Tega Cay Water Service, Inc.
Docket No. 2006-97-WS

BEFORE THE

PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

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REBUTTAL TESTIMONY

OF

PAULINE M. AHERN, CRRA
VICE PRESIDENT
AUS CONSULTANTS – UTILITY SERVICES

ON BEHALF OF

TEGA CAY WATER SERVICE, INC.

CONCERNING

FAIR RATE OF RETURN

JULY 2006

I. INTRODUCTION

Q. Please state your name, occupation and business address.

A. My name is Pauline M. Ahern and I am a Vice President of AUS Consultants – Utility Services. My business address is 155 Gaither Drive, P. O. Box 1050, Moorestown, New Jersey 08057.

Q. Are you the same Pauline M. Ahern who previously submitted prepared direct testimony in this proceeding?

A. Yes, I am.

Q. Have you prepared an exhibit which supports your rebuttal testimony?

A. Yes, I have. It has been marked for identification as Exhibit No. __ and consists of Schedules PMA-13 through PMA-20. Hereinafter, references to Schedules within this testimony will be from this Exhibit, unless otherwise noted.

II. PURPOSE

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to rebut certain aspects of the direct testimony of J. Randall Woolridge, witness for the Office of Regulatory Staff (ORS)

concerning overall rate of return. Specifically, I will address ORS Witness Woolridge's discussion of the relationship between market-to-book ratios and returns on common equity, his assessment of the relative riskiness of utilities and other industries, his application of the Capital Asset Pricing Model (CAPM) and the inadequacy of his recommended common equity cost rate range. I will also respond to comments on my direct testimony by ORS Witness Woolridge.

III. COMMON EQUITY COST RATE

Q. On pages 9 through 13 and pages 50 and 51 of his direct testimony, ORS Witness Woolridge contends that a company's accounting return on book equity (ROE) determines whether its common stock is worth more or less than its book value. Please comment.

A. On pages 10 and 11 of his direct testimony, ORS Witness Woolridge discusses the competitive process. Since regulation acts as a surrogate for competition, these comments apply to public utilities as well as non-price regulated firms. *In the competitive environment, there is no evidence of any direct and exclusive relationship between market-to-book ratios and ROE.*

To determine if his contention has any merit, I observed the market-to-book ratios and the ROEs for the Standard & Poor's (S&P) Industrial Index and the S&P 500 Composite Index over a long period of time. On Schedule PMA-13 I have shown the market-to-book ratios, ROEs, annual inflation rates and ROEs net of the annual rates of inflation for each year from 1947 through 2005. In

only one year, 1949, did the S&P Industrials have a market-to-book ratio of 1.00 time. In all of the other years, the market-to-book ratios exceeded 1.00 time. In no year did the market-to-book ratio fall below 1.00 time. In 1949, the only year the market-to-book ratio was 1.00 (or 100%), the real rate of earnings on book equity, adjusted for deflation, was 18.1% (16.3% + 1.8%). In contrast, in 1961, the S&P Industrials had a market-to-book ratio of 2.01 times, while experiencing a rate of earnings on book equity (adjusted for inflation) of only 9.1% (9.8% - 0.7%). In 2004, the estimated average market-to-book ratio of the S&P 500 Composite was 3.12 times, while the average rate of earnings on book equity (adjusted for inflation) was 8.9% (12.2% - 3.3%).

The foregoing information, and all of the information shown on Schedule PMA-13 shows that competitive unregulated companies have never sold below book value, on average and have sold at their book value in only one year since 1947. These data also show that there is no relationship between ROE (either the nominal rate or the real earnings rate, i.e., the nominal rate less inflation or plus deflation for the only two years in which deflation incurred, 1949 and 1954) and the market-to-book ratio. It is illogical that investors would pay 2.56 times book value to earn an ROE net of inflation of 13.7% in 1989, yet would pay 2.73 times book value to earn a rate, net of inflation, of only 7.6 in 1991.

Because of the nearly 60 years in the period, it cannot validly be argued that the expected trend would be different because the market-to-book ratios best relate to future years. The foregoing data, and all of the data on Schedule PMA-13 demonstrate that it is a distortion of reality to suggest that regulation is

a substitute for the competition of the marketplace on the one hand and on the other to suggest that those competitive companies have consistently over-earned based on market-to-book ratios which ORS Witness Woolridge suggests are affected only by ROEs.

Q. Is there any support in the academic literature for ORS Witness Woolridge's' suggestion of a direct and exclusive relationship between allowed regulatory ROEs and utility market-to-book ratios?

A. No. As demonstrated above, there is no evidence that a market-to-book ratio will be at unity if a firm's ROE equals its cost of equity. For example, as stated in my direct testimony at pages 26 and 27, Phillips[1] states:

> Many question the assumption that market price should equal book value, believing that 'the earnings of utilities should be sufficiently high to achieve market-to-book ratios which are consistent with those prevailing for stocks of unregulated companies.'

In addition, Bonbright[2] states:

> In the first place, commissions cannot forecast, except within wide limits, the effect their rate orders will have on the market prices of the stocks of the companies they regulate. In the second place, *whatever the initial market prices may be, they are sure to change not only with the changing prospects for earnings, but with the changing outlook of an inherently volatile stock market.* In short, market prices are beyond the control, though not beyond the influence of rate regulation. Moreover, even if a commission did possess the power of control, any

[1] Charles F. Phillips, Jr., The Regulation of Public Utilities-Theory and Practice, 1993, Public Utility Reports, Inc., Arlington, VA, p. 395.

[2] James C. Bonbright, Albert L. Danielsen and David R. Kamerschen, Principles of Public Utility Rates. 1988, Public Utilities Reports, Inc., Arlington, VA, p. 334.

> attempt to exercise it ... would result in harmful, uneconomic shifts in public utility rate levels. (italics added)

In view of the literature and the fact that the stocks of competitive firms on average almost always sell well above their book values, it should be clear that ORS Witness Woolridge's contention of a direct and exclusive relationship between market-to-book ratios and ROEs is erroneous and should be disregarded.

Q. At pages 13 and 14 of his direct testimony, ORS Witness Woolridge, in comparing the business and financial risks of public utilities with that of other industries, relies on a comparison of "investment risk for 100 different industries as measured by beta" (see page 13, line 19 of his direct testimony). Please comment.

A. ORS Witness Woolridge justifies such a comparison by stating that "beta . . . is the only relevant measure of investment risk that need be of concern for investors." (page 13, line 19 through page 14, line 1) Investment risk is comprised of both company-specific or diversifiable and systematic or non-diversifiable risk. Beta is a measure of systematic risk and explains only approximately 30%, on average, of the variance, or total riskiness of a typical stock.[3] While it may be true that systematic risk is the only risk of concern for investors in terms of portfolio theory where an investor can diversify away

[3] Diana R. Harrington, Modern Portfolio Theory & the Capital Asset Pricing Model: A User's Guide, 1983, Prentice-Hall,

1 company-specific risk as he / she builds a portfolio of securities, it is incorrect
2 that such risk should not be rewarded and is not relevant to investors, especially
3 in a ratemaking proceeding where the cost rate on common equity for a single
4 firm is being determined. The goal in the current proceeding is to set rates for a
5 single regulated utility, Tega Cay, and not for a portfolio of water companies.
6 Therefore, it is the total risk, i.e., the sum of diversifiable, company-specific, and
7 non-diversifiable, market, risk of their investment which is relevant to investors'
8 risk analysis. Since beta, as discussed above, does not capture the total
9 investment risk of a security, to compare the relative riskiness of various
10 industries based exclusively upon beta is an incomplete comparison. No
11 conclusions of relative total investment risk can be drawn from such a
12 comparison. Therefore, ORS Witness Woolridge's comparison of the business
13 and financial risk of public utilities and other industries is meaningless.
14
15 Q. Please comment upon ORS Witness Woolridge's CAPM.
16
17 A. Although ORS Witness Woolridge bases the equity risk premium component of
18 his CAPM upon Ibbotson and Chen's "building blocks methodology", in part, he
19 has failed to consider Ibbotson Associates application of the building blocks
20 methodology as presented in its Stocks, Bonds, Bills and Inflation – Valuation
21 Edition 2006 Yearbook, which is more current than the Ibbotson and Chen
22 article of January 2003 upon which he relies. In the 2006 Yearbook, the building
23 blocks methodology is described on page 37 (page 2 of Schedule PMA-14),

Inc., p. 74

which begins with an estimate of the risk-free rate to which an equity risk premium is added to derive the market cost of equity. On page 43, Ibbotson Associates state that the estimate of the risk-free rate and equity risk premium are from Appendix C, namely the risk-free rate is 4.6%, the yield on long-term (20-year) U.S. Treasury bonds and the long-horizon expected equity risk premium of 7.1%.[4] The sum of the risk-free rate of 4.6% and the long-horizon expected equity risk premium of 7.1% is 11.7%, which represents the market cost of equity. This is a far cry from ORS Witness Woolridge's estimate of the expected market return of 8.10% based upon "decomposing" the building blocks methodology shown on page 39 of his direct testimony.

Ibbotson Associates' building blocks methodology as presented in the 2006 Yearbook can be taken even further and used to develop a company specific common equity cost rate. To do so, Ibbotson Associates next add an industry risk premium and size premium to the market equity return. Since, Tega Cay engages in regulated water operations, its comparable three-digit SIC code is 494. Table 3-5 of the 2006 Yearbook presents industry premia estimates for various SIC codes. For SIC code 494, the industry premia estimate is a negative 6.41% of (6.41%). As discussed in my direct testimony, Tega Cay's estimated market capitalization places it in the 10th decile of Ibbotson Associates' small size premia which has a size premium of 6.36% (see page 3 of Schedule PMA-1). Adding the industry premium of (6.41%) and the size premium of 6.36% to the market cost of common equity of 11.7%, yields a

[4] Large company stock arithmetic mean total returns of 12.3% for 1926-2005 minus the arithmetic mean long-term government bond income returns of 5.2% for 1926-2005. (7.1% = 12.3% - 5.2%)

Tega Cay specific cost of common equity of 11.65%. (11.65% = 11.7% - 6.41% + 6.36%)

In addition, an expected market equity risk premium of 6.45%, to be used in a CAPM analysis, is indicated based upon Ibbotson Associates market cost of common equity of 11.7% derived above, relative to ORS Witness Woolridge's recommended risk-free rate of 5.25%[5] (6.45% = 11.7% - 5.25%). Utilizing the average betas of the small water group, 0.67% and the large water group, 0.74% yields CAPM cost rates for the groups of 9.57% and 10.02% respectively. (9.57% = (5.25% + (0.67% * 6.45%)) and (10.02% = 5.25% + (0.74 * 6.45%)). However, even these CAPM results do not reflect the additional investment riskiness of Tega Cay due to its small size and higher debt ratio vis-à-vis the companies in either of ORS Witness Woolridge's water groups.

In view of the foregoing, it is clear that ORS Witness Woolridge's CAPM analysis grossly understates both the market equity return as well as the cost of common equity of Tega Cay and therefore, should be disregarded.

Q. On pages 35 through 47, ORS Witness Woolridge discusses a recent decline in the equity risk premium. Please comment.

A. The decline in the equity risk premia discussed by ORS Witness Woolridge is

[5] From page 48 of ORS Witness Woolridge's direct testimony.

short-term phenomenon. He cites a study by Claus and Thomas, on page 36 of his direct testimony, which evaluated equity risk premia over the 1985-1998 time period. He also cites a study by Einhorn which evaluated equity risk premia in the early 1990s. And on page 5, he cites a speech given by Alan Greenspan which discussed declining equity risk premia during the past decade. However, the cost of capital is a long-term concept. This long-term concept of the cost of capital is evident in the infinite horizon of investors presumed by the DCF model upon which ORS Witness Woolridge primarily relied in arriving at his recommended common equity cost rate. As discussed in my direct testimony at page 40, line 1 through page 41, line 14 and clearly enunciated in Schedule PMA-18 which will be discussed subsequently, Ibbotson Associates state that focusing on shorter, more recent time periods is suspect and arbitrary, and the use of a very long historical period of time which takes into account all types of events is appropriate for providing insight into the risk over a <u>very long future period of time</u>. In an article by Michael Annin, CFA and Dominic Falaschetti, CFA, for Ibbotson Associates and which appeared in the January / February 1998 issue of <u>Valuation Strategies</u> entitled "Equity Risk Premiums Still Produce Debate" the authors note the following regarding the equity risk premium over time:

> . . . the equity risk premium varies considerably from year-to-year. The table below also indicates that the equity risk premium varies considerably by decade, from a high of 17.9 percent in the 1950s to a low of 2.3 percent in the 1930s. In the recent periods, the equity risk premium has been higher than its long-term average of 7.5 percent.
>
> Exhibit 2 illustrates the resulting equity risk premium based

> on different starting dates through year-end 1996. Over longer periods, the results are fairly stable, centering around 7.5 percent. In contrast, the equity risk premium calculations over shorter periods can fluctuate considerably. When measured from 1966 through 1996, the lowest period, the resulting equity risk premium is only 4.3 percent. More recent calculations of the equity risk premium lie above 8 percent. (emphasis added) (table and exhibit omitted)
>
> * * * *
>
> Relatively recently there have been periods of recession and boom, low and high inflation, low and high interest rates, in addition to the stagflation period of the 1970s. By including market data measured over the entire set of economic scenarios available, the model can better anticipate similar events in the future. It would be inappropriate to overemphasize one period over another without the knowledge of what lies ahead.

Therefore, ORS Witness Woolridge's belief that there is any relevance to recently lower equity risk premia is misplaced.

Q. Please explain.

A. There is no real difference between the growth component used in the DCF model and the long-term arithmetic mean equity risk premium used in the risk premium model in that each is "expectationally constant" based upon theory. Morin[6] states with regard to the DCF model:

> It is not necessary the *g* be constant year after year to make the model valid. The growth rate may vary randomly around some average expected value. Random variations around a trend are perfectly acceptable. As long as the mean expected growth is constant.

[6] Roger A. Morin, Regulatory Finance-Utilities' Cost of Capital, 1994, Public Utilities Reports, Inc., Arlington, VA, p. 111.

Morin's reference to the concept of expectational constancy relative to the *g* in the DCF model can be applied equally to the equity risk premium. The equity risk premium will vary from year to year because it is mean reverting, just like the *g* in the DCF model. What is important is to keep in mind the infinite investment horizon (in reality a very long run investment horizon) of common stocks.

The *g* in the DCF model varies but is presumed to be constant over an infinite horizon in the conventional or standard DCF model. The same is true with regard to the risk premium in any risk premium model, including the CAPM, as the equity risk premium is derived from achieved and/or expected common stock returns. ORS Witness Woolridge's' criticism is without merit.

Q. Has ORS Witness Woolridge adequately reflected the risk of Tega Cay's smaller size relative to his comparison groups of water companies?

A. No. Although ORS Witness Woolridge chose a range of common equity cost rate at the high end of his range of common equity cost rate of 8.00% to 9.40%, i.e., 9.00% to 9.40%, as his recommendation, to reflect the small size of Tega Cay, such a cost rate still does not fully reflect the increased business risk of Tega Cay based upon its small size vis-à-vis the two proxy groups of water companies. I have made a study of the total market capitalization of Tega Cay vis-à-vis his two proxy groups of water companies. The results are shown on Schedule PMA-15. Page 1 contains a summary of a small size risk adjustment

based upon the Ibbotson Associates Size Premia study, page 2 contains notes relative to page 1 and page 3 contains a summary of the market capitalizations as of July 20, 2006. Pages 4 through 16 contain excerpt from Ibbotson Associates' Stocks, Bonds, Bills and Inflation – Valuation Edition 2006 Yearbook. Tega Cay is significantly smaller than the average company in either of ORS Witness Woolridge's water groups based upon market capitalization as shown below:

Table 1

	Market Capitalization (1) ($ millions)	Times Greater than Tega Cay ($ Millions)
ORS Witness Woolridge's Small Water Group	$146.387	20.8x
ORS Witness Woolridge's Large Water Group	$1,189.147	131.7x
Tega Cay	7.026 (2) 9.026 (3)	

(1) From Schedule PMA-15.
(2) Based upon the average market-to-book ratio of ORS Witness Woolridge's small water group.
(3) Based upon the average market-to-book ratio of ORS Witness Woolridge's large water group.

Since Tega Cay has no common stock which is publicly traded, I have assumed that if it did and it were publicly traded, its common shares would be selling at the same market to book value as the average water company in ORS Witness Woolridge's two water groups. Hence, Tega Cay's market capitalization is estimated to be $7.026 million as of July 20, 2006, based upon the small water group and $9.026 based upon the large water group. In contrast, the

market capitalization of the average water company in ORS Witness Woolridge's small water group was $146.387 million on July 20, 2006, or 20.8 times larger than Tega Cay's estimated market capitalization. Likewise, the market capitalization of the average water company in his large water group was $1.189 billion on July 20, 2006, or 131.7 times larger than Tega Cay's estimated market capitalization. It is conventional wisdom, supported by actual returns over time, and a general premise contained in basic finance textbooks, that smaller companies tend to be more risky causing investors to expect greater returns as compensation for that risk. Pages 4 through 16 of Schedule PMA-15 confirm this proposition to be true. As shown on page 13 of Schedule PMA-15, the average size premium for stocks in the 10th decile was 6.36% from 1926 – 2005. It can also be determined from the information shown on page 1 of Schedule PMA-15 that the market capitalization of the average company in the 10th (smallest) decile was approximately $123.903 million ($216.335 billion aggregate decile market capitalization divided by 1,746 companies). In other words, even the average smallest company had a theoretical market capitalization between about 14 to 18 times greater than Tega Cay with estimated market capitalizations of $7.026 to $9.026 million based upon the average market-to-book ratio of ORS Witness Woolridge's small and large water groups.

Although the market capitalization of ORS Witness Woolridge's small water group also falls in the 10th decile, as does Tega Cay's, the small water group's market capitalization is still significantly larger, i.e., 20.8 times, than

Tega Cay. Therefore, in view of Tega Cay's extremely small estimated market capitalization, relative to the estimated average market capitalization of both of ORS Witness Woolridge's two water groups, it is reasonable to assume a small size risk premium of 2.38% or the approximately one-half of the size premium shown in column 4 on page 1 of Schedule PMA-15. In my opinion, although my adjustment to common equity cost rate is an extremely conservative 0.35%, or 35 basis points, the assumption of 2.38% as the risk premium represents a reasonable equity premium which would be applicable to Tega Cay. Thus, ORS Witness Woolridge's business risk-adjusted common equity cost rate range should more appropriately be 11.38% to 11.78%, [i.e., 9.00% + 2.38% = 11.38% and 9.40% + 2.38% = 11.78%].

Q. Does a common equity cost rate range of 11.38% to 11.78%, after adjustment for Tega Cay's small size, fully reflect the total investment risk of Tega Cay?

A. No. ORS Witness Woolridge did not reflect the greater financial risk of Tega Cay as evidenced by its lower common equity ratio, i.e., 40.90%, vis-à-vis the average common equity ratios of his two groups of water companies, namely 46.2% for his small water group and 50.0% for his large water group as shown on Exhibit___(JRW-3). As discussed in my direct testimony, at pages 14 through 16, financial risk is the additional risk created by the introduction of senior capital into the capital structure, i.e., the higher the proportion of senior capital in the capital structure, the higher the financial risk. And the higher the

1 financial risk of a given firm such as Tega Cay, the higher the total investment
2 risk of that firm. Consistent with the basic financial precept of risk and return,
3 i.e., the higher the risk, the higher the investor required return, Tega Cay's
4 greater financial risk vis-à-vis the companies in ORS Witness Woolridge's two
5 water groups must be reflected in his recommended common equity cost rate
6 range. His common equity cost rate range reflects the level of financial risk of
7 his two groups of water companies and not Tega Cay's level of financial risk
8 which is higher. On pages 64 and 65 of my direct testimony, I provided an
9 indication of the possible magnitude of the adjustment to common equity cost
10 rate which is necessary to reflect Tega Cay's greater relative financial risk.
11 Although the Brigham, Gapenski and Aberwald study cited is nearly twenty
12 years old, the basic financial precept remains the same, that as the level of
13 financial risk increases for a firm, so does its common equity cost rate. On page
14 65 of my direct testimony, I derived adjustments of 0.58% and 0.95% relative to
15 my two proxy groups based upon the Brigham, Gapenski and Aberwald study.
16 Adjustments of a similar magnitude would be derived based upon ORS Witness
17 Woolridge's two water groups as their average common equity ratios are nearly
18 identical to those of my two proxy groups.
19 Rather than use these adjustments, i.e., 0.58% and 0.95%, as the
20 financial risk adjustments to my recommended common equity cost rate range, I
21 made a conservatively reasonable financial risk adjustment of 0.20%. An
22 adjustment of 0.20% is consistent with the recent average spread between
23 Moody's A and Baa rated public utility bonds of 0.23% as shown on page 4 of

1 Schedule PMA-10. It is my opinion that Tega Cay's bonds, if it had bonds which
2 were rated by Moody's and S&P, would be rated in the Baa and BBB rating
3 categories, respectively. Assuming that Tega Cay would be assigned a
4 business profile by S&P of '3', i.e., the average business profiles of my two
5 proxy groups of water companies (see page 2 of Schedule PMA-10) and of
6 ORS Witness Woolridge's two water groups (see page 1 of Schedule PMA-14),
7 rounded to '3', Tega Cay's ratemaking debt ratio of 59.10% is consistent with
8 S&P's total debt to total capital financial guideline for BBB rated public utility
9 bonds with a business profile of '3' of 55% - 65%. Therefore, an adjustment to
10 reflect financial risk of 0.20% is clearly reasonable. Had ORS Witness
11 Woolridge included such a modest financial risk adjustment, along with the
12 business risk adjustment described above, his recommended common equity
13 cost rate range would have been 11.58% to 11.98%.
14
15 Q. On page 51, lines 5 through 12 of his direct testimony ORS Witness Woolridge
16 discusses the interest coverage ratios implied in his recommended range of
17 common equity cost rate. Please comment.
18
19 A. These interest coverage ratios are meaningless and irrelevant. As the rate of
20 return recommended or authorized in this proceeding is but an <u>opportunity</u> for
21 earnings and not a guarantee, it is likely that his implied coverage ratios will not
22 be achieved due to attrition as discussed previously. Moreover, S&P no longer
23 publishes interest coverage ratios as part of their financial guidelines to be used

in its bond / credit rating analyses. Hence, no conclusions regarding the adequacy of either the implied interest coverage ratios or the historically achieved coverage ratios of his two groups of water companies at or over some unknown time period can be made for bond / credit rating analyses. The only conclusion that can be drawn from ORS Witness Woolridge's comparison of interest coverages on page 51 of his direct testimony is that his implied interest coverage ratios for Tega Cay based upon his recommended range of common equity cost rate are at the low end of the coverages achieved by his water groups, keeping in mind that they will likely not be achieved due to attrition.

IV. RESPONDING TO COMMENTS ON COMPANY TESTIMONY

1. Business Risk Adjustment

Q. On page 54, lines 1 and 2 of his direct testimony ORS Witness Woolridge states that the Ibbotson Associates size premium data can not be associated with the water utility industry. Please comment.

