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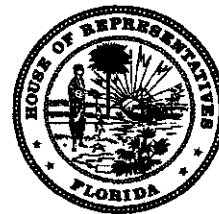
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MARCO RUBIO
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September 26, 2008

Ms. Ann Cole
Commission Clerk and Administrative Services
Room 100, Easley Building
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

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COMMISSION
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Re: Docket No. 080006-WS

Dear Ms. Cole:

Enclosed for filing, on behalf of the Citizens of the State of Florida, are the original and 15 copies of the Surrebuttal Testimony of James A. Rothschild.

Please indicate the time and date of receipt on the enclosed duplicate of this letter and return it to our office.

Sincerely,

Charlie Beck
Deputy Public Counsel

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FPSC-COMMISSION CLERK

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Water and Wastewater Industry) Docket No. 080006-WS
Annual Reestablishment of Authorized)
Range of Return on Common Equity for) Filed: September 26, 2008
Water and Wastewater Utilities pursuant)
to Section 367.081(4)(f), F.S.)

SURREBUTTAL TESTIMONY

OF

JAMES A. ROTHSCHILD

On Behalf of the Citizens of the State of Florida

J.R. Kelly
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Of the State of Florida

DOCUMENT NUMBER-DATE

09103 SEP 26 08

FPSC-COMMISSION CLERK

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1 the cost of equity and the cost of debt only move together if all else is equal. She
2 then lists things like the war with Afghanistan and Iraq, the recent run-up in
3 energy prices, mortgage and credit crisis, etc. that make 2001 and 2008 different.

4
5 First, I'd like to start by correcting a mischaracterization of my testimony made
6 by Ms. Ahern. What I said in my direct testimony was that the cost of equity
7 proposed for use in these proceedings was based on a cost of equity determination
8 that was 1.33% higher than the cost of equity found appropriate by this
9 commission in 2001 and that:

10
11 Between the 2001 leverage formula finding made by this Commission and Staffs
12 updated determination of the findings in that prior decision, long-term U.S.
13 treasury interest rates dropped by about 0.95%. As stated earlier, with such a large
14 drop in long-term interest rates, one should be highly confident that the cost of
15 equity has also dropped. An increase in the computed cost of equity in the face of
16 such a large drop in interest rates should be carefully analyzed. It is a strong
17 indication that something must be wrong with the underlying computations that
18 develop the leverage formula. Later in this testimony I will show that the
19 difference this improper result from the updated leverage formula is primarily due
20 to severe deficiencies in the approach to the CAPM that has been used to develop
21 the leverage formula.

22
23 [Rothschild direct, page 6]
24

25 Therefore, an objective reading of my direct testimony shows that I pointed out
26 that since the cost of debt dropped substantially between 2001 and 2008, it was
27 "... a strong indication that something must be wrong with the computation..."
28 Ms. Ahern's conclusion that I somehow said, "... the cost rate of common equity
29 must move in tandem with interest rate levels..." is a mischaracterization of my
30 testimony. (Ahern rebuttal, page 2).

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Q. ON PAGES 5-7 OF HER REBUTTAL TESTIMONY, MS. AHERN IDENTIFIES VARIOUS DIFFERENCES BETWEEN THE CAPITAL MARKETS IN 2001 AND 2008. PLEASE COMMENT.

A. When examining any two points in time, there are always differences in the capital markets. However, the reason people look to interest-based equity costing methods such as CAPM or risk premium is because any impact of these differences is felt in both the equity markets and the bond markets. Ms. Ahern has not provided any reason why any of the differences in the capital markets would have had any difference in their impact on bond returns compared to stock returns let alone changes that would be so largely different in impact between the cost of bonds and the cost of common equity that it would have caused one to see a substantial increase in cost while the other to see a substantial decrease.

Further, the above actual quote from my testimony shows that, in contrast to Ms. Ahern's random observations that were not tied in any way to a different impact on bonds than stocks, I not only showed that there was such a substantial inconsistency between the change in Staff's computation of the cost of equity and the actual change in the cost of debt between 2001 and 2008, but I also explained why. I showed that the inconsistency between the indicated change in the cost of equity and the cost of debt between 2001 and 2008 was due to an identifiable error in the old leverage formula result. See page 6 to 9 of my direct testimony in this case.

