journal, who thinks future equity returns could be below 6%. (See "Dueling Market Forecasts" chart.) The big difference between his forecast and Ibbotson's is that Arnott uses the current dividend yield (1.76%) as a starting point, while Ibbotson goes with the much higher long-term average yield (4.23%). Ibbotson believes the historical number provides a better picture of what investors think is ahead. He still relies on the assumption that markets are efficient, so current dividend yields must be low for a reason—his guess is that investors are expecting big growth in earnings (and dividends) in the future. Arnott, whose research has shown that low yields in the past were followed by slow earnings growth, thinks that's balderdash. "One of my biggest beefs with the academic community is the notion that theory is fact," he complains. "When they find evidence that contradicts the theory, instead of saying, 'Wonderful, let's improve the theory,' they throw it out because it conflicts with theory."

But the theoretical assumption that the market knows best is central to Ibbotson's whole forecasting endeavor, something even Arnott acknowledges. "In a sense Ibbotson is trying to infer what the consensus view is," Arnott says. "I'm trying to profit from that consensus." What Ibbotson is telling us is that the market still believes stocks will handily outperform bonds over the long haul. And if the market turns out to be wrong about that, it won't just be Roger Ibbotson who feels the pain.

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JUN 20 2006

UTILITY STOCKS AND THE SIZE EFFECT: AN EMPIRICAL ANALYSIS

Annie Wong*

I. Introduction

The objective of this study is to examine whether the firm size effect exists in the public utility industry. Public utilities are regulated by federal, municipal, and state authorities. Every state has a public service commission with board and varying powers. Often their task is to estimate a fair rate of return to a utility's stockholders in order to determine the rates charged by the utility. The legal principles underlying rate regulation are that "the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks," and that the return to a utility should be sufficient to "attract capital and maintain credit worthiness." However, difficulties arise from the ambiguous interpretation of the legal definition of *fair and reasonable rate of return* to an equity owner.

Some finance researchers have suggested that the Capital Asset Pricing Model (CAPM) should be used in rate regulation because the CAPM beta can serve as a risk measure, thus making risk comparisons possible. This approach is consistent with the spirit of a Supreme Court ruling that equity owners sharing similar level of risk should be compensated by similar rate of return.

The empirical studies of Banz (1981) and Reinganum (1981) showed that small firms tend to earn higher returns than large firms after adjusting for beta. This phenomenon leads to the proposition that firm size is a proxy for omitted risk factors in determining stock returns. Barry and Brown (1984) and Brauer (1986) suggested that the omitted risk factor could be the differential information environment between small and large firms. Their argument is based on the fact that investors often have less publicly available information to assess the future cash flows of small firms than that of large

firms. Therefore, an additional risk premium should be included to determine the appropriate rate of return to shareholders of small firms.

The samples used in prior studies are dominated by industrial firms, no one has examined the size effect in public utilities. The objective of this study is to extend the empirical findings of the existing studies by investigating whether the size effect is also present in the utility industry. The findings of this study have important implications for investors, public utility firms, and state regulatory agencies. If the size effect does exist in the utility industry, this would suggest that the size factor should be considered when the CAPM is being used to determine the fair rate of return for public utilities in regulatory proceedings.

II. Information Environment of Public Utilities

In general, utilities differ from industrials in that utilities are heavily regulated and they follow similar accounting procedures. A public utility's financial reporting is mainly regulated by the Securities and Exchange Commission (SEC) and the Federal Energy Regulatory Commission (FERC). Under the Public Utility Holding Company Act of 1935, the SEC is empowered to regulate the holding company systems of electric and gas utilities. The Act requires registration of public utility holding companies with the SEC. Only under strict conditions would the purchase, sale or issuance of securities by these holding companies be permitted. The purpose of the Act is to keep the SEC and investors informed of the financial conditions of these firms. Moreover, the FERC is in charge of the interstate operations of electric and gas companies. It requires utilities to follow the accounting procedures set forth in its Uniform Systems of Accounts. In particular, electric and gas utilities must request their Certified Public Accountants to certify that certain schedules in the financial reports are in conformity with the Commission's accounting requirements. These detailed reports are submitted annually and are open to the public.

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The FERC requires public utilities to keep accurate records of revenues, operating costs, depreciation expenses, and investment in plant and equipment. Specific financial accounting standards for these purposes are also issued by the Financial Accounting Standards Board (FASB). Uniformity is required so that utilities are not subject to different accounting regulations in each of the states in which they operate. The ultimate objective is to achieve comparability in financial reporting so that factual matters are not hidden from the public view by accounting flexibility.

Other regulatory reports tend to provide additional financial information about utilities. For example, utilities are required to file the FERC Form No. 1 with the state commission. This form is designed for state commissions to collect financial and operational information about utilities, and serves as a source for statistical reports published by state commissions.

Unlike industrials, a utility's earnings are predetermined to a certain extent. Before allowed earnings requests are approved, a utility's performance is analyzed in depth by the state commission, interest groups, and other witnesses. This process leads to the disclosure of substantial amount of information.

III. Hypothesis and Objective

Due to the Act of 1935, the Uniform Systems of Accounts, the uniform disclosure requirements, and the predetermined earnings, all utilities are reasonably homogeneous with respect to the information available to the public. Barry and Brown (1984) and Brauer (1986) suggested that the difference of risk-adjusted returns between small and large firms is due to their differential information environment. Assuming that the differential information hypothesis is true, then uniformity of information availability among utility firms would suggest that the size effect should not be observed in the public utility industry. The objective of this paper is to provide a test of the size effect in public utilities.

IV. Methodology

1. Sample and Data

To test for the size effect, a sample of public utilities and a sample of industrials matched by equity value are formed so that their results can be compared. Companies in both samples are listed on the Center for Research in Security Prices (CRSP)

Daily and Monthly Returns files. The utility sample includes 152 electric and gas companies. For each utility in the sample, two industrial firms with similar firm size (one is slightly larger and the other is slightly smaller than the utility) are selected. Thus, the industrial sample includes 304 non-regulated firms.

The size variable is defined as the natural logarithm of market value of equity at the beginning of each year. Both the equally-weighted and value-weighted CRSP indices are employed as proxies for the market returns. Daily, weekly and monthly returns are used. The Fama-MacBeth (1973) procedure is utilized to examine the relation between risk-adjusted returns and firm size.

2. Research Design

All utilities in the sample are ranked according to the equity size at the beginning of the year, and the distribution is broken down into deciles. Decile one contains the stocks with the lowest market values while decile ten contains those with the highest market values. These portfolios are denoted by MV_1 , MV_2 , ..., and MV_{10} , respectively.

The combinations of the ten portfolios are updated annually. In the year after a portfolio is formed, equally-weighted portfolio returns are computed by combining the returns of the component stocks within the portfolio. The betas for each portfolio at year t , $\hat{\beta}_{pt}$'s, are estimated by regressing the previous five years of portfolio returns on market returns:

$$\tilde{R}_{pt} = \alpha_p + \hat{\beta}_{pt} \tilde{R}_{mt} + \tilde{U}_{pt} \quad (1)$$

where

R_{pt} = periodic return in year t on portfolio p

R_{mt} = periodic market return in year t

U_{pt} = disturbance term.

Banz (1981) applied both the ordinary and generalized least squares regressions to estimate β ; and concluded that the results are essentially identical (p.8). Since adjusting for heteroscedasticity does not necessarily lead to more efficient estimators, the ordinary least squares procedures are used in this study to estimate β in equation (1).

The following cross-sectional regression is then run for the portfolios to estimate γ_i , $i = 0, 1$, and 2 :

$$R_{pt} = \gamma_0 + \gamma_1 \hat{\beta}_{pt} + \gamma_2 \hat{S}_{pt} + U_{pt} \quad (2)$$

where

$\hat{\beta}_{pt}$ = estimated beta for portfolio p at year t, t=1968, ..., 1987

\hat{S}_{pt} = mean of the logarithm of firm size in portfolio p at the beginning of year t

U_{pt} = disturbance term.

Depending on whether daily, weekly or monthly returns are used, a portfolio's average return changes periodically while its beta and size only change once a year. The γ_1 and γ_2 coefficients are estimated over the following four subperiods: 1968-72, 1973-77, 1978-82 and 1983-1987. If portfolio betas can fully account for the differences in returns, one would expect the average coefficient for the beta variable to be positive and for the size variable to be zero. A t-statistic will be used to test the hypothesis. The coefficients of a matched sample are also examined so that the results between industrial and utility firms can be compared.

V. Analysis of Results

1. Equity Value of the Utility Portfolios

The mean equity values of the ten size-based utility portfolios are reported in Table 1. Panels A and B present the average firm size of these portfolios at the beginning and end of the test period, 1968-1987. The first interesting observation from Table 1 is that the difference in magnitude between the smallest and the largest market value utility portfolios is tremendous. In Panel A, the average size of MV_1 is about \$31 million while that of MV_{10} is over \$1.4 billion. In Panel B, that is twenty years later, they are \$62 million and \$5.2 billion, respectively. Another interesting finding is that there is a substantial increase in average firm size from MV_9 to MV_{10} . Since these two findings are consistent over the entire test period, the average portfolio market values for interim years are not reported. These results are similar to the empirical evidence provided by Reinganum (1981).

The utility sample in this study contains 152 firms whereas Reinganum's sample contains 535 firms that are mainly industrial companies. Two conclusions may be drawn from the results of the Reinganum study and this one. First, utilities and industrials are similar in the sense that their market

values vary over a wide spectrum. Second, the fact that there is a huge jump in firm size from MV_9 to MV_{10} indicates that the distribution of firm size is positively skewed. To correct for the skewness problem, the natural logarithm of the mean equity value of each portfolio is calculated. This variable is then used in later regressions instead of the actual mean equity value.

2. Betas of the Utility and Industrial Samples

The betas based on monthly, weekly and daily returns are reported for the utility and industrial samples. For simplicity, they will be referred to as monthly, weekly, and daily betas. In all cases, five years of returns are used to estimate the systematic risk. The betas estimated over the 1963-67 time period are used to proxy for the betas in 1968, which is the beginning of the test period. By the same token, the betas obtained from the time period 1982-86 are used as proxies for the betas in 1987, which is the end of the test period.

The betas from using the equally-weighted and value-weighted indices are calculated in order to check whether the results are affected by the choice of market index. Since the results are similar, only those obtained from the equally-weighted index are reported and analyzed.

Table 2 reports the monthly, weekly and daily betas of the two samples at the beginning and end of the test period. Panel A shows the various betas of the industrial portfolios. Two conclusions may be drawn. First, in the 1960's, smaller market value portfolios tend to have relatively larger betas. This is consistent with the empirical findings by Banz (1981) and Reinganum (1981). Second, this trend seems to vanish in the 1980's, especially when weekly and daily returns are used.

The betas of the utility portfolios are presented in Panel B. The table shows that none of the utility betas are greater than 0.71. A comparison between Panels A and B reveals that utility portfolios are relatively less risky than industrial portfolios after controlling for firm size. The comparison also reveals that, unlike industrial stocks, betas of the utility portfolios are not related to the market values of equity.

The negative correlation between firm size and beta in the industrial sample may introduce a multicollinearity problem in estimating equation (2). Banz (p.11) had addressed this issue and concluded that the test results are not sensitive to the

multicollinearity problem. For the utility sample, this problem does not exist.

3. Tests on the Coefficients of Beta and Size

The beta and firm size are used to estimate γ_1 and γ_2 in equation (2). A t-statistic is used to test if the mean values of the gammas are significantly different from zero. The tests were performed for four 5-year periods which are reported in Table 3. The mean of the gammas and their t-statistic are presented in Panel A for the utilities and in Panel B for the industrial firms.

The empirical results for the utility sample are reported in Panel A of Table 3. When monthly returns are used, 60 regressions were run to obtain 60 pairs of gammas for each of the 5-year periods. When daily returns are used, over 1200 regressions were run for each period to obtain the gammas. The results are similar: in all of the time periods tested, none of the average coefficients for beta and size are significantly different from zero. When weekly returns are used, 260 pairs of gammas were obtained. The average coefficients for beta are not significant in any test period, and the average coefficients for size are not significant in three of the test periods. For the test period of 1978-82, the average coefficient for size is significantly negative at a 5% level.

The test results for the industrial sample are reported in Panel B of Table 3. When monthly returns are used, the average coefficient estimates for size and beta are significant and have the expected sign only in the 1983-87 test period. When weekly returns are used, only the size variable is significantly negative in the 1978-82 period. When daily returns are used, the coefficient estimates for betas and size are not significant at any conventional level.

According to the CAPM, beta is the sole determinant of stock returns. It is expected that the coefficient for beta is significantly positive. However, the empirical findings reported in this study and in Fama and French (1992) only provide weak support for beta in explaining stock returns. The empirical findings in this study also suggest that the size effect varies over time. It is not unusual to document the firm size effect at certain time periods but not at others. Banz (1981) found that the size effect is not stable over time with substantial differences in the magnitude of the coefficient of the size factor (p.9, Table 1). Brown, Kleidon and Marsh (1983) not only have shown that size effect is not constant over time but also have reported a reversal of the size anomaly for certain years.

The research design of this study allows us to keep the sample, test period, and methodology the same with the holding-period being the only variable. The size effect is documented for the industrial sample in one of the four test periods when monthly returns are used and in another when weekly returns are used. When daily returns are used, no size effect is observed. For the utility sample, the size effect is significant in only one test period when weekly returns are used. When monthly and daily returns are used, no size effect is found. Therefore, this study concludes that the size effect is not only time-period specific but also holding-period specific.

VI. Concluding Remarks

The fact that the two samples show different, though weak, results indicates that utility and industrial stocks do not share the same characteristics. First, given firm size, utility stocks are consistently less risky than industrial stocks. Second, industrial betas tend to decrease with firm size but utility betas do not. These findings may be attributed to the fact that all public utilities operate in an environment with regional monopolistic power and regulated financial structure. As a result, the business and financial risks are very similar among the utilities regardless of their sizes. Therefore, utility betas would not necessarily be expected to be related to firm size.

The objective of this study is to examine if the size effect exists in the utility industry. After controlling for equity values, there is some weak evidence that firm size is a missing factor from the CAPM for the industrial but not for the utility stocks. This implies that although the size phenomenon has been strongly documented for the industriales, the findings suggest that there is no need to adjust for the firm size in utility rate regulations.

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Table 1

Average Equity Size of the Utility Portfolios at the Beginning and End of the Test Period
(Dollar figures in millions)

	A: Beginning (1968)	B: End (1987)
MV ₁	\$31	\$62
MV ₂	\$77	\$177
MV ₃	\$113	\$334
MV ₄	\$161	\$475
MV ₅	\$220	\$715
MV ₆	\$334	\$957
MV ₇	\$437	\$1,279
MV ₈	\$505	\$1,805
MV ₉	\$791	\$2,665
MV ₁₀	\$1,447	\$5,399

Table 2

Betas of the Two Samples at the Beginning and End of the Test Period

	<u>Monthly Betas</u>		<u>Weekly Betas</u>		<u>Daily Betas</u>	
	1963-67	1982-86	1963-67	1982-86	1963-67	1982-86
Panel A: Industrial Firms						
MV ₁	0.89	1.00	1.15	0.95	1.11	0.92
MV ₂	0.94	0.87	1.07	1.01	1.14	1.01
MV ₃	0.88	0.82	1.12	0.86	1.14	1.04
MV ₄	0.69	0.74	1.00	0.83	1.03	0.86
MV ₅	0.73	0.80	1.05	0.96	1.13	1.01
MV ₆	0.66	0.82	1.03	1.01	1.05	1.04
MV ₇	0.64	0.81	0.97	1.04	0.98	1.09
MV ₈	0.62	0.75	0.97	1.11	1.00	1.20
MV ₉	0.52	0.78	0.84	1.06	0.94	1.16
MV ₁₀	0.43	0.65	0.78	1.01	0.86	1.22
Panel B: Public Utilities						
MV ₁	0.30	0.37	0.31	0.43	0.30	0.40
MV ₂	0.28	0.38	0.37	0.47	0.36	0.44
MV ₃	0.22	0.42	0.33	0.42	0.31	0.49
MV ₄	0.27	0.35	0.36	0.52	0.34	0.54
MV ₅	0.25	0.45	0.37	0.61	0.35	0.62
MV ₆	0.25	0.41	0.39	0.54	0.40	0.65
MV ₇	0.20	0.35	0.34	0.54	0.37	0.63
MV ₈	0.17	0.38	0.34	0.65	0.33	0.68
MV ₉	0.19	0.34	0.35	0.60	0.34	0.71
MV ₁₀	0.18	0.29	0.38	0.59	0.39	0.71

Table 3

Tests on the Mean Coefficients of Beta (γ_1) and Size (γ_2)

$$R_{pt} = \gamma_{\alpha} + \gamma_{1t}\hat{\beta}_{pt} + \gamma_{2t}\hat{S}_{pt} + U_{pt}$$

Returns Used:		Monthly (t-value)	Weekly (t-value)	Daily (t-value)
Panel A: Utility Sample				
1968-72	γ_1	-0.46% (-0.26)	-0.32% (-0.42)	-0.02% (-0.18)
	γ_2	-0.07% (-0.78)	-0.01% (-0.51)	-0.00% (-0.46)
1973-77	γ_1	-0.28% (-0.13)	0.14% (0.14)	-0.03% (-0.21)
	γ_2	-0.11% (-0.70)	-0.03% (-0.67)	-0.00% (-0.53)
1978-82	γ_1	0.55% (0.36)	0.54% (1.00)	0.05% (0.43)
	γ_2	-0.10% (-0.75)	-0.05% (-1.71)*	-0.01% (-1.60)
1983-87	γ_1	1.74% (1.28)	-0.24% (-0.51)	-0.02% (-0.18)
	γ_2	-0.16% (-1.54)	-0.03% (-0.86)	-0.01% (-0.63)
Panel B: Industrial Sample				
1968-72	γ_1	-0.36% (-0.27)	-0.28% (-0.55)	-0.02% (-0.32)
	γ_2	0.07% (0.43)	-0.01% (-0.19)	0.00% (0.51)
1973-77	γ_1	1.34% (0.64)	-0.23% (-0.31)	0.14% (1.45)
	γ_2	-0.01% (-0.06)	-0.04% (-0.85)	-0.00% (-0.64)
1978-82	γ_1	-0.84% (-0.28)	-0.56% (-0.91)	-0.09% (-0.81)
	γ_2	-0.29% (-0.75)	-0.01% (-1.72)*	-0.00% (-1.33)
1983-87	γ_1	2.51% (1.83)*	0.34% (0.64)	0.11% (1.40)
	γ_2	-0.25% (-1.90)*	-0.01% (-0.43)	0.00% (0.14)

* Significant at the 5% level based on a one-tailed test.

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ON COMPUTING MEAN RETURNS AND THE SMALL FIRM PREMIUM

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The mean return computational method has a substantial effect on the estimated small firm premium. The buy-and-hold method, which best mimics actual investment experience, produces an estimated small-firm premium only one-half as large as the arithmetic and re-balanced methods which are often used in empirical studies. Similar biases can be expected in mean returns when securities are classified by any variable related to trading volume.

1. Introduction

There is a potentially serious problem in estimating expected return differences between small and large firms. Even with exactly the same sample observations, the method used to compute sample mean returns can have a substantial effect on the estimates.

With an arithmetic computational method, daily returns on individual stocks are averaged across both firms and days to obtain the mean daily return on an equally-weighted portfolio; then the portfolio's mean daily return is compounded to obtain an estimate of the expected return over a longer interval. With a buy-and-hold method, individual stock returns are first obtained for the longer interval by linking together the daily individual returns; then an equally-weighted portfolio's mean return is computed by averaging the longer-term (individual) returns.

Defining a 'longer interval' as one year, the arithmetic method produces an average annual return difference of 14.9 percent between AMEX and NYSE stocks¹ over the 19 complete calendar years, 1963-1981 inclusive. The buy-and-hold method gives an annual return difference of only 7.45 percent. Assuming that annual returns are statistically independent, the arithmetic

*Comments and suggestions by Gordon Alexander, Kenneth French, Stephen Ross and the referee, Allan Kleidon, are gratefully acknowledged.