A. ORS Witness Woolridge bases his assertion on the fact that the "average beta for companies in the 10th decile is 1.38 as shown at the bottom of Table 7-5 on page 15 of Schedule PMA-1. His comparison to the average beta of water companies is misplaced and irrelevant. As described in Table 7-5, the beta of 1.38 associated with the 10th decile was derived from excess returns for the time period January 1926 through December 2004.[7] Presumably, when he

[7] Note that pages 6 through 18 of Schedule PMA-1 are from Ibbotson Associates, Stocks, Bonds, Bills and Inflation –

1 states that this beta is twice that of water utilities, he is comparing the 1.38 beta
2 with the average betas of his two water groups, i.e., 0.67 and 0.74, as shown on
3 Exhibit __(JRW-8), page 2. This is an apples and oranges comparison as the
4 0.67 and 0.74 average betas for the two water groups is calculated with the
5 most recent five years of weekly observations (259 observations) ending with
6 the latest Wednesday, April 26, 2006, prior to publication of each water
7 company Value Line Ratings and Report of April 28, 2006. In contrast, the 1.38
8 beta cited by Ibbotson Associates is calculated with observations from the last
9 eighty (80) years which amounts to 960 monthly observations and 4,160 weekly
10 observations. Clearly then, no comparison between a beta calculated over the
11 most recent 5-year period can be compared with a beta calculated over an
12 historical 80-year period.
13
14 2. Discounted Cash Flow Model
15 Q. On page 56, lines 16 through 21 of his direct testimony ORS Witness Woolridge
16 criticizes your "elimination" of certain DCF results. Please comment.
17
18 A. ORS Witness Woolridge has "two issues" with my "hurdle rate" of 8.8% for
19 individual company results to be included in arriving at a conclusion of DCF
20 common equity cost rate. Both of his "'issues" are incorrect. First, while noting
21 that the 8.8% is "the sum of [the] projected yield of 6.8% on "A" rated public
22 utility bonds plus 200 basis points" on lines 17 through 18 on page 56, he

Valuation Edition 2005 Yearbook. They should have been from the 2006 Yearbook. The correct pages are included as pages 4 through 16 of Schedule PMA-15 accompanying this rebuttal testimony.

1 seems to fault the fact that it is "above current yields on 'A' rated public utility
2 bonds." We are currently in a rising interest environment, with the Federal
3 Reserve Open Market Committee raising the Fed Funds rate on June 29, 2006
4 for the seventeenth consecutive time and with no clear indication that it will not
5 continue to raise the Fed Funds rate in the near future. Moody's reports that for
6 June 2006, the latest month for which 'A' rated public utility bonds are available,
7 'A' rated public utility bond yield was 6.40%, while the 'Aaa' rated corporate
8 bond yields averaged 5.89%, or a spread of 0.51%. 'Aa' corporate bond yields
9 are expected to rise from an expected second quarter 2006 average of 5.88% to
10 6.2% on average for the fourth quarter 2007, or an average of 6.3% for the six
11 quarters ending with the fourth quarter 2007 as can be gleaned from the
12 information shown on page 7 of Schedule PMA-10 with a spread between 'A'
13 rated public utility bond yields and 'Aaa' rated corporate bond yields of 0.51%,
14 the projected 'A' rated bond yield is currently 6.81% (6.81% = 6.3% + 0.51%).
15 Clearly, interest rates are rising and it is appropriate to utilize a projected bond
16 yield when establishing a "hurdle" rate. Moreover, as both the cost of capital and
17 rate making are prospective, projected interest rates are more indicative of the
18 level of future capital costs as will be discussed subsequently.

19 Second, ORS Witness Woolridge claims that I have "performed no
20 studies" and "provided no basis to support this figure", i.e., the 200 basis points
21 premium over the projected 'A' rated public utility bond yield. This is incorrect,
22 as page 35, lines 13 through 27, of my direct testimony, describes my review of
23 recent authorized returns on common equity throughout the United States vis-à-

1 vis concurrent estimates of the forecasted average yield on 'A' rated public utility
2 bonds. An update of the authorized returns on common equity which I reviewed
3 is shown in Schedule PMA-16. As shown on page 2, the spread between the
4 authorized returns on common equity and the forecasts 'A' rated public utility
5 bond yield was 2.80% to 5.51% from January 2004 through June 2006,
6 averaging 3.98%, clearly supporting and indicating that my "assumption" of a
7 200 basis points premium over the projected 'A' rated public utility bond yield is
8 reasonable, if not conservative.

9 In view of the foregoing, it is clear that ORS Witness Woolridge's two
10 "issues" are non-issues and should be rejected.

11

12 Q. On page 57, lines 1 through 8 of his direct testimony, ORS Witness Woolridge
13 also criticizes your reliance on analysts' projected five-year earnings growth
14 forecasts because "[I]t is well known that the EPS forecasts of these analysts . .
15 . are overly optimistic and therefore biased upwards." Is he correct?

16

17 A. No. Based upon his contention that there is a direct and exclusive relationship
18 between earnings and the market prices established by investors and his own
19 use of analysts' earnings growth rate forecasts, it is curious that he criticizes my
20 use of analysts' forecasts of earnings growth rates, which he himself uses in his
21 DCF application. Over the long run, there can be no growth in DPS without
22 growth in EPS. Earnings expectations have a more significant, but not sole,

influence on market prices than dividend expectations. Thus, the use of earnings growth rates in a DCF analysis provides a better matching between investors' market appreciation expectations implicit in market prices and the growth rate component of the DCF. Consequently, earnings expectations have a significant influence on market prices which affect market price appreciation and hence, the "growth" experienced by investors. This should be evident even to relatively unsophisticated investors just by listening to financial new reports on radio, TV or reading the newspapers. In fact, Dr. Morin in his book, Regulatory Finance – Utilities' Cost of Capital, (1994) states on page 153 "moreover, there is an abundance of empirical research that shows the validity and superiority of earnings forecasts to estimate the cost of capital."

In addition, Myron Gordon, the "father" of the standard regulatory version of the DCF model utilized by ORS Witness Woolridge, ORS Witness Woolridge and myself in the instant docket, has recognized the significance of analysts' forecasts of growth in EPS in a speech he gave in March 1990 before the Institute for Quantitative Research and Finance. He said:

> We have seen that earnings and growth estimates by security analysts were found by Malkiel and Cragg to be superior to data obtained from financial statements for the explanation of variation in price among common stocks. . . estimates by security analysts available from sources such as IBES are far superior to the data available to Malkiel and Cragg. Eq (7) is not as elegant as Eq (4), but it has a good deal more intuitive appeal. It says that investors buy earnings, but what they will pay for a dollar of earnings increases with the extent to which the earnings are reflected in the dividend or in appreciation through growth.

Professor Gordon recognized that total return is largely affected by the terminal price which is mostly affected by earnings (hence price / earnings

multiples). However, while EPS is the most significant factor influencing market prices, it is by no means the only factor that affects market prices, a fact recognized by Bonbright with regard to public utilities as discussed previously in both this rebuttal testimony and my direct testimony.

Studies performed by Cragg and Malkiel[8] demonstrate that analysts' forecasts are superior to historical growth rate extrapolations. Nonetheless, it does not really matter what the level of accuracy of those analysts' forecasts is well after the fact. What is important is that they influence investors and hence the market prices they pay. Moreover, there is no empirical evidence that investors, consistent with the EMH, would discount or disregard analysts' estimates of growth in earnings per share. As discussed in my direct testimony at page 20, line 1 through page 21, line 23, the "semistrong" form of the EMH is generally held to be true where all perceived risks are taken into account by investors in the prices they pay for securities and investors are aware of all publicly-available information, including bond ratings, discussions about companies by bond rating agencies and investment analysts, as well as the many analysts earnings growth forecasts available. Investors are also aware of the accuracy of past forecasts, whether for earnings or dividends growth or for interest rates. Investors have no prior knowledge of the accuracy of any forecasts available at the time they make their investment decisions, as that accuracy only becomes known after some future period of time has elapsed. Therefore, consistent with the EMH upon which the cost of common equity

[8] John G. Cragg and Burton G. Malkiel, Expectations and the Structure of Share Prices, University of Chicago Press, 1982, Chapter 2.

models utilized by both ORS Witness Woolridge and myself are predicated, since investors have such analysts earnings growth rate projections available to them and investors are aware of the accuracy of such projections, analysts earnings projections should receive significant weight in a cost of common equity analysis. Finally, it is obvious that the majority of analysts' forecasts are from brokerage firms. ORS Witness Woolridge would like us to ignore reality by disregarding the largest influence on individual investors who own approximately 70%, on average (see Schedule PMA-8), of all the common stock shares of the companies in my proxy groups. Rate of return analysts, such as ORS Witness Woolridge and myself who attempt to emulate investor behavior, should not ignore this reality.

Q. In his discussion of the apparent upward bias in analysts' earnings forecasts on page 61 of his direct testimony, ORS Witness Woolridge quotes a Wall Street Journal article by Ken Brown which intimates that the scandals from the early part of this decade involving security analysts has not changed anything regarding analysts' forecasts. Please comment.

A. ORS Witness Woolridge's discussion is misplaced since the U.S. Securities and Exchange Commission (SEC) has taken steps to remove the bias revealed in the events discussed in the Wall Street Journal article cited on page 61 of his direct testimony. Schedule PMA-17 is a copy of a speech given on May 8, 2002 by Lori Richards, Director, Office of Compliance Inspections and Examinations.

She notes that on May 8, 2002,

> "the SEC approved rule changes proposed by the National Association of Securities Dealers, Inc. and the new York Stock Exchange, Inc. regarding analyst conflicts of interest. These rules reflect a dramatic change in the way analysts are regulated."
>
> The new rules include:
>
> 1) Limitations on the Relationships and Communications Between Investment Banking and Research Analysts.
> 2) Analyst Compensation Prohibitions.
> 3) Firm Compensation.
> 4) Promises of Favorable Research are Prohibited.
> 5) Restrictions on Personal Trading by Analysts.
> 6) Disclosures of Financial Interests in Covered Companies.
> 7) Disclosures in Research Reports Regarding the Firm's Ratings.
> 8) Disclosures During Public Appearances by Analysts.

Ms. Richards concludes her speech with:

> "This is a time of change for research analysts. In some quarters, they have been vilified. It's important to remember that they perform an important service - - - and they need to do their work in an environment free from conflicts and biases. Investor trust is too critical to their work to allow them to be compromised. The new SRO rules approved by the SEC today, and the other steps we are taking, go a long way to helping analysts regain their independence."

Clearly, ORS Witness Woolridge's comments are misplaced as they no longer apply to security analysts, notwithstanding a newspaper journalist's opinion to the contrary. Moreover, although the penalties paid by the nation's largest securities firms occurred in 2003 after this speech was given, these penalties were in response to investor abuses which occurred prior to the SEC's action on May 8, 2002.

1

2 3. Risk Premium / Capital Asset Pricing Model

3 Q. On page 64, line 8 through page 65, line 3 of his direct testimony, ORS Witness
4 Woolridge suggests that your risk premium analysis is flawed because of your
5 use of the prospective yield on A rated public utility bonds. He also suggests
6 that common stockholders are not subject to interest rate or default risks. Is he
7 correct?

8

9 A. No. First, ratemaking is prospective, as is the cost of capital, including common
10 equity cost rate. Therefore, it is entirely appropriate to utilize the prospective
11 bond yield or risk-free rate, and not a current or historical yield, in a risk
12 premium or capital asset pricing model analysis.

13 Second, the cost of capital is a long-term concept. Therefore, it is
14 entirely appropriate to utilize the yields on long-term bond or U.S. Treasury
15 securities in a risk premium or capital asset pricing model analysis because it is
16 consistent with the long-term, in perpetuity, investment horizon presumed in the
17 DCF model relied upon by ORS Witness Woolridge. My direct testimony, at
18 page 48, line 12 through page 49, line 18 provides clear support for the use of
19 long-term bond yields in cost of capital analyses as they are consistent with the
20 long-term cost of capital to public utilities and with the long-term investment
21 horizon inherent in utilities' common stocks.

22 Third, company specific bond yields for a given bond rating reflect all
23 elements of diversifiable investment risk, i.e., the sum of business and financial

risks (see my direct testimony, page 15, line 20 through page 16, line 14 and Schedule PMA-2, pages 3 through 9). Interest rate risk does affect common shareholders. When interest rates rise, the cost of fixed capital rises for capital-intensive utilities. The typical impact is reflected by a significant erosion in the achieved rates of earnings, referred to in regulation as attrition. The impact of such attrition is, of course, absorbed by the common shareholders. ORS Witness Woolridge's testimony at page 13 lines 4 through 7 confirms that interest rate risk does affect common shareholders when he states:

> The expected or required rate of return on common stock is a function of market-wide, as well as company-specific, factors. The most important market factor is the time value of money as indicated by the level of interest rates in the economy. Common stock investor requirements generally increase and decrease with like changes in interest rates.

Investor-owned utilities can be and are subject to the risk of default. A prime example is the liquidity crisis faced by Pacific Gas & Electric Co. and Southern California Edison Co. during the first half of 2001 when they began to default on their financial obligations in January of that year.

Q. Please address ORS Witness Woolridge's criticism on pages 68 through 70 of his direct testimony of your use of the long-term historic returns from Ibbotson Associates and on page 66 of your use of Value Line's 3-5 year annual return projections in your risk premium analysis.

A. His criticism of the use of long-term historic returns from Ibbotson Associates is incorrect for the reasons provided by Ibbotson Associates cited in my direct

1 testimony at pages 40 through 43 and discussed in detail later in this rebuttal
2 testimony. In addition, the use of long-term data is consistent with the long-term
3 investment horizon for utilities' common stocks consistent with the application of
4 the conventional or standard regulatory version of the DCF model which is based
5 on an infinite investment horizon.

6 His criticism of the use of Value Line's forecasted 3-5 year annual return
7 projections is unwarranted as well. Value Line is highly respected and widely
8 subscribed to. It is available in most libraries, brokerage houses and on the
9 Internet, and is clearly investor-influencing, especially since approximately 70%,
10 on average, of all the shares of the water companies in my proxy groups are held
11 by individuals (see Schedule PMA-8). Whether such forecasts have been
12 accurate is irrelevant. What is relevant is whether they influence investors and
13 their expectations of growth and total return rate which are reflected in the
14 market prices which they pay. ORS Witness Woolridge criticizes the use of all
15 projections whether they be from Value Line, Zacks, First Call, I/B/E/S or
16 Reuters, although he, himself, uses the latter in his DCF analysis. He denies
17 reality and because he does so his contention is without basis.

18

19 Q. At pages 68 through 70 of his direct testimony, ORS Witness Woolridge also
20 suggests that the geometric mean is proper to use for estimating the cost of
21 capital and that the use of the arithmetic mean is incorrect. Please comment.

22

23 A. As discussed in this testimony and in my direct testimony at page 41, line 16
24 through page 43, line 8, it is the arithmetic mean return which is appropriate for

cost of capital purposes precisely because it does capture the effect of changing economic conditions on risk premia over time. Because historical total returns and equity risk premium spreads differ in size and direction over time, the arithmetic mean provides insight into the variance and standard deviation of returns. The prospect for variance, i.e., standard deviation, captured in the arithmetic mean, provides the valuable insight needed by investors and rate of return analysts alike to estimate the expected risk of stocks. Absent such insight, investors cannot meaningfully evaluate prospective risk.

The financial literature is quite clear on this point, that risk is measured by the variability of expected returns, i.e., the probability distribution of returns. Ibbotson Associates explains in detail, in pages 77 through 83 of Stocks, Bonds, Bills and Inflation: Valuation Edition 2006 Yearbook, and shown in Schedule PMA-18, why the arithmetic mean calculated over a very long period of time is the correct mean to use when estimated the cost of capital.

Weston and Brigham[9] provide the standard financial textbook definition of the riskiness of an asset when they state:

> The riskiness of an asset is defined in terms of the likely variability of future returns from the asset. (emphasis added)

And Morin states[10]:

> The geometric mean answers the question of what constant return an investor would have to achieve in each year to have his or her investment growth match the return achieved by the stock market. The arithmetic mean answers the question of what growth rate is the best estimate of the future amount of money that will be

[9] J. Fred Weston and Eugene F. Brigham, Essentials of Managerial Finance, 3rd Ed., The Dryden Press, 1974, p. 272.
[10] Morin at p. 276.

produced by continually reinvesting in the stock market. (emphasis added)

As previously discussed, investors gain insight into relative riskiness by analyzing expected future variability. This is accomplished by the use of the arithmetic mean of a distribution of returns / premia because it takes into account all of the returns / premia, hence, providing meaningful insight into the variance and standard deviation of those returns / premia.

Q. Can it be demonstrated that the arithmetic mean takes into account all of the returns and therefore, that the arithmetic mean is appropriate to use when estimating the opportunity cost of capital?

A. Yes. Schedule PMA-19, which consists of two pages, graphically demonstrates this premise. Page 1 charts the returns on large company stocks for each and every year, 1926 through 2005 from Ibbotson Associates' Stocks, Bonds, Bills, and Inflation – Valuation Edition 2006 Yearbook. It is clear from looking at the variation of these returns that stock market returns, and hence, equity risk premia, vary.

Shown on page 2 is the distribution of each and every one of those returns for the entire period from 1926 through 2005. There is a clear bell-shaped pattern to the probability distribution of returns. The arithmetic mean of this distribution of returns takes into account all of the returns in the distribution and thus the potential variance and standard deviation likely to be experienced

in the future when estimating the rate of return based upon such historical returns. In contrast, the bold years: 1926 and 2005, on page 2 of Schedule PMA-19, demonstrate that when the geometric mean is calculated, only two of the returns are taken into account, namely the initial and terminal years, which, in this case, are 1926 and 2005. Based only upon those two years, a constant rate of return is calculated by the geometric average. That constant return, when represented graphically, would be a flat line over the entire 1926 to 2005 time period which is obviously far different from reality, based upon the probability distribution or returns shown on page 2 and demonstrated on page 1.

In view of all the foregoing, it should be clear that the arithmetic mean long-term historical risk premium takes the standard deviation of returns which is critical to risk analysis into account. Therefore, ORS Witness Woolridge's suggestion that the geometric mean is proper to use for estimating the cost of capital is incorrect.

Q. On pages 72 through 74 of his direct testimony, ORS Witness Woolridge suggests that your risk premium analysis is flawed because it does "not reflect the change in risk and return in today's financial markets." Please comment.

A. His criticism is unfounded. I have shown previously that: 1) utilities' cost of common equity capital applies to a very long investment horizon (in theory, infinity) and 2) that Ibbotson Associates states that focusing on shorter, more recent time periods is suspect and only the use of a very long historical period of

time which takes into account all types of events is appropriate for providing insight into the risk over a very long future period of time (see my direct testimony, pages 40 through 42). Therefore, ORS Witness Woolridge's' contention that there is relevance "the market risk premium has declined in recent years" is misplaced.

4. Empirical Capital Asset Pricing Model (ECAPM)

Q. At page 76, lines 9 through 14, of his direct testimony, ORS Witness Woolridge criticizes your use of the ECAPM by criticizing your citations from Roger A. Morin's book Regulatory Finance -- Utilities' Cost of Capital. Please comment.

A. ORS Witness Woolridge claims that Dr. Morin provides only "anecdotal evidence on the ECAPM and the weights to be use[d] in applying the ECAPM." A review of Dr. Morin's discussion in his book indicate that ORS Witness Woolridge has misrepresented Dr. Morin's "evidence." Schedule PMA-20 is an excerpt of pages 321 and 335-341 from Dr. Morin's book where, on page 321, he clearly cites the numerous tests of the CAPM which have confirmed its validity while also determining that the empirical Security Market Line (SML) described by the CAPM is not as steeply sloped as the predicted SML. In addition, Dr. Morin describes, on pages 334-337 of his book, his own research developing the "weights to be use[d] in applying the ECAPM.

In closing, it should be noted that ORS Witness Woolridge has not commented upon the regulatory support cited in my direct testimony at page 52,

line 31 through page 53, line 9, which supports the ECAPM, namely the New York Public Service Commission and the Regulatory Commission of Alaska. Nor, has ORS Witness Woolridge criticized Eugene F. Brigham's comments regarding the confusion among students between beta and the slope of the SML cited on page 53, lines 14 through 28 of my direct testimony.

5. Comparable Earnings Model

Q. At page 78, lines 2 through 18 of his direct testimony, ORS Witness Woolridge claims that your CEM is flawed. Please comment.

A. His criticism is based, again, upon his contention that there is a direct and exclusive relationship between market-to-book ratios and achieved return rates on common equity which I have abundantly demonstrated earlier in this rebuttal testimony and in Schedule PMA-13 is unsupported by the empirical evidence. Therefore, his criticism should be ignored as without merit.

Q. Does that conclude your rebuttal testimony?

A. Yes.

Tega Cay Water Service, Inc.
Docket No. _____

BEFORE THE

PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA

EXHIBIT

TO ACCOMPANY THE

REBUTTAL TESTIMONY

OF

PAULINE M. AHERN, CRRA
VICE PRESIDENT
AUS CONSULTANTS – UTILITY SERVICES

ON BEHALF OF

TEGA CAY WATER SERVICE, INC.