1

2 **Q. DOES MS. AHERN RELY ON AN ANALYSIS THAT ASSUMES THE**
3 **COST OF EQUITY AND INTEREST RATES MOVE IN TANDEM?**

4 A. Yes. In addition to Ms. Ahern's misrepresentation of my testimony, it is
5 additionally strange that she took the position of arguing against the position that
6 interest rates and the cost of equity move in tandem because both her CAPM and
7 her risk premium methods are specifically tied "IN TANDEM" to changes in
8 interest rates. Therefore, her answers from these methods do, in fact, have results
9 that change in tandem. Therefore, her testimony regarding the rejection of the
10 concept that interest rates and the cost of equity move in tandem is really rebuttal
11 to her suggested cost of equity procedures and not my overview observation.

12

13 **II. RELATIONSHIP BETWEEN COST OF DEBT AND LEVEL OF**
14 **COMMON EQUITY IN THE CAPITAL STRUCTURE**

15

16 **Q. IN YOUR DIRECT TESTIMONY, ON PAGE 11, YOU RECOMMEND TO**
17 **THE COMMISSION THAT THE DETERMINATION OF HOW THE**
18 **COST OF EQUITY CHANGES WITH CHANGES IN THE LEVEL OF**
19 **COMMON EQUITY IN THE CAPITAL STRUCTURE SHOULD**
20 **CONSIDER THAT THE COST OF DEBT CHANGES WITH CHANGES**
21 **IN THE LEVEL OF COMMON EQUITY. DOES MS. AHERN AGREE?**

22 A. No. On pages 9-10 of her rebuttal testimony, while she agrees with me that both
23 "... in theory and consistent with the Modigliani/Miller principle which provides

1 the basis for the leverage formula, the debt cost rate is a function of the debt ratio
2 with debt cost rising as the debt ratio rises.” But, in spite of her
3 acknowledgement of how the Modigliani/Miller principle works, she still goes on
4 to argue for rejecting this important principle and instead irresponsibly testifies
5 that it is somehow reasonable to make the “... assumption that the debt cost rate is
6 constant over a common equity range of 40% to 100%...”¹

7
8 **Q. COULD MS. AHERN PROVIDE ANY LOGICAL BASIS FOR HER**
9 **RECOMMENDATION TO REJECT THE MODIGLIANI/MILLER**
10 **PRINCIPLE?**

11 A. No. She attempts to criticize me on page 10, line 6, for being wrong because I
12 had been assuming “... that all else is equal.” A close examination of the
13 situation shows that her criticisms are completely hollow. Indeed, the entire
14 premise behind the leverage formula in the first place is that the leverage formula
15 only makes sense to use if the cost of capital to water and wastewater companies
16 remains the same from company to company --- in other words, the leverage
17 formula is only expected to apply if all the relevant factors that bring rise to the
18 desire to use the leverage formula are in fact equal.
19 Rather than merely assign the same cost of capital to all water and wastewater
20 utilities, the concept behind the leverage formula starts out by recognizing that
21 companies use different capital structures. Because companies use different
22 capital structures, even if the overall cost of capital were the same from company

¹ See page 10, lines 7-8 of Ms. Ahern’s Rebuttal Testimony

1 to company, the cost of equity will be different because of variations in the capital
2 structures actually used. In other words, two water companies that both have the
3 same business risk will have different financial risk if they use different capital
4 structures. The Modigliani/Miller principle tells us that as the percentage of
5 common equity goes up, financial risk goes down such that both the cost of debt
6 and the cost of equity go down. It also tells us that before considering taxes and
7 bankruptcy risk, the sum of the weighted cost of equity and the weighted cost of
8 debt (i.e. the overall cost of capital) remains the same. This is specifically why
9 the derivation of the leverage formula, whether done by Staff or by me, assumes
10 that the cost of capital would remain the same irrespective of changes in the
11 capital structure of a Florida water or wastewater company. It then first
12 determines an overall cost of capital for a theoretical water or wastewater
13 company that is using a capital structure containing 40% common equity and 60%
14 debt. It then holds this overall cost of capital constant while computing the cost
15 of equity that would be necessary to hold the overall cost of capital constant.
16 While the actual cost of equity is the desired input into the leverage formula
17 starting point, rather than using the actual embedded cost of debt of the
18 comparative companies, the cost of debt that is used for the starting point is the
19 current rate that it would cost to obtain debt. Using the current cost of equity and
20 current cost of debt is correct for this computation because it is current cost rates
21 that have relevance in the capital structure interplay as expressed in the
22 Modigliani/Miller principle. Both Ms. Ahern and I agree that the current cost of
23 debt should be used as the starting point, but where Ms. Ahern goes wrong is

1 when she argues for deviating from the Modigliani/Miller principle by failing to
2 model for anticipated changes in the cost of debt that are expected to occur in
3 response to changes in capital structure.