¹The effect of smallness can be measured by the difference in returns of stock listed on the American Exchange (AMEX) and the New York Exchange (NYSE) because AMEX issues are, on average, much smaller than NYSE issues. Most of the results presented here are based on the AMEX-NYSE differential because it is convenient and easy to use. Some confirmatory results based directly on measured size will also be presented.

method's return differential had an associated t -statistic of 3.07 while the buy-and-hold method yielded a t -statistic of 1.53.

Speculation on possible causes of the small firm premium has occupied the attention of many finance theorists over the past few years; but perhaps this attention has been premature. If the estimated small firm premium can be cut in half simply by compounding individual returns before averaging them, some consideration should be given to whether the magnitude of the true premium is really all that large. The various explanations for the premium offered so far would become more plausible if the premium is actually smaller than has been previously reported.

This paper investigates why the mean return computational method can be such a significant choice in some empirical research. The reason seems to be that individual asset returns are not as well-behaved as we might like. Individual assets do not trade continuously and there are significant trading costs. In some empirical studies, the effect of these factors might be safely ignored; but when the object of investigation is related to trading volume (and thus to trading frequency and trading costs), there can be measurement problems. Firm size is related to trading volume and it is used as an example throughout the paper. Other variables related to size and to trading, such as dividend yield, price/earnings ratio, and beta, could also present similar empirical difficulties. Section 2 gives a brief theoretical discussion of mean return computational methods and section 3 presents details of the empirical results for small firm premia.

2. Compounding and the bias in mean return calculation

2.1. Formulae for computing mean returns

To elucidate the differences in mean return computation and explain why they might produce different results, consider a sample of N securities, each having returns observed for T periods. Let R_{it} be the value relative ($1 + \text{return}$), of security i in period t . Suppose also that investment results are reviewed every τ periods. For example, if data were available daily but returns were to be reviewed every month, we would have $\tau \cong 21$ since there are usually about 21 trading days per month.

Two alternative methods of computing the mean equally-weighted return over the review period can be written algebraically as

$$\bar{R}_{AR} = \left[\frac{1}{N \cdot \tau} \sum_i \sum_t R_{it} \right]^\tau, \quad (1)$$

$$\bar{R}_{BH} = \frac{1}{N} \sum_i \left[\prod_t R_{it} \right], \quad (2)$$

where the subscripts 'AR' and 'BH' denote 'arithmetic' and 'buy-and-hold', respectively. These labels are intended to portray the sense of the computation method. The first method (1) is simply an arithmetic mean raised to the τ th power while the second method gives the actual investment results an investor would achieve from buying equal dollar amounts of N securities and holding the shares for τ periods.

There is also a third possible definition of mean return,

$$\bar{R}_{RB} = \prod_t \left[\frac{1}{N} \sum_i R_{it} \right], \quad (3)$$

where the subscript 'RB' stands for 'rebalanced'. This would be the actual investment return (ignoring transactions costs) on a portfolio which begins with equal investments in the N securities and *maintains* equal investments by rebalancing at the end of each period, $t = 1, \dots, \tau$.

To compare results over different review periods, we must choose some typical and familiar calendar interval, say a year, and express the results as percentage returns over that common calendar interval. In the tables below, annualization is accomplished and reported for 'linked' returns; the review period returns within each calendar year are simply multiplied together (or linked) in order to obtain an annual return.² Linked annualization includes *every* daily observation in some review period during the year. This assures that in any comparison of the results across review periods, the observed differences are due to review period alone and cannot be ascribed to slightly different sample observations.

The next two subsections investigate some properties of these sample mean returns. Subsection 2.2 derives their expected values under the assumption of temporally independent individual asset returns. Subsection 2.3 then examines the effect of intertemporal dependence.

²The exact formulae for linked returns can be written as follows. Let $\bar{R}_m(y, \tau)$ denote the mean annualized linked return for year y ($y = 1, \dots, Y$) using a review period whose length is τ trading days and using method ($m = \text{BH, AR, RB}$), to compute the review period returns. Then,

$$\begin{aligned} \bar{R}_{\text{BH}}(y, \tau) &= \prod_{j=(y-1)k_r+1}^{y \cdot k_r} \left[\frac{1}{N} \sum_{i=(j-1)\tau+1}^{j\tau} (R_{it}) \right], \\ \bar{R}_{\text{AR}}(y, \tau) &= \prod_{j=(y-1)k_r+1}^{y \cdot k_r} \left[\frac{1}{N^{\tau}} \sum_{i=(j-1)\tau+1}^{j\tau} R_{it} \right]^{\tau}, \\ \bar{R}_{\text{RB}}(y, \tau) &= \prod_{j=(y-1)k_r+1}^{y \cdot k_r} \left\{ \prod_{i=(j-1)\tau+1}^{j\tau} \left[\frac{1}{N} \sum_i R_{it} \right] \right\}, \end{aligned}$$

where $k_r = T/(Y \cdot \tau)$ is the number of review periods per year and T is the total number of trading days in the entire sample. When returns are reviewed in natural calendar intervals such as months, the review period cannot be a fixed number of trading days and thus τ in the formulae above varies slightly with the actual number of trading days.

2.2. Sample mean return biases with temporal independence

Following Blume (1974), assume that each individual asset return is drawn from a stationary distribution with temporally independent disturbances; that is,

$$\tilde{R}_{it} = \mu_i + \tilde{\varepsilon}_{it}, \quad \forall i, \quad (4)$$

with $E(\tilde{R}_{it}) = \mu_i$, a constant for all t , and where the unexpected return, $\tilde{\varepsilon}_{it}$, satisfies $\text{cov}(\tilde{\varepsilon}_{i,t}, \tilde{\varepsilon}_{i,t-j}) = 0$ for $j \neq 0$.

The expected value of the arithmetic mean (1) can be expressed as

$$E(\bar{R}_{AR}) = E \left[\left(\frac{1}{N} \sum_i \mu_i + \tilde{h} \right)^\tau \right], \quad (5)$$

where

$$\tilde{h} \equiv \frac{1}{N \cdot \tau} \sum_i \sum_t \tilde{\varepsilon}_{it}$$

is the average disturbance on the equally-weighted portfolio over the sample review period τ .

The expected value of the buy-and-hold mean (2) is

$$E(\bar{R}_{BH}) = \frac{1}{N} \sum_i \left[E \prod_t (\mu_i + \tilde{\varepsilon}_{it}) \right] = \frac{1}{N} \sum_i (\mu_i^\tau). \quad (6)$$

This follows since the expectation can be taken inside the product with independent returns and since $E(\tilde{\varepsilon}) = 0$, by definition.

The rebalancing method (3) produces a mean return whose expectation is

$$E(\bar{R}_{RB}) = \prod_i \left[\frac{1}{N} \sum_i \mu_i \right] = \left(\frac{1}{N} \sum_i \mu_i \right)^\tau, \quad (7)$$

where, again, the expectation can be taken inside the product because of time independence.

Expressions (5), (6) and (7) imply that the three different mean return definitions do not produce the same results. By Jensen's inequality,

$$E(\bar{R}_{AR}) \geq E(\bar{R}_{RB}),^3$$

³Jensen's inequality for a random variable \tilde{x} and a convex function $f(x)$ is $E[f(\tilde{x})] \geq f[E(\tilde{x})]$. Let $\tilde{x} \equiv (1/N) \sum_i \mu_i + \tilde{h}$; then $f(\tilde{x}) = \tilde{x}^\tau$ is convex since $\tau > 1$. $E(\bar{R}_{AR}) > E(\bar{R}_{RB})$ follows immediately from (5) and (7) since $E(\tilde{h}) = 0$.

with strict inequality if $\text{var}(\tilde{h}) > 0$, and

$$E(\bar{R}_{BH}) \geq E(\bar{R}_{RB}),^4$$

with strict inequality if $N > 1$ and at least two assets have different returns. Since we generally have some randomness [$\text{var}(\tilde{h}) > 0$], and many securities, ($N > 1$), the rebalanced method generally should produce lower mean returns than either the arithmetic or the buy-and-hold method, provided that returns are temporally independent.

The relation between the buy-and-hold and arithmetic means is more complex; and, indeed, neither is invariably smaller than the other. The larger the cross-sectional dispersion of individual expected returns, the larger $E(\bar{R}_{BH})$ relative to $E(\bar{R}_{AR})$. But there is an offsetting influence: the larger the intertemporal dispersion of unexpected returns (\tilde{h}), the larger $E(\bar{R}_{AR})$ relative to $E(\bar{R}_{BH})$.⁵ Their relation in a given sample depends, therefore, on the characteristics of the underlying individual returns.

2.3. Time series dependence and its effect on estimated expected returns

The effect of serial dependence is seen most easily by examining expected mean returns when the review period is doubled, say from daily to bi-daily or from bi-weekly to monthly. Assume first that returns are collected for the shorter review period and then let $\tau = 2$ (a doubling of the period). Over the doubled review period, the three mean returns are

$$\bar{R}_{AR} = \left[\frac{1}{N} \sum_i \left(\mu_i + \frac{\varepsilon_{i1} + \varepsilon_{i2}}{2} \right) \right]^2, \quad (8)$$

⁴Define $f(\mu_i) = \mu_i^\tau$, a convex function for $\tau > 1$. With $1/N$ used as a (pseudo) probability, $E(\bar{R}_{BH}) \geq E(\bar{R}_{RB})$ follows immediately from (6) and (7). (Cf. footnote 3.) Strict inequality holds if at least two μ_i 's are different. [This result was noted by Cheng and Deets in (1971).]

The inequality above grows with the cross-sectional dispersion in μ_i , ceteris paribus. To prove this, expand μ_i^τ in a Taylor series about $\bar{\mu} \equiv (1/N) \sum_i \mu_i$; the second-order term is a positive function of the cross-sectional variance in μ_i . If μ_i were cross-sectionally normally distributed, the variance alone would determine the size of the inequality.

⁵This can be confirmed by using a Taylor series expansion of $E(\bar{R}_{AR})$. Define $\bar{\mu} = (1/N) \sum_i \mu_i$; then

$$E(\bar{R}_{AR}) = \bar{\mu}^\tau E \left[1 + \frac{\tilde{h}^2}{2} (\tau-1) \bar{\mu}^{-2} + \frac{\tilde{h}^3}{3!} (\tau-1)(\tau-2) \bar{\mu}^{-3} + \dots + \tilde{h}^\tau \bar{\mu}^{-\tau} \right].$$

Jensen's inequality (see footnote 4 above), implies that $E(\bar{R}_{BH}) > \bar{\mu}^\tau$ with the inequality being larger the larger the cross-sectional variance in μ_i . But the term in brackets just above shows that $E(\bar{R}_{AR})$ increases with the higher moments of \tilde{h} (since $\bar{\mu}$ is strictly positive). For example, the second term in brackets involves the variance of \tilde{h} . Conceivably, this term could more than offset the cross-sectional variance in μ_i . If the unexpected arithmetic portfolio return h happens to be normally-distributed, the expression above simplifies to $E(\bar{R}_{AR}) = \bar{\mu}^\tau [1 + k \cdot \text{var}(\tilde{h})]$ with the constant $k > 0$. In this case, there is a simple and direct tradeoff between the cross-sectional variance in expected return, μ_i , and the variance of the unexpected portfolio return, \tilde{h} .

$$\bar{R}_{BH} = \frac{1}{N} \sum_i [(\mu_i + \varepsilon_{i1})(\mu_i + \varepsilon_{i2})], \quad (9)$$

$$\bar{R}_{RB} = \left[\frac{1}{N} \sum_i (\mu_i + \varepsilon_{i1}) \right] \left[\frac{1}{N} \sum_i (\mu_i + \varepsilon_{i2}) \right], \quad (10)$$

where $R_{it} = \mu_i + \varepsilon_{it}$ is the observed return on individual stock i ($i=1, \dots, N$) in period t , and μ_i is i 's single-period (i.e., shorter review period) expected return.

For notational convenience, define the cross-sectional averages

$$\bar{\mu} = \frac{1}{N} \sum_i \mu_i \quad \text{and} \quad \bar{\varepsilon}_t = \frac{1}{N} \sum_i \varepsilon_{it}.$$

Then the three mean returns have expected values,

$$E(\bar{R}_{AR}) = \bar{\mu}^2 + \frac{1}{2}(\sigma_{\bar{\varepsilon}}^2 + \sigma_{\bar{\varepsilon}_1, \bar{\varepsilon}_2}), \quad (11)$$

$$E(\bar{R}_{BH}) = \frac{1}{N} \sum_i \mu_i^2 + \frac{1}{N} \sum_i \sigma_{\varepsilon_{i1}, \varepsilon_{i2}}, \quad (12)$$

$$E(\bar{R}_{RB}) = \bar{\mu}^2 + \sigma_{\bar{\varepsilon}_1, \bar{\varepsilon}_2}, \quad (13)$$

where σ_x^2 is the variance of x and $\sigma_{x,y}$ is the covariance of x and y .

Even with serial dependence, the expected arithmetic mean still exceeds the expected rebalanced mean in all circumstances since,

$$E(\bar{R}_{AR} - \bar{R}_{RB}) = \frac{1}{2}(\sigma_{\bar{\varepsilon}}^2 - \sigma_{\bar{\varepsilon}_1, \bar{\varepsilon}_2}) > 0. \quad (14)$$

Comparing the buy-and-hold means and the rebalanced means, we have

$$E(\bar{R}_{BH} - \bar{R}_{RB}) = \sigma_{\bar{\mu}}^2 + \left(\frac{1}{N} \sum_i \sigma_{\varepsilon_{i1}, \varepsilon_{i2}} - \sigma_{\bar{\varepsilon}_1, \bar{\varepsilon}_2} \right).$$

With no serial dependence in the ε 's, the term in parentheses is zero and the BH mean would exceed the RB mean by the cross-sectional variance in expected individual returns.

However, with negative serial dependence in unexpected individual returns (ε_{i1} and ε_{i2}) or positive dependence in portfolio returns ($\bar{\varepsilon}_1$ and $\bar{\varepsilon}_2$), the rebalanced mean would become larger; enough such dependence could conceivably render it larger than the buy-and-hold mean. Since the expected arithmetic mean exceeds the expected rebalanced mean, it too could be larger than the BH mean with enough serial dependence of the right type.

There is some reason to anticipate just this type of serial dependence because of the intertemporal characteristics of individual returns. Scholes and Williams (1977, pp. 313–314) explain that because of non-synchronous trading individual assets display first-order *negative* serial dependence while diversified portfolios display *positive* dependence. A difference in the sign of serial dependence between individual assets and portfolios is relevant here because buy-and-hold (BH) means are mainly affected by individual asset serial dependence [see (12)], while the arithmetic (AR) and rebalanced (RB) means are affected by portfolio serial dependence [see (11) and (13)]. The Scholes/Williams explanation implies that BH means would tend to fall as review period lengthens while the AR and RB means would tend to rise.

There is also negative serial dependence induced in very short-term returns because of the institutional arrangement of trading. Neiderhoffer and Osborne (1966) pointed out that negative serial dependence should be anticipated when a market maker is involved in most transactions (because successive transactions are conducted at either the bid or the asked price).⁶

First-order negative serial dependence in individual returns has the effect of widening the disparity between the buy-and-hold mean and the arithmetic and rebalanced means as the review period lengthens. This follows from the fact that a doubling of the review period introduces serial covariance terms in *addition* to those already present. However, the marginal effect of lengthening the review period should probably diminish as the review period becomes longer; the effect on measured mean return should be greater when changing from, say, a daily to a weekly review period than from a monthly to an annual period. The exact impact of serial dependence can, of course, only be determined empirically and we now turn to an examination of the data.

3. The empirical small firm premium

3.1. Results

In the previous section, we found that the computational formula for sample mean returns can affect the estimated expected return. The buy-and-hold (BH) mean (2) gives an unbiased estimate of the holding period return on a realistic portfolio. The rebalanced (RB) mean (3), gives an unbiased estimate of return for its strategy but it is not realistic if the period is short since rebalancing is so costly. Except under a fortuitous combination of circumstances, the arithmetic (AR) mean (3) gives a biased estimate of *both* the rebalanced and the buy-and-hold investment returns.

⁶A paper by Blume and Stambaugh (1983), which came to my attention after the first version of this paper was written, investigates this explanation for serial dependence in detail. They find empirical results very similar to those reported here. See also Cohen et al. (1979).

Although the arithmetic and rebalanced methods of calculating the mean return probably do not portray realistic investment experience, the small-firm premium is calculated as the *difference* between the two mean returns and one might hope that the improper portrayal in these methods would cancel. Unfortunately, this is not likely for several reasons. The intertemporal variance in the portfolio disturbance, \tilde{h} , and the cross-sectional variance in individual security expected returns, μ_i , will not be the same in samples of large and small firms. The disturbance, \tilde{h} , will almost certainly have a larger variance for portfolios of small firms while the cross-sectional variances of μ_i within large- and small-firm portfolios could conceivably differ in either direction. Furthermore, serial dependence has an effect which is stronger for stocks with lower trading volumes and thus with less synchronous trading and with larger bid/ask spreads.

Empirical evidence is reported in table 1. Small Firm Premia (AMEX-NYSE) are given for the 19 complete calendar years, 1963-1981, according to the method of computation and the 'review' period. As explained earlier, the 'review' period refers to the rebalancing interval for buy-and-hold returns. For example, with a monthly review period, an equal allocation is made to stocks listed on the first day of the month and the original positions are held until the end of the month. This is repeated for each calendar month of the sample. The daily rebalancing method uses the same available returns, but it re-initializes equal positions every day during the month. The arithmetic method simply averages the same available returns during the month.

In order to compare results across the different review periods, returns are annualized by linking together the review period returns obtained during the calendar year.⁷ Thus, there are 19 annual observations (one for each calendar year, 1963-81), regardless of the review period.⁸ Means and *t*-statistics are calculated from the 19 annual returns differences between exchanges; *t*-

⁷See footnote 2 for exact computational formulae.

⁸Daily and bi-daily returns are over trading day intervals, while weekly and longer returns use actual calendar intervals. In the weekly case, the first week of the year ends on the same day of the week as the last trading day of the previous year, say Thursday for a given year. Then weekly returns are computed from Thursday to Thursday during that year. If the year does not terminate on a Thursday trading day, the last 'weekly' return of the year is over the remaining fraction of a calendar week. This method of year-end padding was used to ensure that every daily return during a year was included, regardless of the review period. Only the bi-daily, weekly, and bi-weekly returns are subject to such padding because the other intervals are evenly divisible into years.

Weekly returns are not always for five trading day intervals. During 1968, the exchanges were closed on Wednesdays for part of the year so that a week was composed of only four trading days. Holidays are also a problem for weekly returns; if the calendar week ended on a holiday, the return was computed through the next trading day. Then the subsequent week's return covered four trading days. Bi-weekly returns were treated identically to weekly returns with respect to year-end padding, holidays, and exchange closings.

Table 1

The small firm premium as measured by the difference in returns between American Exchange and New York Exchange listed stocks, 1963-1981 (basic data are daily, January 2, 1963 — December 31, 1981).

Review period ^a (number of review periods in sample)	Return computation method ^b		
	Buy-and-hold (BH)	Arithmetic (AR)	Daily rebalancing (RB)
	AMEX-NYSE mean return differential (% per annum) ^c		
Daily (4767)	14.9 (3.16) [7.76]	14.9 (3.16) [7.76]	14.9 (3.16) [7.76]
Bi-daily (2389)	12.3 (2.64) [5.58]	14.9 (3.16) [7.06]	14.8 (3.15) [7.01]
Weekly (992)	9.81 (2.16) [3.35]	14.8 (3.15) [5.64]	14.7 (3.14) [5.62]
Bi-weekly (498)	8.27 (1.84) [2.46]	14.9 (3.14) [5.09]	14.7 (3.13) [5.07]
Monthly (228)	7.06 (1.58) [1.82]	14.9 (3.14) [4.40]	14.7 (3.11) [4.38]
Quarterly (76)	6.42 (1.43) [1.67]	15.0 (3.15) [3.88]	14.8 (3.12) [3.85]
Annual (19)	7.45 (1.53) [1.53]	15.1 (3.10) [3.10]	14.9 (3.07) [3.07]

^aFor the daily and bi-daily cases, one- and two-trading-day intervals were used respectively. For all other cases, actual calendar intervals were used. (In the weekly and bi-weekly cases, a residual interval was necessary to fill out each calendar year). All returns were compounded to an annual basis by linking successive observations within each year (see footnote 2 of the text).