CONCERNING

FAIR RATE OF RETURN

JULY 2006

Exhibit No. ___
Schedule PMA-13

Tega Water Service, Inc.
Market-to-Book Ratios, Earnings / Book Ratios and
Inflation for Standard & Poor's Industrial Index and
the Standard & Poor's 500 Composite Index
from 1947 through 2005

Year	Market-to-Book Ratio (1)		Earnings/ Book Ratio (2)		Inflation (4)	Earnings / Book Ratio - Net of Inflation	
	S&P Industrial Index (3)	S&P 500 Composite Index (3)	S&P Industrial Index (3)	S&P 500 Composite Index (3)			
1947	1.23 %	NA	13.0 %	NA	9.0 %	4.0 %	NA
1948	1.13	NA	17.3	NA	2.7	14.6	NA
1949	1.00	NA	16.3	NA	(1.8)	18.1	NA
1950	1.16	NA	18.3	NA	5.8	12.5	NA
1951	1.27	NA	14.4	NA	5.9	8.5	NA
1952	1.29	NA	12.7	NA	0.9	11.8	NA
1953	1.21	NA	12.7	NA	0.6	12.1	NA
1954	1.45	NA	13.5	NA	(0.5)	14.0	NA
1955	1.81	NA	16.0	NA	0.4	15.6	NA
1956	1.92	NA	13.7	NA	2.9	10.8	NA
1957	1.71	NA	12.5	NA	3.0	9.5	NA
1958	1.70	NA	9.8	NA	1.8	8.0	NA
1959	1.94	NA	11.2	NA	1.5	9.7	NA
1960	1.82	NA	10.3	NA	1.5	8.8	NA
1961	2.01	NA	9.8	NA	0.7	9.1	NA
1962	1.83	NA	10.9	NA	1.2	9.7	NA
1963	1.94	NA	11.4	NA	1.7	9.7	NA
1964	2.18	NA	12.3	NA	1.2	11.1	NA
1965	2.21	NA	13.2	NA	1.9	11.3	NA
1966	2.00	NA	13.2	NA	3.4	9.8	NA
1967	2.05	NA	12.1	NA	3.0	9.1	NA
1968	2.17	NA	12.6	NA	4.7	7.9	NA
1969	2.10	NA	12.1	NA	6.1	6.0	NA
1970	1.71	NA	10.4	NA	5.5	4.9	NA
1971	1.99	NA	11.2	NA	3.4	7.8	NA
1972	2.16	NA	12.0	NA	3.4	8.6	NA
1973	1.96	NA	14.6	NA	8.8	5.8	NA
1974	1.39	NA	14.8	NA	12.2	2.6	NA
1975	1.34	NA	12.3	NA	7.0	5.3	NA
1976	1.51	NA	14.5	NA	4.8	9.7	NA
1977	1.38	NA	14.6	NA	6.8	7.8	NA
1978	1.25	NA	15.3	NA	9.0	6.3	NA
1979	1.23	NA	17.2	NA	13.3	3.9	NA
1980	1.31	NA	15.6	NA	12.4	3.2	NA
1981	1.24	NA	14.9	NA	8.9	6.0	NA
1982	1.17	NA	11.3	NA	3.9	7.4	NA
1983	1.45	NA	12.2	NA	3.8	8.4	NA
1984	1.46	NA	14.6	NA	4.0	10.6	NA
1985	1.67	NA	12.2	NA	3.8	8.4	NA
1986	2.02	NA	11.5	NA	1.1	10.4	NA
1987	2.50	NA	15.7	NA	4.4	11.3	NA
1988	2.13	NA	19.0	NA	4.4	14.6	NA
1989	2.56	NA	18.5	NA	4.7	13.8	NA
1990	2.63	NA	16.3	NA	6.1	10.2	NA
1991	2.77	NA	10.8	NA	3.1	7.7	NA
1992	3.29	NA	13.0	NA	2.9	10.1	NA
1993	3.72	NA	15.7	NA	2.8	12.9	NA
1994	3.73	NA	23.0	NA	2.7	20.3	NA
1995	4.06	2.64	22.9	16.0 %	2.5	20.4	13.5 %
1996	4.79	2.99	24.8	16.8	3.3	21.5	13.5
1997	5.88	3.53	24.6	16.3	1.7	22.9	14.6
1998	7.13	4.16	21.3	14.5	1.6	19.7	12.9
1999	8.27	4.76	25.2	16.7	2.7	22.5	14.0
2000	7.51	4.51	23.9	15.6	3.4	20.5	12.2
2001	NA	3.50	NA	15.0	1.6	NA	13.4
2002	NA	2.93	NA	8.3	2.4	NA	5.9
2003	NA	2.78	NA	14.1	1.9	NA	12.2
2004	NA	3.12 (5)	NA	16.1	3.3	NA	12.8
2005	NA	3.35 (5)	NA	19.9	3.4	NA	16.5
Average	2.34	3.48	14.9 %	15.4 %	3.9 %	10.9 %	12.9 %

P = Preliminary

Notes: (1) Market-to-Book Ratio equals average of the high and low market price for the year divided by the average book value

(2) Earnings/Book equals earnings per share for the year divided by the average book value

(3) On January 2, 2001 Standard & Poor's released Global Industry Classification Standard (GICS) price indexes for all Standard & Poor's U.S. indexes. As a result, all S&P Indexes have been calculated with a common base of 100 at a start date of December 31, 1994. Also, the GICS industrial sector is not comparable to the former S&P Industrial Index and data for the former S&P Industrial Index has been discontinued

(4) As measured by the Consumer Price Index (CPI)

(5) Ratios for 2004 are based upon estimated book values using the actual average price and the estimated book value calculated by adding the 2004 or 2005 earnings per share to the 2003 and 2004 book value per share and then subtracting the 2004 and 2005 dividends per share as provided by Standard & Poor's Security Price Index Record, 2006 Edition. Pp. 471 and 473and 2005

Source of Information: Standard & Poor's Security Price Index Record, 2000 Edition, p. 40
Standard & Poor's Statistical Service, Current Statistics, August 2001, p. 29
Standard & Poor's Statistical Service, Current Statistics, January 2001, p. 36
Standard & Poor's Current Statistics, June 2006, p. 29
Standard & Poor's Security Price Index Record, 2006 Edition, pp. 1, 471 and 473
Standard & Poor's Compustat Services, Inc. PC Plus Research Insight Data Base
Ibbotson Associates, Stocks, Bonds, Bills and Inflation - Valuation Edition 2006 Yearbook, 2006

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Chapter 3

The Buildup Method

Estimating the equity cost of capital is a difficult task to which much of modern financial theory is devoted. The equity cost of capital is equal to the expected rate of return for a firm's equity; this return includes all dividends plus any capital gains or losses. A properly specified cost of equity must include, if appropriate, provisions for flotation costs and certain market inefficiencies that might not be captured by standard methods for estimating equity rates of return.

There are several widely used and effective methods to estimate the equity cost of capital. The most common of these are: 1) the buildup method, 2) the capital asset pricing model (CAPM), 3) the discounted cash flow (DCF) method, 4) arbitrage pricing theory (APT), and 5) the Fama–French three factor model. This chapter will focus on the buildup method, while Chapter 4 will cover all other cost of equity models.

The Buildup Method for Cost of Equity Capital

The buildup method is an additive model in which the return on an asset is estimated as the sum of a risk–free rate and one or more risk premia. Each premium represents the reward an investor receives for taking on a specific risk. The building blocks are summed arithmetically to form an estimate of the cost of capital.

	Risk–Free Rate
+	Equity Risk Premium
+	Firm Size Premium
+	?
=	Cost of Equity

Risk–Free Rate

Since any risky investment should return at least as much as the riskless asset, the risk–free rate is the starting point of the buildup method. The buildup method, the capital asset pricing model, and the Fama–French three factor model all implicitly assume the presence of a single riskless asset, that is, an asset perceived by all investors as having no risk. Selecting the appropriate risk–free rate is discussed in detail in the CAPM section of Chapter 4.

Risk Premia

There are several risk premia that can be used with the buildup method. Some are widely accepted, while others are more controversial. The equity risk premium is the most common; like the risk–free rate, it is a component of the capital asset pricing model and the Fama–French three factor model. The same equity risk premium can be used in each of these models. For additional information on the equity risk premium, see Chapter 5, which has been devoted exclusively to this subject.

Small Stock or Size Premia

A small stock or size premium may also be added in the buildup method to account for the additional risk inherent in small company stocks (for additional information regarding size premia, see Chapter 7, which is devoted to this subject). It is important to note, however, that the size premia presented elsewhere in this publication have been adjusted for beta. In other words, the portion of the excess return on small stocks that can be explained by their higher betas is not included in the size premia. Some assert that a small stock premium that has not been adjusted for beta would be more appropriate for use in the buildup method. This non–beta–adjusted small stock premium can be calculated by subtracting the arithmetic mean of the large company stock return from the arithmetic mean of the small company stock return. Table 3–1 shows the various size premia on both a beta–adjusted and a non–beta–adjusted basis. Table 3–2 shows how the non–beta–adjusted small stock premia are calculated using the arithmetic mean returns from Table 2–1. Calculation of the beta–adjusted size premia is explained in detail in Chapter 7.

Table 3–1

Size Premia on a Beta–Adjusted versus Non–Beta–Adjusted Basis
1926–2005

	Beta–Adjusted Size Premia	Non–Beta–Adjusted Small Stock Premia
Mid–Cap	1 0%	1 9%
Low–Cap	1.8%	3 4%
Micro–Cap	3 9%	6 5%
Ibbotson Small Company Stocks	3 2%	5 1%

Table 3–2

Derivation of Non–Beta Adjusted Small Stock Premia
1926–2005

	Small Company Stock Arithmetic Mean Return		Large Company Stock Arithmetic Mean Return		Non–Beta–Adjusted Small Stock Premia
Mid–Cap	14.2%	–	12 3%	=	1 9%
Low–Cap	15 7%	–	12 3%	=	3 4%
Micro–Cap	18.8%	–	12.3%	=	6 5%
Ibbotson Small Company Stocks	17 4%	–	12 3%	=	5.1%

The problem with using a non–beta–adjusted small stock premium is that in doing so one assumes that the company being valued has the same systematic risk (or beta) as the portfolio of small stocks used in the calculation of the size premium. This ignores much of the information that we have regarding market returns. Primarily, different industries tend to have different levels of systematic risk. For example, companies within health services industries tend to have less systematic risk than the market as a whole. Since the beta–adjusted size premium isolates the excess return due to size, it can be applied to a company without making any assumptions regarding the company's systematic risk.

Suppose we wish to calculate the cost of equity for a small electric utility company falling within the micro–cap size group by using the buildup method. Based on our industry knowledge, we know that the electric utility industry tends to exhibit less risk than the market as a whole. We can calculate the cost of equity with either a beta–adjusted size premium or a non–beta–adjusted size premium as follows:

$$k_s = r_f + ERP + SP_s = 4.6\% + 7.1\% + 3.9\% = 15.6\% \text{ or}$$
$$k_s = r_f + ERP + SSP_s = 4.6\% + 7.1\% + 6.5\% = 18.2\%$$

where:

k_s = the cost of equity for company s;

r_f = the expected return of the riskless asset;

ERP = the expected equity risk premium, or the amount by which investors expect the future return on equities to exceed that on the riskless asset;

SP_s = the expected beta–adjusted size premium for company s based on the firm's equity market capitalization; and

SSP_s = the expected non–beta–adjusted small stock premium for company s based on the firm's equity market capitalization.

The first calculation assumes that the company is neither more nor less risky than the market as a whole. The second calculation, however, assumes that the risk of the company is the same as the micro–cap portfolio as a whole. This poses a problem. The micro–cap portfolio is riskier than the market, but the electric utility industry is less risky than the market as a whole. Therefore, in this example, using the non–beta–adjusted size premium may overstate the cost of equity. Since the beta–adjusted size premium assumes that beta is equal to one, the buildup method may still overstate the cost of equity. We know that the electric utility industry exhibits less risk than the market and should therefore exhibit a lower return. Further adjustments for industry risk are necessary.

Industry Premia

One common element appraisers often add to the buildup approach is an industry risk premium. Traditionally, the appraiser looks at aspects and characteristics of the industry in which the subject company participates to determine the magnitude of the industry risk premium. A major problem with this process in the past has been the qualitative nature of the analysis. The magnitude of the industry premium was often left to the professional opinion of the appraiser instead of a more quantitative methodology.

Ibbotson has developed an industry premium methodology that appraisers can now reference and cite in their appraisal reports. This methodology relies on the full information beta estimation process outlined in Chapter 6, Beta Estimation Methodologies. The full information beta estimation process includes the proportionate risk of all companies that participate in a given industry.

To make it through the screening process, a company must have at least 36 months of return data available, have sales greater than $1,000,000 in the most recent year, and have a market capitalization of at least $10,000 in the most recent month. At the industry level, only those industries that have at least 5 participants and have an aggregate beta between 0 and 3 are considered. Our industry risk premium estimation methodology uses the following equation:

$$IRP_i = (RI_i \times ERP) - ERP$$

where:

IRP_i = the expected industry risk premium for industry i, or the amount by which investors expect the future return of the industry to exceed that of the market as a whole;

RI_i = the risk index for industry i; and

ERP = the expected equity risk premium.

The equity risk premium figure used in this estimation process is the long-horizon expected equity risk premium outlined in Appendix C. For an industry with a risk index of 1, the expected industry risk premium will be 0, for those with a risk index less than one, the expected industry risk premium is negative, and for those with a risk index greater than 1, the expected industry risk premium is positive.

For example, if an investor were looking at a company that has the same risk as the market, (remembering that Ibbotson uses the S&P 500 as the market benchmark), the risk index, by definition, would be equal to 1, and the industry risk premium would be calculated as follows:

$$IRP = (RI \times ERP) - ERP$$

$$IRP = (1 \times 7.1) - 7.1 = 0$$

An IRP of 0 implies that the industry has the same risk as the market.

If an investor were studying an industry that has more risk than the market, the risk index would be greater than 1, e.g. 1.4. The industry risk premium would be calculated in the same fashion:

$$IRP = (1.4 \times 7.1) - 7.1 = 2.84$$

An IRP greater than 0 implies that the industry is riskier than the market.

And finally, if an investor were examining an industry that has less risk than the market, the risk index would be less than 1, e.g. 0.7, and calculation of the industry risk premium would be as follows:

$$IRP = (0.7 \times 7.1) - 7.1 = -2.13$$

An IRP less than 0 implies that the industry is less risky than the market.

The industry risk premium estimates can be found in Table 3–5 at the end of this chapter and should be added to the risk–free rate, equity risk premium, and size premium as follows to determine a cost of equity estimate:

$$k_s = r_f + ERP + SP_s + IRP_s$$

where all of the variables are as given above and IRP_s is the appropriate expected industry risk premium for company s. Table 3–5 also presents the number of companies included in each estimate.

For a complete list of companies used to calculate each industry risk premia estimate, visit www.ibbotson.com/irp and download the Industry Premia Company List Report.

Common Misconceptions and Questions

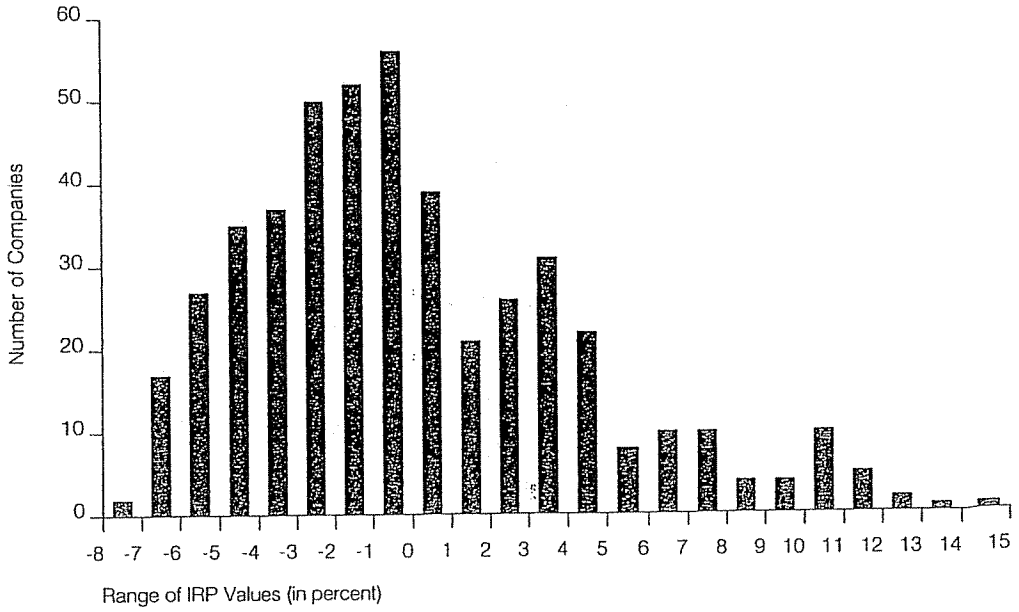
A concern of some analysts is that the introduction of an industry risk premium in addition to a size premium in the buildup method is a form of double counting. It is not. Ibbotson size premia measure excess return over what would be predicted by CAPM. In other words, Ibbotson size premia measure that part of return not reflected by beta. An industry risk premium, on the other hand, measures how risky the industry is in relation to the market as a whole, regardless of size.

For example, consider two companies, one a large chain of 10,000 gas stations, the other family-owned, single-location gas station. If there were a major disruption in oil refining capability, both of these businesses would have exposure to this industry risk even after taking into consideration adjustments for their respective size. In the case of our two gas station businesses, one large, one small, the size premia and the industry premia are measuring completely different kinds of risk.

Another question that has arisen is why there are more negative industry risk premia than positive industry risk premia. As of December 2005, Ibbotson published a total of 470 industry risk premia. Of these, 194 were positive and 276 were negative, with a median value of -0.82% and an average value of 0.02%. Remembering that an IRP of less than zero implies that the industry is less risky than the market, we can conclude that riskier companies are less likely to make it through the full information screening process, and therefore a result comprised of more negative than positive values is justified.

The distribution of these premia is shown in Graph 3-1:

Graph 3-1
Industry Risk Premia Distribution
(December 2005)



Starting with the 2005 Valuation Edition Yearbook, the industry risk premia table was expanded to include four-digit SIC codes. The four-digit SIC codes that had the same number of companies as their corresponding three-digit SIC codes were removed. Similarly, three-digit SIC codes that had the same number of companies as the corresponding two-digit SIC codes were removed from this edition. For example, if SIC code 4911 and 491 had the same number of companies, then the companies included in SIC 4911 were also included in 491. Displaying the industry risk premium for SIC 4911 would not reveal any information not already revealed in SIC 491, and therefore SIC 4911 should not be included in the result.

Please note that the size premium to use should be the beta–adjusted size premium found in Appendix C or Table 7–5, and not the small stock premium, which is the simple difference in returns of large and small company stocks. The small stock premium is meant for use by security analysts in constructing an expected return for a small stock benchmark when forecasting (an input to mean variance optimization). The size premium, on the other hand, is intended for use in the construction of a forward-looking cost of equity estimate appropriate to discounting future cash flows. Using the small stock premium in conjunction with the industry risk premium will most likely overestimate the cost of equity. The simple difference between large and small company returns makes the assumption that the systematic risk of the company is the same as the risk of the small company portfolio. The industry risk premium presented here is therefore a better measure of the appropriate systematic risk to apply.

Other Building Blocks

Other building blocks that have been used with this approach are minority discounts, control premia, and a key person discount. Use of these discounts and premia is more controversial, primarily because it is difficult to quantify their size; generally, the magnitude of the premia or discount is set. In addition, these premia do not necessarily represent rewards an investor receives for taking on a specific risk. For instance, does having a majority owner increase or decrease the risk of the business? Most would agree that the risk of a business does not change with ownership.

In some cases, however, a controlling owner may have influence on decisions that affect the risk of a business. Quantifying the effect of this controlling party in terms of a premium is not easily accomplished. Unlike other risk premia, a control premium is not readily measurable. An additional complication is that it is possible for some of these additional factors to already be present as part of the size premia.

In attempting to account for controlling interests or key people, it may be preferable to include these items when projecting cash flows, rather than making arbitrary adjustments to the discount rate. A probability weight can be assigned to the expected future cash flows based on the influence of these factors under various scenarios. From this probability distribution, the expected cash flow can be determined. By discounting these expected cash flows at a pure discount rate, one can achieve a cleaner analysis.

Estimating the Cost of Equity Using the Data Presented in this Book: Buildup Method

Due to the vast amount of data presented in this publication, the need for a reference that makes it easy to find all of the relevant data to estimate the cost of equity arose. Through the following examples, you will see how to use this book to estimate the cost of equity with the current data set as well as for any prior year using the buildup method. For similar examples using the CAPM method, refer to Chapter 4. Table numbers and alternatives are also provided to make your search easy.

Example Using Current Data

Develop a cost of equity estimate for a company operating in SIC Code 36, the Electronic and Other Electrical Equipment industry, with a market capitalization of $600 million.

Table 3–3
Buildup Method Cost of Equity Example Estimate: Current Data
Year–end 2005

	Components		Current Estimates	Table Reference
	Riskless Rate		4 6	Appendix C
+	Equity Risk Premium	+	7.1	Appendix C
+	Industry Risk Premium	+	8 6	Table 3–5
+	Size Premium	+	1 8	Appendix C
	Cost of Equity Estimate		22.1	

Table 3–3 illustrates the estimation of the cost of equity using current data and the buildup method. From Appendix C, select the yield on the riskless asset. This is the current yield on a government security or the market's current forecast of the riskless rate for the term on the security. Since we are looking to estimate the cost of equity for the entire firm, and the firm is a going concern; we should choose the long–term U.S. Treasury coupon bond yield of 4.6 percent. This current yield can also be found in Table 4–1.

Again, from Appendix C, the long horizon equity risk premium of 7.1 percent should be used.

The industry premium of 8.60 percent can be found in Table 3–5 for the Electronic and Other Electrical Equipment industry.

The company falls within the low–cap category based on the figures in Appendix C or Table 7–2, so the appropriate size premia is 1.8 percent. Alternatively, one could use the decile analysis found in Appendix C and Chapter 7, Table 7–5, to determine the appropriate size premium. In addition to size premia estimates for mid–, low–, and micro–cap companies, Appendix C and Table 7–5 contain estimates by decile. Due to the magnitude of difference between deciles, especially in the smallest deciles, it may be appropriate to use the size premium for the corresponding decile. In this example, the company we are analyzing falls within decile 8 based on the figures found in Appendix C and Table 7–2. Therefore, an alternative size premium would be 2.3 percent, the size premium for decile 8.

Example Estimating the Cost of Equity for a Prior Year

Develop a cost of equity estimate for the same company as of 1996. The company operates in SIC Code 36, the Electronic and Other Electrical Equipment industry, with a market capitalization of $186 million as of December 30, 1996.

Table 3–4

Buildup Method Cost of Equity Example Estimate: Prior Year Data
Year–end 1996

	Components		1996 Estimates	Table Reference
	Riskless Rate		6.7	Appendix B–9
+	Equity Risk Premium	+	7.5	Appendix A–1
	Industry Risk Premium	+	NA	
+	Size Premium	+	3.4	Appendix A–6
	Cost of Equity Estimate		17.6	

Table 3–4 illustrates the estimation of the cost of equity using data from 1996 and the buildup method. From Table B–9, select the yield on the riskless asset, the long–term U.S. Treasury coupon bond yield, for year–end 1996 of 6.7 percent.

From Table A–1, select the long horizon equity risk premium with starting date 1926 and ending date 1996, 7.5 percent. To find a value from Appendix A, select a beginning date across the top of the page. These tables span six pages each, so you will have to find the appropriate page. Once you find the beginning date, scroll down the first column to find the appropriate ending date. The number contained at the intersection of the beginning date 1926 and the ending date 1996, is the average value over that period.

Since Ibbotson did not calculate industry premia in 1996, this estimate is not available. In 1996, the company fell within the micro–cap category based on the figures in Table 7–3. From Table A–6, select the micro–cap size premium with starting date 1926 and ending date 1996, 3.4 percent. Please note that the omission of the industry premium results in an estimate that is lower than that of the CAPM model. An adjustment, either positive or negative, to account for industry risk may be applied. However, as stated above, Ibbotson does not provide a statistically based estimate for prior years.