4
5 **Q. CAN YOU PROVIDE AN EXAMPLE THAT PROVES WHY MS. AHERN**
6 **IS WRONG?**

7 A. Yes. Assume there are two different water companies that both start brand new
8 regulated water utility businesses, call them Company A and Company B.
9 Assume that Company A when it goes into business starts with a capital structure
10 made up of 40% common equity and 60% debt and does so at a time when the
11 Florida PSC has determined the cost of equity applicable to a water company with
12 40% common equity in the capital structure is 9.50%. Since such a company is a
13 new company, debt that is actually issued would be issued at a rate equal to the
14 current cost of debt consistent with its bond rating so that if the cost rate on BBB
15 rated debt were 6.0%, the company would be able to issue debt for about 6.0%.
16 Since the Florida PSC uses this 40% equity and 60% debt capital structure and
17 uses the current cost of equity and cost of debt, the overall cost of capital allowed
18 to this Company A would be computed as follows:

19
20

Type of Capital	Amount	Cost Rate	Weighted Cost
21 Common Equity	40%	9.00%	3.60%
22 Debt	60%	6.00%	3.60%
23			
24			
25			
26			
27 Totals	<u>100%</u>		<u>7.20%</u>
28			

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In the above example, before addressing the income tax expense issue, the overall cost of capital that would both be allowed to Company A and would likewise be held constant when quantifying the leverage formula is the 7.20% overall cost of capital. So far, based on the hypothetical situation, Ms. Ahern and I would see it the same way. Now, to show what happens if Ms. Ahern's bad advice to hold the cost of debt constant were to be used, consider the following. If Company B came along at the same time Company A did, was also a new start-up water company in Florida, but had a capital structure containing 65% common equity and 35% debt, Ms. Ahern's incorrect recommendation to violate the Modigliani/Miller principles and hold the cost of debt constant would result in the following determination of the cost of equity for Company B:

Type of Capital	Amount	Cost Rate	Weighted Cost
Common Equity	65%	7.846%	5.10%
Debt	35%	6.00%	2.10%
Totals	<u>100%</u>		<u>7.20%</u>

In the above example, if Ms. Ahern's incorrect method of holding the cost of debt constant were used to determine the overall cost of capital to allow to Company B, the allowed return on equity in order to think the overall cost of capital was being kept at 7.20% would be an allowed return on equity of 7.846%. Yet, as we know both from the Modigliani/Miller principles and real world observations,

1 Company B that was identical to Company A but for capital structure would be
 2 able to issue debt at a lower interest rate than Company A. While the actual
 3 amount of the reduction in interest rates will vary depending upon financial
 4 conditions prevailing at the time, it is reasonable to assume for purposes of this
 5 exercise, that Company B could issue debt at a cost rate of 5.50% at a time when
 6 Company A could issue debt at a cost rate of 6.00%² Look what would really
 7 happen to Company B. Although it would be allowed a cost of capital of 7.20%,
 8 it would only experience the following cost of capital:

9
10

11	Type of Capital	Amount	Cost Rate	Weighted Cost
12	Common Equity	65%	7.846%	5.10%
13	Debt	35%	5.50%	1.93%
14				
15				
16				
17	Totals	100%		7.03%
18				
19				
20				
21				

22 The effect of this would be for Company B to earn more than the intended
 23 7.846% cost of equity because rates would have been set to provide Company B
 24 with a return on capital of 7.20% instead of 7.03%. In fact, as shown below, with
 25 a 65% equity/35% debt capital structure, actual cost of debt of 5.50% and allowed
 26 overall cost of capital of 7.20%, Company B would earn a return on equity of
 27 8.11%, which is 0.264% higher than the 7.846% that would have been intended

² One could quibble about whether or not the reduction in the cost of debt would be 0.50%, or a slightly different number. But, for purposes of this example, the key factor that cannot be responsibly rebutted is that the cost of debt to startup Company B would be less than for startup Company A.

1 by the Commission.