^bThe computation method follows expressions (1), (2) and (3) of the text. For interested readers, the author will gladly supply a mimeographed sheet containing details on the treatment of delisting and listing securities. The main feature of the treatment of new listings and delistings was to assure that all three mean return methods employed exactly the same sample observations.

^c*t*-statistics based on the 19 annual (linked) observations are in parentheses; *t*-statistics based on the review period returns as independent observations are given in brackets. To understand the difference in the two reported *t*-statistics, consider the example of the daily review period of which there are 4767 in the sample. The *t*-statistic in brackets is calculated from these 4767 (daily) observations (mean *daily* return divided by standard error of mean daily return). The *t*-statistic in brackets is calculated from 19 annual observations; each annual observation having been calculated by linking together approximately 250 (4767/19) daily observations observed during that year. In calculating the review-period-based *t*-statistics for the weekly and bi-weekly cases, ten days were omitted; these ten days were the reminders of partial weeks at year end. It turned out that in 10 years of the 19, the year was exactly 52 weeks plus one trading day long. An earlier version of the paper, available on request, details the effect of omitting these single-day partial weeks. N.B. This is an issue only for the bracketed *t*-statistics. The linked annual returns include *every* sample day.

statistics are also given based on review period returns taken as independent observations.⁹

The results most like actual investment experience are those in the first column, buy-and-hold returns. Most actual portfolios pursue a buy-and-hold strategy within a given review period with only minor modifications induced by new information about particular individual issues. The results are frequently expressed on an annual percentage basis by comparing wealth levels at the ends of successive years, i.e., after linking sub-year results.

The review period seems to have little effect on the AR and RB means. The annual average difference in returns between AMEX and NYSE issues is about fifteen percent. But for the BH means, the review period has a large impact. Monthly and longer review periods give an AMEX-NYSE return differential of only around seven percent (and the t -statistic does not indicate an overwhelming probability that the differential is even positive). The drop in the BH mean with lengthening review period is statistically significant and so is the difference between the BH and the other means.¹⁰

⁹Note that the t -statistics in these tables are based on the assumption that the annual returns (t -statistics in parentheses) and review period returns (t -statistics in brackets) are temporally independent. The results indicate that the AR and RB returns are, in fact, close to independent while there is negative serial dependence in the BH returns. This implies that the t -statistics for the BH means are actually *understated*.

¹⁰A statistical test of the significance of the review period can be conducted by considering each year's mean difference, AMEX-NYSE, as an independent observation. Let $D_{m,y,\tau}$ be the difference for year y , review period τ , and the method m ($m = \text{BH, AR, RB}$). Then the time series mean of $D_{m,y,\tau} - D_{m,y,\tau'}$ ($\tau \neq \tau'$) can be tested for significance under the presumption that the years constitute independent observations. t -statistics for the AR and RB means, for all combinations of τ and τ' , never indicated significance. Of the 42 combinations (21 for each mean AR and RB) none exceeded 2.0, five exceeded 1.5, and 28 were less than 1.0. In contrast, the t -statistics for the BH mean comparisons across review periods are given below:

Review period τ'	Review period τ					
	Daily	Bi-daily	Weekly	Bi-weekly	Monthly	Quarterly
Bi-daily	6.21					
Weekly	6.75	6.82				
Bi-weekly	7.67	8.37	10.8			
Monthly	8.11	8.89	11.3	9.82		
Quarterly	8.10	7.68	8.65	6.49	3.27	
Annual	5.08	4.42	2.81	1.04	-0.532	-1.67

All BH means are significantly different across-review periods except the annual mean versus the bi-weekly, monthly and quarterly means. Note that these table entries are not statistically independent of one another (they were all calculated from the same underlying data).

A similar procedure can be employed to test the statistical significance of mean computational method. The difference $D_{m,y,\tau} - D_{m',y,\tau}$ ($m \neq m'$) forms another time series across years. Based on 19 annual observations, t -statistics for the significance of this difference from zero are as follows:

Given that the BH results in table 1 are most likely to portray actual investment experience, we now turn to the interesting econometric question: What explains the observed pattern of means? To aid in answering this question, the mean returns for each exchange are presented separately in table 2. Notice that the pattern is not predicted by the expected values of the mean returns derived in section 2.2 under the assumption of temporally independent returns. With serial independence, the BH expected mean should be greater than the RB expected mean. The empirical results in table 2 show, however, that serial dependence must be present since \bar{R}_{BH} falls below \bar{R}_{RB} as the review period lengthens.

The arithmetic (AR) mean is larger than the rebalanced (RB) mean as was expected with or without serial dependence. However, these two means are very close and this suggests that serial dependence in *portfolio* returns is not much of an influence [Cf. eq. (14)]. Indeed, the strikingly different behavior of the BH means from the other two means indicates that negative serial dependence in individual securities is the dominant influence on the results.

In order to be certain that the AMEX-NYSE comparison measures the small firm effect properly, table 3 is presented. It contains results for the annual review period and for portfolios classified directly by size. Firm size was calculated as market capitalization (market price times number shares), at the end of each year, 1962-1980. Firms were assigned to fractiles based on market capitalization and their returns were calculated for the following year according to three mean return methods, BH, AR, and RB.

Not surprisingly, the results are consistent with the AMEX corresponding to lower size quintiles and the NYSE to higher quintiles. The overall implication is identical: viz., the estimated small firm premium is much smaller and less significant when mean returns are computed with the buy-

Review period τ	$m = AR, m' = BH$	$m = RB, m' = BH$	$m = AR, m' = RB$
	t -statistic for difference		
Bi-daily	6.82	6.30	1.47
Weekly	7.33	6.80	1.59
Bi-weekly	8.14	7.59	1.74
Monthly	8.44	7.90	2.17
Quarterly	8.21	7.69	2.72
Annual	5.85	5.48	3.16

No statistic was computed in the daily case because all three means are identical by construction in that case. Notice that the BH means are significantly smaller than the other two means for all review periods.

Although the difference between the AR and RB small firm premium is very small (cf. table 1), the AR mean premium is always larger and is significantly larger for monthly, quarterly and annual review periods. This is predicted by eq. (14); the AR mean grows with review period relative to the RB mean.

Table 2
Mean returns on NYSE and AMEX listed securities, 1963-1981.^a

Review period	Buy-and-hold (BH)		Arithmetic (AR)		Daily rebalancing (RB)	
	NYSE	AMEX	NYSE	AMEX	NYSE	AMEX
	Mean returns (% per Annum)					
Daily	17.24 (2.94) [5.09]	32.09 (3.29) [7.72]	17.24 (2.94) [5.09]	32.09 (3.29) [7.72]	17.24 (2.94) [5.09]	32.09 (3.29) [7.72]
Bi-daily	16.93 (2.89) [4.59]	29.23 (3.03) [6.25]	17.53 (2.98) [4.76]	32.42 (3.31) [6.96]	17.24 (2.94) [4.68]	32.09 (3.29) [6.88]
Weekly	16.38 (2.80) [4.47]	26.19 (2.78) [5.32]	17.79 (3.02) [4.81]	32.61 (3.34) [6.44]	17.26 (2.94) [4.68]	31.99 (3.28) [6.32]
Bi-weekly	15.86 (2.72) [4.29]	24.14 (2.58) [4.66]	17.95 (3.05) [4.71]	32.83 (3.36) [5.85]	17.29 (2.95) [4.58]	32.08 (3.28) [5.74]
Monthly	15.34 (2.65) [3.11]	22.39 (2.42) [3.08]	18.07 (3.07) [3.67]	32.96 (3.36) [4.54]	17.34 (2.95) [3.51]	32.08 (3.28) [4.41]
Quarterly	15.01 (2.63) [2.73]	21.42 (2.33) [2.62]	18.17 (3.09) [3.22]	33.17 (3.38) [3.84]	17.38 (2.96) [3.09]	32.19 (3.29) [3.73]
Annual	15.18 (2.69) [2.69]	22.63 (2.39) [2.39]	17.96 (3.11) [3.11]	33.07 (3.36) [3.36]	17.16 (2.98) [2.98]	32.03 (3.27) [3.27]

^aSee footnotes to table 1.

and-hold method than when means are computed with the AR and RB methods.

3.2. Implications for previous research and for the 'risk-adjusted' small firm premium

The implications of these findings for previously-published estimates of the small firm premium are: if the basic data were very short-term and arithmetic or rebalanced means were used, the estimated premium overstates the reward investors can expect from a buy-and-hold position in small firms. Papers by Reinganum (1981a, b, 1982) and Roll (1981) used daily data and arithmetic mean returns. Reinganum's (1982) paper gives monthly and quarterly returns but these were computed with the daily rebalancing method since the author states that '... these holding period returns are created by compounding the daily *portfolio* returns' (p. 34, emphasis added).

Table 3
Mean returns and small firm premia for portfolios classified by size^a at year-end, 1963–1981, annual review period.

Size quintile	Return computation method ^b		
	Buy-and-hold (BH)	Arithmetic (AR)	Daily rebalancing (RB)
	Mean return (% per annum) ^c		
Smallest	27.9 (2.42)	46.0 (3.68)	44.9 (3.61)
2	21.1 (2.51)	27.6 (3.15)	26.6 (3.04)
3	17.1 (2.41)	20.7 (2.86)	19.7 (2.73)
4	14.6 (2.53)	16.9 (2.89)	16.1 (2.75)
Largest	10.8 (2.50)	12.2 (2.85)	11.5 (2.68)
Small firm premium, smallest–largest quintile (% per annum).			
	17.1 (1.88)	33.9 (3.47)	33.4 (3.46)
Small firm premium, smallest–largest decile (% per annum)			
	22.8 (2.07)	49.1 (3.84)	48.3 (3.83)

^aFirms are included in the *k*th size fractile if the closing price times the number of outstanding shares is ranked in that fractile among all listed AMEX and NYSE firms.

^bThe computation method follows expressions (1), (2) and (3) of the text. An unpublished appendix (available from the author) contains details on the treatment of listing and delisting.

^c*t*-statistics based on 19 annual observations are in parentheses.

Papers with monthly returns are apparently much less subject to mean return estimation problems. Tables 1 and 2 show that there is little additional discrepancy between the BH and other means in going from monthly to annual data. The well-known paper by Banz (1981) used monthly data as did earlier papers on the closely-related stock price effect [Blume and Husic (1973), Bachrach and Galai (1979)]. Thus, it seems unlikely that the results presented in those papers will be much affected by the problem investigated here. In a more recent paper, Reinganum, (1983) used the buy-and-hold method and found results close to those reported above. Reinganum did not, however, contrast the buy-and-hold with other mean returns.

It is important to ascertain whether the *risk-adjusted* small firm premium is attributable solely to econometric problems. Is underestimation of risk for small firms [Roll (1981), Reinganum (1982)], combined with overestimation of expected returns, sufficient to induce the observed risk-adjusted premium; or is the premium really evidence of a misspecified capital asset pricing model (CAPM), perhaps because of omitted factors in the single index CAPM?

This is tantamount to asking whether the implicit CAPM market risk premium \hat{p} ($\hat{p} \equiv \hat{E}(R_{\text{small}} - R_{\text{large}}) / (\hat{\beta}_{\text{small}} - \hat{\beta}_{\text{large}})$), is in a reasonable range. \hat{p} was computed by Reinganum (1983) as 37.5 percent per annum using (a) buy-and-hold means on the smallest and largest deciles of NYSE and AMEX stocks, (b) Dimson's (1979) aggregated coefficient betas, (c) the value-weighted C.R.S.P. index and (d) daily data for 1963-1980. The return on the value-weighted index during this period was only about 9.5 percent, so \hat{p} is grossly too large, thereby indicating a substantial risk-adjusted small firm premium.

The main problem with such a test was described some time ago [Roll (1977)]. Even if we make the dubious assumption that the value-weighted C.R.S.P. index is *ex-ante* mean/variance efficient, there is no necessity in the generalized Black (1972) C.A.P.M. that $E(\hat{p}) = E(R_M - R_F)$. Instead, the model requires that $E(\hat{p}) = E(R_M - R_Z)$ where Z is M 's 'zero-beta' portfolio. Depending upon M 's position on the efficient frontier, $E(R_Z)$ can be negative and large.

To illustrate the difference in inferences that can be obtained with a different index, I recomputed \hat{p} using (a) buy-and-hold annual means on the smallest and largest deciles of NYSE and AMEX stocks, (b) simple OLS beta coefficients estimated from annual returns,¹¹ (c) the *equally-weighted* C.R.S.P. index, and (d) annual data for 1963-1981.

The beta estimates (*t*-statistics) were $\beta_{\text{small}} = 1.78$ (5.59), $\beta_{\text{large}} = 0.598$ (8.60). Using the estimated premium $E(R_{\text{small}} - R_{\text{large}}) = 22.8\%$ from table 3, we have $\hat{p} = 19.3$ percent. The actual *ex post* return on this market index was 15.3 percent, so \hat{p} is still somewhat too high (thus indicating a risk-adjusted small-firm premium). Nevertheless, the discrepancy between a \hat{p} of 19.3 and a market return of 15.3 is much less aberrant than the difference Reinganum (1983) reports between $\hat{p} = 37.5$ and $\bar{R}_M = 9.5$ percent.

It still seems that investigation of the observed small firm premium in the context of a more general asset pricing model would be a worthwhile endeavor; but estimation problems in expected returns and in simple risk parameters can explain much of the apparent anomaly.

¹¹Instead of the Dimson aggregated coefficient betas, I used betas from annual data because of the now well-documented annual seasonal [Keim (1983), Roll (1983)], which has the potential to induce biases into any betas, including the Dimson type, when they are computed from non-yearly data.

5. Conclusion

Computing mean returns in order to estimate investment experience is not as easy as it sounds. Common stock data have serial dependence which, though seemingly slight, substantially affects the estimates obtained under alternate mean return computational methods. Investment experience is best portrayed by buy-and-hold portfolio returns but scholars often use arithmetic or rebalanced portfolio returns because they are easier to compute.

Perhaps this makes little difference for some studies; but if serial dependence differs systematically with the item being investigated, the computational method can be quite material.

For the small firm premium, as measured by the difference in mean returns of American Exchange and New York Exchange listed stocks, the buy-and-hold mean return difference is only about $7\frac{1}{2}$ percent per annum (for 1963-81) while the rebalanced and arithmetic methods produce annual return differences *with the same stocks and time periods* of over 14 percent. The annual difference in returns between the smallest and largest size quintiles (deciles) is about 34 (49.1) percent using the rebalanced and arithmetic methods and about 17 (22.8) percent using the buy-and-hold method.

The annual small-firm premium is only marginally significant at usual significance levels if mean returns are measured with the buy-and-hold method.

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The Size Premium in the Long Run

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Abstract

Contrary to the usual practice of including a size premium in a small firm's cost-of-equity estimation, this paper shows that there should not be such a premium in the long run because firm size is a changing characteristic. By tracking the return performance of firms in the same size group for a longer horizon, I find that the size premium wears off just after two years. This is much shorter than the general assumption used in the cost-of-equity estimation, so the role of the size premium in it should be reconsidered.

Keywords: Cost of Equity Capital, Size Premium, Size Effect, Regime Switching

JEL Classification: G12, G14

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1 Introduction

In the field of business valuation, practitioners usually include a size premium in a small firm's cost-of-equity estimation to account for a risk source or risk sources that cannot be captured by usual risk factors.¹ That is, on top of the cost of equity a small firm gets from the estimation by the CAPM or other models, it is usually offered an extra premium to compensate for the higher risk it is taking.² This paper aims to examine its validity, and the finding suggests that this commonly accepted size premium is not appropriate.

Since Banz (1981) and Reinganum (1981) both demonstrated that small size firms on the New York Stock Exchange usually outperform big firms than what the asset-pricing model of Sharpe (1964), Lintner (1965) and Black (1972) would suggest, the existence of the size effect has come into consideration by standard practice in the finance industry and soon became one of the most exploited concepts in modern finance. This size anomaly leads to an assumption that it might stem from a risk source or risk sources which cannot be explained by the market factor. Berk (1995) explains in theory that market value is inversely correlated with unmeasured risk because investors pay a lower price for a company's stock if it bears a higher risk than its CAPM beta could measure. The seminal works of Fama and French (1993), and Fama and French (1995) also acknowledge another kind of size effect in which

¹Although there are many ways to define the size of a company, I stick to the most popular criteria, the market value of its equity, to proceed the discussion.

²Other than the CAPM, the build-up method and the Fama-French 3-factor model are also popular approaches in business valuation. The build-up method is advocated by the Ibbotson Associates, now a part of Morningstar, Inc., which aims to break down the expected return of a firm into a risk-free rate, a premium for equity risk, a risk premium attributable to this company by the industry it is in, and another risk premium for smaller size if applicable. This size premium is added in practice no matter whether the CAPM model or the build-up method is used. Please see Pratt and Grabowski (2008) Chapter 12 for a thorough discussion. Such a size premium is not required in the Fama-French 3-factor model because size is a risk factor embedded in it already.

small firms usually outperform big firms in realize returns and they use the return differential between small and big stock portfolios (I call it “small stock premium” hereafter for convenience) as a risk factor (also known as *SMB*). If the CAPM holds well, the small stock premium should be proportional to the difference between the CAPM betas of small and big stock portfolios in cross section, and the size premium should not exist. However, empirical evidence shows that the small stock premium is usually much bigger than the CAPM could explain because small firms usually have a significant size premium, which links these two different perspectives of size anomalies together.

Besides serving as a measure of an alternative risk source, the idea of the existence of a small stock premium is often used in forming a trading strategy. Since the commence of the Dimensional Fund Advisors (DFA hereafter) in 1981, the strategy of overweighing small-cap stocks to exploit this small stock premium has been utilized extensively. This same concept is also used to construct ETFs featuring size as an important characteristic. There are currently at least 6 micro-cap and 40 small-cap ETFs trading on the U.S. stock exchanges.³ The main attraction of these ETFs is to exploit their potentially higher returns over big firms or the market.

With all the acknowledgement from both academics and practitioners, however, there lies an inconsistency between these applications of the size effect. The usage of the *SMB* factor requires yearly rebalancing of the size portfolios, and a trading strategy related to firm size demands probably even more frequent position adjustments. However, the size premium added to a small firm’s cost-of-equity estimation is based

³Size is an important characteristic of these ETFs. However, it may not be the “only” characteristic. For example, the Vanguard Group, a U.S. investment management company, has three ETFs related to small-cap firms. Their exchange ticker symbols are VB, VBR, and VBK, which account for a total of \$2.79 billion capital at the end of 2007. VBK is the combination of small-cap and growth stocks, while VBR is a small-cap and value stock ETF.

on the assumption that a firm will carry this extra premium in its discount factor moving forward for an extended period of time. Fama and French (2007) explain that the small stock premium comes from small firms gaining market capitalization and subsequently becoming bigger firms, but a firm's size behaves more like a long-lasting characteristic in the size premium application, which contradicts the empirical evidence. Although we do not know for certain which small firm will move to a bigger size group because of its own success, we do know that firms shift between different size groups in subsequent years after they were first assigned to a certain size rank. The size premium of a firm should be time-varying even if the CAPM beta of the size portfolio is time-invariant, so the cost of equity capital estimation could or should be adjusted accordingly if size has to be taken into consideration.