Table 3-5

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Agriculture, Forestry, and Fishing		
01	Agricultural Production–Crops	9	-3.55%
08	Forestry	5	9.37%
	Mining		
10	Metal Mining	14	-4.03%
12	Coal Mining	18	-0.45%
1220	Bituminous Coal and Lignite Mining	10	-3.77%
13	Oil and Gas Extraction	174	-2.64%
131	Crude Petroleum and Natural Gas	141	-3.53%
132	Natural Gas Liquids	5	4.22%
138	Oil and Gas Field Services	40	0.95%
1381	Drilling Oil and Gas Wells	21	0.32%
1382	Oil and Gas Field Exploration Services	8	5.59%
1389	Oil and Gas Field Services, Not Elsewhere Classified	14	2.04%
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels	14	-2.29%
	Construction		
15	Building Construction—General Contractors and Operative Builders	33	-0.35%
152	General Building Contractors–Residential Buildings	9	4.20%
1521	General Contractors–Single–Family Houses	7	3.85%
153	Operative Builders	22	-0.49%
16	Heavy Construction Other than Building Construction—Contractors	21	2.75%
162	Heavy Construction, Except Highway and Street Construction	18	2.62%
1623	Water, Sewer, Pipeline, and Communication and Power Line Construction	10	10.43%
1629	Heavy Construction, Not Elsewhere Classified	8	1.05%
17	Construction–Special Trade Contractors	31	3.35%
171	Plumbing, Heating and Air–Conditioning	7	-1.09%
173	Electrical Work	10	9.01%
179	Miscellaneous Special Trade Contractors	9	0.32%
1799	Special Trade Contractors, Not Elsewhere Classified	5	-2.00%
	Manufacturing		
20	Food and Kindred Products	116	-4.78%
201	Meat Products	11	-2.06%
2015	Poultry Slaughtering and Processing	5	-0.79%
203	Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties	15	-4.41%
2038	Frozen Specialties, Not Elsewhere Classified	5	-5.72%
204	Grain Mill Products	13	-6.23%
205	Bakery Products	11	-1.42%
2051	Bread and Other Bakery Products, Except Cookies and Crackers	5	2.16%
206	Sugar and Confectionery Products	17	-6.90%
2064	Candy and Other Confectionery Products	8	-2.69%
208	Beverages	31	-4.26
2082	Malt Beverages	6	-6.49%
2084	Wines, Brandy, and Brandy Spirits	6	-5.81%
2086	Bottled and Canned Soft Drinks and Carbonated Waters	14	-3.38%
209	Miscellaneous Food Preparations and Kindred Products	21	-5.06%
2099	Food Preparations, Not Elsewhere Classified	7	-6.58%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Manufacturing (continued)		
21	Tobacco Products	7	-2.71%
211	Cigarettes	5	-5.02%
22	Textile Mill Products	22	-5.04%
221	Broadwoven Fabric Mills, Cotton	6	3.24%
225	Knitting Mills	5	-6.80%
227	Carpets and Rugs	5	-2.16%
23	Apparel and Other Finished Products Made from Fabrics	49	-0.33%
230	Apparel and other Finished Products	11	-0.09%
232	Men's and Boys' Furnishings, Work Clothing, and Allied Garments	14	0.38%
2329	Men's and Boy's Clothing, Not Elsewhere Classified	7	0.43%
233	Women's, Misses', and Juniors' Blouses and Shirts	15	-0.17%
2330	Women's, Misses', and Juniors' Outerwear	7	0.97%
24	Lumber and Wood Products, Except Furniture	31	2.86%
241	Logging	7	-5.50%
242	Sawmills and Planing Mills	12	3.76%
2421	Sawmills and Planning Mills, General	10	1.89%
243	Millwork, Veneer, Plywood, and Structural Wood Members	5	0.32%
245	Wood Buildings and Mobile Homes	10	8.20%
2451	Mobile Homes	6	11.56%
25	Furniture and Fixtures	27	-1.45%
251	Household Furniture	13	-0.33%
2511	Wood Household Furniture, Except Upholstered	5	-0.05%
2512	Wood Household Furniture, Upholstered	5	-2.89%
252	Office Furniture	6	-0.69%
26	Paper and Allied Products	49	-4.37%
262	Paper Mills	14	-6.42%
263	Paperboard Mills	9	2.77%
265	Paperboard Containers and Boxes	7	-1.15%
267	Converted Paper and Paperboard	25	-2.48%
2671	Packaging Paper and Plastics Film, Coated and Laminated	6	3.41%
2672	Coated and Laminated Paper, Not Elsewhere Classified	11	-2.20%
27	Printing, Publishing, and Allied Industries	75	-3.07%
271	Newspapers: Publishing, or Publishing and Printing	18	-3.49%
272	Periodicals: Publishing, or Publishing and Printing	16	13.03%
273	Books	10	-6.36%
2731	Books: Publishing, or Publishing and Printing	9	-4.74%
2741	Miscellaneous Publishing	12	1.52%
275	Commercial Printing	15	-2.44%
2750	Commercial Printing	7	-2.61%
2759	Commercial Printing, Not Elsewhere Classified	6	-0.98%
28	Chemicals and Allied Products	448	-2.32%
281	Industrial Inorganic Chemicals	42	-1.95%
2812	Alkalies and Chlorine	8	-2.25%
2813	Industrial Gases	5	-2.42%
2816	Inorganic Pigments	5	-4.00%
2819	Industrial Inorganic Chemicals, Not Elsewhere Classified	26	0.89%
282	Plastics Materials and Synthetic Resins	34	-0.13%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Manufacturing (continued)		
2821	Plastics Materials, Synthetic Resins, and Nonvulcanizable Elastomers	22	-2.20%
2824	Manmade Organic Fibers, Except Cellulosic	11	11.84%
283	Drugs	301	-1.72%
2833	Medicinal Chemicals and Botanical Products	11	1.76%
2834	Pharmaceutical Preparations	152	-2.31%
2835	In Vitro and In Vivo Diagnostic Substances	54	3.13%
2836	Biological Products, Except Diagnostic Substances	93	-0.35%
2842	Specialty Cleaning, Polishing, and Sanitation Preparations	11	-5.33%
2844	Perfumes, Cosmetics, and Other Toilet Preparations	24	-6.28%
285	Paints, Varnishes, Lacquers, Enamels, and Allied Products	9	-2.08%
286	Industrial Organic Chemicals	24	-0.75%
2869	Industrial Organic Chemicals, Not Elsewhere Classified	18	-1.15%
287	Agricultural Chemicals	16	0.23%
2870	Agricultural Chemicals	5	-0.86%
2879	Pesticides and Agricultural Chemicals, Not Else where Classified	9	0.17%
289	Miscellaneous Chemical Products	25	0.27%
2899	Chemicals and Chemical Preparations, Not Elsewhere Classified	19	0.79%
29	Petroleum Refining and Related Industries	23	-2.80%
291	Petroleum Refining	14	-2.70%
299	Miscellaneous Products of Petroleum and Coal	7	-3.29%
30	Rubber and Miscellaneous Plastics Products	79	-1.83%
301	Tires and Inner Tubes	5	3.71%
306	Fabricated Rubber Products, Not Elsewhere Classified	8	-4.17%
3069	Fabricated Rubber Products, Not Elsewhere Classified	7	-4.88%
308	Miscellaneous Plastics Products	61	0.25%
3081	Unsupported Plastics Film and Sheet	10	-4.18%
3086	Plastics Foam Products	5	-6.29%
3089	Plastics Products, Not Elsewhere Classified	38	0.91%
31	Leather and Leather Products	23	1.73%
314	Footwear, Except Rubber	16	1.35%
3140	Footwear, Except Rubber	5	1.38%
3143	Men's Footwear, Except Athletic	5	7.41%
32	Stone, Clay, Glass, and Concrete Products	43	2.30%
322	Glass and Glassware, Pressed or Blown	6	2.07%
3241	Cement, Hydraulic	5	-5.00%
327	Concrete, Gypsum, and Plaster Products	13	2.86%
3273	Ready-Mixed Concrete	9	-0.72%
33	Primary Metal Industries	83	7.43%
331	Steel Works, Blast Furnaces, and Rolling and Finishing Mills	35	4.85%
3312	Steel Works, Blast Furnaces, and Rolling Mills	19	6.16%
3316	Cold-Rolled Steel Sheet, Strip, and Bars	7	-1.48%
3317	Steel Pipe and Tubes	8	3.22%
333	Primary Smelting and Refining of Nonferrous Metals	9	3.78%
335	Rolling, Drawing, and Extruding of Nonferrous Metals	30	9.61%
3351	Rolling, Drawing, and Extruding of Copper	5	1.62%
3354	Aluminium Extruded Products	5	12.88%
3357	Drawing and Insulating of Nonferrous Wire	13	14.12%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Manufacturing (continued)		
339	Miscellaneous Primary Metal Products	6	1.10%
34	Fabricated Metal Products, Except Machinery and Transportation Equipment	103	-3.27%
341	Metal Cans and Shipping Containers	6	-1.25%
342	Cutlery, Handtools, and General Hardware	20	-4.95%
3423	Hand and Edge Tools, Except Machine Tools and Handsaws	6	-3.25%
3429	Hardware, Not Elsewhere Classified	8	-4.16%
343	Heating Equipment, Except Electric and Warm Air; and Plumbing Fixtures	7	-4.55%
344	Fabricated Structural Metal Products	30	-1.69%
3441	Fabricated Structural Metal	5	-4.15%
3442	Metal Doors, Sash, Frames, Molding, and Trim	5	-1.07%
3443	Fabricated Plate Work (Boiler Shops)	12	-1.75%
346	Metal Forgings and Stampings	8	2.14%
347	Coating, Engraving, and Allied Services	9	-5.89%
3479	Coating, Engraving, and Allied Services, Not Elsewhere Classified	6	-2.03%
349	Miscellaneous Fabricated Metal Products	23	-0.58%
3499	Fabricated Metal Products, Not Elsewhere Classified	9	-3.36%
35	Industrial and Commercial Machinery and Computer Equipment	352	5.60%
351	Engines and Turbines	12	0.61%
3511	Steam, Gas, and Hydraulic Turbines, and Turbine Generator Set Units	5	2.06%
3519	Internal Combustion Engines, Not Elsewhere Classified	7	4.48%
352	Farm and Garden Machinery and Equipment	13	-0.96%
3523	Farm Machinery and Equipment	11	-1.76%
353	Construction, Mining, and Materials Handling Machinery and Equipment	38	0.38%
3531	Construction Machinery and Equipment	8	0.96%
3533	Oil and Gas Field Machinery and Equipment	21	-0.42%
354	Metalworking Machinery and Equipment	22	-0.36%
3541	Machine Tools, Metal Cutting Types	6	0.00%
3546	Power-Driven Handtools	6	0.19%
355	Special Industry Machinery, Except Metalworking Machinery	55	10.41%
3555	Printing Trades Machinery and Equipment	6	7.98%
3559	Special Industry Machinery, Not Elsewhere Classified	46	10.52%
356	General Industrial Machinery and Equipment	56	-0.78%
3561	Pumps and Pumping Equipment	11	-0.46%
3562	Ball and Roller Bearings	6	-2.32%
3563	Air and Gas Compressors	6	-2.35%
3564	Industrial and Commercial Fans and Air Purification Equipment	10	-1.77%
3569	General Industrial Machinery and Equipment, Not Elsewhere Classified	13	0.74%
357	Computer and Office Equipment	140	7.41%
3571	Electronic Computers	23	3.13%
3576	Computer Communication Equipment	39	10.27%
3577	Computer Peripheral Equipment, Not Elsewhere Classified	40	7.68%
3578	Calculating and Accounting Machines, Except Computers	9	3.77%
3579	Office Machines, Not Elsewhere Classified	6	-1.97%
358	Refrigeration and Service Industry Machinery	33	-2.73%
3585	Air-Conditioning, Warm Air Heating, and Commercial Refrigeration Equipment	18	-1.95%
3589	Service Industry Machinery, Not Elsewhere Classified	14	2.53%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Manufacturing (continued)		
359	Miscellaneous Industrial And Commercial Machinery And Equipment	16	-1.04%
3594	Fluid Power Pumps and Motors	6	-1.68%
36	Electronic and Other Electrical Equipment	466	8.60%
361	Electric Transmission and Distribution Equipment	11	0.72%
3612	Power, Distribution, and Specialty Transformers	7	7.32%
362	Electrical Industrial Apparatus	35	2.09%
3621	Motors and Generators	16	-1.98%
3625	Relays and Industrial Controls	9	-1.26%
3629	Electrical Industrial Apparatus, Not Elsewhere Classified	9	6.64%
363	Household Appliances	12	-0.86%
3634	Electric Housewares and Fans	6	-5.16%
364	Electrical Lighting and Wiring Equipment	23	-0.47%
3643	Current-Carrying Wiring Devices	8	-0.17%
3644	Noncurrent-Carrying Wiring Devices	5	-3.53%
3646	Commercial, Industrial, and Institutional Electric Lighting Fixtures	5	-0.83%
365	Household Audio and Video Equipment	15	3.30%
3651	Household Audio and Video Equipment	14	3.28%
366	Communications Equipment	158	6.58%
3661	Telephone and Telegraph Apparatus	41	11.11%
3663	Radio and Television Broadcasting and Communications Equipment	86	4.57%
3669	Communications Equipment Not Elsewhere Classified	34	5.75%
367	Electronic Components and Accessories	206	10.63%
3672	Printed Circuit Boards	17	12.56%
3674	Semiconductors and Related Devices	124	10.64%
3678	Electronic Connectors	8	4.62%
3679	Electronic Components Not Elsewhere Classified	48	11.93%
369	Miscellaneous Electrical Machinery, Equipment, and Supplies	33	1.52%
3691	Storage Batteries	7	-0.01%
3694	Electrical Equipment for Internal Combustion Engines	6	-2.00%
3699	Electrical Machinery, Equipment, and Supplies, Not Elsewhere Classified	15	5.20%
37	Transportation Equipment	130	-2.31%
371	Motor Vehicles and Motor Vehicle Equipment	70	1.97%
3711	Motor Vehicles and Passenger Car Bodies	10	2.11%
3713	Truck and Bus Bodies	5	5.71%
3714	Motor Vehicle Parts and Accessories	46	1.72%
3715	Truck Trailers	5	3.16%
3716	Motor Homes	7	5.13%
372	Aircraft Parts	40	-0.83%
3721	Aircraft	10	-1.36%
3724	Aircraft Engines and Engine Parts	9	-0.81%
3728	Aircraft Parts and Auxiliary Equipment, Not Elsewhere Classified	24	1.62%
3732	Boat Building and Repairing	5	-2.55%
379	Miscellaneous Transportation Equipment	9	-3.21%
3799	Transportation Equipment, Not Elsewhere Classified	6	-0.97%
38	Measuring, Analyzing, and Controlling Equipment	388	-2.65%
382	Laboratory Apparatus and Analytical, Optical, Measuring Instruments	152	4.49%
3821	Laboratory Apparatus and Furniture	10	-7.07%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Manufacturing (continued)		
3823	Industrial Instruments for Measurement, and Control of Process Variables	25	2.79%
3824	Totalizing Fluid Meters and Counting Devices	5	-3.16%
3825	Instruments for Measuring and Testing of Electricity and Electrical Signals	37	10.56%
3826	Laboratory Analytical Instruments	35	2.03%
3827	Optical Instruments and Lenses	14	10.17%
3829	Measuring and Controlling Devices, Not Elsewhere Classified	30	0.85%
384	Surgical, Medical, and Dental Instruments and Supplies	200	-4.28%
3841	Surgical and Medical Instruments and Apparatus	55	-5.10%
3842	Orthopedic, Prosthetic, and Surgical Appliances and Supplies	60	-5.94%
3843	Dental Equipment and Supplies	10	-4.05%
3844	X-Ray Apparatus and Tubes and Related Irradiation Apparatus	7	4.11%
3845	Electromedical and Electrotherapeutic Apparatus	82	-2.17%
385	Ophthalmic Goods	5	-0.59%
386	Photographic Equipment and Supplies	14	3.52%
39	Miscellaneous Manufacturing Industries	54	-3.60%
394	Dolls, Toys, Games and Sporting and Athletic Goods	27	-5.64%
3942	Dolls and Stuffed Toys	6	-1.14%
3949	Sporting and Athletic Goods, Not Elsewhere Classified	14	0.30%
399	Miscellaneous Manufacturing Industries	21	-0.95%
3993	Signs and Advertising Specialties	6	0.34%
3999	Manufacturing Industries, Not Elsewhere Classified	14	-1.00%
	Transportation, Communications, Electric, Gas, and Sanitary Services		
40	Railroad Transportation	12	-1.96%
4011	Railroads, Line-Haul Operating	10	-1.98%
42	Motor Freight Transportation and Warehousing	34	-2.99%
421	Trucking and Courier Services, Except Air	32	-2.84%
4213	Trucking, Except Local	26	-0.56%
4215	Courier Services, Except by Air	7	-3.68%
44	Water Transportation	17	-1.28%
441	Deep Sea Foreign Transportation of Freight	7	-1.05%
449	Services incidental to water transportation	6	-1.56%
45	Transportation by Air	32	1.42%
451	Air Transportation, Scheduled, and Air Courier Services	23	2.53%
4512	Air Transportation, Scheduled	20	4.83%
4522	Air Transportation, Nonscheduled	9	-5.49%
46	Pipelines, except natural gas	8	-4.93%
47	Transportation Services	33	-1.02%
472	Arrangement of Passenger Transportation	7	-2.08%
4724	Travel Agencies	6	-1.65%
473	Arrangement of Transportation of Freight and Cargo	20	-1.34%
48	Communications	171	1.88%
481	Telephone Communications	77	1.34%
4812	Radiotelephone Communications	31	3.78%
4813	Telephone Communications, Except Radiotelephone	60	-0.87%
483	Radio and Television Broadcasting Stations	45	4.53%
4832	Radio Broadcasting	19	10.53%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Transportation, Communications, Electric, Gas, and Sanitary Services (continued)		
4833	Television Broadcasting Stations	33	3.13%
484	Cable and Other Pay Television Services	22	0.85%
489	Communications Services, Not Elsewhere Classified	44	9.90%
49	Electric, Gas, and Sanitary Services	165	-3.83%
491	Electric Services	78	-4.98%
492	Gas Production and Distribution	68	-3.39%
4922	Natural Gas Transmission	28	-0.41%
4923	Natural Gas Transmission and Distribution	14	-3.36%
4924	Natural Gas Distribution	40	-5.03%
493	Combination Electric and Gas, and Other Utility Services	8	-3.75%
4931	Electric and Other Services Combined	7	-3.31%
494	Water Supply	12	-6.41%
495	Sanitary Services	34	-2.75%
4953	Refuse Systems	14	-2.15%
4955	Hazardous Waste Management	16	-6.45%
499	Cogeneration Power Producers	23	8.68%
	Wholesale Trade		
50	Wholesale Trade–Durable Goods	169	-0.84%
501	Motor Vehicles and Motor Vehicle Parts and Supplies–Wholesale	12	-2.93%
503	Lumber and other construction materials	8	6.57%
504	Professional and Commercial Equipment and Supplies	53	-3.27%
5045	Computers and Computer Peripheral Equipment and Software	26	4.52%
5049	Professional Equipment and Supplies, Not Elsewhere Classified	5	-6.73%
505	Metals and Minerals, Except Petroleum	12	0.08%
5051	Metals Service Centers and Offices	11	-0.09%
506	Electrical Goods	32	6.45%
5063	Electrical Apparatus and Equipment and Construction Equipment	5	2.22%
5065	Electronic Parts and Equipment, Not Elsewhere Classified	24	7.98%
507	Hardware, and Plumbing and Heating Equipment and Supplies	13	-0.37%
508	Machinery, Equipment, and Supplies	26	-0.92%
5084	Industrial Machinery and Equipment	9	0.72%
5085	Industrial Supplies	6	-3.46%
5088	Transportation Equipment and Supplies, Except Motor Vehicles	5	0.51%
509	Miscellaneous Durable Goods	17	-1.65%
5093	Scrap and Waste Materials	8	-4.47%
51	Wholesale Trade–Nondurable Goods	113	-3.34%
511	Paper and Paper Products	10	1.78%
5112	Stationery and Office Supplies	8	6.13%
512	Drugs, Drug Proprietaries, and Druggists' Sundries	17	-4.18%
513	Apparel, piece goods, and notions	6	-2.11%
514	Groceries and Related Products	19	-5.65%
5149	Groceries and Related Products, Not Elsewhere Classified	5	-1.42%
516	Chemicals and Allied Products	8	-2.66%
5169	Chemicals and Allied Products, Not Elsewhere Classified	6	-2.49%
517	Petroleum and Petroleum Products	39	3.16%
5172	Petroleum and Petroleum Products Wholesalers	35	3.17%
519	Miscellaneous Nondurable Goods	11	-0.95%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Retail Trade		
52	Building Materials, Hardware, Garden Supply, and Mobile Home Dealers	8	1.60%
53	General Merchandise Stores	24	-1.29%
531	Department Stores	7	0.67%
533	Variety Stores	14	-1.74%
54	Food Stores	27	-1.17%
541	Grocery Stores	25	-1.15%
5411	Grocery Stores	23	-1.09%
55	Automotive Dealers and Gasoline Service Stations	26	-0.82%
551	Motor Vehicle Dealers (New and Used)	9	1.06%
553	Auto and Home Supply Stores	7	-2.80%
554	Gasoline Service Stations	5	0.71%
56	Apparel and Accessory Stores	59	2.69%
562	Women's Clothing Stores	18	3.52%
565	Family Clothing Stores	18	2.69%
566	Shoe Stores	14	-0.85%
57	Home Furniture, Furnishings, and Equipment Stores	28	3.40%
571	Home Furniture and Furnishings Stores	13	-0.49%
5712	Furniture Stores	6	-0.42%
5719	Miscellaneous Homefurnishings Stores	7	-0.25%
573	Radio, Television, Consumer Electronics, and Music Stores	14	4.64%
5731	Radio, Television, and Consumer Electronics Stores	8	6.70%
58	Eating and Drinking Places	80	-2.07%
5812	Eating Places	77	-2.10%
59	Miscellaneous Retail	118	0.35%
591	Drug Stores and Proprietary Stores	16	-3.28%
594	Miscellaneous Shopping Goods Stores	27	2.76%
5941	Sporting Goods Stores and Bicycle Shops	5	4.02%
5944	Jewelry Stores	7	6.27%
596	Nonstore Retailers	49	7.78%
5961	Catalog and Mail-Order Houses	48	8.07%
599	Retail Stores, Not Elsewhere Classified	17	-0.83%
5999	Miscellaneous Retail Stores, Not Elsewhere Classified	15	-1.08%
	Finance, Insurance, and Real Estate		
60	Depository Institutions	635	-2.42%
602	Commercial Banks	449	-2.19%
6020	Commercial Banks	441	-2.21%
603	Savings Institutions	170	-4.31%
6035	Savings Institutions, Federally Chartered	131	-4.25%
6036	Savings Institutions, Not Federally Chartered	39	-4.73%
609	Functions Related to Depository Banking	15	-3.61%
61	Nondepository Credit Institutions	112	-0.78%
611	Federal and Federally-Sponsored Credit Agencies	5	-5.28%
614	Personal Credit Institutions	26	3.99%
615	Business Credit Institutions	36	-1.40%
6153	Short Term Business Credit Institutions, Except Agricultural	14	6.04%
6159	Miscellaneous Business Credit Institutions	19	-3.95%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Finance, Insurance, and Real Estate (continued)		
616	Mortgage Bankers and Brokers	38	-5.19%
62	Security and Commodity Brokers, Dealers, Exchanges, and Services	88	3.83%
621	Security Brokers, Dealers, and Floatation Companies	45	4.84%
628	Services Allied With the Exchange of Securities or Commodities	53	0.68%
6282	Investment Advice	41	1.38%
6289	Services Allied With the Exchange of Securities or Commodities, Not Elsewhere Classified	13	-3.33%
63	Insurance Carriers	135	-3.90%
631	Life Insurance	48	-1.88%
632	Accident and Health Insurance and Medical Service Plans	31	-5.58%
6321	Accident and Health Insurance	17	-4.29%
6324	Hospital and Medical Service Plans	15	-5.60%
633	Fire, Marine, and Casualty Insurance	67	-3.03%
635	Surety Insurance	23	-2.07%
64	Insurance Agents, Brokers, and Service	46	-5.14%
65	Real Estate	108	-1.60%
650	Real Estate	14	-4.36%
651	Real Estate Operators and Lessors	53	-5.41%
6510	Real Estate Operators (Except Developers) and Lessors	10	-0.30%
6512	Operators of Nonresidential Buildings	38	-6.39%
6513	Operators of Apartment Buildings	8	-3.94%
653	Real Estate Agents and Managers	22	3.12%
6531	Real Estate Agents and Managers	18	0.38%
655	Land Subdividers and Developers	34	-3.07%
6552	Land Subdividers and Developers, except Cemeteries	31	-4.23%
67	Holding and Other Investment Offices	292	-4.39%
679	Miscellaneous Investing	288	-4.22%
6792	Oil Royalty Traders	6	-4.77%
6794	Patent Owners and Lessors	63	4.96%
6795	Mineral Royalty Traders	6	-6.35%
6798	Real Estate Investment Trusts	160	-4.56%
6799	Investors, Not Elsewhere Classified	55	-4.50%
	Services		
70	Hotels, Rooming Houses, and Other Lodging Places	20	2.14%
72	Personal Services	18	-5.77%
726	Funeral Service and Crematories	5	3.95%
729	Miscellaneous Personal Services	7	-7.05%
7299	Miscellaneous Personal Services, Not Elsewhere Classified	5	-6.95%
73	Business Services	810	4.76%
731	Advertising	25	3.81%
7311	Advertising Agencies	6	5.53%
7319	Advertising, Not Elsewhere Classified	11	-1.66%
732	Credit Reporting and Collection	8	-3.91%
7323	Credit Reporting Services	5	-4.10%
733	Mailing, Reproduction, Commercial Art, and Stenographic Services	7	7.49%
734	Services to dwellings and other buildings	8	-5.21%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Services (continued)		
735	Miscellaneous Equipment Rental and Leasing	30	4.04%
7352	Medical Equipment Rental and Leasing	5	0.13%
7359	Equipment Rental and Leasing, Not Elsewhere Classified	24	4.74%
736	Personnel Supply Services	38	4.00%
7361	Employment Agencies	8	3.90%
7363	Help Supply Services	33	3.99%
737	Computer Programming, Data Processing, and Other Computer Services	636	5.15%
7371	Computer Programming Services	21	11.51%
7372	Prepackaged Software	313	4.50%
7373	Computer Integrated Systems Design	140	6.34%
7374	Computer Processing and Data Preparation	29	0.44%
7375	Information Retrieval Services	137	10.89%
7379	Computer Related Services, Not Elsewhere Classified	53	3.81%
738	Miscellaneous Business Services	86	4.45%
7381	Detective, Guard, and Armored Car Services	5	-3.24%
7382	Security Systems Serices	8	-3.48%
7389	Business Services, Not Elsewhere Classified	72	2.12%
75	Automotive Repair, Services, and Parking	18	3.42%
751	Automotive rental and leasing, without drivers	8	2.11%
753	Automotive Repair Shops	6	-0.84%
762	Electrical Repair Shops	5	-2.17%
78	Motion Pictures	38	7.74%
781	Motion Picture Production and Allied Services	25	4.75%
7812	Motion Picture and Video Tape Production	21	4.98%
783	Motion Picture Theatres	6	-0.22%
79	Amusement and Recreation Services	66	-1.39%
792	Theatrical producers (except motion picture), bands, orchestras, and entertainers	5	1.85%
794	Commercial Sports	14	-1.82%
7948	Racing, Including Track Operation	10	-2.97%
799	Miscellaneous Amusement and Recreation Services	48	-1.85%
7993	Coin-Operated Amusement Devices	9	-0.76%
7999	Amusement and Recreation Services, Not Elsewhere Classified	30	-1.84%
80	Health Services	94	-5.78%
801	Offices and Clinics of Doctors of Medicine	8	-4.91%
805	Nursing and Personal Care Facilities	8	-1.10%
8051	Skilled Nursing Care Facilities	7	-1.39%
807	Medical and Dental Laboratories	19	-3.70%
8071	Medical Laboratories	18	-3.70%
808	Home Health Care Services	14	-4.76%
809	Miscellaneous Health and Allied Services, Not Elsewhere Classified	33	-2.59%
8093	Specialty Outpatient Facilities, Not Elsewhere Classified	18	0.28%
8099	Health and Allied Services, Not Elsewhere Classified	13	-4.08%
82	Educational Services	30	-6.37%
822	Colleges, Universities, Professional Schools, and Junior Colleges	8	-5.24%
8221	Colleges, Universities, and Professional Schools	6	-5.44%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp.