2

3 Type of Capital	Amount	Cost Rate	Weighted Cost
4 Common Equity	65%	8.11%	5.27%
5 Debt	35%	5.50%	1.93%
6			
7			
8			
9			
10 Totals	100%		7.20%

11

12

13 In other words, if the Commission were to adopt Ms. Ahern's bad advice and as a
14 result misuse the Modigliani/Miller principles, it would be using a methodology
15 that would provide a windfall gain to investors in the form of a higher return on
16 equity than the Commission would have intended.

17

18 **Q. ON PAGE 10 OF HER REBUTTAL TESTIMONY, MS. AHERN**
19 **ATTEMPTS TO DEFEND HER POSITION BY SAYING THAT WHEN**
20 **DETERMINING THE OVERALL COST OF CAPITAL, IT IS TYPICAL**
21 **FOR THE COMMISSION TO USE THE EMBEDDED COST OF DEBT IN**
22 **THE COMPUTATION OF THE OVERALL COST OF CAPITAL. DOES**
23 **THIS SOLVE THE PROBLEM?**

24 A. No, not at all. In the above example, the embedded cost of debt and the new cost
25 of debt were the same, yet by making the mistake of failing to change the cost of
26 debt when deriving the leverage formula resulted in providing an inadequately
27 small downward adjustment to the cost of equity. The bottom line is that to get
28 the right answer, both the expectation of the lower cost of debt must be modeled

1 into the determination of the leverage formula and then when computing the
2 overall cost of capital for the subject company both the cost of equity derived
3 from the leverage formula that is consistent with the subject company's capital
4 structure and the actual embedded cost of debt of the subject company must both
5 be used.

6
7 **Q. OF WHAT RELEVANCE ARE MS. AHERN'S COMMENTS ON PAGE 11**
8 **OF HER REBUTTAL TESTIMONY THAT "BOND RATINGS ARE NOT**
9 **SIMPLY AND EXCLUSIVELY A FUNCTION OF DEBT RATIOS...."**

10 A. Once a decision is made to use the leverage formula approach and to base that on
11 the principles of Modigliani/Miller, these comments by Ms. Ahern are irrelevant.
12 The entire basis for using the leverage formula approach in the first place is to
13 allow one cost of equity determination to be applied to all water and wastewater
14 companies in proceedings where the leverage formula use is not challenged by
15 either the Company or other parties. As is correctly noted on page 11 of Ms.
16 Ahern's rebuttal testimony, in addition to considering financial parameters that
17 are a function of the capital structure, Standard & Poor's does consider business
18 risk. A company with an excellent business risk rating would be likely to have a
19 lower cost of debt for any given capital structure than a company with a weak
20 business risk position. However, the relevance of that factor would come into
21 play on whether or not the leverage formula result is or is not applicable to the
22 company in question. It would have absolutely nothing to do with how to
23 determine the leverage formula or any of the results obtained from the formula.

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III. B X R APPROACH TO DCF

Q. DOES MS. AHERN COMMENT ON YOUR APPROACH TO THE DCF METHOD IN THIS PROCEEDING?

A. Yes. Starting on page 28 of her rebuttal testimony, she provides a discussion of my recommended DCF approach. On page 29, she claims that my recommended approach to the DCF method is based on the short-term forecasts she thinks I have advised against. Additionally, she claims that the approach I have used is somehow circular. She is wrong on both counts.

Q. PLEASE COMMENT ON MS. AHERN'S CLAIM THAT YOUR APPROACH VIOLATES YOUR ADVICE ON THE USE OF SHORT-TERM FORECASTS.

A. On page 29 of her testimony, Ms. Ahern provides a quote from page 18, lines 16-18 of my direct testimony. I will repeat the quote she provided, and will highlight that section in bold, but will also provide material from my direct testimony that appeared immediately before and immediately after that quote so it can be put into proper context:

While the CAPM method is also dependent upon a DCF result to compute the risk premium, growth in the implementation of the DCF method is not based on the two- stage approach, but is instead computed by Staff by averaging the five year growth rate in dividends and earnings forecast by Value Line (based on over 600 companies) to occur between the average of the three most recent historical years and a three year period a few years into the future.

1 **As I have argued for decades, the historical to short-term future five-year**
2 **growth rates are NOT the kind of growth rate applicable for use in the DCF**
3 **formula because they are not long-term sustainable growth rates.** Growth
4 rates from any base period are subject to distortion depending on how atypical the
5 three-year average base period is compared to what is expected for the future.
6 Value Line itself apparently knows better than to use these growth rates in a DCF
7 method, because when it advises investors what total return to expect for the
8 future, it does NOT add these growth rates to the dividend yield as it would if it
9 believed these growth rates to be a credible DCF approach. Therefore, I am not
10 surprised that the results of such an inherently flawed approach to the DCF would
11 result in vastly inconsistent results when comparing the computational results
12 from 2001 to 2008.