The existence of the size effect is not always perceived with full faith. This issue has to be addressed first, otherwise the debate of the application of the size premium will become a vain attempt. In the early 1980s when a fierce debate was conducted about the existence and the explanation of the size effect, Roll (1983) and Blume and Stambaugh (1983) both question the empirical importance of this phenomenon because the magnitude of the size effect is too sensitive to the technique used to evaluate the risk-adjusted return. Keim (1983) and Reinganum (1983) show that most of the risk-adjusted abnormal return to small firms occurs in the first two weeks in January, thus makes this effect easily exploited. It was the evaluation and the existence of the size premium being challenged, but the small stock premium was mostly untouched. Fiercer challenges came in the late 1990s, when Booth, Keim, and Ziemba (2000) argue that the January effect is not significantly different from zero in the returns to the DFA 9-10 portfolio over the period 1982-1995,⁴ and Horowitz,

⁴The DFA 9-10 portfolio includes stocks with the lowest 20% market capitalization according to NYSE breakpoints.

Loughran, and Savin (2000b) also claim that the size effect ceases to exist after it was made well known because its benefit has already been exploited. Small firms do not have higher returns over big firms from the early 1980s to the mid-to-late 1990s, so the existence of the size effect is in doubt and deserves a thorough examination.

In this paper I will show that the size effect in the traditional definition is still intact given a longer sample period. The disappearance of the size effect in the 1980s and 1990s probably stems from a sample selection bias because the effect re-emerged in the late 1990s. I also examine whether this sample selection anomaly is a recurring scenario with a longer history of stock prices and find that the similar event occurred from the 1940s to 1960s.

However, an analysis of the evolution of the size premium will show that it is inappropriate to attach a fixed amount of premium to the cost of equity of a firm simply because of its current market capitalization. For a small stock portfolio which does not rebalance since the day it was constructed, its annual return and the size premium are all declining over years instead of staying at a relatively stable level. This confirms that a small firm should not be expected to have a higher size premium going forward sheerly because it is small now.

The paper proceeds as follows. Section 2 introduces the data used in this study. All NYSE, AMEX and NASDAQ operating firms are included and they are sorted by their respective market capitalization to form size portfolios. I also examine whether the size effect disappeared during the 1980s and 1990s and discuss its possible impact in this section. Section 3 offers a forward looking perspective of the size effect in response to the assumption of Fama and French (2007) that the small stock premium mainly resulted from firms moving between different size groups. We can also see the evolution of the size premium of the small stock portfolio and find evidence to con-

clude that a small firm does not always have a larger size premium simply because of its current size. Section 4 provides a method to separate the size premium into different regimes with macroeconomic variables, which shows that it is also very difficult to estimate the size premium with a time-varying estimation. Section 5 offers concluding remarks.

2 Data Description and the Evidence of the Existence of the Size Effect

2.1 Data Description

Monthly stock return data used in this research are collected from the University of Chicago Center for Research in Security Prices (CRSP) database. All NYSE, AMEX and NASDAQ operating firms are included when they are available on the CRSP tape.⁵ Unlike Fama and French (1992), this study does not exclude financial firms from the sample because financial leverage is not in discussion. Since the market capitalization of a firm is the only firm characteristic covered in this paper and I also do not incorporate the Compustat database for the book equity data of companies, the number of firms each year is also greater than research considering both size and book-to-market equity characteristics. This choice of sample also prevents the potential survival bias generated by the Compustat database, please see the discussion in Kothari, Shanken, and Sloan (1995). The sample period is from December 1925 to December 2008.

The market portfolio return used in this paper is the CRSP value-weighted return on all NYSE, AMEX, and NASDAQ stocks, and the risk free rate is the total return on 30-day Treasury bill calculated by Ibbotson Associates.

To sort firms into different deciles according to their relative size, I follow the Fama and French (1992, 1993) tradition to use a firm's market equity at the end of June each year as the measure of its size. A firm has to be on the CRSP tape in

⁵American Depository Receipts, closed-end funds, Real Estate Investment Trusts, and companies incorporated outside the U.S. are excluded, which means only firms with CRSP share code 12 or less are included in this research.

June of year t to be included in a size portfolio from July of year t to June of year $t + 1$ and years after that.⁶ All NYSE listed firms are ranked each year according to their June market value, then these firms are allocated equally into 10 size portfolios on the basis of their relative size, so each portfolio has the same number of NYSE firms. The breakpoints between size portfolios are extracted from these NYSE firms, and AMEX and NASDAQ firms are inserted into these portfolios according to their market capitalization relative to the portfolio breakpoints. The first decile (portfolio 1) contains the smallest firms and the 10th decile (portfolio 10) includes the largest firms. In December 2008, Portfolio 1 has 1,895 firms and portfolio 10 has 158.

2.2 Does the Size Effect Still Exist?

In response to the question raised by Horowitz, Loughran, and Savin (2000b) about whether the size effect still exists, some basic statistics are presented in Table 1 to show that the effect did disappear during the 1980s and the early 1990s, but it was intact in most of the other sample periods. The statistics from the full sample are shown in Panel A. They are consistent with early findings on the size effect: big firms report lower returns than small firms, and the CAPM beta is also negatively related to size. The size premiums in the last row of each panel are calculated as follows:

$$\begin{aligned}
 SP_{i,t} &= R_{i,t} - (R_{f,t} + \beta_i(R_{m,t} - R_{f,t})), \text{ and} \\
 SP_i &= \frac{1}{T} \sum_{t=1}^T SP_{i,t} \quad i = 1, \dots, 10.
 \end{aligned} \tag{1}$$

⁶Instead of the usual one-year holding period immediately following the size sorting date, I also extend the holding period to longer time spans to see how persistent the size premium is for the same group of firms.

where SP_i represents the average size premium of portfolio i which is shown in the table, $R_{i,t}$ and $R_{m,t}$ are monthly returns on size portfolio i and the market portfolio, respectively. R_f is the risk-free rate. β_i is the CAPM beta estimated by regressing $(R_i - R_f)$ on $(R_m - R_f)$ with the matching sample period. This size premium captures the part of the size portfolio return which cannot be explained by the CAPM. Practitioners usually add it to the cost-of-equity estimation of small-cap firms to compensate for their higher risks. Another way to estimate the size premium is through the estimation of the CAPM alpha. However, I will not adopt this approach because the sample period used by the regression to estimate CAPM coefficients and the one used by the realized return in equation (1) do not always match in this article.

[Insert Table 1 here.]

Panel B displays the statistics of the same variables with the sample period before June 1980, roughly when the size effect was made well known by academia. Although the statistics in the first two panels are not exactly the same, they look very much alike.

Panel C of Table 1 is consistent with the assertion of Horowitz, Loughran, and Savin (2000a) that there is no significant difference between the performance of different size portfolios during the period from 1980 to 1996.⁷ The average returns on different size portfolios are no longer negatively related to their market capitalizations. From portfolio 1 to 4, the four smallest size portfolios, the average returns are increasing instead of moving in the opposite direction shown in the early years. The pattern of size premiums is also different from the ones shown in the previous two

⁷This period can be extended to 1998 and the results are still in the similar pattern to what one would get with sample period from 1980 to 1996, so this longer sub-sample period is chosen instead of the one used by Horowitz, Loughran, and Savin (2000a).

panels. For instance, portfolio 1 and 2 did not have the largest size premiums, they had biggest size “discounts” instead.

It is often suggested that pricing anomalies may disappear after they were made known to the public by researchers or financial practitioners if these anomalies were easily exploited. Horowitz, Loughran, and Savin (2000a) show that simply adding \$0.125 to the December 31 price of small stocks can easily lower their average January returns from over 8% to -0.37% during the 1982-1997 span. Since Keim (1983) and Reinganum (1983) showed that most of the size premiums to small firms occurred during the first two weeks in January, it is no surprise that the January effect could be totally wiped out just by informed investors flocking into the market to buy small firm stocks in December, and so goes the size premium.

Sixteen years of time is not short, but the recent development shows that the result in Panel C is more likely to be an aberration from the formerly established rule than a new norm. Panel D presents the statistics from the past 10 years and shows that the negative relation between firm size and equity return has been restored, with only a few exceptions from some mid-cap size portfolios. The inconsistency of the mid-cap portfolios probably arises because the sample period is too short to offer a robust pattern between a firm’s size and its return. It has to be noted that the realized equity premium of the U.S. market during these 10 years is slightly below zero, which is significantly lower than the historical standard. This might contribute to the flat security market line, where the beta of size portfolios seems independent of their respective average return.

Another serious threat generated by the data from the 1980s and 1990s is that the return differential between small and big firm size portfolios, also known as *SMB* in the Fama-French 3-factor model, may have an insignificant or even a negative price

of risk. This implies that the *SMB* factor is either meaningless or has a negative effect on the stock return. We can use a simple cross-sectional regression to show how and why this matters.

[Insert Table 2 here.]

Table 2 displays price-of-risk estimations of the popular Fama-French factors with different sample periods. Following the Fama and MacBeth (1973) procedures, in each sub-sample period I run time-series regressions of each test portfolio return in excess of the risk-free rate ($R_{it}^e = R_{it} - R_{ft}$) on the excess market return ($R_{mt}^e = R_{mt} - R_{ft}$), the returns on the small size portfolios minus the returns on the big size portfolio (*SMB*), and the differential between the returns on high and low book-to-market equity firms (*HML*).⁸

$$R_{it}^e = \alpha_i + \beta_i R_{mt}^e + s_i SMB_t + h_i HML_t + \varepsilon_{it} \quad t = 1, 2, \dots, T, \forall i. \quad (2)$$

The test portfolios include 5-by-5 portfolios formed on book-to-market equity and size, and 17 industry portfolios.⁹ Since there are missing observations in the return series of the portfolio with the highest book-to-market equity and the largest size, it is taken out of the test portfolios. These portfolios are chosen because they cover different aspects of security characteristics.

The next step is to regress the expected returns of test portfolios from each sample period on their respective risk loading estimates from the time-series regression. I

⁸Please refer to Fama and French (1993) for the detailed definition of *SMB* and *HML*. Data on these two variables are obtained from Professor Kenneth French's website at Dartmouth University.

⁹All the portfolio data are also acquired from French's website.

take the average return of each portfolio from the corresponding sample period as their return expectation. The cross-sectional regression is:

$$E_T(R_i^e) = \beta_i \lambda_1 + s_i \lambda_2 + h_i \lambda_3 + a_i, \quad i = 1, 2, \dots, N. \quad (3)$$

where λ_2 is the price of the risk represented by the size factor *SMB*. During the period from 1980 to 1998, the price of *SMB* is insignificantly different from zero and its magnitude is also comparably smaller than it is in the other sub-periods. The number is 0.29 before 1980 and 0.20 after 1998, but it is only 0.07 from July 1980 to June 1998. The other parameters do not change as dramatically over different sub-periods. The price of a risk factor being equal to zero discredits its explanatory power to the cross-sectional variability of returns, and this is exactly the case for the *SMB* factor from 1980 to 1998.

It may be too early to say that the explanatory power of the *SMB* factor fully recovers in the post-1996 or the post-1998 period, but it is clear that the zero or slightly negative *SMB* price during the 1980s and 1990s is not necessary a lasting problem.

2.3 Regime Shifts of the small stock premium

As mentioned earlier, the size premium and the small stock premium are related because the risk-adjusted abnormal return of small firms is an important part of the return differential between small and big stock portfolios. According to Table 1 Panel A, the small stock premium of portfolio 1 is 3.39%, which accounts for half of the return difference between portfolio 1 and 10. Since the size premium is highly dependent on the asset pricing model and the sample period it is using, I will focus

on the possible structural change or regime shift of the small stock premium in this section first.

Although the differential between the returns on size portfolio 1 and portfolio 10 is different from the definition of the *SMB* factor in the Fama and French 3-factor model, I will borrow this acronym to represent the small stock premium for the following discussion. Motivated by the earlier discussion of the disappearance of the small stock premium in the 1980s and 1990s and the reappearance in the following years, I believe that there may exist structural changes or regime shifts of the expected mean of *SMB*. Panel A of Figure 1 exhibits the annual return differential between portfolio 1 and portfolio 10, in which we see annual *SMB* alternates between high and low values but certain persistency exists. From 1984 to 1998, the supposedly positive *SMB* is negative in most years except in 1988 and 1991 to 1993. The sample average of the equity risk premium during these 15 years is 10.53%, which is well above the historical average. Big firms performed exceptionally well while small firms did not during this period, so the disappearance of *SMB* should certainly come from the size premium, or lack thereof.

[Insert Figure 1 here.]

Assuming that the expected mean and variance of *SMB* can be expressed by a two state Markov-switching model, so the state variable S_t , which governs the regime shift, takes a value of 1 or 2. When $S_t = 1$, the expected mean of SMB_t is in the state of a low value, while $S_t = 2$ represents the state when the expected mean of SMB_t is high.

$$y_t = \mu_k + \sigma_k \varepsilon_t \quad \varepsilon_t \sim N(0, 1). \quad (4)$$

where y_t represents SMB_t , μ_k and σ_k are state-dependent mean and standard deviation of SMB_t . $k=1$ or 2 , which identifies the state SMB_t is in at time t .

The state variable S_t is assumed to follow a 2-state first-order Markov process with fixed transition probabilities as follows:

$$\begin{aligned}
 p &= \Pr(S_t = 1 | S_{t-1} = 1) \\
 1 - p &= \Pr(S_t = 2 | S_{t-1} = 1) \\
 q &= \Pr(S_t = 2 | S_{t-1} = 2) \\
 1 - q &= \Pr(S_t = 1 | S_{t-1} = 2)
 \end{aligned} \tag{5}$$

The mean and variance of SMB are determined by the current state, and the state variable S_t is not dependent on the past information beyond one period.

SMB_t under each state is assumed to follow the normal distribution and the parameters of the distribution function are only contingent on the state k , so

$$f(y_t | S_t = k) = \frac{1}{\sqrt{2\pi\sigma_k^2}} \exp\left(\frac{-(y_t - \mu_k)^2}{2\sigma_k^2}\right) \tag{6}$$

for $k = 1, 2$. The log-likelihood function is

$$\ln \mathcal{L}(y_1, y_2, \dots, y_T; \theta) = \sum_{t=1}^T \ln[\Pr(S_t = 1)f(y_t | S_t = 1) + \Pr(S_t = 2)f(y_t | S_t = 2)] \tag{7}$$

and the regime probability $\Pr(S_t = k)$ can be estimated with the following recursive representation proposed by Gray (1996):

$$\Pr(S_t = 1) = (1 - q) \left[\frac{f(y_{t-1} | S_{t-1} = 2)\Pr(S_{t-1} = 2)}{f(y_{t-1} | S_{t-1} = 1)\Pr(S_{t-1} = 1) + f(y_{t-1} | S_{t-1} = 2)\Pr(S_{t-1} = 2)} \right]$$

$$+p \left[\frac{f(y_{t-1}|S_{t-1} = 1)\Pr(S_{t-1} = 1)}{f(y_{t-1}|S_{t-1} = 1)\Pr(S_{t-1} = 1) + f(y_{t-1}|S_{t-1} = 2)\Pr(S_{t-1} = 2)} \right] \quad (8)$$

where the lowercase p and q are the transition probabilities defined in equation (5) and $\Pr(S_t = 2) = 1 - \Pr(S_t = 1)$.

Table 3 presents the estimation results of the above Markov-switching model along with an unconditional normal distribution model as its comparison. The sample period is from July 1940 to December 2008 instead of starting from July 1926 because it has to be trimmed short in the following sections to accommodate the portfolio positions with longer holding periods. According to the log-likelihood values, AIC, and BIC statistics of these two models, the Markov-switching model fits the sample better than the model with the assumption that *SMB* follows an unconditional normal distribution. The expected mean of the low *SMB* state is insignificantly different from zero, which explains why *SMB* can disappear over an extended period. The average annualized returns under two different states are -2.67% and 44.97%.

[Insert Table 3 here.]

Panel B of Figure 1 displays the smoothed probability in state 2 (high *SMB* state). Table 3 also shows the transition probabilities p and q , which are 0.9579 and 0.8090, respectively. These results imply that the low *SMB* regime is more persistent than the high *SMB* regime. On average the high *SMB* regime lasts for 5.2 months, and the low *SMB* regime keeps at the same state for 23.8 months. If the true data generating process of *SMB* follows the description of this Markov-switching model, it is no surprise that the small stock premium could disappear over a long period during the 1980s and most of the 1990s then resurfaces in recent years.

From Figure 1 we can also see that *SMB* is persistently low from 1946 to 1963, which indicates that the experience from the 1980s and 90s indeed has a predecessor. Repeat the same exercise done in Table 1 for this period, we can find that portfolio 1 has an average size premium at -1.77% per annum, while portfolio 10 has a slightly positive 0.42% average size premium. The average of *SMB* from 1946 to 1963 is -0.74%, which mostly stems from the low size premium of small stocks instead of the difference between their respective CAPM projections.¹⁰ These results show that the temporary disappearance of the size effect is a recurring event. However, when we look at a longer time span, the small stock premium could still hold true at least on average.

¹⁰CAPM beta is still negatively related to firm size during this period, but the slope of the security market line calculated with returns on size portfolios and their respective betas is smaller than it is calculated with the full sample.

3 Size as a Genetic Code or a Short-Lived Characteristic?

If the size premium ceases to exist like Horowitz, Loughran, and Savin (2000b) assert, or its magnitude has no relation to firm size, there is no need to give a “premium” to a small firm when estimating its cost of equity capital. In fact, given what we see in Panel C of Table 1 we might have to give small-cap firms a discount if the negative size premium of portfolio 1 remains. The data from the last 10 years seem to restore the order of the size premium and the necessity to add it to small firms, but I will show in this section that it still remains to be proved whether a small-cap firm should require this size premium in its cost-of-equity estimation.

3.1 Design of the $t+j$ Portfolio

Fama and French (2007) find that the return differential between small and big firms is mainly driven by small-cap firms moving up the size rank to become large-cap firms. This perspective changes the assumption of the size premium a small firm should get in the long run. The logic is simple: a small firm becomes a big firm because its market capitalization increases faster than its peer, which usually results from its fast growing price. However, small firms cannot keep the higher average return of old once they become big firms, otherwise the small stock premium will turn into a big stock premium. Although this is mainly an explanation of the small stock premium instead of the size premium, the discussion in the previous section shows that these two premiums are related.

Since the Fama-French size portfolios are constructed in each June and are held for a whole year until they are rebalanced in June next year, their finding implies that some firms are likely to switch to different size groups sooner than a year, especially for the small firms to become big firms. The usual practice of the size premium estimation is to calculate it with annually rebalanced size portfolios,¹¹ then we add this number to a firm's cost of equity for the following years to discount its future cash flows to the present value. We know this is probably a proper assessment of the discount factor for the first year, but is it still proper if an originally small firm becomes a big firm from the second year on and does not warrant such a premium hereafter?

To investigate whether the size premium is changing over time and how it evolves, I design the following $t+j$ size portfolio approach. In the traditional size portfolio formation, securities are assigned to each portfolio in June and the portfolios are held from July to June next year under a buy-and-hold strategy. In the $t+j$ size portfolio approach I also choose to sort securities in June of each year t , but instead of holding the portfolios for the following year, I also look at the monthly returns for an one-year holding period from July of year $t+j-1$ to June of year $t+j$, where $j = 2, \dots, 15$.¹² All the firms are identified and tracked by their CRSP permanent number. If a firm goes bankrupt or is merged by another firm in the following years, then it is taken out of the portfolio once it is off the CRSP tape. Otherwise it keeps in the same $t+j$ size portfolio as assigned in the initial sorting date no matter how big or how small its market capitalization becomes.

¹¹For getting the size premium estimation, some practitioners rebalance the size portfolios more frequently. For example, Ibbotson Associates sorts and assigns all eligible companies to different size portfolios with the closing price and shares outstanding data for the last trading day of March, June, September and December instead of June each year.

¹²This approach reduces to the traditional size portfolio formation when $j = 1$.