Table 3-5 (continued)

Industry Premia Estimates

Through Year-end 2005

SIC Code	Short Descriptions	Number of Companies*	Industry Premia
	Services (continued)		
8243	Data Processing Schools	5	2.87%
8249	Vocational Schools, Not Elsewhere Classified	5	-6.71%
83	Social Services	12	-2.85%
836	Residential Care	7	-2.66%
87	Engineering, Accounting, Research, Management, and Related Services	189	-0.17%
871	Engineering, Architectural, and Surveying Services	35	0.38%
8711	Engineering Services	34	-0.27%
872	Accounting, Auditing, and Bookkeeping Services	17	-0.67%
873	Research, Development, and Testing Services	77	0.89%
8731	Commercial Physical and Biological Research	60	2.56%
8732	Commercial Economic, Sociological, and Educational Research	7	-1.72%
8734	Testing Laboratories	10	-3.48%
874	Management and Public Relations Services	68	-0.58%
8741	Management Services	20	-2.92%
8742	Management Consulting Services	41	0.40%
8744	Facilities Support Management Services	7	-0.28%

*To view the full list of companies, download the Industry Premia Company List Report at www.ibbotson.com/irp

Tega Cay Water Service, Inc.
Derivation of Investment Risk Adjustment Based upon
Ibbotson Associates' Size Premia for the Decile Portfolios of the NYSE/AMEX/NASDAQ

Line No.		1 Market Capitalization on July 20, 2006 (1) (millions)	(times larger)	2 Applicable Decile of the NYSE/AMEX/ NASDAQ	3 Applicable Size Premium		4 Spread from Applicable Size Premium (2)
1.	Tega Cay Water Service, Inc.						
A.	Based upon ORS Witness Woolridge's Small Water Group	$ 7.026		10 (3)	6.36%	(4)	
B.	Based upon ORS Witness Woolridge's Large Water Group	$ 9.026		10 (3)	6.36%	(4)	
2.	ORS Witness Woolridge's Small Water Group	$ 146.387	20.8 x	10 (5)	6.36%	(6)	0.00%
3.	ORS Witness Woolridge's Large Water Group	$ 1,189.147	131.7 x	7 (7)	1.61%	(8)	4.75%

Decile	Number of Companies	Recent Total Market Capitalization (millions)	Recent Average Market Capitalization (millions)
1 - Largest	169	$8,869,801.117	$52,484.030
2	182	2,025,323.685	11,128.152
3	195	1,074,448.763	5,509.994
4	206	656,297.080	3,185.908
5	207	452,329.097	2,185.165
6	238	389,595.517	1,636.956
7	299	319,642.175	1,069.037
8	352	287,783.718	817.567
9	693	268,738.291	387.790
10 - Smallest	1746	216,334.858	123.903

See page 2 for notes.

Tega Cay Water Service, Inc.
Derivation of Investment Risk Adjustment Based upon
Ibbotson Associates' Size Premia for the Decile Portfolios of the NYSE

Notes:

(1) From page 3 of this Schedule.

(2) Line No. 1 – Line No. 2 and Line No. 1 – Line No. 3 of Columns 3 and 4, respectively. For example, the 4.75% in Column 5, Line No. 3 is derived as follows 4.75% = 6.36% - 1.61%.

(3) With an estimated market capitalization of $7.026 million (based upon ORS Witness Woolridge's small water group) and $9.026 (based upon ORS Witness Woolridge's large water group), Tega Cay Water Service, Inc. falls in the 10th decile of the NYSE/AMEX/NASDAQ which has an average market capitalization of $123 903 as shown in the table on the bottom half of page 1 of this Schedule.

(4) Size premium applicable to the 10th decile of the NYSE/AMEX/NASDAQ as shown on page 13 of This Schedule.

(5) With an estimated market capitalization of $146 387 million, ORS Witness Woolridge's small water group falls in the 10th decile of the NYSE/AMEX/NASDAQ which has an average market capitalization of $123.903 million as shown in the table on the bottom half of page 1 of this Schedule.

(6) Size premium applicable to the 10th decile of the NYSE/AMEX/NASDAQ as shown on page 13 of This Schedule.

(7) With an estimated market capitalization of $1,189.147 million, ORS Witness Woolridge's large water group falls in the 7th decile of the NYSE/AMEX/NASDAQ which has an average market capitalization of $1,069.037 million as shown in the table on the bottom half of page 1 of this Schedule.

(8) Size premium applicable to the 7th decile of the NYSE/AMEX/NASDAQ as shown on page 13 of This Schedule.

Source of Information: Ibbotson Associates, Stocks, Bonds, Bills and Inflation – Valuation Edition – 2006 Yearbook, Chicago, IL, 2006

Tega Cay Water Service, Inc.
Market Capitalization of Tega Cay Water Service, Inc. and
The Office of Regulatory Staff Witness Woolridge's Small Water and Large Water Groups

Company	1 Common Stock Shares Outstanding at March 31,2006 (millions)	2 Book Value per Share at March 31,2006 (1)	3 Total Common Equity at March 31,2006 (millions)	4 Closing Stock Market Price on July 20, 2006	5 Market-to-Book Ratio at July 20, 2006 (2)	6 Market Capitalization on July 20, 2006 (3) (millions)	Standard & Poor's Bond Rating	Num. Wtg. (9)	Business Profile / Position (10)
Tega Cay Water Service, Inc.	NA (4)	NA	$ 3.262 (4)	NA			NR	--	--
Based upon ORS Witness Woolridge's Small Water Group					215.4 (5)	$ 7.026 (6)			
Based upon ORS Witness Woolridge's Large Water Group					276.7 (7)	$ 9.026 (8)			
ORS Witness Woolridge's Small Water Group									
Artesian Resources Corp.	4.018	$ 14.453	$ 58.074	$ 19.515	135.0	$ 78.411	NR	--	--
Connecticut Water Services, Inc. (11)	8.205	11.537	94.663	21.920	190.0	179.854	AAA	1	3.0
Middlesex Water Company	11.603	8.599	99.779	17.960	208.9	208.390	A	6	3.0
Pennichuck Corporation	4.194	10.577	44.360	18.670	176.5	78.302	NR	--	--
York Water Company	6.944	7.346	51.011	26.927	366.5	186.978	A	6	2.0
Average	6.993	$ 10.502	$ 69.577	$ 20.998	215.4	$ 146.387	AA-	4.3	2.7
ORS Witness Woolridge's Large Water Group									
American States Water Co. (12)	16.826	$ 15.873	$ 267.071	$ 37.850	238.5	$ 636.864	A-	7	3.0
Aqua America, Inc. (13)	129.506	6.364	824.194	22.170	348.4	2,871.148	AA-	4	2.0
California Water Service Group (14)	18.390	15.756	289.749	35.450	225.0	651.926	NR	--	3.0
SJW Corporation	23.010	8.793	202.324	25.930	294.9	596.649	NR	--	--
Average	46.933	$ 11.697	$ 395.835	$ 30.350	276.7	$ 1,189.147	A+ / A	5.5	2.7

NA = Not Available

Notes:
(1) Column 3 / Column 1.
(2) Column 4 / Column 2.
(3) Column 5 * Column 3.
(4) Company-provided.
(5) The market-to-book ratio of Tega Cay Water Service, Inc. at July 20, 2006 is assumed to be equal to the average market-to-book ratio at July 20, 2006 of ORS Witness Woolridge's small water group
(6) Tega Cay Water Service, Inc.' common stock, if traded, would trade at a market-to-book ratio equal to the average market-to-book ratio at July 20, 2006 of ORS Witness Woolridge's small water group, 215.4%, and Tega Cay Water Service, Inc.' market capitalization at July 20, 2006 would therefore have been $7.026 million. ($7.026 = $3.262 * 257.4%).
(7) The market-to-book ratio of Tega Cay Water Service, Inc. at July 20, 2006 is assumed to be equal to the average market-to-book ratio at July 20, 2006 of ORS Witness Woolridge's large water group
(8) Tega Cay Water Service, Inc.' common stock, if traded, would trade at a market-to-book ratio equal to the average market-to-book ratio at July 20, 2006 of ORS Witness Woolridge's large water group, 276.7%, and Tega Cay Water Service, Inc.' market capitalization at July 20, 2006 would therefore have been $9.026+ million. ($9.026 = $3.262 * 276.7%).
(9) From page 3 of Schedule PMA-10.
(10) From Standard & Poor's U.S. Utilities and Power Ranking List, July 14, 2006
(11) Ratings and business profile are those of Connecticut Water Company.
(12) Ratings and business profile are those of Golden State Water Company
(13) Ratings and business profile are those of Aqua Pennsylvania, Inc.
(14) Ratings and business profile are those of California Water Service Company.

Source of Information: Standard & Poor's Compustat Services, Inc., PC Plus / Research Insight Data Base
Company Quarterly Forms 10Q
finance.yahoo.com
AUS Utility Reports - AUS Monthly Report - July 2006

Stocks, Bonds, Bills, and Inflation

SBBI

Valuation Edition
2006 Yearbook

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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 169 stocks, while the smallest decile accounts for just over

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.

one percent of the market value. The data in the second column of Table 7-1 are averages across all 80 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 2005.

Table 7-1

Size-Decile Portfolios of the NYSE/AMEX/NASDAQ Size and Composition
1926 through September 30, 2005

Decile	Historical Average Percentage of Total Capitalization	Recent Number of Companies	Recent Decile Market Capitalization (in thousands)	Recent Percentage of Total Capitalization
1-largest	63.29%	169	$8,869,801,117	60.92%
2	13.97%	182	2,025,323,685	13.91%
3	7.57%	195	1,074,448,763	7.38%
4	4.74%	206	656,297,080	4.51%
5	3.24%	207	452,329,097	3.11%
6	2.37%	238	389,595,517	2.68%
7	1.73%	299	319,642,175	2.20%
8	1.28%	352	287,783,718	1.98%
9	0.99%	693	268,738,291	1.85%
10-Smallest	0.81%	1,746	216,334,858	1.49%
Mid-Cap 3-5	15.55%	608	2,183,074,940	14.99%
Low-Cap 6-8	5.39%	889	997,021,410	6.85%
Micro-Cap 9-10	1.80%	2,439	485,073,149	3.33%

Source: © 200603 CRSP® Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved. www.crsp.uchicago.edu.

Historical average percentage of total capitalization shows the average, over the last 80 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, 2005.

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 $7,187,244,000 but greater than $1,728,888,000. Low-cap stocks include deciles 6–8 and currently include all companies in the NYSE/AMEX/NASDAQ with market capitalizations at or below $1,728,888,000 but greater than $586,393,000. Micro-cap stocks include deciles 9–10 and include companies with market capitalizations at or below $586,393,000. The market capitalization of the smallest company included in the micro-capitalization group is currently $1,079,000.

Table 7-2

Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Largest Company and Its Market Capitalization by Decile
September 30, 2005

Decile	Market Capitalization of Largest Company (in thousands)	Company Name
1-Largest	$367,495,144	General Electric Co
2	16,016,450	Entergy Corp.
3	7,187,244	Chesapeake Energy Corp.
4	3,961,425	Ball Corp.
5	2,519,280	Celenese Corp.
6	1,728,888	AGCO Corp
7	1,280,966	ESCO Technologies Inc
8	872,103	West Pharmaceutical Services Inc
9	586,393	General Cable Corp.
10-Smallest	264,981	4Kids Entertainment Inc.

Source: Center for Research in Security Prices, University of Chicago.

Presentation of the Decile Data

Summary statistics of annual returns of the 10 deciles over 1926–2005 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 two 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 224 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 to1965

	Capitalization of Largest Company (in thousands)			Capitalization of Smallest Company (in thousands)		
Date (Sept 30)	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	$61,490	$14,040	$4,305	$14,100	$4,325	$43
1927	$65,281	$14,746	$4,450	$15,311	$4,496	$72
1928	$81,998	$18,975	$5,074	$19,050	$5,119	$135
1929	$107,085	$24,328	$5,875	$24,480	$5,915	$126
1930	$67,808	$13,050	$3,219	$13,068	$3,264	$30
1931	$42,607	$8,142	$1,905	$8,222	$1,927	$15
1932	$12,431	$2,170	$473	$2,196	$477	$19
1933	$40,298	$7,210	$1,830	$7,280	$1,875	$100
1934	$38,129	$6,669	$1,669	$6,734	$1,673	$68
1935	$37,631	$6,519	$1,350	$6,549	$1,383	$38
1936	$46,920	$11,505	$2,660	$11,526	$2,668	$98
1937	$51,750	$13,601	$3,500	$13,635	$3,539	$68
1938	$36,102	$8,325	$2,125	$8,372	$2,145	$60
1939	$35,784	$7,367	$1,697	$7,389	$1,800	$75
1940	$31,050	$7,990	$1,861	$8,007	$1,872	$51
1941	$31,744	$8,316	$2,086	$8,336	$2,087	$72
1942	$26,135	$6,870	$1,779	$6,875	$1,788	$82
1943	$43,218	$11,475	$3,847	$11,480	$3,903	$395
1944	$46,621	$13,066	$4,800	$13,068	$4,812	$309
1945	$55,268	$17,325	$6,413	$17,575	$6,428	$225
1946	$79,158	$24,192	$10,013	$24,199	$10,051	$829
1947	$57,830	$17,735	$6,373	$17,872	$6,380	$747
1948	$67,238	$19,575	$7,313	$19,651	$7,329	$784
1949	$55,506	$14,549	$5,037	$14,577	$5,108	$379
1950	$65,881	$18,675	$6,176	$18,750	$6,201	$303
1951	$82,517	$22,750	$7,567	$22,860	$7,598	$668
1952	$97,936	$25,452	$8,428	$25,532	$8,480	$480
1953	$98,595	$25,374	$8,156	$25,395	$8,168	$459
1954	$125,834	$29,645	$8,484	$29,707	$8,488	$463
1955	$170,829	$41,445	$12,353	$41,681	$12,366	$553
1956	$183,434	$46,805	$13,481	$46,886	$13,524	$1,122
1957	$192,861	$47,658	$13,844	$48,509	$13,848	$925
1958	$195,083	$46,774	$13,789	$46,871	$13,816	$550
1959	$253,644	$64,221	$19,500	$64,372	$19,548	$1,804
1960	$246,202	$61,485	$19,344	$61,529	$19,385	$831
1961	$296,261	$79,058	$23,562	$79,422	$23,613	$2,455
1962	$250,433	$58,866	$18,952	$59,143	$18,968	$1,018
1963	$308,438	$71,846	$23,819	$71,971	$23,822	$296
1964	$344,033	$79,343	$25,594	$79,508	$25,595	$223
1965	$363,759	$84,479	$28,365	$84,600	$28,375	$250

Source: Center for Research in Security Prices, University of Chicago.

Table 7-3 (continued)

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

from 1966 to 2005

	Capitalization of Largest Company (in thousands)			Capitalization of Smallest Company (in thousands)		
Date (Sept 30)	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	$399,455	$99,578	$34,884	$99,935	$34,966	$381
1967	$459,170	$117,985	$42,267	$118,329	$42,313	$381
1968	$528,326	$149,261	$60,351	$150,128	$60,397	$592
1969	$517,452	$144,770	$54,273	$145,684	$54,280	$2,119
1970	$380,246	$94,025	$29,910	$94,047	$29,916	$822
1971	$542,517	$145,340	$45,571	$145,673	$45,589	$865
1972	$545,211	$139,647	$46,728	$139,710	$46,757	$1,031
1973	$424,584	$94,809	$29,601	$95,378	$29,606	$561
1974	$344,013	$75,272	$22,475	$75,853	$22,481	$444
1975	$465,763	$96,954	$28,140	$97,266	$28,144	$540
1976	$551,071	$116,184	$31,987	$116,212	$32,002	$564
1977	$573,084	$135,804	$39,192	$137,323	$39,254	$513
1978	$572,967	$159,778	$46,621	$160,524	$46,629	$830
1979	$661,336	$174,480	$49,088	$174,517	$49,172	$948
1980	$754,562	$194,012	$48,671	$194,241	$48,953	$549
1981	$954,665	$259,028	$71,276	$261,059	$71,289	$1,446
1982	$762,028	$205,590	$54,675	$206,536	$54,883	$1,060
1983	$1,200,680	$352,698	$103,443	$352,944	$103,530	$2,025
1984	$1,068,972	$314,650	$90,419	$315,214	$90,659	$2,093
1985	$1,432,342	$367,413	$93,810	$368,249	$94,000	$760
1986	$1,857,621	$444,827	$109,956	$445,648	$109,975	$706
1987	$2,059,143	$467,430	$112,035	$468,948	$112,125	$1,277
1988	$1,957,926	$420,257	$94,268	$421,340	$94,302	$696
1989	$2,147,608	$480,975	$100,285	$483,623	$100,384	$96
1990	$2,164,185	$472,003	$93,627	$474,065	$93,750	$132
1991	$2,129,863	$457,958	$87,586	$458,853	$87,733	$278
1992	$2,428,671	$500,346	$103,352	$501,050	$103,500	$510
1993	$2,711,068	$608,520	$137,945	$608,825	$137,987	$602
1994	$2,497,073	$601,552	$149,435	$602,552	$149,532	$598
1995	$2,793,761	$653,178	$158,011	$654,019	$158,063	$89
1996	$3,150,685	$763,377	$195,188	$763,812	$195,326	$1,043
1997	$3,511,132	$818,299	$230,472	$821,028	$230,554	$480
1998	$4,216,707	$934,264	$253,329	$936,727	$253,336	$1,671
1999	$4,251,741	$875,309	$218,336	$875,582	$218,368	$1,502
2000	$4,143,902	$840,000	$192,598	$840,730	$192,721	$1,462
2001	$5,252,063	$1,114,792	$269,275	$1,115,200	$270,391	$443
2002	$5,012,705	$1,143,845	$314,042	$1,144,452	$314,174	$501
2003	$4,794,027	$1,166,799	$330,608	$1,167,040	$330,797	$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

Source: Center for Research in Security Prices, University of Chicago.

Table 7-4

Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, Summary Statistics of Annual Returns 1926–2005

Decile	Geometric Mean	Arithmetic Mean	Standard Deviation	Serial Correlation
1-Largest	9.5	11.3	19.17	0.09
2	10.9	13.2	21.86	0.03
3	11.3	13.8	23.66	-0.02
4	11.3	14.3	25.94	-0.02
5	11.6	14.9	26.78	-0.02
6	11.8	15.3	27.84	0.04
7	11.6	15.6	29.99	0.01
8	11.8	16.6	33.47	0.04
9	12.0	17.5	36.55	0.05
10-Smallest	14.0	21.6	45.44	0.15
Mid-Cap, 3-5	11.4	14.2	24.74	-0.02
Low-Cap, 6-8	11.7	15.7	29.52	0.03
Micro-Cap, 9-10	12.7	18.8	39.16	0.08
NYSE/AMEX/NASDAQ Total Value-Weighted Index	10.1	12.0	20.21	0.03

Source: Center for Research in Security Prices, University of Chicago.