13
14
15 Putting the portion of my testimony that Ms. Ahern quoted into its proper context
16 shows that her criticisms are totally without foundation. I was, am, and will be
17 opposed to the use of short-term, five-year earnings per share and/or dividends
18 per share growth rates in a constant growth form of the DCF model because these
19 growth rates are purely and simply unsustainable growth rates. However,
20 determining what growth rate is sustainable by determining what future expected
21 return on book equity is anticipated by investors can produce a sustainable growth
22 rate. This approach of applying the “b x r” approach to quantify future
23 sustainable growth was used both in the Staff report when it applied the DCF
24 method and in my testimony.

25
26 **Q. PLEASE COMMENT ON MS. AHERN’S CLAIM THAT YOUR**
27 **APPROACH TO THE DCF METHOD IS SOMEHOW CIRCULAR.**

28 A. In making this statement, Ms. Ahern shows her fundamental misunderstanding of
29 the DCF method. She apparently has lost sight of the fact that DCF stands for
30 “Discounted Cash Flow”. The basic principle behind the DCF method is to find

1 the discount rate (cost of equity) that equates the future expected cash flows to the
2 current stock price. Ms. Ahern should know that future cash flows that investors
3 will receive would come from future dividends until such time as an investor sells
4 the stock. At the time the stock is sold, the investor receives proceeds from the
5 sale of the stock and a corresponding one-time cash flow from the sale of the
6 stock. Both the dividends and the future stock price a company will receive are
7 highly dependent upon the level of earnings a company will achieve. The level of
8 future earnings a regulated utility will earn, and therefore the cash flow investors
9 will expect to receive, are directly related to how high of an earned return on
10 equity a commission gives a company the opportunity to earn. Therefore, Ms.
11 Ahern should know that any accurate approach to the DCF method must
12 recognize that the results of regulation are what is a key determinant to what
13 future cash flows will be. This is true whether future cash flows are measured by
14 quantifying growth through use of the $b \times r$ (or retention rate times future
15 expected return on book equity) method, or if it is based on quantifying earnings
16 per share growth or dividends per share growth.

17
18 **Q. ARE B X R GROWTH RATES MORE OR LESS SUSCEPTIBLE TO**
19 **CHANGES IN THE ALLOWED RETURN ON EQUITY THAN B X R**
20 **GROWTH RATES?**

21 **A.** Five year earnings per share growth rates of the kind used by Ms. Ahern are far
22 more susceptible to a change in the allowed return on equity than $b \times r$ growth
23 rates. Here is why. Assume a company that in the past has been allowed to earn a

1 return on equity of 9.25% convinces a commission to increase its authorized
2 return on equity to 9.75%. Such a change, if it were accompanied by other
3 ratemaking computations that result in investors changing future expectations for
4 return on equity actually increasing from 9.25% to 9.75% would result in an
5 increased expectation in earnings per share. How much the increase in earnings
6 per share would be is easy to estimate. If investors expected a company to earn
7 \$2.00 per share five years from now when it earned the 9.25% return on equity,
8 the earnings expectation would have to change from \$2.00 to approximately \$2.11
9 ($\$2.00 \times 9.75/9.25$)³. Now, if a company in which investors were expecting \$2.00
10 in earnings per share five years from now had investors who were expecting a 5%
11 per year earnings per share growth rate over the next five years when earnings per
12 share expectations were at the \$2.00 level, then earnings per share at the
13 beginning of the five year period would have to be $\$2.00/((1.05)^5)$, or \$1.567.
14 Or, said another way, \$1.0567 grown at a compound rate of 5% for 5 years
15 becomes \$2.00. Now look what happens to the computation of the growth rate if
16 the allowed return on equity is increased from 9.25% to 9.75% and there is a
17 corresponding increase in future expected return on book equity. Even though we
18 said the DCF method that obtained an indicated cost of equity of 9.75% based
19 upon a 5% earnings per share growth rate when investors were thought to expect
20 future earnings per share of \$2.00, the higher earnings that would result from the

³ This computation is approximate rather than exact because higher earnings in the year prior to the fifth year would be added to book value if dividends were not increased. The higher book value would mean earnings per share would be that much higher by the fifth year, making the earnings per share required to produce the 9.75% earned return on equity a bit higher than the \$2.11 I've shown. However, I have not included this effect to make the computations easier to follow without hurting the integrity of the example.