For example, the firms in $t+2$ portfolios from July 1989 to June 1990 were sorted and assigned to different size portfolios in June 1988; the same composition of firms is used in $t+1$ portfolios from July 1988 to June 1989, which are 12 months immediately after the sorting date. The $t+3$ portfolios in July 1990 also consist of the same firms, except for those were delisted during the first two years. There is also another set of $t+2$ portfolios from July 1988 to June 1989, each consists firms sorted by their June 1987 size. We can string together all the $t+2$ portfolios to see how firms perform a year after its original sorting date for a whole year. The same process is done for all $t+j$ size portfolios. This approach allows us to follow the average performance of firms j years after they were assigned to a specific size group.

If a firm's size behaves as a characteristic and this attribute follows the firm for an extended period of time, return patterns among different $t+j$ size portfolios should not change much for different j . On the other hand, if a small firm deserves a lower size premium after it becomes a bigger firm, the size premium in the following years will decrease accordingly. By tracking the historical performance of firms sorted by size, we can get a better idea on how the size premium of a firm behaves and whether it is a good indicator of an extra risk source.

3.2 Size Premium is Changing Over Time

Practitioners usually consider a fixed size premium for a firm for subsequent years, which implies that either firms will not migrate to other size groups, or they will still demand the same size premium even after they switch to different size groups. To make a valid comparison between different $t+j$ portfolios, I change the starting date of all portfolios from July 1926 to July 1940 to accommodate the $t+15$ portfolios,

which have companies being sorted in June 1926 but will not report the first return observation until July 1940.¹³

Table 4 presents the average size premiums of different $t+j$ size portfolios in reference to the respective CAPM projected returns on the traditional size portfolios. The “traditional” size portfolio means that firms are sorted and assigned to different size portfolios according to their June market capitalization, and the portfolios are held from July of the same year to June next year. The definition of the average size premium of a $t+j$ size portfolio is

$$\begin{aligned} SP_{i,t}^{t+j} &= R_{i,t}^{t+j} - (R_{f,t} + \beta_i(R_{m,t} - R_{f,t})), \text{ and} \\ SP_i^{t+j} &= \frac{1}{T} \sum_{t=1}^T SP_{i,t}^{t+j}, \end{aligned} \quad (9)$$

where $R_{i,t}^{t+j}$ represents the time t return on the $t+j$ portfolio of firms in the i th size group, and β_i is the same as in equation (1).

[Insert Table 4 here.]

The first decile size portfolio, which contains firms with the lowest market capitalizations among all listed firms on the sorting date, usually has a large and significant CAPM alpha and a beta too low to project the realized return. Table 1 shows that portfolio 1 has a size premium of 3.39% per annum with the sample period from July 1926 to December 2008. The corresponding number in Table 4 is the average size premium of the $t+1$ portfolio for portfolio 1. Although the benchmark is still calculated with the same beta, it drops to 1.49% because the sample period here does not start until July 1940. The difference reflects a large historical size premium for the

¹³The security return data on CRSP tape start from December 1925, so June 1926 becomes the first available sorting date.

small firms from 1926 to 1940. The premiums change a lot with different sample periods, but the pattern is nevertheless revealing. The smallest firms still get a bigger size premium, while the biggest firms even get a size discount.

If firms are supposed to be awarded a fixed size premium for years, we should see the numbers in Table 4 remain stable over different $t+j$ portfolios within each size group. The result is apparently contrary to this hypothesis. The size premium of portfolio 1 drops dramatically two years after the initial sorting date and becomes insignificantly different from zero in the third year. After that the small firms get a discount and such a discount gradually becomes significantly different from zero. On the other hand, portfolio 10 sees its size premium going up from the negative value in the first two years to a positive but insignificant number for the most part of the following eight years. Most of the size portfolios have a declining size premium after the sorting date except for portfolio 10, which reflects the fact that returns on different size portfolios tend to converge to the same number over years. Table 5 shows that the difference in average returns on different size portfolios gradually becomes insignificant as sorting dates pass by.

[Insert Table 5 here.]

If history can be any guide to the future performance, we are likely to over-estimate the cost of equity capital of small firms and under-estimate the cost of equity of big firms by the current treatment of the size premium.

3.3 Robustness Check

We have seen in Table 1 that the historical averages of both the size premium and the small stock premium are sensitive to the choice of the sample period, but the

pattern remains unchanged if given a long enough horizon. Here I will verify that the findings in this section are not sensitive to different breakpoints of size groups.

Fama and French (2007) divide firms into two groups in terms of size to explain the cause of the Fama-French *SMB* factor, so I also divide all the acting firms into two groups according to the NYSE median market-cap breakpoint in each June.

For better examining the relation between firm size and the corresponding return performance, I also rank firms according to their size each June and form three portfolios with firms of their size in the bottom 30%, middle 40%, and top 30% (S-30%, M-40% and B-30% hereafter) by the NYSE market-cap breakpoints.

The size premiums calculated with new breakpoints are displayed in Table 6. The big size portfolios (Big or B-30%) all have very small and insignificant size premiums like the size premium of portfolio 10 reported in Table 4. Please be noted that I still use the traditional size portfolio approach (it is equivalent to the $t+1$ portfolio here) with the new breakpoints and the sample period from 1926 to 2008 to estimate CAPM betas. The size premiums of "Small" and "S-30%" size portfolios are significant through $t+1$ to $t+4$ or $t+5$ portfolios, respectively, and they are also declining as j goes up. Ten or seven years after the initial sorting dates, these two small size portfolios even have a discount. These characteristics are all consistent with the pattern shown in portfolio 1 in Table 4.

[Insert Table 6 here.]

Comparing Table 6 to Table 4, it is apparent that the size premium for small stocks in the traditional sense does exist no matter how many size groups the stocks

are divided into, but it fades out gradually if the same composition of firms is held longer than a year.¹⁴

If a group of firms have the same stream of expected future cash flows, it is possible that the firm with a higher risk is going to be priced lower. Such a firm may end up having a higher return because it is more likely to have a higher dividend yield. However, small firms do not only gather higher returns through higher dividend yields, they usually have higher capital appreciation rates too. Fama and French (2007) explain that migration of stocks across size groups is the cause of the small stock premium.¹⁵ Once a small firm's market capitalization increases and it is qualified as a big firm, a size premium should not apply anymore. According to Table 4 and 6, small firms did have higher size premiums when they were first assigned to the small size portfolio, but this effect does not persist. A firm which belongs to portfolio 1 sees its size premium turns into a discount after a few years if it is still expected to be compensated as a small stock. It is probably reasonable for a small firm to get a larger discount factor than the CAPM suggests because it bears higher risks than the model can explain for the time being, but the usual practice could very likely over-compensate the risks a small firm is bearing.

If the size effect has to be considered in the cost-of-equity estimation, we should search for the root of this short-lived premium and identify the risk source it represents. This is just as important as how much it is, if not more important.

¹⁴The small stock premium fades away until it is barely noticeable. However, the size premium for small stocks sometimes becomes a size discount if the same composition of stocks is held for a few years.

¹⁵In their article Fama and French use "size premium" to refer to the fact that small-cap firms have higher returns than big-cap firms without risk adjustment, which is equivalent to the "small stock premium" used in this paper. As shown earlier that these two premiums are related.

4 Size Premium under Different Economic Situations

Section 3 shows that a small firm can have a higher size premium only in the short run. Over a longer time span, a firm's size and even its sensitivity to risk are all subject to change, and its size premium changes accordingly.¹⁶ In light of these results, I propose not to include a fixed size premium in the long-term cost-of-equity estimation. However, the size premium, no matter how short-lived it is, still appears to exist in the first few years for small firms. Take the popular discounted cash flow method as an example, the first few years matter the most if given a steady stream of future cash flows. By excluding the size premium from the cost-of-equity estimation, one might argue that we are also likely to understate the risk a small firm is taking.

The simplest way to resolve this conundrum seems to apply a time-varying cost of equity by adding different size premiums to the estimation according to the results in Table 4. The short-term size effect is thus accounted for, and the long-term size premium is also no longer permanent. However, Table 4 only displays the standard deviation of the average of the size premium, the variation of the annual size premium per se is much larger. If the size premium swings between high and low levels like the two-regime small stock premium model shown in section 2.3, adding an average size premium into the short-term cost-of-equity estimation may not help the matter. We could easily over-estimate the cost of equity of small firms in one period and suppress their value, while under-estimate the cost of equity in another period

¹⁶CAPM betas of all size groups are monotonically decreasing from $t+1$ through $t+15$ portfolios. These results are not shown in the tables, but they are available upon request. In this paper I use the traditional size portfolios with the full sample (July 1926 to December 2008) to estimate CAPM betas to get a consistent benchmark in all cases but ones in Table 1.

and bring the price to an un-deserving high level. In this section I will examine the likelihood of this scenario.

The concept of connecting financial distress to firm size has been discussed in the asset pricing literature to explain the anomalous cross-sectional pattern of stock returns. Queen and Roll (1987) find that a firm's unfavorable mortality rate is a decreasing function of its size, and Campbell, Hilscher, and Szilagyi (2008) further show that size has a negative relation with the excess return between safe and distress stocks. I will examine from a different angle to see whether economic distress has an effect on the size premiums.

I divide the sample period into several two-regime scenarios according to different macroeconomic variables related to distress and calculate the size effect under each regime. There are two reasons for this experiment: the first is that only the systematic risk should be taken into account when pricing a firm or an asset. If small firms are supposed to be awarded a higher premium sheerly because of their failure risk, then we should be able to distinguish different patterns of their size premium under different economic situations. Second, in light of the success of a simple Markov-switching model used on the small stock premium in section 2, it is natural to try a two-regime model on the size premium as well. However, the estimation of the size premium is highly contingent on the choice of the asset pricing model and the sample period, so I do not investigate the possible regime shifts of the size premium directly. Instead, I will try to explore the relation between the size premium and three different candidates of macroeconomic variables. If the size premium is at least partly driven by systematic risk sources, its magnitude should vary as the economic environment changes.

4.1 Identifying the States of Economy

The first state variable is an indicator variable which identifies the economic status during a business cycle: a dummy variable which equals 1 for months in the expansion period and 0 for months in the contraction period.¹⁷ When in distress, smaller firms usually get hit harder because they have thinner cushion in common equity and their ability to raise capital via new debts, bank loans, or even government bailouts is also poorer than big firms. On the other hand, small firms which survive the storm can often see a sudden boom in their stock returns, as were evidenced by their bigger beta.¹⁸ Whether the bigger volatility in the stock return for the small stock portfolio can translate to separate size premiums is the focus of the investigation. According to NBER's Business Cycle Dating Committee, there are 14 business cycles since 1926 to date with the shortest contraction period being 6 months and the shortest expansion period being 24 months.

The second indicator is the market trend, which is similar to the idea of the business cycle. I distinguish the bull and bear markets by a Markov-switching model on the CRSP value-weighted market portfolio return with the similar procedure laid

¹⁷NBER's Business Cycle Dating Committee publishes the U.S. business cycle peak and trough months on the NBER website. Their latest announcement on 12/01/2008 declares that the previous expansion period peaked in December 2007 and a recession soon followed. The conclusion of the current recession has not yet been determined as the writing of this paper. I assume all of year 2008 fell into the contraction period to make the sample period consistent with other state variables.

¹⁸Fama and French (1993) point out that small firms do not participate in the economic boom of the middle and late 1980s for an unknown reason. This finding is consistent with the argument of the disappearance of the size effect in the 1980s and 1990s. Indeed, the small stock premium was -10.4% per annum from December 1982 to July 1990, the expansion period right after the longest recession since the Great Depression. However, small firms greatly outperform big firms during the economic booms after the Great Depression or the recession caused by 1973 oil crisis, with average small stock premiums at 55.9% and 23.1%, respectively. It is probably premature to judge the experience in the 1980s as a new norm or just an anomaly. Nonetheless, the magnitude of *SMB* during the expansion periods in the middle 1930s and the late 1980s could counter the argument raised by Fama and French (1993).

out in section 2.3.¹⁹ Regime 1 represents the state of the bear market with a lower mean return and higher volatility; regime 2 indicates the bull market with a higher mean return and lower volatility. An indicator variable is used to represent the bull market with its value being equal to 1 when the regime 2 smoothed inference of the month is greater than 0.5, and 0 otherwise. The reason to use a dummy to identify the market trend instead of the realized market return is to filter out noise. When we apply the size premium on the cost of equity capital estimation, we look for the long-term performance instead of the short-term disturbance. Looking too much into the day-to-day or month-to-month performance will mix up true trend and noise. For instance, even during the huge market downturn in the Great Depression, when the Dow Jones Industrial Average (DJIA) dropped from then historical high of 381.17 on 9/3/1929 to the following lowest point of 41.22 on 7/8/1932, we can still see the market posted double digit gains on return during the process. In February and June 1931, the monthly returns derived from the DJIA were 12.40% and 16.90%, respectively. These were great rallies even in any bull market, but they still cannot stop the free fall of the stock market and the investment environment would not be changed simply because of a sudden spark of life. Since the cost of equity capital and the size premium are all about the long term prospect of the firm, it is more fitting to examine the general market trend in this simple fashion.

The third indicator is the credit spread between AAA and BAA corporate bond rates. The data are obtained from the Federal Reserve Bank of St. Louis website. Although we cannot link a firm's size directly to its credit rating, large firms usually get better ratings and lower borrowing rates.²⁰ When there is abundant credit

¹⁹There is no consensus on the definition of bear or bull markets other than a general description. Here I adopt the market trend definition of the model 1 in Chen (2009).

²⁰According to the summary statistics provided by Altman and Rijken (2004), firm's credit rating is negatively related to the market value of equity. I also compare the average market values between

floating in the market, the credit spread tends to narrow down because banks and funds compete against each other for an investment opportunity without thinking too much about the risk. This process will eventually drive the spread down. On the other hand, the credit spread increases when the credit market is in a dire condition and investors take default risks more seriously. Every banker will think twice before lending money out. When the credit spread is high, it is more likely that small firms endure a higher borrowing cost than big firms, therefore their failure risk induced by the poorer credit rating is also higher. I continue to apply the same technique previously used in the market trend indicator to separate the credit spreads into two different states, and then convert the smoothed inference into a dummy variable using the 0.50 threshold.

The transition probabilities of staying in the same state for the Markov-switching model of the market trend are 0.892 (bear market) and 0.963 (bull market); they are 0.987 (low credit spread) and 0.974 (high credit spread) for the credit spread. The common feature of these macroeconomic variables is that the states defined by them are all very persistent, so we can link these variables with the shift of the size premium over a longer span instead of the month-by-month movement. Once the state variable of the market trend shifts to the bull market state, it would stay put for 27 months on average, and a credit spread dummy remains in the state of a lower mean value for 78 months.

[Insert Figure 2 here.]

firms with investment grade ratings and with non-investment grade ratings over the past 15 years. The average size of firms with better credit is 9 to 10 times bigger than the size of poorer rating firms. The sample includes all firms in the Compustat database from 1994 to 2008.

Figure 2 illustrates three different dummy variables on the right-hand side and their original data on the left.²¹ It has to be noted that these state variables are all asymmetrical. We see expansion periods more often than contraction periods, longer bull markets than bear markets, and more days with low credit spreads than days with high ones. Over the total 822 observations, there are 698 months identified as in the expansion period, 646 months in the bull market, and 552 months in the low credit spread regime.

4.2 The Size Premium under Different Economic Environments

These state variables do not highly coincide with each other, but they are all capable of separating the size premium of small stocks under different states. I also use the $t+j$ portfolio approach to see whether these states can identify the size effect of stocks over the long run. Table 7 and 8 present the size premiums of the first and the 10th size portfolios under different economic situations.

[Insert Table 7 here.]

[Insert Table 8 here.]

The first column of Table 7 or 8 shows the same average size premiums as the corresponding column in Table 4. Through the second column to the last, the average size premiums under different states of the same macroeconomic variable are paired with each other. The second and third columns are the average size premiums in the expansion or contraction state identified by the business cycle dummy; the fourth and fifth columns show the averages during bull or bear markets from the market

²¹I use the GDP growth rate for the business cycle dummy as its "original data". However, it is well known that the Business Cycle Dating Committee of the NBER does not determine the peaks and troughs by the GDP data alone.

trend dummy; and the last two columns are average size premiums in the high or low state of the credit spread dummy.

The last row of each table shows the number of observations in a specific state. These three dummy variables post asymmetric states as earlier mentioned, but the credit spread dummy is significantly different from the others because the state brings the higher average returns has a lot less observations than the state brings the higher return for the other two dummy variables.²²

Small stocks usually have a high and significant size premium, and this premium is even more pronounced in the expansion period or the high credit spread period, and interestingly, during the bear market. Portfolio 1 has a positive premium for most of the $t+j$ portfolios during the market downturn because the market trend dummy successfully identifies the low return period of the market, which in turn drives the benchmark even lower than the drop of the realized return on small stocks. The time series dynamics of the size premium revealed by the $t+j$ portfolio approach present a different scenario for the business cycle dummy. It is indecisive whether a small firm has a greater size premium during the expansion or contraction period.

Table 8 displays the size premium, or more precisely, the size discount of portfolio 10. Large firms usually can be explained well by the CAPM or other asset pricing models, so the common practice does not require a size premium on them. Even under different states, the size premiums are still small in magnitude comparing to the corresponding statistics of portfolio 1. If we focus on the first few $t+j$ portfolios, the business cycle does not seem to play an important role. The average size premi-

²²The state generates the higher average return does not necessarily have the higher size premium. The latter also depends on the sensitivity to the market risk and the market return under this "unfavorable" state.

ums under different regimes of the market trends or credit spreads are much more different, but they are still not as pronounced as their counterparts in portfolio 1.

A one-sided t test on unequal sized variables is also applied here to compare the difference between average size premiums under different economic states. The size premiums in Table 7 and 8 are shown in **boldface fonts** if the difference is significant at the 10 percent level. We cannot reject the null hypothesis that none of the size premium pairs of portfolio 1 or 10 are significantly different during different periods of business cycles. The same test for different market trends shows the similar result for the first nine years for portfolio 1 and the first two years for portfolio 10. The state variable derived from the credit spread data is the most successful of all. The difference of the average size premiums of $t+j$ portfolios is significant at 10 percent level for most of the cases for portfolio 1, and it is also significant for the first 6 years for portfolio 10.

The size premium a small firm should demand for bearing higher risks is limited only in the first few years and its magnitude is difficult to predict. The empirical results imply that we should be very careful to identify the risks a firm is bearing instead of taking it only by the firm's current size. If there are other systematic risks which is related to size, we should reconsider whether that is the cause of a firm being riskier than the others and assign the specific risk premium to it accordingly.

5 Conclusion

This study verifies the existence of the size effect of annually rebalanced size portfolios with a longer sample period, but suggests not to include the size premium in the cost-of-equity estimation of small firms because this effect is only short-lived.

The assertion of the disappearance of the size effect in the 1980s and 90s was just a result of sample selection. Similar events of temporary disappearance of the size effect from different periods were found but they have never been proved permanent. Suffice it to say that the size effect did not simply disappear because it was revealed by academics and exploited by practitioners. It is shown in section 2 that the small stock premium can be better captured by a two-state Markov-switching model rather than the usual stationary normal distribution assumption. This empirical evidence is consistent with the story of the temporary disappearance of the size effect in the 1980s and 1990s.

Using the $t+j$ portfolio approach designed for this study, I demonstrate that the small stock premium declines if we hold the size portfolio longer than the usual one-year holding period rule. This can be considered as evidence of Fama and French (2007)'s finding that the size premium stems from small firms moving up the size rank to become big firms. Since firms move between size groups, the size premium should not be considered as a constant and it has to reflect the new size group they are currently in. The popular perception of a fixed size premium used by practitioners in the cost-of-equity estimation is obviously mistaken. I track the size premiums of different size portfolios for the subsequent 15 years after their formation date and find that most of the premiums converge toward zero, so firms should not be awarded a size premium for a long-term estimation.