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.

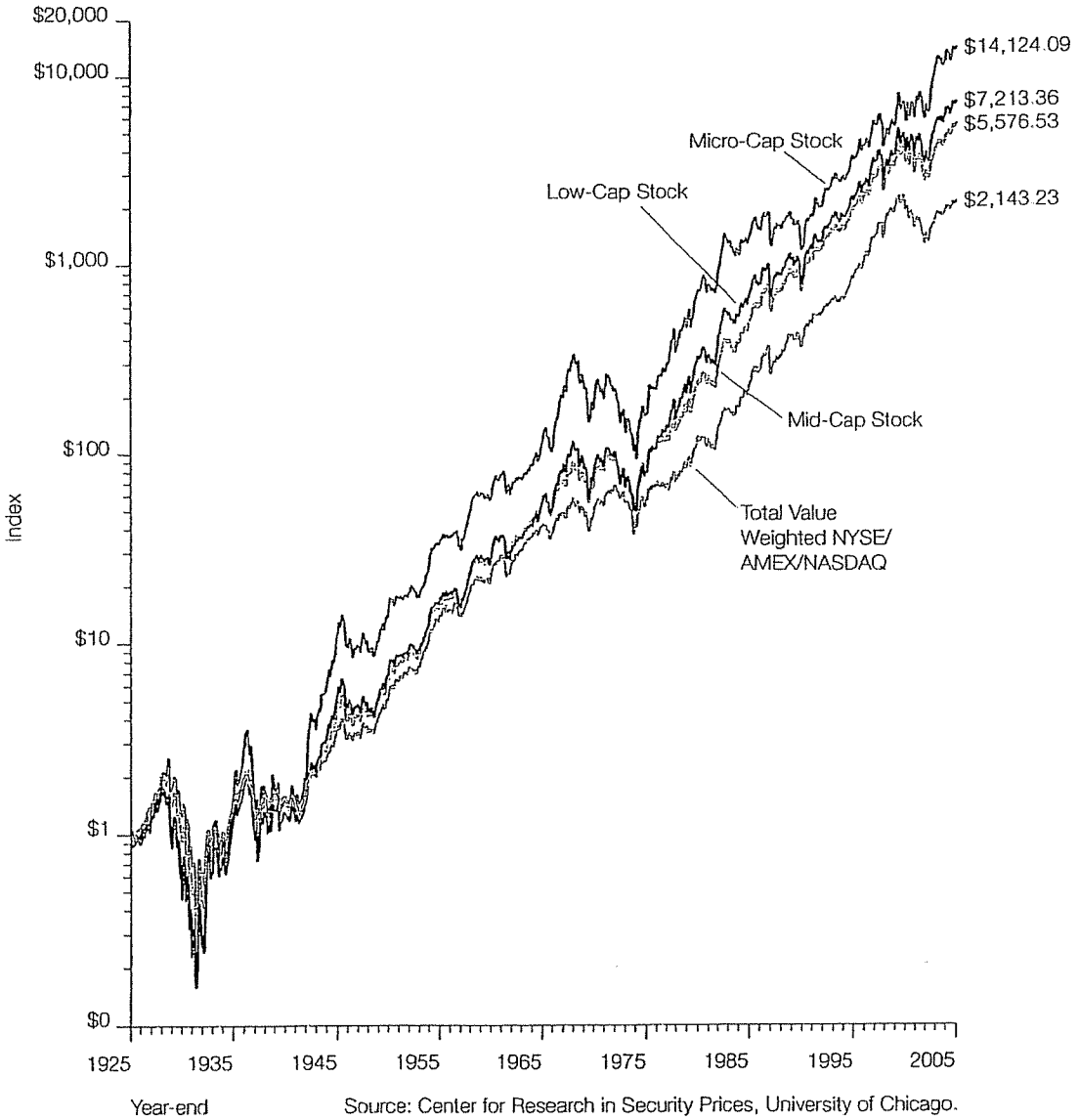
Second, the calendar annual return differences between small and large companies are serially correlated. This suggests that past annual returns may be of some value in predicting future annual returns. Such serial correlation, or autocorrelation, is practically unknown in the market for large stocks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

Graph 7-1

Size-Decile Portfolios of the NYSE/AMEX/NASDAQ: Wealth Indices of Investments in Mid-, Low-, Micro- and Total Capitalization Stocks
1925–2005

Year-end 1925 = $1.00



Source: Center for Research in Security Prices, University of Chicago.

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 80 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 80-year arithmetic mean return on large company stocks, 12.30 percent, less the 80-year arithmetic mean income-return component of 20-year government bonds as the historical riskless rate, in this case 5.22 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 2005. See Chapter 6 for more detail on beta estimation.

Table 7-5

Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ 1926–2005

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	11.29%	6.07%	6.45%	–0.37%
2	1.04	13.22%	8.00%	7.33%	0.67%
3	1.10	13.84%	8.62%	7.77%	0.85%
4	1.13	14.31%	9.09%	7.98%	1.10%
5	1.16	14.91%	9.69%	8.20%	1.49%
6	1.18	15.33%	10.11%	8.38%	1.73%
7	1.23	15.62%	10.40%	8.73%	1.67%
8	1.28	16.60%	11.38%	9.05%	2.33%
9	1.34	17.48%	12.26%	9.50%	2.76%
10-Smallest	1.41	21.59%	16.37%	10.01%	6.36%
Mid-Cap, 3-5	1.12	14.15%	8.94%	7.91%	1.02%
Low-Cap, 6-8	1.22	15.66%	10.44%	8.63%	1.81%
Micro-Cap, 9-10	1.36	18.77%	13.55%	9.61%	3.95

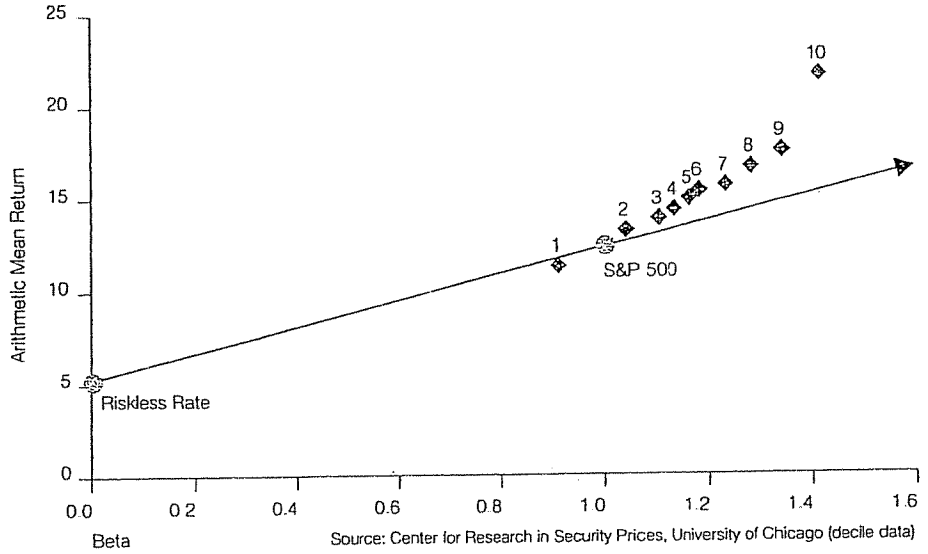
*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926–December 2005.

**Historical riskless rate is measured by the 80-year arithmetic mean income return component of 20-year government bonds (5.22 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 (12.30 percent) minus the arithmetic mean income return component of 20-year government bonds (5.22 percent) from 1926–2005.

Graph 7-2

Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ 1926–2005



Source: Center for Research in Security Prices, University of Chicago (decile data)

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, 2005

Decile	Recent Number of Companies	Recent Decile Market Capitalization (in thousands)	Market Capitalization of Largest Company (in thousands)	Company Name
10a	483	$108,194,821	$264,981	4Kids Entertaint Inc.
10b	1,279	$102,157,012	$169,195	Quaker Chemical Corp.

Note: These numbers may not aggregate to equal decile 10 figures.
Source: Center for Research in Security Prices, University of Chicago.

Table 7-7

Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split
1926–2005

	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	11.29%	6.07%	6.45%	-0.37%
2	1.04	13.22%	8 00%	7 33%	0 67%
3	1 10	13 84%	8.62%	7.77%	0 85%
4	1 13	14 31%	9 09%	7 98%	1 10%
5	1.16	14 91%	9.69%	8.20%	1.49%
6	1.18	15.33%	10.11%	8 38%	1.73%
7	1 23	15 62%	10 40%	8 73%	1.67%
8	1.28	16 60%	11.38%	9.05%	2.33%
9	1.34	17.48%	12 26%	9 50%	2 76%
10a	1 43	19 71%	14.49%	10 10%	4 39%
10b-Smallest	1.39	24 87%	19.65%	9.82%	9 83%
Mid Cap, 3-5	1.12	14 15%	8.94%	7 91%	1 02%
Low-Cap, 6-8	1 22	15.66%	10.44%	8 63%	1.81%
Micro-Cap, 9-10	1 36	18 77%	13.55%	9 61%	3.95%

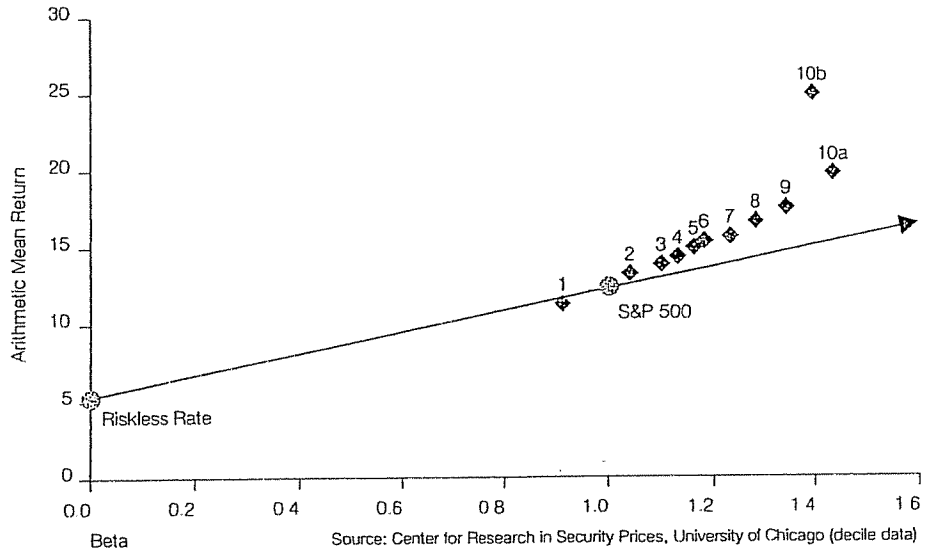
*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U S. Treasury bill, January 1926–December 2005.

**Historical riskless rate is measured by the 80-year arithmetic mean income return component of 20-year government bonds (5.22 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 30 percent) minus the arithmetic mean income return component of 20-year government bonds (5 22 percent) from 1926–2005.

Graph 7-3

Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split
1926-2005



Source: Center for Research in Security Prices, University of Chicago (decile data)

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

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

Source: Center for Research in Security Prices, University of Chicago.

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, 1926–2005, 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 6.33, as opposed to 7.08 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.

Tega Cay Water Service, Inc.
Electric & Gas Company ROEs vs. Forecasted A Rated Public Utility Bond Yields for January 2004 through June 2006

Date	Company	Type	State	ROE	Common Eq as % Cap. Str.	Forecasted A Rated Public Utility Bond Yield	Spread between Authorized ROE and Forecasted A Rated Public Utility Bond
13-Jan-04	Madison Gas and Electric	Electric	WI	12.00 %	55.91 %	6.99 %	5.01 %
13-Jan-04	Madison Gas and Electric	Gas	WI	12.00	55.91	6.99	5.01
13-Jan-04	Public Service Co. of New Mexico	Gas	NM	10.25	47.77	6.99	3.26
9-Feb-04	City Gas Co. of Florida	Gas	FL	11.25	38.77 *	6.82	4.43
2-Mar-04	PacifiCorp	Electric	WY	10.75	44.95	6.66	4.09
16-Mar-04	Southwest Gas	Gas	CA	10.90	42.00	6.66	4.24
24-Mar-04	Nevada Power	Electric	NV	10.25	33.97	6.66	3.59
5-Apr-04	Interstate Power & Light	Gas	MN	11.00	47.15	6.60	4.40
13-Apr-04	Aquila -MPS	Electric	MO	-	-	6.60	--
13-Apr-04	Aquila- L&P	Electric	MO	-	-	6.60	--
22-Apr-04	Aquila Networks-MPS	Gas	MO	-	-	6.60	--
22-Apr-04	Aquila Networks- L&P	Gas	MO	-	-	6.60	--
5-May-04	Wisconsin Electric Power	Electric	WI	-	-	6.87	--
18-May-04	PSI Energy	Electric	IN	10.50	44.44*	6.87	3.63
20-May-04	Rochester Gas & Electric	Electric	NY	-	-	6.87	--
20-May-04	Rochester Gas & Electric	Gas	NY	-	-	6.87	--
25-May-04	Idaho Power	Electric	ID	10.25	45.97	6.87	3.38
25-May-04	TXU- Gas	Gas	TX	10.00	49.80	6.87	3.13
27-May-04	Pacific Gas and Electric	Electric	CA	-	-	6.87	--
27-May-04	Sierra Pacific Power	Electric	NV	10.25	35.77	6.87	3.38
27-May-04	Pacific Gas and Electric	Gas	CA	-	-	6.87	--
23-Jun-04	Northwest Natural Gas	Gas	WA	-	-	7.11	--
30-Jun-04	Kentucky Utilities	Electric	KY	10.50	51.58	7.11	3.39
30-Jun-04	Louisville Gas and Electric	Electric	KY	10.50	48.60	7.11	3.39
30-Jun-04	Southern Indiana Gas & Electric	Gas	IN	10.50 (B	44.00 *	7.11	3.39
30-Jun-04	Louisville Gas and Electric	Gas	KY	-	-	7.11	--
8-Jul-04	Southern California Edison	Electric	CA	-	-	7.20	--
8-Jul-04	South Jersey Gas	Gas	NJ	10.00	46.00	7.20	2.80
22-Jul-04	Centerpoint Energy Arkla	Gas	LA	10.25	45.80 (HY)	7.20	3.05
25-Aug-04	Aquila	Electric	CO	10.25	47.50	6.97	3.28
26-Aug-04	Southwest Gas, Southern Division	Gas	NV	10.50	40.00	6.97	3.53
26-Aug-04	Southern Gas Northern Division	Gas	NV	10.50	40.00	6.97	3.53
2-Sep-04	Public Service New Hampshire	Electric	NH	-	-	6.79	--
9-Sep-04	Avista Corp	Electric	ID	10.40	42.59	6.79	3.61
9-Sep-04	Avista Corp	Gas	ID	10.40	42.59	6.79	3.61
21-Sep-04	Missouri Gas Energy	Gas	MO	10.50	29.99	6.79	3.71
22-Sep-04	Consolidated Edison of New York	Gas	NY	-	-	6.79	--
27-Sep-04	Consolidated Edison of New York	Gas	NY	10.30	48.00	6.79	3.51
27-Sep-04	Washington Gas	Gas	VA	10.50	50.96	6.79	3.71
20-Oct-04	Chattanooga Gas	Gas	TN	10.20	35.50	6.73	3.47
27-Oct-04	PacifiCorp	Electric	WA	-	-	6.73	--
9-Nov-04	Narragansett Electric	Electric	RI	10.50	50.00	6.56	3.94
23-Nov-04	Cincinnati Gas & Electric	Electric	OH	-	-	6.56	--
23-Nov-04	Detroit Edison	Electric	MI	11.00	38.08 *	6.56	4.44
30-Nov-04	Indiana Gas	Gas	IN	10.60	50.06	6.56	4.04
8-Dec-04	San Diego Gas & Electric	Electric	CA	-	-	6.56	--
8-Dec-04	San Diego Gas & Electric	Gas	CA	--	--	6.56	--
8-Dec-04	Southern California Gas	Gas	CA	--	--	6.56	--
8-Dec-04	Yankee Gas Service	Gas	CT	9.90	47.90	6.56	3.34
14-Dec-04	Interstate Power & Light	Electric	IA	10.97	47.89	6.56	4.41
21-Dec-04	Georgia Power	Electric	GA	11.25	-	6.56	4.69
21-Dec-04	Wisconsin Public Service	Electric	WI	11.50	57.35	6.56	4.94
21-Dec-04	Wisconsin Public Service	Gas	WI	11.50	57.35	6.56	4.94
22-Dec-04	PPL Electric Utilities	Electric	PA	10.70	46.87	6.56	4.14
22-Dec-04	Madison Gas and Electric	Electric	WI	11.50	57.64	6.56	4.94
22-Dec-04	Madison Gas and Electric	Gas	WI	11.50	57.64	6.56	4.94
28-Dec-04	Centerpoint Energy Arkla	Gas	OK	10.25	49.86	6.56	3.69
29-Dec-04	Western Massachusetts Electric	Electric	MA	9.85	-	6.56	3.29
5-Jan-05	Avista Corp	Gas	WA	--	--	6.71	--
6-Jan-05	South Carolina Electric & Gas	Electric	SC	10.70	50.31	6.71	3.99
28-Jan-05	Aquila Networks-WPK	Electric	KS	10.50	33.63	6.71	3.79
16-Feb-05	Puget Sound Energy	Electric	WA	10.30	43.00	6.76	3.54
16-Feb-05	Puget Sound Energy	Gas	WA	10.30	43.00	6.76	3.54
25-Feb-05	PacifiCorp	Electric	UT	10.50	47.80	6.76	3.74
10-Mar-05	Empire District Electric	Electric	MO	11.00	49.14	6.59	4.41
18-Mar-05	Dominion North Carolina Power	Electric	NC	--	--	6.59	--
24-Mar-05	Consolidated Edison of New York	Electric	NY	10.30	48.00	6.59	3.71
29-Mar-05	Central Vermont Public Service	Electric	VT	10.00	55.53	6.59	3.41
29-Mar-05	SEMCO Energy Gas	Gas	MI	11.00	--	6.59	4.41
30-Mar-05	National Fuel Gas Distribution	Gas	PA	--	--	6.59	--
31-Mar-05	Texas- New Mexico Power	Electric	TX	10.25	40.00	6.59	3.66
7-Apr-05	Arizona Public Service	Electric	AZ	10.25	45.00 (HY)	6.81	3.44
13-Apr-05	Vectren Energy Delivery of Ohio	Gas	OH	10.60	48.10 (E)	6.81	3.79
28-Apr-05	Michigan Consolidated Gas	Gas	MI	11.00	39.31 *	6.81	4.19
28-Apr-05	Atlanta Gas Light	Gas	GA	10.90	--	6.81	4.09
2-May-05	Public Service Co. of Oklahoma	Electric	OH	--	--	6.65	--
4-May-05	Aquila Networks- KGO	Gas	KS	--	--	6.65	--
17-May-05	Wisconsin Electric Power	Electric	WI	--	--	6.65	--
17-May-05	AmerenIP	Gas	IL	10.00	53.09	6.65	3.35
18-May-05	Entergy Louisiana	Electric	LA	10.25	48.73	6.65	3.60
25-May-05	Jersey Central Power & Light	Electric	NJ	9.75	46.00	6.65	3.10
25-May-05	Savannah Electric and Power	Electric	GA	10.75	--	6.65	4.10
26-May-05	Atlantic City Electric	Electric	NJ	9.75	46.22	6.65	3.10
26-May-05	Idaho Power	Electric	ID	--	--	6.65	--
8-Jun-05	Public Service New Hampshire	Electric	NH	9.63 Gn	--	6.48	3.15
8-Jun-05	CenterPoint Energy Minnegasco	Gas	MN	10.18	50.27	6.48	3.70
15-Jun-05	Entergy Gulf States	Gas	LA	10.50	47.52	6.48	4.02
6-Jul-05	Entergy Gulf States	Gas	LA	10.50	47.52	6.44	4.06
19-Jul-05	Wisconsin Power and Light	Electric	WI	11.50	61.75	6.44	5.06
19-Jul-05	Wisconsin Power and Light	Gas	WI	11.50	61.75	6.44	5.06
22-Jul-05	PacifiCorp	Electric	ID	--	--	6.44	--
22-Jul-05	National Fuel Gas Distribution	Gas	NY	--	--	6.44	--

Tega Cay Water Service, Inc.
Electric & Gas Company ROEs vs. Forecasted A Rated Public Utility Bond Yields for January 2004 through June 2006