1 now higher allowed return on equity would produce a new growth rate of 6.13%
2 (the compound rate of growth required for \$1.567 to grow to \$2.11 in 5 years).
3 Therefore, if it were somehow felt to be circular because a change in the future
4 expected earned return on equity from 9.25% to 9.75% would increase the b x r
5 growth rate, it would be just as circular to rely upon a five-year earnings per share
6 growth rate because it, too, would increase in response to investors' changed
7 earnings expectations.

8
9 **Q. ARE YOU THEN SAYING THAT BOTH B X R AND A FIVE –YEAR**
10 **EARNINGS PER SHARE GROWTH RATE COMPUTATION ARE**
11 **CIRCULAR?**

12 **A.** No, actually neither is circular. Remember that the DCF method is implemented
13 by finding the discount rate that equates the current stock price with investor's
14 future cash flow expectations. As long as the stock price and the future
15 expectations of investors are measured from the same point in time, there is no
16 circularity in either method. Actually, the proper mathematical term for factors
17 such as this where one influences the other is an iteration. Even those of us who
18 may not be familiar with this mathematical term do iterations all the time. For
19 example, if a room is cold we increase the setting of the thermostat. The
20 thermostat turns on a furnace until it gets information that the temperature has
21 risen and it no longer needs to have the furnace on. A sailboat captain sailing a
22 compass course turns the boat to one direction to get back on course and then
23 turns the wheel straight again once arriving to the desired course.

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Q. IF NEITHER THE B X R METHOD NOR THE FIVE YEAR EARNINGS PER SHARE METHOD HAS ANY CIRCULARITY, DOES THAT MAKE IT ACCEPTABLE TO USE THE FIVE YEAR EARNINGS PER SHARE COMPUTATION AS AN INICATOR OF FUTURE EXPECTED GROWTH IN THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. No. The constant growth form of the DCF model only has mathematical integrity if the best estimate for the future expected level of growth in earnings, dividends, book value, and stock price all share the same growth rate as the best estimate of what is expected for the future. This is not to say that they would actually grow at the same rate, but it does mean that investors have no basis for thinking any one is likely to grow more rapidly than another.

The b x r method is merely a way that estimates future expected growth in a way that is sustainable. It is not susceptible to beginning or ending point errors like 5-year growth rates are, and it provides an estimate of growth that is equally credible for earnings per share, dividends per share, book value per share, and stock price per share. This is why it is the only approach to the constant growth form of the DCF model that is mathematically derivable.

Q. WHY IS IT SO IMPORTANT TO USE A GROWTH RATE IN THE CONSTANT GROWTH FORM OF THE DCF MODEL THAT IS EQUALLY REPRESENTATIVE OF WHAT INVESTOS EXPECT FOR

1 **FUTURE EARNINGS PER SHARE, DIVIDENDS PER SHARE, BOOK**
2 **VALUE PER SHARE, AND STOCK PRICE PER SHARE GROWTH?**

3 A. While the reason constant growth is required as the input into the constant growth
4 form of the DCF model could be shown mathematically by illustrating the
5 algebraic derivation of the constant growth form of the DCF model, there is a
6 simple example that readily shows the deficiency of using five year earnings per
7 share growth as an indicator in an environment of non-constant growth.

8
9 The constant growth form of the DCF model recognizes that the total return
10 received by investors is the sum of the dividend yield and a future expected
11 growth rate. Given this, consider what happens if growth rates are unequal:

- 12
13 1. If dividends grow less rapidly than earnings, but stock price grows at the
14 same rate as dividends, then the dividend yield declines. Yet, the constant
15 growth form of the DCF model has no mechanism to quantify the impact
16 of a declining dividend yield on the future expected total return. Hence, in
17 this scenario, the constant growth DCF result loses meaning.
- 18
19 2. If earnings grow more rapidly than dividends, then the retention rate keeps
20 increasing. Other things being equal, a higher and higher retention rate
21 causes earnings per share growth rate to become higher and higher. Yet,
22 the constant growth form of the DCF model has no mechanism to quantify
23 the impact of an increasing growth rate on the expected total return
24 investors expect to receive.