If the size premium of a firm is estimated with the assumption that a firm moves from one size group to another all the time, it should be time-varying as well. The average size premium of portfolio 1, which includes all NYSE, NASDAQ and AMEX firms with market capitalization less than the first decile market-cap breakpoint of all NYSE listed firms, is 1.49% for the first year after its creation for the past 68 years. The same composition of firms still merit an average of 1.02% premium in the following year, but it declines rapidly after that. Adding a fixed size premium according to a firm's current size could very well overstate the relation between a firm's size and the risk it is bearing.

Certain macroeconomic variables can help us to distinguish the possible regimes of the size premium. These variables include the business cycle, the market trend, and the credit spread. However, the decision to distinguish the size premium of a firm under the assumption of one specific state is very difficult to make given how highly volatile the monthly size premium is. Adding a naive size premium to a firm's cost of equity capital estimation still potentially introduces more errors no matter this size premium is fixed or time-varying.

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Figure 1: The return difference between the first and the 10th decile size portfolios and the smoothed probability of the high small stock premium regime. Panel A shows the annual portfolio return difference between small and big stocks. It is apparent that big firms outperform small firms most of the time from the mid-1980s to late 1990s. This account for the “disappearance” of the size effect in that time span. Similar situation also happened in the 1950s and late 1960s to early 1970s. The smoothed inference of the high SMB regime is shown in Panel B.

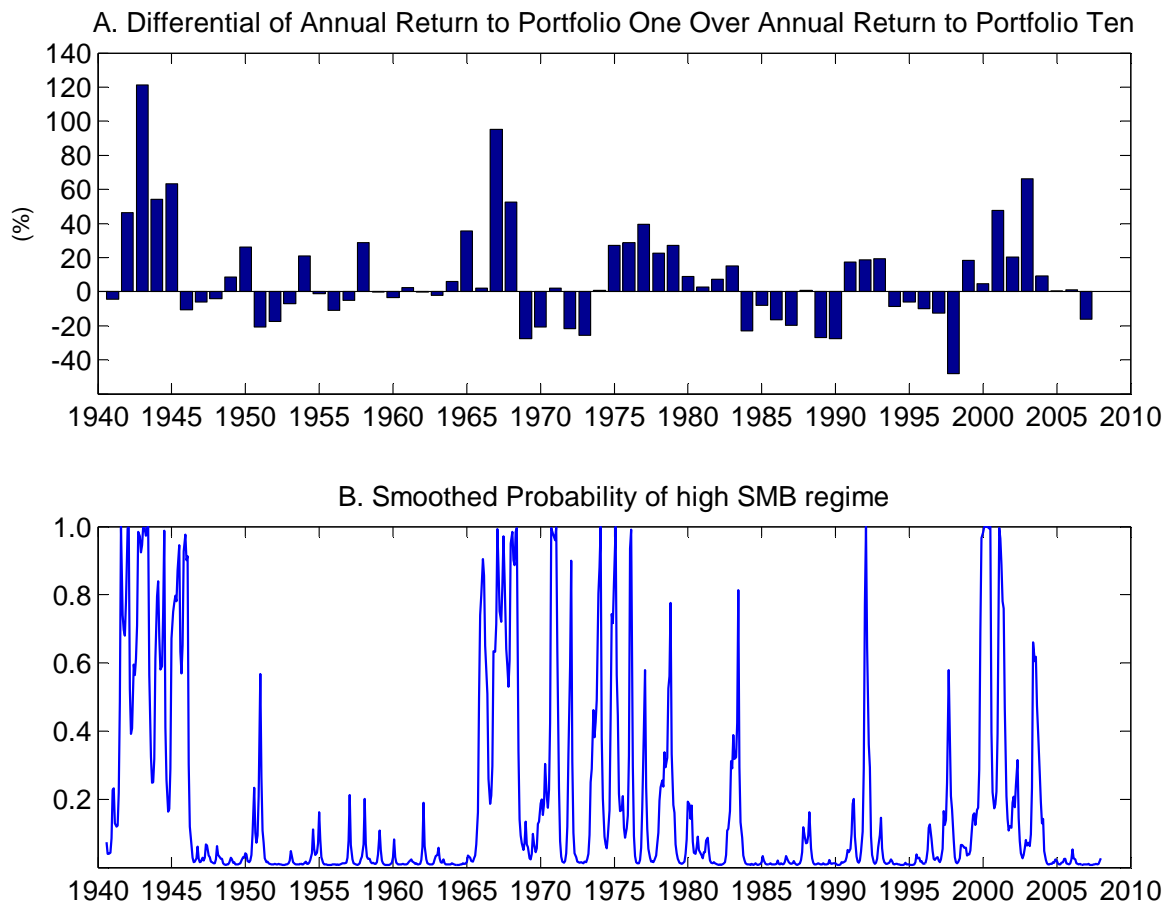


Figure 2: Three different dummy variables indicates three different economic environments. The first row includes the GDP growth rate of the U.S. and the business cycle dummy. The second row presents the CRSP monthly return and the market trend dummy variable derived from the smoothed probability of the bull market regime. The third row contains the credit spread and the high credit spread dummy also generated from the smoothed inference of a two-state Markov-switching model.

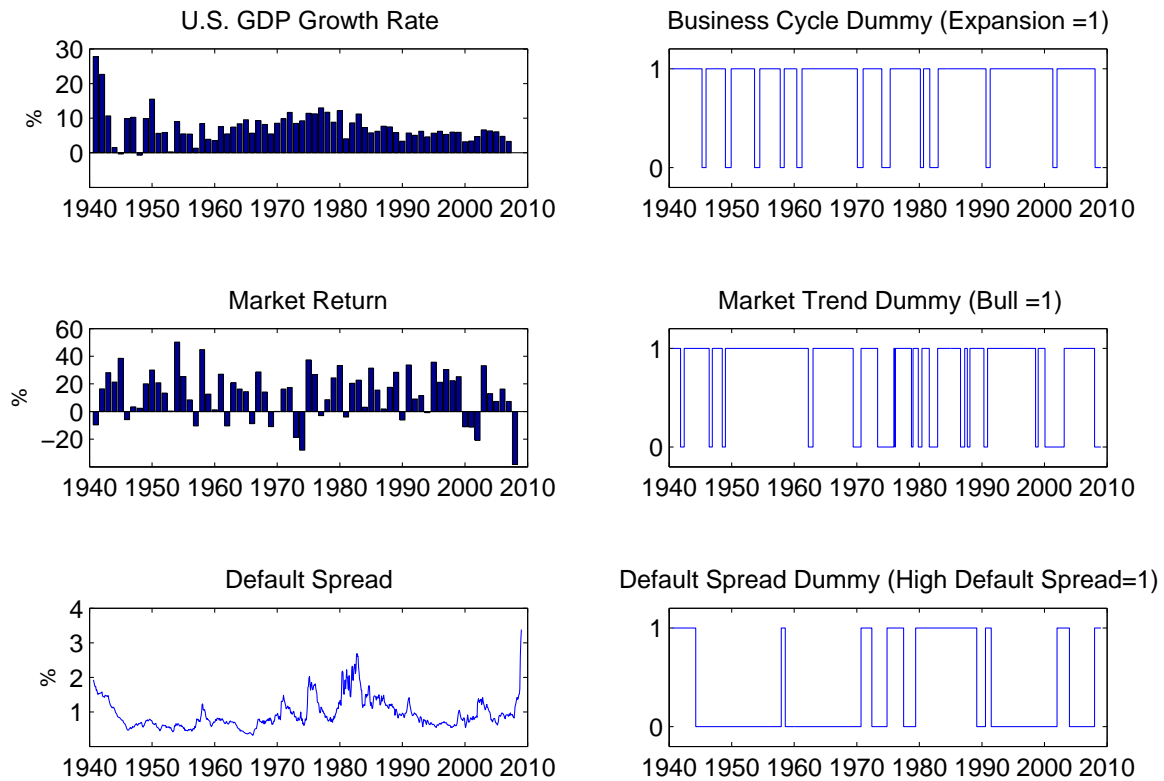


Table 1: Returns on Size Portfolios and Size Premiums in Reference to CAPM

Panel A. Full Sample (1926.7 to 2008.12)

	1 (Small)	2	3	4	5	6	7	8	9	10 (Big)
Mean Return	17.36	14.79	14.52	14.37	13.68	13.22	12.75	12.16	11.66	10.14
Standard Dev.	35.46	30.86	28.39	26.58	25.08	23.68	22.77	21.82	20.24	17.80
β	1.46	1.40	1.34	1.27	1.25	1.20	1.16	1.13	1.05	0.93
Size Premium	3.39	1.21	1.37	1.70	1.21	1.08	0.85	0.53	0.54	-0.10

Panel B. 1926.7 to 1980.6

	1 (Small)	2	3	4	5	6	7	8	9	10 (Big)
Mean Return	20.44	16.19	15.61	15.23	14.14	13.84	12.58	12.22	11.45	9.70
Standard Deviation	41.17	34.89	31.96	29.55	27.82	26.30	25.13	23.80	22.12	19.04
CAPM β	1.60	1.48	1.41	1.32	1.29	1.24	1.19	1.14	1.07	0.93
Size Premium	5.14	1.79	1.80	2.11	1.30	1.38	0.50	0.54	0.33	-0.29

Panel C. 1980.7 to 1998.6

	1 (Small)	2	3	4	5	6	7	8	9	10 (Big)
Mean Return	12.93	14.50	15.96	16.52	17.23	16.96	17.16	15.94	16.84	17.40
Standard Dev.	17.63	17.89	17.77	17.66	17.16	16.24	16.09	15.58	15.32	14.32
β	0.95	1.07	1.10	1.10	1.09	1.05	1.08	1.04	1.04	0.96
Size Premium	-2.99	-2.61	-1.40	-0.90	-0.08	0.01	-0.03	-0.93	0.01	1.31

Panel D. 1998.7 to 2008.12

	1 (Small)	2	3	4	5	6	7	8	9	10 (Big)
Mean Return	9.14	8.05	6.48	6.26	5.23	3.61	6.03	5.36	3.87	-0.03
Standard Dev.	25.11	26.08	23.24	22.94	21.33	19.83	19.57	20.24	17.13	16.10
β	1.06	1.21	1.15	1.13	1.13	1.08	1.08	1.14	0.98	0.92
Size Premium	7.47	6.59	4.95	4.68	3.66	1.97	4.38	3.80	2.07	-1.92

All securities in NYSE, AMEX and NASDAQ are sorted at the end of June of each year t and are assigned to ten different size portfolios according to NYSE breakpoints. The size portfolios are constructed with securities in each size group with their respective market cap as weights and are held from July of year t through June of year $t + 1$.

β 's are estimated with regression of monthly portfolio returns in excess of the Ibbotson Associates risk free rate on the CRSP value-weighted market returns in excess of the same risk free rate.

The size premium is calculated by subtracting the product of the CAPM beta and the equity premium from the size portfolio returns in excess of the risk free rate. All the equity risk premiums in different panels are estimated from their respective sample periods.

Returns, standard deviations and size premiums are all annualized and in percentage points.

Table 2: Prices of Fama-French Risk Factors

	1926.7-2007.12	1926.7-1980.6	1980.7-1998.6	1998.7-2007.12
$R_m - R_f$	0.64 (0.17)	0.70 (0.23)	0.84 (0.29)	-0.04 (0.44)
SMB	0.24 (0.11)	0.29 (0.14)	-0.04 (0.17)	0.47 (0.37)
HML	0.38 (0.12)	0.41 (0.15)	0.41 (0.18)	0.24 (0.35)

I calculate the price of risk of the Fama-French (1993) three factors with Fama and MacBeth (1973)'s two-pass regression approach. These data are retrieved from Professor French's website at Dartmouth. Test portfolios are obtained from 25 portfolios formed on size and book-to-market equity and 17 industry portfolios. Since there exist missing values in one of the 25 size/BM portfolio, it is taken out of the portfolio set. The returns on the remaining 41 test portfolios are named as R_{it} , $i = 1, 2, \dots, N, N = 41$.

First we find beta estimates from the time-series regressions,

$$R_{it}^e = \alpha_i + \beta_i R_{mt}^e + s_i SMB_t + h_i HML_t + \varepsilon_{it} \quad t = 1, 2, \dots, T, \forall i.$$

where $R_{it}^e = R_{it} - R_{ft}$ and $R_{mt}^e = R_{mt} - R_{ft}$.

Then estimate the factor risk premiums λ from a cross-sectional regression,

$$E_T(R_i^e) = \beta_i \lambda_1 + s_i \lambda_2 + h_i \lambda_3 + \alpha_i, \quad i = 1, 2, \dots, N.$$

Since the pricing errors α_i are likely to be correlated, we follow Cochrane (2005)'s suggestion to run a GLS cross-sectional regression and the estimations of the price of risk are

$$\begin{aligned} \hat{\lambda} &= (\beta \Sigma^{-1} \beta)^{-1} \beta \Sigma^{-1} E_T(R^e), \text{ and} \\ \sigma^2(\hat{\lambda}) &= \frac{1}{T} \left[(\beta \Sigma_f^{-1} \beta)^{-1} + \Sigma_f \right] \end{aligned}$$

where β is an N-by-3 matrix with $[\beta_i \ s_i \ h_i]$ in each row, $\lambda = [\lambda_1 \ \lambda_2 \ \lambda_3]$, f is a T-by-3 matrix of the risk factors, R_{mt}^e , SMB , HML .

The sample period is broken down like in Table 1. The parameter estimates in each subperiod use only observations from that subperiod. Standard deviations of λ estimates are reported in parentheses.

The insignificance of parameters in the subperiod from July 1996 to December 2007 probably results from sample selection and short sample period. The most interesting finding is on λ_2 , the price of the risk factor SMB . During the sample period from July 1980 to June 1996, the price of this factor is not only insignificant but also much smaller in its value.

Table 3: Regime Switching Model of the return difference between the 1st and 10th decile Size Portfolios

	Regime Switching Model			Unconditional Normal Dist	
	Parameter	Standard Deviation		Parameter	Standard Deviation
μ_1	-0.002436	0.00189	μ	0.004590	0.001825
μ_2	0.036465	0.01184			
σ_1^2	0.001263	0.00013	σ^2	0.052284	0.000136
σ_2^2	0.008167	0.00179			
p	0.9579	0.01991			
q	0.8090	0.11592			
Log-Likelihood Value	1367.73901			1257.87773	
AIC	-2723.47802			-2511.75546	
BIC	-2695.20758			-2502.33198	

Table 4: **Size Premium of $t+j$ Decile Size Portfolio**

	Small	2	3	4	5	6	7	8	9	Big
$t+1$	1.49 (0.56)	0.57 (0.42)	0.94 (0.34)	1.26 (0.31)	0.87 (0.26)	0.48 (0.22)	1.02 (0.18)	0.48 (0.16)	0.50 (0.12)	-0.19 (0.11)
$t+2$	1.02 (0.52)	1.70 (0.40)	1.63 (0.33)	1.50 (0.29)	1.16 (0.25)	0.53 (0.21)	0.36 (0.18)	0.84 (0.15)	0.36 (0.13)	-0.14 (0.11)
$t+3$	-0.67 (0.48)	1.33 (0.39)	1.51 (0.32)	0.77 (0.29)	1.46 (0.25)	0.47 (0.22)	0.34 (0.18)	0.52 (0.15)	0.17 (0.13)	0.03 (0.12)
$t+4$	-1.60 (0.45)	1.96 (0.37)	0.79 (0.32)	1.69 (0.29)	0.82 (0.25)	-0.04 (0.22)	0.59 (0.18)	0.37 (0.16)	0.40 (0.12)	0.10 (0.12)
$t+5$	-0.83 (0.44)	1.42 (0.37)	1.26 (0.31)	0.58 (0.27)	-0.44 (0.24)	0.73 (0.20)	0.88 (0.19)	0.53 (0.15)	0.27 (0.12)	0.10 (0.12)
$t+6$	-0.18 (0.44)	0.43 (0.36)	0.91 (0.30)	0.38 (0.27)	0.29 (0.23)	0.90 (0.21)	0.49 (0.19)	0.77 (0.14)	0.18 (0.13)	0.14 (0.12)
$t+7$	-1.57 (0.43)	0.51 (0.35)	0.43 (0.30)	0.27 (0.26)	0.66 (0.24)	0.89 (0.21)	-0.78 (0.17)	0.12 (0.15)	0.50 (0.14)	0.29 (0.12)
$t+8$	-1.31 (0.42)	-0.54 (0.33)	0.86 (0.30)	0.99 (0.25)	0.19 (0.23)	0.12 (0.20)	0.34 (0.18)	0.27 (0.14)	0.64 (0.13)	0.11 (0.13)
$t+9$	-1.38 (0.39)	-0.46 (0.32)	0.43 (0.30)	-0.02 (0.26)	0.98 (0.24)	0.01 (0.21)	1.27 (0.20)	-0.42 (0.17)	0.47 (0.14)	0.16 (0.13)
$t+10$	-1.61 (0.38)	-0.72 (0.31)	-0.65 (0.30)	1.22 (0.25)	-0.08 (0.23)	0.33 (0.21)	-1.02 (0.20)	-0.26 (0.19)	0.76 (0.13)	0.20 (0.14)
$t+11$	-1.30 (0.39)	-0.62 (0.31)	-0.76 (0.28)	0.05 (0.26)	0.12 (0.24)	0.18 (0.20)	-0.36 (0.21)	0.56 (0.17)	-0.12 (0.13)	0.31 (0.14)
$t+12$	-1.62 (0.39)	-1.60 (0.30)	-0.83 (0.30)	1.11 (0.26)	0.12 (0.23)	0.37 (0.21)	0.14 (0.20)	-0.21 (0.16)	-0.17 (0.14)	0.33 (0.14)
$t+13$	-1.40 (0.38)	-2.30 (0.31)	-0.20 (0.30)	0.72 (0.26)	0.36 (0.25)	-0.04 (0.21)	-0.62 (0.19)	-0.51 (0.18)	-0.26 (0.15)	0.35 (0.14)
$t+14$	-2.64 (0.38)	-1.08 (0.31)	-1.22 (0.31)	0.90 (0.27)	-0.45 (0.25)	-1.08 (0.22)	-0.91 (0.21)	-0.84 (0.19)	-0.26 (0.15)	0.42 (0.15)
$t+15$	-3.14 (0.39)	-0.86 (0.31)	-1.50 (0.30)	-0.01 (0.26)	-1.02 (0.24)	-1.29 (0.24)	-0.83 (0.23)	-0.81 (0.20)	-1.21 (0.16)	0.68 (0.15)

Standard deviations of mean returns (or return differential in the last column) are in the parentheses.

CAPM betas used in this table are estimated with full sample period (July 1926 to December 2008) instead of the trimmed sample period (July 1940 to December 2008) for the $t+j$ portfolios. The size premium of the $t+1$ portfolios here and the size premium of the Panel A of Table 1 should be the same if given the same length of sample.