Date	Company	Type	State	ROE	Common Eq. as % Cap. Str.	Forecasted A Rated Public Utility Bond Yield	Spread between Authorized ROE and Forecasted A Rated Public Utility Bond
5-Aug-05	Cap Rock Energy	Electric	TX	11.75	25.00 (HY)	6 24	5 51
11-Aug-05	Northern States Power	Gas	MN	10.40	50 24	6 24	4 16
15-Aug-05	AEP Texas Central	Electric	TX	10.13	40 00	6 24	3 89
24-Aug-05	Mountaineer Gas Company	Gas	WV	--	--	6 24	--
19-Sep-05	CenterPoint Energy Arkansas Gas	Gas	AR	9 45	31 80 *	6 15	3 30
28-Sep-05	PacifiCorp	Electric	OR	10 00	47.50	6 15	3 85
30-Sep-05	Northern Illinois Gas	Gas	IL	10 51	56 37	6.15	4 36
3-Oct-05	Laclede Gas	Gas	MO	--	--	5 95	--
4-Oct-05	Oklahoma Natural Gas	Gas	OK	9 90	46 76	5 95	3.95
14-Oct-05	Interstate Power & Light	Gas	IA	10 40	49 35	5.95	4.45
21-Oct-05	Dominion Hope Gas	Gas	WV	--	--	5 95	--
31-Oct-05	South Carolina Electric & Gas	Gas	SC	10 25	50 75	5 95	4 30
2-Nov-05	Arkansas Western Gas	Gas	AR	9 70	33 03 *	6 25	3 45
3-Nov-05	Piedmont Natural Gas	Gas	NC	--	--	6 25	--
30-Nov-05	Bay State Gas	Gas	MA	10 00	53 95	6 25	3 75
9-Dec-05	Empire District Electric	Electric	KS	--	--	6 41	--
9-Dec-05	Arkansas Oklahoma Gas	Gas	AR	9.70	41 04 (YE)	6.41	3 29
12-Dec-05	Madison Gas and Electric	Electric	WI	11.00	56 65	6 41	4 59
12-Dec-05	Madison Gas and Electric	Gas	WI	11.00	56 65	6 41	4 59
13-Dec-05	OGE Electric Service	Electric	OK	10 75	55 69	6 41	4 34
16-Dec-05	Pacific Gas and Electric	Electric	CA	11 35	52.00	6 41	4 94
16-Dec-05	Southern California Edison	Electric	CA	11 60	48 00	6.41	5 19
16-Dec-05	Pacific Gas and Electric	Gas	CA	11 35	52 00	6 41	4 94
16-Dec-05	San Diego Gas & Electric	Gas	CA	10 70	49 00	6.41	4 29
16-Dec-05	San Diego Gas & Electric	Electric	CA	10 70	49 00	6.41	4 29
21-Dec-05	Cincinnati Gas & Electric	Electric	OJ	10 29	47 53	6 41	3 88
21-Dec-05	Avista Corp	Electric	WA	10 40	40.00	6.41	3 99
21-Dec-05	Baltimore Gas & Electric	Gas	MD	11.00	48 40	6.41	4.59
21-Dec-05	Avista Corp	Gas	WA	10.40	40 00	6.41	3 99
22-Dec-05	Wisconsin Public Service	Electric	WI	11 00	59 73	6.41	4 59
22-Dec-05	Consumers Energy	Electric	MI	11 15	36.31 *	6.41	4 74
22-Dec-05	Wisconsin Public Service	Gas	WI	11 00	59 73	6 41	4 59
22-Dec-05	Union Light, Heat & Power	Gas	KY	10 20	54 45	6 41	3 79
28-Dec-05	Westar Energy North	Electric	KS	10 00	44 59	6.41	3 59
28-Dec-05	Kansas Gas and Electric	Electric	KS	10.00	44 59	6 41	3 59
28-Dec-05	Dayton Power & Light	Electric	OH	--	--	6 41	--
28-Dec-05	Southern Connecticut Gas	Gas	CN	10.00	51 28	6.41	3 59
30-Dec-05	NSTAR Electric	Electric	MA	--	--	6 41	--
5-Jan-06	Northern States Power	Gas	WI	11 00	53.66	6 64	4 36
5-Jan-06	Northern States Power	Electric	WI	11.00	53 66	6.64	4 36
25-Jan-06	Wisconsin Electric Power	Gas	WI	11.20	56 24	6 64	4 56
25-Jan-06	Wisconsin Gas	Gas	WI	11.20	50 20	6 64	4 56
25-Jan-06	Wisconsin Electric Power	Electric	WI	--	--	6.64	--
27-Jan-06	United Illuminating	Electric	CT	9 75	48 00	6 64	3 11
3-Feb-06	Public Service of Colorado	Gas	CO	10 50	55.49	6 49	4 01
22-Feb-06	PacifiCorp	Electric	WY	--	--	6 49	--
23-Feb-06	Southwest Gas	Gas	AZ	9 50	40 00 Hy	6 49	3 01
23-Feb-06	Aquila Networks-MPS	Electric	MO	--	--	6 49	--
23-Feb-06	Aquila Networks-L&P	Electric	MO	--	--	6 49	--
1-Mar-06	Aquila	Gas	IA	10 40 E	51 39	6 43	3 97
3-Mar-06	Interstate Power and Light	Electric	MN	10.39	49.10	6 43	3 96
14-Mar-06	Kentucky Power	Electric	KY	--	--	6 43	--
29-Mar-06	Entergy Gulf States	Electric	LA	--	--	6 43	--
17-Apr-06	PacifiCorp	Electric	WA	10 20	46.00	6 49	3 71
18-Apr-06	MidAmerican Energy	Electric	IA	11 90 (4)	--	6 49	5 41
25-Apr-06	Delmarva Power & Light	Electric	DE	10 00	47 72	6 49	3.51
26-Apr-06	Sierra Pacific Power	Electric	NV	10.60	40 76	6 49	4 11
26-Apr-06	Sierra Pacific Power	Gas	NV	10 60	40 76	6 49	4 11
12-May-06	Idaho Power	Electric	ID	--	--	6 50	--
17-May-06	Southern California Edison	Electric	CA	--	--	6 50	--
25-May-06	LA Gas Service/Trans LA Gas	Gas	LA	10 40	48 00 (Hy)	6 50	3.90
26-May-06	Questar Gas	Gas	UT	--	--	6 50	--
27-Jun-06	Upper Peninsula Power	Electric	MI	10.75	47.12	6 51	4.24
	Average			10.57 %	47.33 %		3.99 %
	Range - January 2004 - June 2006						2.00% - 5.51%

FOOTNOTES

A- Average
B- Order followed stipulation settlement by the parties. Decision particulars not necessarily
E Estimated
D: Rate change applicable to electric distribution rates only
G- Return on Capital
Hy Hypothetical
I- Interim rate implemented prior to the issuance of final order, normally under bond and subject to refund
R Revised
U Double leveraged capital structure utilized
YE Year-end
Z Rate change to be implemented in multiple steps
* Capital structure includes cost-free items or tax credit balances at the overall rate of return
(1) ROE applies only to a proposed 545mW wind generation project

Source of information: Regulatory Research Associates, Inc
Mergent Bond Record, Various Issues
Blue Chip Financial Forecasts, Various Issues

U.S. Securities and Exchange Commission

Speech by SEC Staff: Analysts Conflicts of Interest: Taking Steps to Remove Bias

by

Lori Richards

Director, Office of Compliance Inspections and Examinations
U.S. Securities and Exchange Commission

Financial Women's Association

New York, New York
May 8, 2002

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Good Evening. I'm so glad to be here with you tonight.

I'd like to thank all of you for coming today, especially those of you who heard I would be substituting for Chairman Pitt and who came anyway.

The bad news is that Chairman Pitt couldn't be here tonight. The good news is that we still have a lot of interesting things to talk about. I thought it would be worthwhile to talk to you about research analysts. At an Open Meeting this morning, the SEC approved rule changes proposed by the National Association of Securities Dealers, Inc. and the New York Stock Exchange, Inc. regarding analyst conflicts of interest. These rules reflect a dramatic change in the way analysts are regulated. I thought it would be timely and interesting to talk with you tonight about the issues affecting research analysts in our securities markets.

Over the last several years there has been increased concern regarding the changing role of research analysts. Certainly this issue has garnered national attention and Attorney General Spitzer has brought this issue into sharp focus. While sell-side analysts used to be perceived as objective forecasters of corporate prospects and providers of opinions, they have increasingly become involved in marketing the broker's investment banking services. As markets have declined and with the downfall of Enron, there is increased public concern about research analyst conflicts of interest. Some

of the key questions raised by Congress, regulators, the media, and the public surrounding the relationship between research and investment banking include:

- Do investment banking interests drive ratings?
- Do the personal financial positions of analysts and the securities ownership positions of their firms impair analysts' objectivity?
- Why are there so few sell ratings?
- Why don't analysts change recommendations when there are material financial problems affecting the issuer?

I. Conflicts of Interest for Research Analysts at Full Service Firms: Commission and Congressional Initiatives

Recent press articles make it sound as though the SEC has only just started examining analyst conflict of interest issues. In fact, the SEC began to examine this issue in 1999. We were concerned that analysts, who had became veritable media stars, appearing ubiquitously on television financial programs, did not disclose their own conflicts of interest so that investors could evaluate their recommendations against their possible biases. We were particularly concerned that many investors who rely on analysts' recommendations may not know, among other things, that: the issuer may be an investment banking client of the analyst's firm; the promise of favorable research can be an important component of the marketing of investment banking services; the analyst's compensation may significantly be based on generating investment banking business; the analyst may have personally purchased pre-IPO shares of the issuer; or the issuer may have reviewed and approved a draft of the research report before its publication.

In the summer of 1999, staff from the SEC's Division of Market Regulation began a review of industry practices regarding disclosure of research analyst's conflicts of interest. Then, staff from my office, the Office of Compliance Inspections and Examinations, conducted examinations of the largest full-service firms on the Street. We focused on analysts' financial interests in companies they covered, as well as analyst compensation arrangements and reporting structures, in particular whether analysts reported to investment banking personnel. The SEC reported our findings in Congressional testimony last summer, which were the following:

- Many research analysts were significantly involved with start-up companies well before the companies had established an investment banking relationship with a broker-dealer. This involvement typically included establishing an initial relationship with the company, reviewing the company's operations, and providing informal strategic advice. Many times, these analysts were invited to invest in these companies' private placements, which were not available to the public generally. The staff also found that if the company went public and the analyst's firm underwrote the IPO, the analyst always issued positive research on the company.
- It was commonplace for research analysts to provide research reports

on companies that the analysts' employer firm underwrote. Many firms paid their analysts largely based upon the profitability of their investment banking unit, and investment bankers at some firms were involved in evaluating the firm's research analysts to determine their compensation.

- Some research analysts owned securities in companies they covered. These analysts sometimes acquired their shares in private placements prior to the initial public offering for a fraction of the IPO price. Subsequently, the analysts' firms took the company public and the analyst initiated research coverage with a "buy" recommendation. Examiners found that some of these analysts executed trades for their personal accounts that were contrary to their recommendations in their research reports. In these instances, examination findings were referred to the SEC's enforcement staff.

- The regulations existing at the time did not prohibit analysts from owning stock in companies their employer firms took public or that the analysts covered, but some firms maintained policies prohibiting analysts from owning stock in companies they covered. Other firms permitted analysts to own stock in companies they covered but prohibited them to execute personal trades that were contrary to the analysts' outstanding recommendations.

- At the firms examined, compliance with SRO rules that require firms to monitor the private equity investments of employees (including analysts) was found to be poor. Nearly all firms examined were unable to identify accurately all private equity investments by their employees in companies the firms took public. Consequently, firms did not always know whether their research analysts owned stock in companies they underwrote and upon which their analysts then issued research reports.

- Disclosure of analysts' and firms' ownership in recommended securities varied widely, which may have been due to gaps and inconsistencies between SRO rules. As a result, some firms' analysts' reports affirmatively stated that they or their employees held positions in recommended securities, while other firms used boilerplate noting, "the firm or employees *may* have positions in the recommended issuer." We found some instances in which the analysts' ownership in stock of the covered company was not disclosed in the research report at all.

- Sell-side analysts routinely recommended securities during public appearances in the media (such as on financial television and radio programs), but rarely revealed any conflicts of interest to investors.

- The ratings terminology may have been be unclear to investors. The variety of undefined terms to describe investment recommendations, included: "buy," "sell," "strong buy," "hold," "neutral," "accumulate," "near-term accumulate," "long-term buy," "outperform," "market perform," and "market under-perform," could confuse investors.

We were concerned that investors were simply not aware of these conflicts of interest. Last summer, the Commission issued an Investor Alert highlighting the numerous biases that may affect analyst recommendations.

The Alert, called *"Analyzing Analyst Recommendations,"* is available on the SEC's website, www.sec.gov, and explains to investors the relationships between securities analysts and the investment banking and brokerage firms that employ them, and educates investors about potential conflicts of interest analysts may face.

Congress also has focused on the independence of research analysis. The House Subcommittee on Capital Markets, Chaired by Richard Baker, held hearings last summer entitled, *"Analyzing the Analysts: Are Investors Getting Unbiased Research from Wall Street?"* The SEC provided testimony at the hearing concerning the preliminary results of the OCIE exams. The Congressional landscape has also recently included proposals covering research analysts. House Financial Services Chairman Oxley's bill (HR 3763) would require the SEC to examine the implementation and effectiveness of any new rules adopted by the SROs and to report to Congress, including making recommendations as to what further action may be necessary. There have been other legislative proposals in Congress that would enact structural reforms in the securities industry and/or require SEC rulemaking.

Given the serious concerns about the conflicts of interest analysts face that may taint or bias their advice, last fall the NASD and NYSE, following a call from the SEC and Congress, began to work together to craft new rules that would aim to restore investor confidence in the analysts' work. These rules were designed to address the conflicts of interest identified by the SEC. They were first proposed and aired for public comment in February and after reviewing and addressing various commenters' concerns, they were adopted today. Before I describe the rules, it's important to note that the Commission was very clear in saying that these rules are a first step in addressing analysts' conflicts, and that additional rules may be appropriate.

II. New Rules Governing Research Analysts

The new rules include the following provisions, among others:

- **Limitations on Relationships and Communications Between Investment Banking and Research Analysts.** The rules prohibit research analysts from being supervised by the investment banking department. In addition, investment banking personnel will be prohibited from discussing research reports with analysts prior to distribution, unless staff from the firm's legal/compliance department monitor those communications. Analysts will also be prohibited from sharing draft research reports with the target companies, other than to check facts after approval from the firm's legal/compliance department. *This provision helps protect research analysts from influences that could impair their objectivity and independence.*

- **Analyst Compensation Prohibitions.**The rules bar securities firms from tying an analyst's compensation to specific investment banking transactions. Furthermore, if an analyst's compensation is based on the firm's general investment banking revenues, that fact will have to be disclosed in the firm's research reports. *Prohibiting compensation from specific investment banking transactions significantly curtails a potentially major influence on research analysts' objectivity.*

- **Firm Compensation.** The rules require a securities firm to disclose in a research report if it managed or co-managed a public offering of equity securities for the company, or if it received any compensation for investment banking services from the company in the past 12 months. A firm also will be required to disclose if it expects to receive or intends to seek compensation for investment banking services from the company during the next 3 months. *Requiring securities firms to disclose compensation from investment banking clients can alert investors to potential biases in their recommendations.*

- **Promises of Favorable Research are Prohibited.** The rules prohibit analysts from offering or threatening to withhold a favorable research rating or specific price target to induce investment banking business from companies. The rule changes also impose "quiet periods" that bar a firm that is acting as manager or co-manager of a securities offering from issuing a report on a company within 40 days after an initial public offering or within 10 days after a secondary offering for an inactively traded company. *Promising favorable research coverage to a company would not be as attractive if the research will follow research issued by other analysts.*

- **Restrictions on Personal Trading by Analysts.** The rules bar analysts and members of their households from investing in a company's securities prior to its initial public offering if the company is in the business sector that the analyst covers. In addition, the rules require "blackout periods" that prohibit analysts from trading securities of the companies they follow for 30 days before and 5 days after they issue a research report about the company. Analysts also will be prohibited from trading against their most recent recommendations. *Removing analysts' incentives to trade around the time they issue research reports should reduce conflicts arising from personal financial interests.*

- **Disclosures of Financial Interests in Covered Companies.** The rules require analysts to disclose if they own shares of recommended companies. Firms also will be required to disclose if they own 1% or more of a company's equity securities as of the previous month end. *Requiring analysts and securities firms to disclose financial interests can alert investors to potential biases in their recommendations.*

- **Disclosures in Research Reports Regarding the Firm's Ratings.** The rules require firms to clearly explain in research reports the meaning of all ratings terms they use, and this terminology must be consistent with its plain meaning. Additionally, firms will have to provide the percentage of all the ratings that they have assigned to buy / hold / sell categories and the percentage of investment banking clients in each category. Firms will also be required to provide a graph or chart that plots the historical price movements of the security and indicates those points at which the firm initiated and changed ratings and price targets for the company. *These disclosures will assist investors in deciding what value to place on a securities firm's ratings and provide them with better information to assess its research.*

- **Disclosures During Public Appearances by Analysts.** The rules require disclosures from analysts during public appearances, such as

television or radio interviews. Guest analysts will have to disclose if they or their firm have a position in the stock and also if the company is an investment banking client of the firm. *This disclosure will inform investors who learn of analyst opinions and ratings through the media, rather than in written research reports, of analyst conflicts.*

As you can see, these new rules are quite significant, and in my view, will certainly help to address the significant conflicts of interests that we saw in our examinations last summer. These new rules impose major changes in the way research is conducted. But the costs of implementation are minimal when compared to the need to restore integrity and investor confidence in research analysts' work.

III. Next Steps

What's next? The rules will be implemented by the firms, and provisions of the new rules have different kick-in dates to allow firms to make systems and other changes to become compliant. The SROs are committed to providing any interpretive guidance that is needed, and to ensure uniformity and consistency in interpretation. Both SROs will provide members with guidance notices to their members about the new rules, and they will work with smaller firms to ensure that the rules can be implemented in their environment. The SEC also requested that the NASD and NYSE report within a year of implementing the rules on their operation and effectiveness, and whether any changes or additions should be made to the rules.

Several weeks ago, the SEC announced that it had commenced a formal inquiry into market practices concerning analysts. We are conducting the inquiry jointly with the NYSE and NASDR, and with NASAA, and numerous state securities regulators. We are focusing in this review on several things — **First**, have analysts issued ratings that are fraudulent? The recent information revealed by the New York Attorney General's Office is very troubling. I note that existing anti-fraud rules prohibit making statements that the speaker knows not to be true — that would be fraud, plain and simple. **Second**, are the firms complying with the new rules? We'll be looking to see compliance with the new rules as they go effective. **Finally**, we'll be reviewing whether additional rules may be appropriate. I am very pleased that we will be partnering with all securities regulators in this effort.

IV. Conclusion

This is a time of change for research analysts. In some quarters, they have been villified. It's important to remember that they perform an important service — and they need to do their work in an environment free from conflicts and biases. Investor trust is too critical to their work to allow them to be compromised. The new SRO rules approved by the SEC today, and the other steps we are taking, go a long way to helping analysts regain their independence.

I have often said that, what's in investors' best interest is also in the best interest of firms doing business with investors. That's certainly true with respect to firms that have analysts who communicate with public investors. It's in these firms' interest to make sure that their analysts are in fact

independent. Literal compliance with the rules is one thing, but firms can take steps, above and beyond the rules, to ensure that they create a culture and an environment that enforces and holds analyst objectivity paramount. Today's news that one firm that helped underwrite an IPO, also issued an unfavorable recommendation on that very issue, is a good sign that objectivity is possible.

Thank you for your attention. If you enjoyed my talk this evening, please remember my name is Lori Richards. And if you didn't enjoy my talk, my name is Harvey Pitt.

http://www.sec.gov/news/speech/spch559.htm

SBBI

Stocks, Bonds, Bills, and Inflation

Valuation Edition
2006 Yearbook

ibbotson

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For example, if bond yields rise unexpectedly, investors can receive a higher coupon payment from a newly issued bond than from the purchase of an outstanding bond with the former lower-coupon payment. The outstanding lower-coupon bond will thus fail to attract buyers, and its price will decrease, causing its yield to increase correspondingly, as its coupon payment remains the same. The newly priced outstanding bond will subsequently attract purchasers who will benefit from the shift in price and yield; however, those investors who already held the bond will suffer a capital loss due to the fall in price.

Anticipated changes in yields are assessed by the market and figured into the price of a bond. Future changes in yields that are not anticipated will cause the price of the bond to adjust accordingly. Price changes in bonds due to unanticipated changes in yields introduce price risk into the total return. Therefore, the total return on the bond series does not represent the riskless rate of return. The income return better represents the unbiased estimate of the purely riskless rate of return, since an investor can hold a bond to maturity and be entitled to the income return with no capital loss.

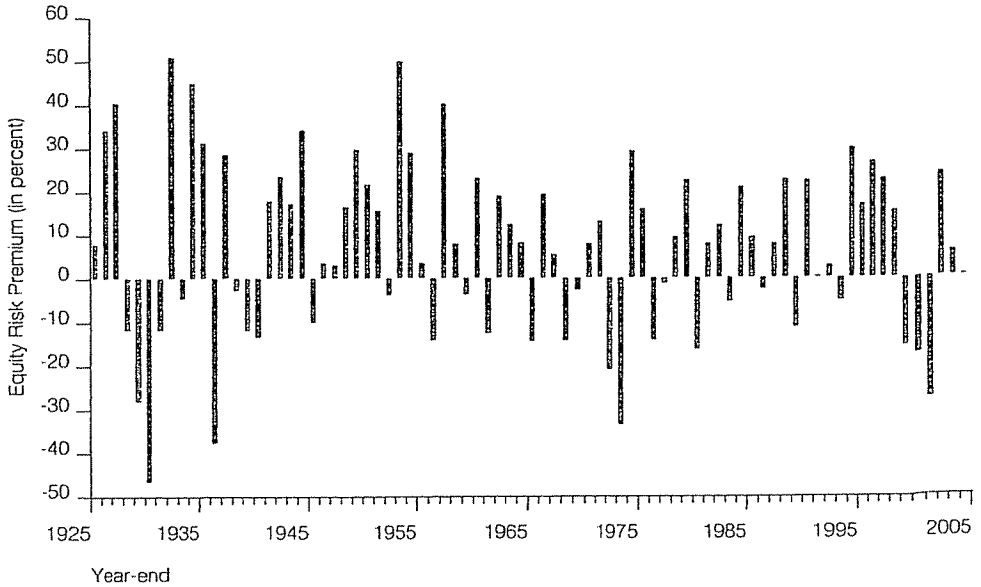
Arithmetic versus Geometric Means

The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return.

The argument for using the arithmetic average is quite straightforward. In looking at projected cash flows, the equity risk premium that should be employed is the equity risk premium that is expected to actually be incurred over the future time periods. Graph 5-3 shows the realized equity risk premium for each year based on the returns of the S&P 500 and the income return on long-term government bonds. (The actual, observed difference between the return on the stock market and the riskless rate is known as the realized equity risk premium.) There is considerable volatility in the year-by-year statistics. At times the realized equity risk premium is even negative.

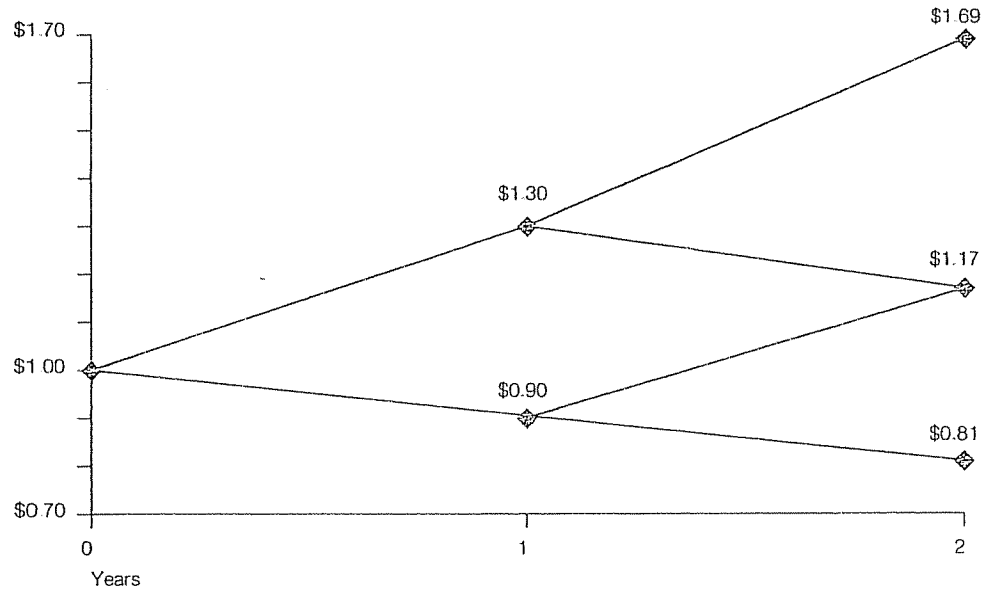
Graph 5-3

Realized Equity Risk Premium Per Year
1926-2005



To illustrate how the arithmetic mean is more appropriate than the geometric mean in discounting cash flows, suppose the expected return on a stock is 10 percent per year with a standard deviation of 20 percent. Also assume that only two outcomes are possible each year— +30 percent and –10 percent (i.e., the mean plus or minus one standard deviation). The probability of occurrence for each outcome is equal. The growth of wealth over a two-year period is illustrated in Graph 5-4.