Table 5: Average Returns on $t+j$ Decile Size Portfolio and Decile 1- Decile 10 Return Difference

	Small	2	3	4	5	6	7	8	9	Big	1-10
$t+1$	16.17 (0.81)	14.85 (0.74)	14.78 (0.69)	14.61 (0.67)	14.02 (0.63)	13.29 (0.60)	13.58 (0.59)	12.76 (0.57)	12.27 (0.53)	10.68 (0.49)	5.49 (0.63)
$t+2$	15.71 (0.80)	15.98 (0.74)	15.47 (0.69)	14.84 (0.67)	14.30 (0.63)	13.33 (0.60)	12.92 (0.60)	13.13 (0.57)	12.13 (0.54)	10.73 (0.48)	4.97 (0.60)
$t+3$	14.01 (0.79)	15.61 (0.75)	15.35 (0.69)	14.12 (0.66)	14.61 (0.63)	13.27 (0.62)	12.89 (0.59)	12.81 (0.57)	11.94 (0.53)	10.90 (0.48)	3.12 (0.58)
$t+4$	13.08 (0.78)	16.23 (0.73)	14.64 (0.69)	15.03 (0.66)	13.97 (0.65)	12.77 (0.61)	13.14 (0.59)	12.66 (0.55)	12.17 (0.53)	10.97 (0.48)	2.12 (0.56)
$t+5$	13.85 (0.78)	15.69 (0.73)	15.10 (0.70)	13.93 (0.66)	12.71 (0.64)	13.53 (0.60)	13.43 (0.58)	12.81 (0.56)	12.04 (0.53)	10.97 (0.47)	2.88 (0.55)
$t+6$	14.50 (0.78)	14.71 (0.74)	14.76 (0.69)	13.72 (0.65)	13.44 (0.62)	13.71 (0.60)	13.04 (0.59)	13.06 (0.56)	11.95 (0.53)	11.01 (0.47)	3.49 (0.55)
$t+7$	13.12 (0.79)	14.79 (0.73)	14.27 (0.68)	13.61 (0.63)	13.80 (0.63)	13.70 (0.60)	11.77 (0.59)	12.41 (0.56)	12.27 (0.53)	11.15 (0.47)	1.96 (0.56)
$t+8$	13.38 (0.78)	13.73 (0.72)	14.70 (0.68)	14.34 (0.64)	13.34 (0.63)	12.92 (0.61)	12.89 (0.58)	12.55 (0.55)	12.41 (0.52)	10.98 (0.47)	2.40 (0.55)
$t+9$	13.30 (0.76)	13.82 (0.70)	14.27 (0.69)	13.33 (0.64)	14.13 (0.63)	12.82 (0.60)	13.82 (0.59)	11.86 (0.55)	12.24 (0.53)	11.03 (0.46)	2.27 (0.51)
$t+10$	13.08 (0.75)	13.56 (0.69)	13.20 (0.69)	14.57 (0.64)	13.07 (0.63)	13.13 (0.59)	11.54 (0.59)	12.03 (0.55)	12.53 (0.53)	11.07 (0.46)	2.00 (0.50)
$t+11$	13.38 (0.74)	13.65 (0.70)	13.09 (0.68)	13.40 (0.63)	13.27 (0.63)	12.99 (0.58)	12.19 (0.58)	12.85 (0.54)	11.65 (0.53)	11.18 (0.46)	2.20 (0.49)
$t+12$	13.06 (0.74)	12.68 (0.68)	13.02 (0.69)	14.46 (0.63)	13.27 (0.63)	13.18 (0.59)	12.69 (0.56)	12.08 (0.55)	11.60 (0.53)	11.20 (0.46)	1.87 (0.50)
$t+13$	13.28 (0.74)	11.97 (0.68)	13.65 (0.69)	14.07 (0.62)	13.51 (0.61)	12.77 (0.59)	11.93 (0.58)	11.78 (0.54)	11.51 (0.53)	11.21 (0.46)	2.07 (0.49)
$t+14$	12.04 (0.73)	13.19 (0.67)	12.62 (0.67)	14.25 (0.62)	12.70 (0.62)	11.72 (0.59)	11.65 (0.59)	11.45 (0.55)	11.51 (0.52)	11.28 (0.46)	0.76 (0.48)
$t+15$	11.54 (0.74)	13.42 (0.66)	12.34 (0.66)	13.34 (0.63)	12.12 (0.60)	11.52 (0.59)	11.72 (0.58)	11.48 (0.53)	10.56 (0.52)	11.55 (0.46)	-0.01 (0.50)

Standard deviations of mean returns (or return differential in the last column) are in the parentheses.

Table 6: Robustness Check: Size Premium of Different Size Portfolios in Reference to CAPM Projected Return

	Small	Big	S-30%	M-40%	B-30%
$t+1$	0.96 (0.32)	0.02 (0.05)	0.91 (0.40)	0.91 (0.21)	-0.05 (0.06)
$t+2$	1.51 (0.31)	0.05 (0.05)	1.60 (0.38)	0.77 (0.20)	0.02 (0.07)
$t+3$	1.09 (0.30)	0.11 (0.06)	0.94 (0.36)	0.70 (0.19)	0.08 (0.08)
$t+4$	0.99 (0.28)	0.14 (0.07)	0.72 (0.35)	0.65 (0.18)	0.13 (0.08)
$t+5$	0.44 (0.26)	0.20 (0.07)	0.95 (0.34)	0.46 (0.17)	0.15 (0.08)
$t+6$	0.30 (0.25)	0.23 (0.07)	0.49 (0.32)	0.52 (0.17)	0.21 (0.09)
$t+7$	0.03 (0.24)	0.24 (0.07)	-0.10 (0.30)	0.07 (0.17)	0.28 (0.09)
$t+8$	0.17 (0.23)	0.20 (0.08)	-0.25 (0.30)	0.37 (0.16)	0.19 (0.09)
$t+9$	0.10 (0.23)	0.21 (0.09)	-0.31 (0.29)	0.52 (0.16)	0.15 (0.10)
$t+10$	-0.22 (0.22)	0.17 (0.09)	-1.05 (0.27)	-0.14 (0.16)	0.26 (0.10)
$t+11$	-0.35 (0.21)	0.22 (0.09)	-1.04 (0.26)	-0.30 (0.16)	0.24 (0.10)
$t+12$	-0.28 (0.21)	0.21 (0.10)	-1.30 (0.27)	0.23 (0.16)	0.18 (0.11)
$t+13$	-0.28 (0.21)	0.13 (0.10)	-1.16 (0.26)	-0.02 (0.16)	0.16 (0.11)
$t+14$	-0.50 (0.21)	0.07 (0.11)	-1.52 (0.26)	-0.55 (0.16)	0.21 (0.12)
$t+15$	-0.97 (0.20)	0.10 (0.12)	-1.68 (0.26)	-0.87 (0.17)	0.22 (0.12)

Standard deviations of mean returns (or return differential in the last column) are in the parentheses.

Table 7: Average Size Premium of Portfolio 1 under Different Economic Environments

	Total	Expansion	Contraction	Bull Mkt	Bear Mkt	High CS	Low CS
$t+1$	1.49 (0.56)	2.07 (0.61)	-1.78 (1.42)	0.65 (0.57)	4.57 (1.57)	5.45 (1.15)	-0.45 (0.62)
$t+2$	1.02 (0.52)	1.36 (0.56)	-0.86 (1.35)	0.15 (0.53)	4.24 (1.47)	4.57 (1.01)	-0.71 (0.60)
$t+3$	-0.67 (0.48)	-0.70 (0.52)	-0.47 (1.30)	-1.08 (0.50)	0.84 (1.32)	2.17 (0.90)	-2.06 (0.57)
$t+4$	-1.60 (0.45)	-1.51 (0.48)	-2.09 (1.30)	-2.13 (0.47)	0.35 (1.23)	2.62 (0.83)	-3.67 (0.54)
$t+5$	-0.83 (0.44)	-0.82 (0.48)	-0.87 (1.19)	-1.33 (0.45)	1.02 (1.24)	3.34 (0.79)	-2.87 (0.53)
$t+6$	-0.18 (0.44)	-0.23 (0.47)	0.06 (1.17)	-0.72 (0.45)	1.80 (1.21)	3.18 (0.75)	-1.83 (0.54)
$t+7$	-1.57 (0.43)	-1.67 (0.46)	-0.97 (1.16)	-1.26 (0.43)	-2.70 (1.24)	2.56 (0.72)	-3.59 (0.53)
$t+8$	-1.31 (0.42)	-1.27 (0.44)	-1.51 (1.28)	-1.30 (0.43)	-1.32 (1.14)	1.60 (0.72)	-2.73 (0.51)
$t+9$	-1.38 (0.39)	-1.25 (0.42)	-2.12 (1.13)	-1.93 (0.42)	0.64 (1.01)	3.54 (0.68)	-3.79 (0.48)
$t+10$	-1.61 (0.38)	-1.47 (0.40)	-2.36 (1.13)	-2.99 (0.40)	3.48 (1.03)	2.38 (0.65)	-3.56 (0.47)
$t+11$	-1.30 (0.39)	-1.21 (0.41)	-1.83 (1.17)	-2.64 (0.40)	3.61 (1.03)	1.22 (0.65)	-2.54 (0.48)
$t+12$	-1.62 (0.39)	-1.80 (0.41)	-0.61 (1.13)	-2.60 (0.41)	1.97 (1.06)	1.23 (0.69)	-3.01 (0.47)
$t+13$	-1.40 (0.38)	-1.22 (0.40)	-2.42 (1.16)	-2.20 (0.40)	1.55 (1.03)	0.35 (0.68)	-2.25 (0.47)
$t+14$	-2.64 (0.38)	-2.33 (0.40)	-4.37 (1.12)	-3.39 (0.39)	0.11 (1.04)	0.33 (0.67)	-4.09 (0.46)
$t+15$	-3.14 (0.39)	-3.20 (0.42)	-2.82 (1.12)	-4.41 (0.39)	1.53 (1.12)	1.30 (0.74)	-5.32 (0.45)
Number of Observations	822	698	124	646	176	270	552

The standard deviation of the average size premium is in the parenthesis.

The first column shows the average size premium of the first decile size portfolio, which is the same as the first column of Table 4.

The number of observations in each state is in the last row of the table. The second and third columns are the expansion and contraction states; the fourth and fifth columns are the bull and bear market states; and the last two columns are the high and low credit spread states.

The size premiums are shown in **boldface fonts** if the difference is significant at the 10 percent level using a one-sided t test.

Table 8: Average Size Premium of Portfolio 10 under Different Economic Environments

	Total	Expansion	Contraction	Bull Mkt	Bear Mkt	High CS	Low CS
$t+1$	-0.19 (0.11)	-0.17 (0.12)	-0.27 (0.29)	-0.29 (0.11)	0.21 (0.32)	-1.10 (0.20)	0.26 (0.13)
$t+2$	-0.14 (0.11)	-0.14 (0.12)	-0.12 (0.29)	-0.39 (0.11)	0.80 (0.34)	-1.10 (0.20)	0.34 (0.13)
$t+3$	0.03 (0.12)	0.03 (0.12)	0.05 (0.30)	-0.34 (0.11)	1.38 (0.35)	-0.87 (0.20)	0.47 (0.14)
$t+4$	0.10 (0.12)	0.04 (0.13)	0.43 (0.31)	-0.33 (0.11)	1.66 (0.35)	-0.63 (0.21)	0.45 (0.14)
$t+5$	0.10 (0.12)	-0.03 (0.13)	0.85 (0.32)	-0.42 (0.11)	2.02 (0.36)	-0.73 (0.21)	0.51 (0.14)
$t+6$	0.14 (0.12)	0.00 (0.13)	0.95 (0.33)	-0.43 (0.11)	2.22 (0.38)	-0.59 (0.21)	0.50 (0.15)
$t+7$	0.29 (0.12)	0.11 (0.13)	1.29 (0.34)	-0.37 (0.12)	2.68 (0.39)	-0.29 (0.22)	0.57 (0.15)
$t+8$	0.11 (0.13)	-0.08 (0.14)	1.17 (0.33)	-0.49 (0.12)	2.30 (0.42)	-0.55 (0.22)	0.43 (0.16)
$t+9$	0.16 (0.13)	0.01 (0.14)	1.03 (0.32)	-0.52 (0.12)	2.67 (0.44)	-0.60 (0.21)	0.54 (0.17)
$t+10$	0.20 (0.14)	0.03 (0.15)	1.16 (0.34)	-0.45 (0.12)	2.60 (0.46)	-0.51 (0.22)	0.55 (0.17)
$t+11$	0.31 (0.14)	0.12 (0.16)	1.37 (0.36)	-0.45 (0.12)	3.10 (0.49)	-0.38 (0.22)	0.65 (0.18)
$t+12$	0.33 (0.14)	0.20 (0.16)	1.08 (0.37)	-0.43 (0.13)	3.11 (0.49)	-0.37 (0.23)	0.67 (0.18)
$t+13$	0.35 (0.14)	0.18 (0.16)	1.27 (0.39)	-0.42 (0.13)	3.15 (0.48)	-0.25 (0.24)	0.64 (0.18)
$t+14$	0.42 (0.15)	0.21 (0.16)	1.55 (0.38)	-0.28 (0.13)	2.96 (0.51)	-0.14 (0.24)	0.68 (0.19)
$t+15$	0.68 (0.15)	0.49 (0.16)	1.76 (0.39)	-0.13 (0.13)	3.67 (0.53)	-0.03 (0.24)	1.03 (0.19)
Number of Observations	822	698	124	646	176	270	552

The standard deviation of the average size premium is in the parenthesis.

The first column shows the average size premium of the 10th decile size portfolio, which is the same as the last column of Table 4.

Column 2 to column 7 use the same dummy variables to separate different states as the corresponding columns in Table 7.

The size premiums are shown in **boldface fonts** if the difference is significant at the 10 percent level using a one-sided t test.

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January 12, 2009

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

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Issuer Review

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

Standard & Poor's Ratings Services has raised its ratings on 26 municipal waterworks, sanitary sewer, and/or drainage utility revenue bonds (see table 1). The upgrades are primarily based on our recent criteria revision (see the article, "Standard & Poor's Revises Criteria For Rating Water, Sewer, And Drainage Utility Revenue Bonds," dated Sept. 15, 2008, on RatingsDirect). In all cases, the rating outlook is stable.

In our opinion, western region utilities included in this review tend to demonstrate strong financial metrics and management practices that mitigate several regionally specific challenges. Western states face a diminishing water supply, coupled with a rising population. Drought in the Colorado River Basin and court-ordered restrictions on water deliveries from the Sacramento-San Joaquin River Delta in California to protect fish and wildlife have necessitated alternative water solutions; the construction of desalination and reclaimed water plants and water banking programs are a few of the alternatives that have gained popularity. For example, the California Department of Water Resources created a drought water bank for 2009 to facilitate the transfer of water from local water districts willing to sell excess supply to those with short supply. Despite these endeavors, we believe conservation efforts will persist and mandatory water restrictions might still be needed. We, however, believe that a well-planned rate structure can mitigate cyclical revenue trends resulting from reduced water usage. In addition, we believe that the funding of capital programs for aging infrastructures in mature areas and new infrastructure for young growing communities will require proactive long-term planning.

In our opinion, stalled housing construction has been both a blessing and a burden for some systems. Slowed new construction has provided some capital expenditure relief for growth-pressured systems. It has also resulted in declining impact fee revenues.

We believe the utilities included in this review, in general, have either sufficient operating revenues to generate adequate debt service coverage and had been using impact fees to fund capital projects that are now on hold because of reduced growth demand or responded with budget adjustments or increased user rates. Notwithstanding these challenges, these issuers, in our view, have exhibited stable credit profiles and, in general, demonstrate one or more of the following credit characteristics:

- Strong financial metrics, including debt service coverage and cash reserves;
- Good economic fundamentals, such that we expect their respective utility system(s) to be able to handle such pressures as housing market vulnerabilities, employment softness, or cost-of-service inflation; and
- Solid management, which includes a demonstrated willingness to adjust rates, long-term planning to fund key service components like water supply or regulatory-driven capital expenditures, and the ability to serve the needs of a growing community.

It should be noted that without exception, municipally owned water, sewer, and drainage systems in the United States are monopolistic service providers that enjoy local rate autonomy in the provision of a relatively price inelastic service. These are characteristics that we believe help support credit quality. Only a few states require local rate increases by a state regulator such as a public service commission.

Although we have historically incorporated factors such as the service area economy and financial performance as components of our analysis, we now believe the sector's demonstrated stability in operations and financial

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performance, as well as successful management of the requirements of the federal Safe Drinking Water Act of 1974 and Clean Water Act of 1972, and all of their respective amendments and state regulations, supports these rating actions.

Our criteria revision reflects our view that for general obligation ratings, a small and/or rural issuer does not necessarily have what we consider weaker credit quality than a larger or more-urban issuer. Although we assess these factors in our credit analysis for some revenue bond ratings, we believe many municipal systems still exhibit, in our view, strong and stable credit quality despite size or location constraints. While we believe that smaller or rural utility systems may not necessarily benefit from the economies of scale that can lead to more-efficient operations or lower costs, in our view, they can still have affordable rates, even in places with less-than-favorable household income and wealth levels.

As a result of our reexamination of these credit factors, we reviewed these issuers and raised our ratings. We expect to publish additional ratings adjustments on water and sewer ratings based on our criteria revisions. All of the systems in table 1 are water and sewer service providers unless noted otherwise.

Issuer Review

Table 1

Rating Changes				
Issuer	New Rating	Previous Rating	Analyst	Comment
East Cherry Creek Wtr & San Dist, CO	A+	A	Timothy Barrett	The district continues to demonstrate what we consider good financial performance, including strong coverage of debt service and strong liquidity. This is despite a slowdown in growth and related water tap fees, which accounted for roughly 15% of total water system revenues in fiscal 2007. Within the next year, we understand that the district will likely issue additional bonds for a water treatment plant that could bring coverage close to 1.25x debt service, but we expect liquidity to remain strong at more than a year's cash on hand.
Marin Municipal Water District, CA	AA+	AA	Timothy Barrett	The district provides water to residents of the southern and central portion of Marin County, located in the North San Francisco Bay Area. The district currently serves a population of approximately 183,000 through 61,054 service connections in the cities of Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Ross, Sausalito, San Anselmo, San Rafael, and Tiburon, as well as a large unincorporated area. We understand that the district is currently reviewing options to expand its water supply. This could be achieved through a new 5 mgd facility or through system enhancements. Despite the potential need for additional debt to fund increased water supply, we expect financial performance to remain strong, with management annually adjusting rates and targeting at least six months' operations in cash on hand.
Montrose, CO	A+	BBB+	Timothy Barrett	The utility system serves a population of 16,070 in western Colorado. Montrose provides water and sewer service to 7,109 and 7,198 customers, respectively. We understand that water and wastewater supply and capacity are sufficient for the near future, with the utility projecting supply to meet demand for a population of 40,000 and treatment capacity to be sufficient through 2020. Liquidity and coverage remain in our view very strong, despite the system's use of operations to fund capital needs. We understand that the city does not expect to issue additional debt.
Santa Ana Financing Authority, CA	AA	AA-	Timothy Barrett	Located about 33 miles southeast of Los Angeles, Santa Ana, with a population estimate of 364,000, is both Orange County's largest city and seat. The water system provides potable water to more than 49,000 customers. The customer base is very diverse and built out. We consider the system's financial performance to be very strong, with strong liquidity and coverage of debt service.
Helix Wtr Dist, CA	AA	A+	Ian Carroll	The water district serves eastern San Diego County with retail water services and benefits from a wealthy economic base. Financial performance has been in our view strong, with 3.25x coverage of debt service and 166 days' cash on hand. Operationally, the system relies on San Diego County Water Authority for about 80% of its water supply.