Graph 5-4
Growth of Wealth Example



The most common outcome of $1.17 is given by the geometric mean of 8.2 percent. Compounding the possible outcomes as follows derives the geometric mean:

$$[(1+0.30)\times(1-0.10)]^{1/2}-1=0.082$$

However, the expected value is predicted by compounding the arithmetic, not the geometric, mean. To illustrate this, we need to look at the probability-weighted average of all possible outcomes:

$$\begin{aligned} (0.25 \times \$1.69) &= \$0.4225 \\ +\ (0.50 \times \$1.17) &= \$0.5850 \\ +\ (0.25 \times \$0.81) &= \$0.2025 \\ \hline \text{Total} \qquad & \quad \$1.2100 \end{aligned}$$

Therefore, $1.21 is the probability-weighted expected value. The rate that must be compounded to achieve the terminal value of $1.21 after 2 years is 10 percent, the arithmetic mean:

$$\$1\times(1+0.10)^2=\$1.21$$

The geometric mean, when compounded, results in the median of the distribution:

$$\$1\times(1+0.082)^2=\$1.17$$

The arithmetic mean equates the expected future value with the present value; it is therefore the appropriate discount rate.

Appropriate Historical Time Period

The equity risk premium can be estimated using any historical time period. For the U.S., market data exists at least as far back as the late 1800s. Therefore, it is possible to estimate the equity risk premium using data that covers roughly the past 100 years.

The Ibbotson Associates equity risk premium covers the time period from 1926 to the present. The original data source for the time series comprising the equity risk premium is the Center for Research in Security Prices. CRSP chose to begin their analysis of market returns with 1926 for two main reasons. CRSP determined that the time period around 1926 was approximately when quality financial data became available. They also made a conscious effort to include the period of extreme market volatility from the late twenties and early thirties; 1926 was chosen because it includes one full business cycle of data before the market crash of 1929. These are the most basic reasons why Ibbotson Associates' equity risk premium calculation window starts in 1926.

Implicit in using history to forecast the future is the assumption that investors' expectations for future outcomes conform to past results. This method assumes that the price of taking on risk changes only slowly, if at all, over time. This "future equals the past" assumption is most applicable to a random time-series variable. A time-series variable is random if its value in one period is independent of its value in other periods.

Does the Equity Risk Premium Revert to Its Mean over Time?

Some have argued that the estimate of the equity risk premium is upwardly biased since the stock market is currently priced high. In other words, since there have been several years with extraordinarily high market returns and realized equity risk premia, the expectation is that returns and realized equity risk premia will be lower in the future, bringing the average back to a normalized level. This argument relies on several studies that have tried to determine whether reversion to the mean exists in stock market prices and the equity risk premium.[3] Several academics contradict each other on this topic; moreover, the evidence supporting this argument is neither conclusive nor compelling enough to make such a strong assumption.

Our own empirical evidence suggests that the yearly difference between the stock market total return and the U.S. Treasury bond income return in any particular year is random. Graph 5-3, presented earlier, illustrates the randomness of the realized equity risk premium.

3 Fama, Eugene F., and Kenneth R. French. "Permanent and Temporary Components of Stock Prices," *Journal of Political Economy*, April 1988, pp. 246–273. Poterba, James M., and Lawrence H. Summers. "Mean Reversion in Stock Prices," *Journal of Financial Economics*, October 1988, pp. 27–59. Lo, Andrew W., and A. Craig MacKinlay. "Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test," *The Review of Financial Studies*, Spring 1988, pp. 41–66. Finnerty, John D., and Dean Leistikow. "The Behavior of Equity and Debt Risk Premiums: Are They Mean Reverting and Downward-Trending?" *The Journal of Portfolio Management*, Summer 1993, pp. 73–84. Ibbotson, Roger G., and Scott L. Lummer. "The Behavior of Equity and Debt Risk Premiums: Comment," *The Journal of Portfolio Management*, Summer 1994, pp. 98–100. Finnerty, John D., and Dean Leistikow. "The Behavior of Equity and Debt Risk Premiums: Reply to Comment," *The Journal of Portfolio Management*, Summer 1994, pp. 101–102.

A statistical measure of the randomness of a return series is its serial correlation. Serial correlation (or autocorrelation) is defined as the degree to which the return of a given series is related from period to period. A serial correlation near positive one indicates that returns are predictable from one period to the next period and are positively related. That is, the returns of one period are a good predictor of the returns in the next period. Conversely, a serial correlation near negative one indicates that the returns in one period are inversely related to those of the next period. A serial correlation near zero indicates that the returns are random or unpredictable from one period to the next. Table 5-3 contains the serial correlation of the market total returns, the realized long-horizon equity risk premium, and inflation.

Table 5-3
Interpretation of Annual Serial Correlations
1926–2005

Series	Serial Correlation	Interpretation
Large Company Stock Total Returns	0 03	Random
Equity Risk Premium	0 04	Random
Inflation Rates	0 65	Trend

The significance of this evidence is that the realized equity risk premium next year will not be dependent on the realized equity risk premium from this year. That is, there is no discernable pattern in the realized equity risk premium—it is virtually impossible to forecast next year's realized risk premium based on the premium of the previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower. The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values.

Table 5-4 also indicates that the equity risk premium varies considerably by decade, from a high of 17.9 percent in the 1950s to a low of 0.3 percent in the 1970s. This look at the historical equity risk premium reveals no observable pattern.

Table 5-4
Long-Horizon Equity Risk Premium by Decade
1926–2005

1920s*	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s**	1996-2005
17.6%	2 3%	8.0%	17 9%	4 2%	0 3%	7.9%	12.1%	–5 1%	5 1%

*Based on the period 1926–1929.

**Based on the period 2000–2005.

Finnerty and Leistikow perform more econometrically sophisticated tests of mean reversion in the equity risk premium. Their tests demonstrate that—as we suspected from our simpler tests—the equity risk premium that was realized over 1926 to the present was almost perfectly free of mean reversion and had no statistically identifiable time trends.[4] Lo and MacKinlay conclude, "the rejection of the random walk for weekly returns does not support a mean-reverting model of asset prices."

Choosing an Appropriate Historical Period

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable.[5] Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events of this century took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, and the development of the European Economic Community—all of these happened approximately in the last 30 years.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929–1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 80-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific

4 Though the study performed by Finnerty and Leistikow demonstrates that the traditional equity risk premium exhibits no mean reversion or drift, they conclude that, "the processes generating these risk premiums are generally mean-reverting." This conclusion is completely unrelated to their statistical findings and has received some criticism. In addition to examining the traditional equity risk premia, Finnerty and Leistikow include analyses on "real" risk premia as well as separate risk premia for income and capital gains. In their comments on the study, Ibbotson and Lummer show that these "real" risk premia adjust for inflation twice, "creating variables with no economic content." In addition, separating income and capital gains does not shed light on the behavior of the risk premia as a whole.

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

events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this.

A Look at the Historical Results

It is interesting to take a look at the realized returns and realized equity risk premium in the context of the above discussion. Table 5-5 shows the average stock market return and the average (arithmetic mean) realized long-horizon equity risk premium over various historical time periods. Similarly, Graph 5-5 shows the average (arithmetic mean) realized equity risk premium calculated through 2005 for different starting dates. The table and the graph both show that using a longer historical period provides a more stable estimate of the equity risk premium. The reason is that any unique period will not be weighted heavily in an average covering a longer historical period. It better represents the probability of these unique events occurring over a long period of time.

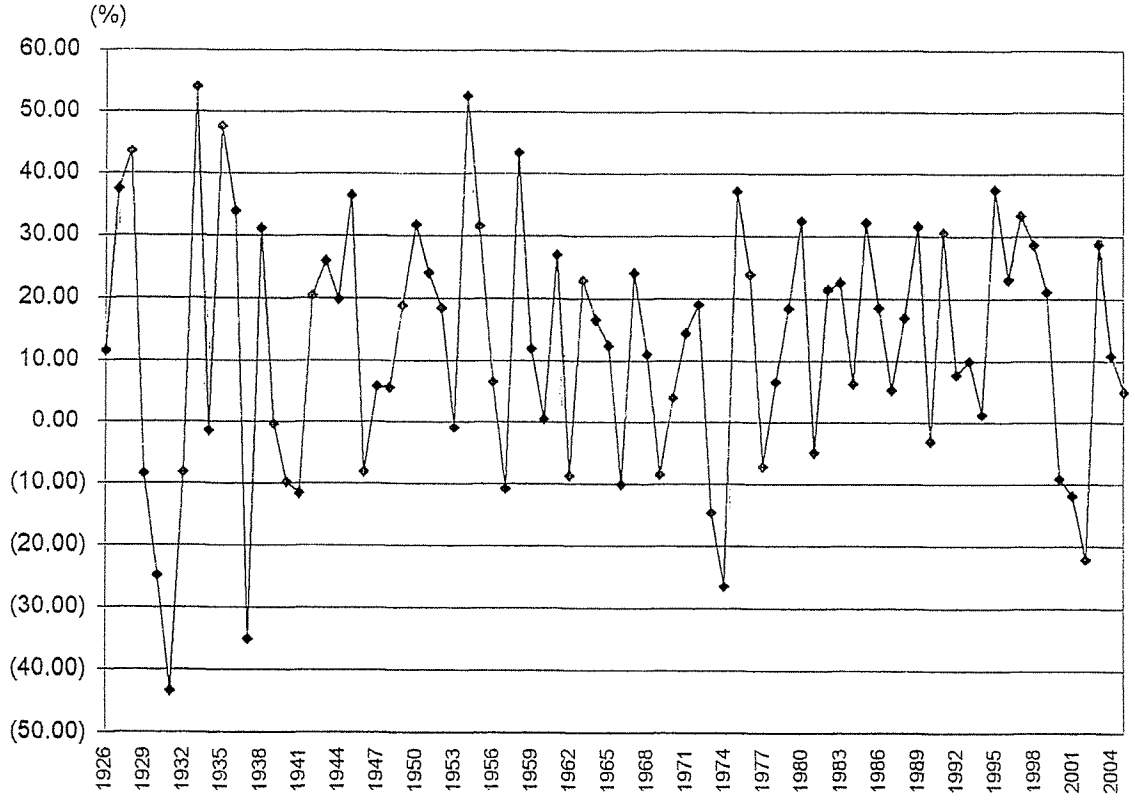
Table 5-5

Stock Market Return and Equity Risk Premium Over Time
1926–2005

Period Length	Period Dates	Large Company Stock Arithmetic Mean Total Return	Long-Horizon Equity Risk Premium
80 years	1926–2005	12.3%	7.1%
70 years	1936–2005	12.5%	7.0%
60 years	1946–2005	12.8%	6.8%
50 years	1956–2005	11.7%	5.0%
40 years	1966–2005	11.6%	4.2%
30 years	1976–2005	13.8%	6.0%
20 years	1986–2005	13.2%	6.4%
15 years	1991–2005	13.0%	6.7%
10 years	1996–2005	10.7%	5.1%
5 years	2001–2005	2.1%	-3.0%

Looking carefully at Graph 5-5 will clarify this point. The graph shows the realized equity risk premium for a series of time periods through 2005, starting with 1926. In other words, the first value on the graph represents the average realized equity risk premium over the period 1926–2005. The next value on the graph represents the average realized equity risk premium over the period 1927–2005, and so on, with the last value representing the average over the most recent five years, 2001–2005. Concentrating on the left side of Graph 5-5, one notices that the realized equity risk premium, when measured over long periods of time, is relatively stable. In viewing the graph from left to right, moving from longer to shorter historical periods, one sees that the value of the realized equity risk premium begins to decline significantly. Why does this occur? The reason is that the severe bear market of 1973–1974 is receiving proportionately more weight in the shorter, more recent average. If you continue to follow the line to the right, however, you will also notice that when 1973 and 1974 fall out of the recent average, the realized equity risk premium jumps up by nearly 1.3 percent.

Tega Cay Water Service, Inc.
Large Company Stock Returns
From 1926 to 2005



Source of Information:
Stocks, Bonds, Bills and Inflation Valuation Edition 2006 Yearbook,
Ibbotson Associates, Chicago, Il

Tega Cay Water Service, Inc.
Total Returns on Large Company Stocks
1926 to 2005

Large Company Stocks

-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%
						2004					
						1988	2003	1997			
						1986	1999	1995			
				1990	**2005**	1979	1998	1991			
				1981	1994	1972	1996	1989			
				1977	1993	1971	1983	1985			
				1969	1992	1968	1982	1980			
				1962	1987	1965	1976	1975			
				1953	1984	1964	1967	1955			
			2001	1946	1978	1959	1963	1950			
			2000	1940	1970	1952	1961	1945			
			1973	1939	1960	1949	1951	1938	1958		
		2002	1966	1934	1956	1944	1943	1936	1935	1954	
		1974	1957	1932	1948	**1926**	1942	1927	1928	1933	
1931	1937	1930	1941	1929	1947						

(Percent)

Arithmetic Mean: $r_A = \sum_{t=1}^{n} r_t \ / \ n$

Source : Stocks, Bonds, Bills, and Inflation – Valuation Edition 2006 Yearbook, pp. 30-31, Ibbotson Associates, Chicago, IL

Exhibit No. ___
Schedule PMA-19
Page 2 of 2

REGULATORY FINANCE:

UTILITIES' COST OF CAPITAL

Roger A. Morin, PhD

in collaboration with
Lisa Todd Hillman

1994
PUBLIC UTILITIES REPORTS, INC.
Arlington, Virginia

Chapter 13
CAPM Extensions

13.1 Empirical Validation

The last chapter showed that the practical difficulties of implementing the CAPM approach are surmountable. Conceptual and empirical problems remain, however.

At the conceptual level, the CAPM has been submitted to criticisms by academicians and practitioners.[1] Contrary to the core assumption of the CAPM, investors may choose not to diversify, and bear company-specific risk if abnormal returns are expected. A substantial percentage of individual investors are indeed inadequately diversified. Short selling is somewhat restricted, in violation of CAPM assumptions. Factors other than market risk (beta) may also influence investor behavior, such as taxation, firm size, and restrictions on borrowing.

At the empirical level, there have been countless tests of the CAPM to determine to what extent security returns and betas are related in the manner predicted by the CAPM.[2] The results of the tests support the idea that beta is related to security returns, that the risk-return tradeoff is positive, and that the relationship is linear. The contradictory finding is that the empirical Security Market Line (SML) is not as steeply sloped as the predicted SML. With few exceptions, the empirical studies agree that the implied intercept term exceeds the risk-free rate and the slope term is less than predicted by the CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted. This is shown in Figure 13-1.

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1 The use of the CAPM in regulatory proceedings has not escaped criticism. See for example Malko and Enholm (1985), Chartoff, Mayo, and Smith (1982), and the Autumn 1978 issue of *Financial Management,* in which several prominent finance scholars address the use of the CAPM in regulatory proceedings.

2 For a summary of the empirical evidence on the CAPM, see Jensen (1972) and Ross (1978). The major empirical tests of the CAPM were published by Friend and Blume (1975), Black, Jensen, and Scholes (1972), Miller and Scholes (1972), Blume and Friend (1973), Blume and Husic (1973), Fama and Macbeth (1973), Basu (1977), Reinganum (1981B), Litzenberger and Ramaswamy (1979), Banz (1981), Gibbons (1982), Stambaugh (1982), and Shanken (1985). CAPM evidence in the Canadian context is available in Morin (1981).

Several finance scholars have developed refined and expanded versions of the standard CAPM by relaxing the constraints imposed on the CAPM, such as dividend yield, size, and skewness effects. In doing so, they obtained broadly similar expressions for the relationship between risk and expected return. These enhanced CAPMs typically produce a risk-return relationship that is flatter than the CAPM prediction. In other words, they obtained a result that is closer to the actual risk-return relationship.[5]

The empirical CAPM formula described below produces a risk-return tradeoff that is flatter than the predicted tradeoff, and approximates the observed relationship between risk and return on capital markets. The empirical approximation to the CAPM is consistent with both theory and empirical evidence, and has the added advantage of computational simplicity. Whereas the traditional version of the CAPM is given by the following:

$$K = R_F + \beta (R_M - R_F)$$

the empirical evidence found by Morin (1989) indicates that the expected return on a security over the period 1926-1984 was actually given by:

$$\text{RETURN} = .0829 + .0520\beta$$

Given that the risk-free rate over the estimation period was approximately 6%, this relationship implies that the intercept of the risk-return relationship is higher than the 6% risk-free rate, contrary to the CAPM's prediction. Given the Ibbotson Associates' result that the average return on an average risk stock exceeded the risk-free rate by about 8% during the period from 1926 through 1984, that is $(R_M - R_F) = 8\%$, the intercept of the observed relationship between return and beta exceeds the risk-free rate by about 2%, or 1/4 of 8%, and that the slope of the relationship, .0520, is close to 3/4 of 8%. Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:

$$K = R_F + x (R_M - R_F) + (1 - x) \beta (R_M - R_F) \qquad (13\text{-}5)$$

where x is a fraction to be determined empirically. The value of x is actually derived by systematically varying the constant x in that equation from zero

[5] An excellent overview of variants of the CAPM is provided in the corporate finance textbook by Brealey and Myers (1991A), Chapter 8, and particularly in the accompanying instructor's manual (1991B).

to 1.00 in steps of 0.05 and choosing that value of x that minimized the mean square error between the observed relationship,

$$\text{RETURN} = .0829 + .0520\,\beta$$

and the empirical shortcut CAPM formula.[6] The value of x that best explains the observed relationship is between 0.25 and 0.30. If $x = 0.25$, the equation becomes:

$$K = R_F + 0.25\,(R_M - R_F) + 0.75\,\beta\,(R_M - R_F) \qquad (13\text{-}6)$$

Using a simple numerical example, assuming a risk-free rate of 7%, a market risk premium of 7%, and a beta of 0.80, the empirical CAPM equation above yields a cost of equity estimate of 12.95% as follows:

$$K = 7\% + 0.25\,(14\% - 7\%) + 0.75 \times 0.80\,(14\% - 7\%)$$

$$= 7\% + 1.75\% + 4.2\%$$

$$= 12.95\%$$

The actual historical relationship between risk premiums and the risk of a large population of common stocks can be observed over a long time period and used to estimate the appropriate risk premium for a given utility. The utility's cost of equity can then be estimated as the yield on long-term Treasury bonds plus the estimated risk premium. To illustrate, the actual relationship between risk premiums and betas on common stocks over a long time period can be estimated, and this historical relationship be used to estimate the risk premium on the utility's common equity, on the grounds that over long time periods, investors' expectations are realized.

To execute this method, monthly rates of return for all common stocks listed on the New York Stock Exchange from 1926 to the present are obtained from the University of Chicago's Center for Research in Security Prices (CRISP) data tapes. Five-year betas are then computed for each month for each company. For each month, the securities are assigned to one of 10 portfolios on the basis of ranked betas, from the lowest to the highest beta. Monthly returns for each of the portfolios are compounded to produce annual rates of return on each of the 10 portfolios from 1931 to the

[6] The corresponding evidence for Canadian capital markets is scant. For studies of the relationship between return and risk in Canada, see Morin (1980) and Jobson and Korkie (1985)

present. Historical risk premiums for each of the 10 portfolios are calculated for the period 1931 to the present by averaging the difference between the portfolio's annual rate of return and the government bond yield. For example, if the following hypothetical relationship between the risk premium and the portfolios' betas is obtained for the period 1931 - 1992[7]:

$$Risk\ Premium = 4.21\% + (3.94\% \times Beta)$$

Using the utility's beta of 0.60, for example, the risk premium for the hypothetical utility is:

$$4.21\% + (3.94\% \times 0.60) = 6.6\%$$

A long-term cost of equity capital estimate for the company is obtained by adding the risk premium of 6.6% to the current yield on long-term Treasury bonds or to the projected long-term yield implied by the closing prices on the Treasury bond futures contract traded on the Chicago Board of Trade. The latter measures the consensus long-term interest rate expectation of investors.[8] If the yield on long-term Treasury bonds is 6%, then the cost of equity implied by the empirical relationship is 6.00% + 6.60% = 12.60%. A similar procedure could be developed based on the standard deviation of return rather than on beta as risk measure.

13.4 Conclusions

Although financial theory has shown that beta is a sufficient risk measure for diversified investors and although most of the empirical literature has confirmed its importance in determining expected return, there are notable exceptions. Over the course of its history, the death of beta has been peridically announced, inevitably followed by its rebirth. The Fama and French (1992) article is a case in point. These authors found little explanatory power in beta. But here again the autopsy of beta was premature, and "reports of beta's death are greatly exaggerated." For one thing, the CAPM specifies a relationship between expected returns and beta, whereas Fama and French employed realized returns. Moreover, in a subsequent re-

[7] See Litzenberger (1988) for an excellent example of this empirical CAPM technique.

[8] The average market forecasts of rates in the form of interest rate Treasury securities futures contracts data can be used as a proxy for the expected risk-free rate.

compensation for beta risk and little relation to M/B ratios, unlike Fama and French. They also found that market risk premiums are much larger when betas are estimated using annual rather than monthly data.

On the positive side, as a tool in the regulatory arena, the CAPM is a rigorous conceptual framework, and is logical insofar as it is not subject to circularity problems, since its inputs are objective, market-based quantities, largely immune to regulatory decisions. The data requirements of the model are not prohibitive, although the amount of data analysis required can be substantial, especially if CAPM extensions are implemented.

On the negative side, the input quantities required for implementing the CAPM are difficult to estimate precisely. These problems are not insurmountable, however, provided that judgment is exercised and that the logic underlying the methodology is well supported. The techniques outlined in this chapter should prove helpful in this regard. Sensitivity analysis over a reasonable range of risk-free rate, market return, and beta is strongly recommended to enhance the credibility of the estimates.

The standard form of the CAPM must be used with some caution. There is strong evidence that the CAPM does not describe security returns perfectly, especially for public utilities. Beta is helpful in explaining security returns only when complemented with other risk indicators, such as dividend yield, size, and skewness variables. Rather than theorize on the effects of such extraneous variables, a more expedient approach to estimating the cost of equity capital is to estimate directly the empirical relationship between return and beta, and let the capital markets speak for themselves as to the relative impact of such variables. The empirical form of the CAPM provides an adequate model of security returns. If a utility's beta can be estimated for a given period, then by knowing the empirical relationship between risk and return, the security's expected return, or cost of capital, can be estimated. Here again, the cost of capital estimates produced by an ECAPM procedure should be sensitized to produce a range of estimates.

The CAPM is one of several tools in the arsenal of techniques to determine the cost of equity capital. Caution, appropriate training in finance and econometrics, and judgment are required for its successful execution, as is the case with the DCF or risk premium methodologies.

It is only natural that the next generation of CAPM models formally account for the presence of several factors influencing security returns. A new finance theory, which extends the standard CAPM to include sensitivity to several market factors other than market risk, has been proposed to replace the CAPM. Proponents of the Arbitrage Pricing Model (APM)

contend that APM provides better results than does the CAPM and is not plagued by the shortcomings of the CAPM, while retaining its basic intuition. Chapter 15 discusses this latest paradigm in financial theory, and explores its pertinence in cost of capital determination. But first, Chapter 14 presents numerous applications of the CAPM that are relevant to utilities.

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