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

Table 1

Rating Changes (cont.)				
Hillsborough, CA	AAA	AA	Ian Carroll	Hillsborough's combined water and sewer utility maintained what we consider its strong financial performance in 2008 with 2.4x coverage and 678 days' cash on hand; the underlying economy is one of the wealthiest in the U.S., with incomes at 414% of the U.S. median. We understand that there is no plan to issue any additional debt.
Imperial Irrigation District, CA	AA-	A+	Ian Carroll	The district has maintained what we consider a good debt service coverage of more than 2x, in part due to rising sales of water to San Diego County Water Authority. In our view, cash was also strong at 395 days in 2007. The system's service area is in the imperial valley, an agricultural area east of San Diego and on the U.S.-Mexico border, but sales to the water authority mitigate the local economy's agricultural concentration.
Municipality of Anchorage (Sewer), AK	AA	A+	Ian Carroll	The city's wastewater enterprise had what we consider very strong coverage of annual debt service of more than 5x in 2007, based on audited financial statements and 215 days' cash on hand, following rate increases in the past few years. We expect finances to remain strong as long as the required treatment standard is not increased, which we believe would add considerable capital pressures.
Municipality of Anchorage (Water), AK	AA	AA-	Ian Carroll	We understand that the city's water utility has virtually unlimited supply by virtue of mountain snowfall. In our view, the enterprise's finances have been strong, with 1.8x coverage and 242 days' cash on hand. Capital needs, moreover, are what we consider minimal, which should allow for stable financial performance without the need for additional rate increases.
Orange County Water Dist, CA	AAA	AA+	Ian Carroll	The water district maintained what we consider very strong coverage, more than 2x in each of the past several years, as well as exceptional cash liquidity of 590 days, in 2007. The district's economy, moreover, does not present a challenge because the district participates in the Teeter plan. Income levels are 33% above the U.S. median. The district is responsible for the long-term viability of the groundwater basin and levies an assessment on its customers who pump from the ground.
Brea Public Finance Authority, CA	A+	A	Le T. Quach	The city of Brea's water rates are adjusted annually based on inflation, which has supported what we consider good coverage of annual debt service. The city projects coverage for fiscal 2008 to be a strong 1.6x. The city has historically funded its water capital improvements with cash, but expects to issue additional parity bonds this spring. Brea receives its water supply from Southern California Metropolitan Water District and California Domestic Water Co., a private company.
Oro Loma Sanitary District, CA	AA+	AA-	Le T. Quach	This wastewater treatment system benefits from what we consider a strong collections process, which allows it to collect a majority of its fees through annual property tax billings. In our view, the system has maintained very strong financial performance, with coverage of at least 5x annual debt service from fiscals 2005-2007. Based on audited results for fiscal 2008, this Bay Area district will end with a \$28.6 million unreserved cash balance, equal to what we consider a strong 817 days' expenditures. The system projects that its capital needs will be funded by ongoing revenues.
Crescenta Vy Wtr Dist, CA	A+	A	Li Yang	Recent rate increases have contributed to what we consider the district's strong 4.3x coverage in fiscal 2008 for its outstanding water revenue debt. The first principal payments for the 2007 certificates of participation begin in fiscal 2009, and we expect coverage to be 1.5x excluding connection fees. The district currently maintains a five-year capital plan totaling roughly \$9.9 million. We understand that the district is considering issuing additional debt.
East Vy Wtr Dist, CA	AA-	A	Li Yang	The district maintains what we consider a sizable capital plan, with the majority being used for constructing new treatment plants in order to meet federal water quality standards. The most recent rate increase of 12.5% became effective in fiscal 2009. We understand that future rate are increases possible, which would enable the district to maintain what we consider good debt service coverage levels.
Goleta Wtr Dist, CA	A+	A-	Li Yang	In our opinion, the district's financial performance has improved significantly in recent years due to increased water demand. In addition, water rates were raised in fiscal 2008, which has led to what we consider strong debt service coverage of 1.53x without connection fees. We expect coverage to remain at this level as the district does not plan to issue additional debt. Currently, the district maintains a five-year capital plan of approximately \$5 million.
Lake Arrowhead Comnty Svcs Dist (water), CA	A+	A-	Matt Reining	In our opinion, the utility has shown good financial performance, while serving a mostly residential, resort community, with strong liquidity and good coverage. After a number of years of ongoing legal action regarding the district's use of water from Lake Arrowhead, the state issued a final order in 2006 allowing the district to use 1,566 acre feet per year, while also pointing to the need for outside sources given that the lake allowance supplies only 63% of recent average years' water usage. The district has met this need in the intermediate future with a 10-year contract with the Crestline-Lake Arrowhead Water Agency. Through rate increases, the district is generating revenue to cover the increase in water supply costs.

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

Table 1

Rating Changes (cont.)				
Los Angeles Cnty San Dist #14 (Lancaster), CA	A+	A-	Matt Reining	The district primarily serves the city of Lancaster, which has seen significant residential growth in recent years. Because of this growth, the district has a \$295 million five-year capital improvement plan that includes more routine sewer and line improvements as well as a major plant expansion and treated water storage facility. The series 2005 bonds were issued to meet these capital financing needs; the district has used and we understand will use additional state loans. Based on audited 2007 results, the district had in our view a solid 1.2x debt service coverage with a strong 1.8x coverage including connection and developer fees. Although the district projects that connection fees will fall, given the local real estate slowdown, management believes that flexibility is built into its capital improvement plan and that it can adjust expenditures through modular plant expansion and section line construction.
Los Angeles Cnty San Dist Fincg Auth, CA	AA+	AA	Matt Reining	The sanitation districts serve a large and diverse customer base of approximately 5.2 million people, or roughly all of the non-City of Los Angeles portions of Los Angeles County. Organized as a partnership among 24 individual districts (each with individual debt and tax bases), the overall district functions as a single unified operating entity with a single management structure. The overall district provides main-line conveyance, treatment, and disposal of sewage, with local collections done by individual, local agencies. For residential usage, customers pay a fixed annual service charge as well as a modest portion of property tax. These service charges ranged from \$78-\$308 in fiscal 2008 and adopted service charge increases averaged 11% for fiscal 2009. Debt service coverage by each of the member districts allows for a 20% increase in revenues as needed for the step-up charges. Coverage by what we consider the stronger districts (taking into account the step-up) ranged from a good 1.4x to a very strong 8.7x in fiscal 2007, with strong cash levels ranging from 365 days to more than 4,000 days.
Arapahoe Cnty Water & Wastewater Authority, CA	AA-	A+	Misty Newland	The authority provides service to portions of Arapahoe and Douglas counties. In our view, proximity to Denver has driven expansion in these areas. Coverage and cash balances have been historically what we consider strong. Estimated coverage for fiscal 2008 is lower but still in our view strong at 3.4x due to a decline in tap fees and added debt service for series 2007 revenue bonds. We understand that future capital projects will include expansion of its water treatment plant and water acquisition, a portion of which would be funded with additional debt. The authority's additional bonds coverage test is 1.25x maximum annual debt service.
Olivenhain Mun Wtr Dist, CA	AA	AA-	Misty Newland	The district serves an affluent area in San Diego County, including part of the city of Encinitas. Financial management includes a 10-year operating and capital spending forecast. In addition, the district is proposing a rate structure that includes step-ups during drought conditions to offset revenue losses due to decreased consumption. The district has reserve targets for the operating, capital, and rate stabilization funds. The district is about 74% built-out and we expect will require additional capacity in the future, which we understand it plans to fund with system revenues and debt financing.
Manteca, CA	A+	A-	Shannon Groff	The city is located in the northern portion of the San Joaquin Valley between the cities of Stockton and Modesto and approximately 75 miles east of San Francisco. The city is located in the agriculturally rich San Joaquin Valley between Interstate 5 and State Highway 99. After determining that it was over-drafting its ground water resources, the city entered into an agreement with South San Joaquin Irrigation District for the provision of surface water. The city's current usage is 44% surface water and 56% ground water and future usage is projected at 53% surface water and 47% ground water. A recent rate study led the city to adopt rate increases of 5% each year from 2009-2013; the adopted plan will decrease fixed rates and increase water use charges.
Susanville, CA	A	BBB-	Lisa Schroerer	The moderately small system serves roughly 18,600 people in the seat of Lassen County. In our view, finances are good, and coverage has not fallen below the 1.25x target. We believe cash is very strong, with \$2.2 million in fiscal 2007, and management has indicated that it intends to keep cash at this level. Finances should stay at what we consider good given the system's relatively small capital needs and recent rate increases. Management intends a recent rate increase to fund the system's capital needs, with an estimated revenue of \$400,000 annually.
Los Angeles Cnty San Dist #20, CA	A	A-	Lisa Schroerer	The system serves the city of Palmdale and surrounding areas with roughly 110,000 people. In 2007, the district issued bonds to address environmental compliance issues. Management expects the project to be completed on time. Coverage was more than 2.0x with connection fee revenue and what we consider a still good 1.2x without it in 2007. Management indicated that approved rate increases are anticipated to be sufficient to cover any decline in connection fee revenue and expects 2008 coverage to be similarly strong. The district does have about \$200 million in additional capital needs through 2014. Management anticipates using state loans in the upcoming year to address some of these needs and that it will meet all bond covenants. In our view, the district's strong cash position, with cash held in restricted funds but available for operations, mitigates some concerns over additional capital needs.

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

Table 1

Rating Changes (cont.)				
Clovis, CA	A+	A-	Lisa Schroeer	The system serves a population of roughly 90,000 in the city of Clovis. Previously a rapidly growing area, the city has had to curb its expectation for one-time revenues, but lower construction costs have provided additional financial flexibility not previously anticipated. Coverage is more than 1x without growth-related revenues, and management expects cash to stay strong. The city's capital plans are, in our view, minimal, but management noted that the city may need to contribute to projects necessary for the Fresno system, which the city currently uses for its treatment. Management indicated a willingness to raise rates to ensure a target level of coverage of 1.2x. Additionally, the city has a rate stabilization fund that can stabilize revenues as growth-related revenues drop off. The new rating reflects our expectation that the city will take into account the decrease in growth-related revenues and adjust its finances.
Weber Basin Wtr Conservancy Dist, UT	AA	AA-	Lisa Schroeer	This wholesale and retail utility, covering Weber and Davis counties, has customer cities that, in our opinion, are of strong credit quality. In addition, the district benefits from property tax revenues and a strong water supply. The district provides water to what we consider a strong economic area that ties into the broader Salt Lake economy.
Valley Sanitary District, CA	A+	A-	Lisa Schroeer	The district serves the city of Indio and surrounding areas. Coverage is more than 4x, even when excluding one-time development-generated revenue. User rates are rising to address additional costs and should help as connection fee revenue decreases. In our view, the district holds strong cash that it may partially use to address some treatment plan needs, but it has a policy to maintain at least six months' operations in cash on hand, which it is well above. Additional capital projects are related to growth, and we understand that the district is evaluating whether or not it is a prudent time, financially, to move forward. These are not currently need-based projects, which gives the district flexibility.

mgd--Million gallons per day, MSA--Metropolitan statistical area MHEBI--Median household effective buying income.

Table 2

Selected Credit Ratios				
Issuer	DSC (x)	Days' Cash	MHEBI (% of U.S.)	Debt to Plant (%)
East Cherry Creek Valley Water and Sanitation District, CO	2.4	537	104	33
Marin Municipal Water District, CA	2.0	238	156	19
Montrose, CO	4.3	876	83	21
Santa Ana Financing Authority, CA	3.9	187	101	30
Helix Wtr Dist, CA	3.3	166	114	11
Hillsborough, CA	2.4	678	414	85
Imperial Irrigation District, CA	2.1	395	75	39
Municipality of Anchorage (Sewer), AK	5.4	215	132	24
Municipality of Anchorage (Water), AK	1.8	242	132	35
Orange County Water Dist, CA	2.3	590	130	73
Brea Public Finance Authority, CA	1.7	212	132	30
Oro Loma Sanitary District, CA	6.4	935	128	8
Crescenta Vy Wtr Dist, CA	4.3	312	133	23
East Vy Wtr Dist, CA	1.7	339	97	24
Goleta Wtr Dist, CA	2.0	112	139	53
Lake Arrowhead Comnty Svcs Dist (water), CA	1.8	397	146	28
Los Angeles Cnty San Dist #14 (Lancaster), CA	1.2	2,493	96	134
Los Angeles Cnty San Dists Fincg Auth, CA	1.4 to 8.7	365 to 4,000	101	38
Arapahoe Cnty Water & Wastewater Authority, CO	7.9	799	127	69
Olivenhain Mun Wtr Dist, CA	4.0	399	145	20
Manteca, CA	5.46	1,977	109	71
Susanville, CA	1.3	289	85	123

26 Western Water And Sewer Issuers Are Upgraded On Revised Criteria

Table 2

Selected Credit Ratios (cont.)				
Los Angeles Cnty San Dist #20, CA	1.2	833	101	303
Clovis, CA	2.2	1,000	100	154
Weber Basin Wtr Conservancy Dist, UT	3.2	696	122/104	31
Valley Sanitary District, CA	6.5	2,120	90	20

MHEBI--Median household effective buying income. DSC--Debt service coverage.

Table 3

Contact Information			
Credit analyst	Location	Phone	E-mail
Tim Barrett	New York	212-438-6327	timothy_barrett@standardandpoors.com
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Chris Morgan	San Francisco	415-371-5032	chris_morgan@standardandpoors.com
Misty Newland	San Francisco	415-371-5073	misty_newland@standardandpoors.com
Le Quach	San Francisco	415-371-5013	le_quach@standardandpoors.com
Matthew Reining	San Francisco	415-371-5044	matthew_reining@standardandpoors.com
Lisa Schroeer	San Francisco	415-371-5006	lisa_schroeer@standardandpoors.com
Li Yang	San Francisco	415-371-5024	Lih_Yang@standardandpoors.com

Hypothesis Testing of the Relationship between Company Size and ROE for Publicly Traded Water Companies

Linear Regression Model: $Y = \beta_0 + \beta_1 * X + \epsilon$

Where, Y is earned ROE and X is company size.

ϵ is the error of the line fit, β_0 is the intercept on the Y-axis, β_1 is the coefficient of the regression model. Company size can be defined as total market capitalization, total assets, or total number of employees. I used market capitalization.

Null Hypothesis: $\beta_1 = 0$, There is no relationship between Size and ROE

Alternative hypothesis $\beta_1 \neq 0$, There is relationship between Size and ROE

Significance level, alpha (α) = 5%

Decision criteria: If the T-statistic falls inside the range bounded by the positive and negative critical values, then there is insufficient evidence of a relationship.

Summary Results of Hypothesis Testing of Size vs. ROE

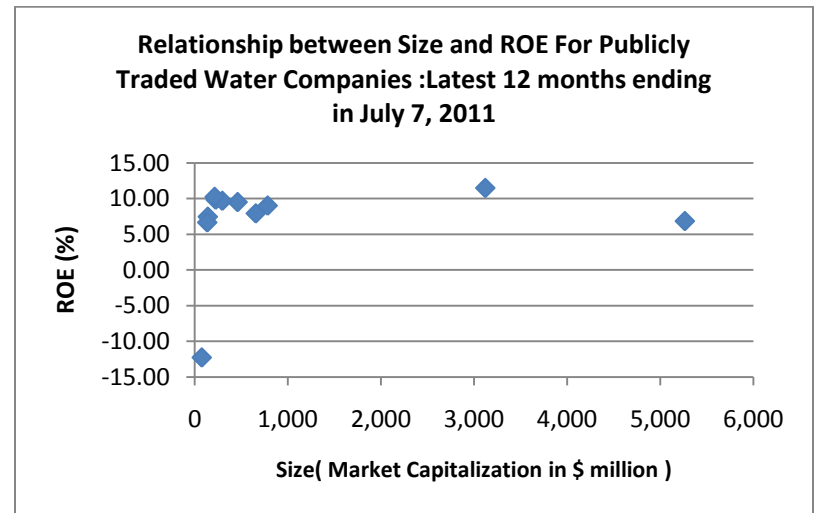
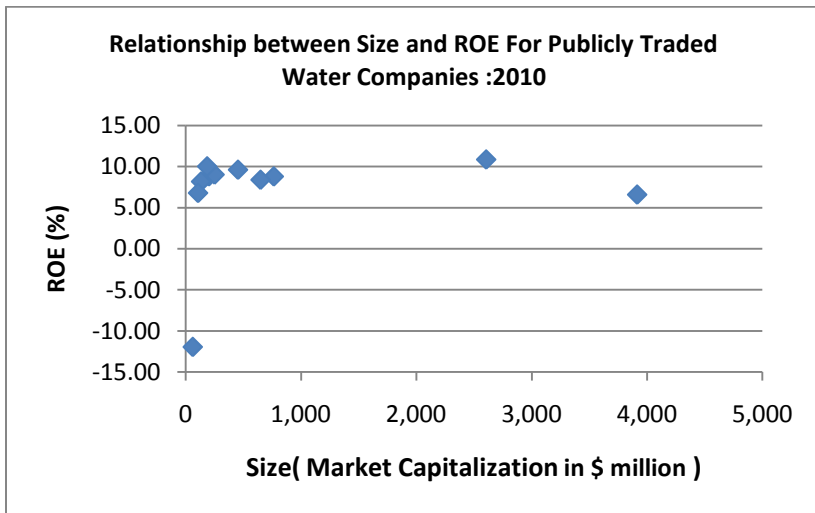
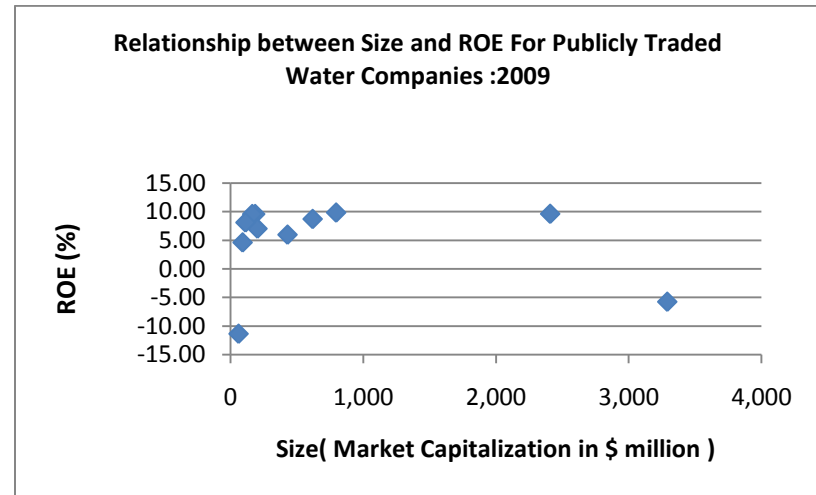
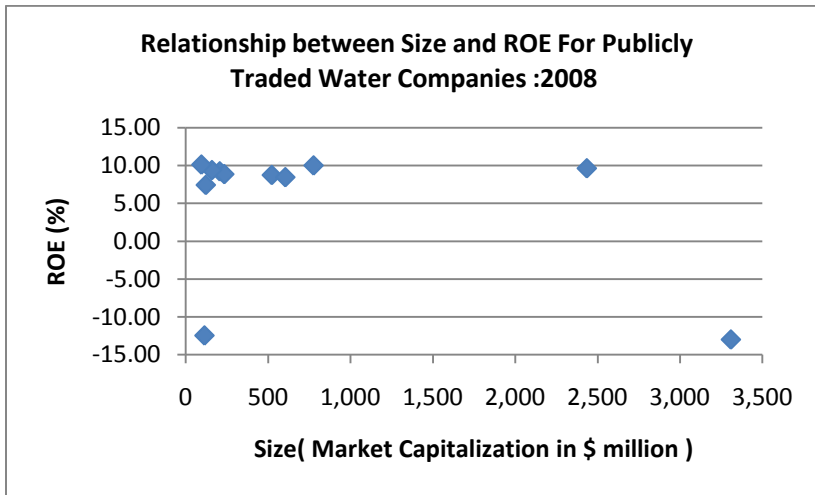
	2008	2009	2010	LTM ¹
R²	0.1773	0.0505	0.0307	0.0273
t-Statistic	-1.3928	-0.6921	0.5341	0.5028
Degrees of Freedom, df	10	10	10	10
Number of Companies, N	11	11	11	11
Alpha, α	5%	5%	5%	5%
Critical Value	± 2.228	± 2.228	± 2.228	± 2.228
Decision	No evidence of a relationship	No evidence of a relationship	No evidence of a relationship	No evidence of a relationship

LTM¹The latest 12 months ending July 7, 2011

List of Companies used in the Analysis

#	Water Company	Exchange/Ticker Symbol
1	American States Water	NYSE:AWR
2	American Water Works	NYSE:AWK
3	Aqua America	NYSE:WTR
4	Artesian Resources Corporation	NasdaqGS:ARTN.A
5	California Water	NYSE:CWT
6	Connecticut Water Services	NasdaqGS:CTWS
7	Middlesex Water	NasdaqGS:MSEX
8	Pennichuck Corp	NasdaqGM:PNNW
9	Pure Cycle Corp.	NasdaqCM:PCYO
10	SJW Corp	NYSE:SJW
11	York Water (The)	NasdaqGS:YORW

Graphs Depicting Relationship between ROE and Company Size



Data Source: CapitalIQ, a business unit of Standard and Poor's