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3. If stock price is expected by investors to grow more rapidly than dividends, then the dividend yield would be expected to go down. Yet, there is no mechanism in the constant growth form of the DCF model to accurately compute the impact of such an expected change. The same but opposite effect would occur if stock price were expected to grow less rapidly than dividends.

IV. CAPM ANALYSIS

Q. WHAT DOES MS. AHERN SAY ABOUT YOUR CAPM ANALYSIS?

A. Ms. Ahern discusses my CAPM method starting on page 31 of my testimony. The first thing she claims is that my CAPM is somehow not a CAPM method because “(I)n CAPM theory, the Security Market Line (SML) is a line that demonstrates the relationship between risk and return as measured by beta and the required rate of return for individual securities.”

Q. IS THAT A VALID CRITICIZM OF YOUR APPROACH TO CAPM?

A. No. The graph on page 2 of Exhibit No. ____ (JAR-7) is specifically the development of the Security Market Line that was quantified by showing the actual relationship between earned returns and betas for all of the roughly 1,000 companies included in the Ibbotson Associates (Now IBES Morningstar) 2008

1 Yearbook.

2 **Q. SINCE YOU DID PROVIDE THE SML, WHAT BASIS DID MS. AHERN**
3 **USE TO CLAIM YOU DID NOT CREATE THE SML?**

4 A. Ms. Ahern did what I would call loophole rebuttal. She found a textbook source
5 that happened to define the SML as the very same relationship I graphed, but
6 happened to use the word "... individual securities..." in the definition. Never
7 mind that the SML shown in my graph shows the very same relationship, Ms.
8 Ahern created a phantom difference anyhow. The data that I used was aggregated
9 by Ibbotson Associates by compiling the average betas for each company in the
10 group and the average returns earned by each group. In other words, the data
11 does include the impact of each individual company.

12

13 **Q. MS. AHERN ALSO SAYS ON LINES 10-11 OF PAGE 31 OF HER**
14 **TESTIMONY THAT "THE SML HAS ITS ORIGIN AT THE RISK-FREE**
15 **RATE, I.E., THE INTERCEPT, WHEREAS OPC WITNESS**
16 **ROTHSCHILD ESTIMATES AN INTERCEPT THAT HE CLAIMS TO BE**
17 **THE RISK-FREE RATE. IS THIS A PROBLEM?**

18 A. No. By CAPM theory, the relationship between beta and cost of equity is
19 supposed to be linear. Therefore, if the true relationship were actually linear,
20 extending the least squares line as defined by the actual historical SML were
21 indeed the true relationship, the line projection would pass through the intercept at
22 the risk free rate. In other words, whether I had actually used some externally
23 determined risk free rate or the risk free rate defined by the data, the results would

1 have been essentially identical. As I stated on page 54 of my direct testimony
2 “(t)he most accurate risk free rate to use with the analysis is the one that is defined
3 by the data itself. This way, the true historical actual relationship between beta
4 and the cost of equity is maintained.” I go on to explain on page 55 of my direct
5 testimony that “(t)he compound annual return actually achieved by investors in
6 US. Treasury Bills from 1926-2007 was 4.70%, or only 25 basis points higher
7 than the result consistent with the actual return versus actual beta data used in my
8 CAPM analysis. This small difference is an excellent confirmation of the integrity
9 of the CAPM theory.” So whether I had obtained the risk free rate by directly
10 using the average U.S. Treasury Bill return from 1926 to 2007 or used the
11 derivation of the risk free rate as implied by the data, the difference would have
12 been slight.

13
14 **Q. IS THE SHORT-TERM TREASURY RATE THE CORRECT RATE TO**
15 **USE AS A RISK FREE RATE?**

16 **A.** From the perspective of the SML, it is the only security that has a beta at or very
17 near zero. A longer-term treasury would be incorrect to plot at the intercept
18 because its beta is above zero. It is also reasonable to use short-term treasuries as
19 a proxy for the risk free rate IF AND ONLY IF the actual treasury yield over a
20 long period of time is used. At any given spot point in time, the yield on risk free
21 treasuries is often distorted due to factors such as whether the U.S. Federal
22 Reserve is artificially increasing interest rates to slow down the economy or is
23 artificially decreasing interest rates to stimulate the economy.

1

2 **Q. IS MS. AHERN'S INCORRECT CLAIM THAT YOU DID NOT BASE**
3 **YOUR CAPM ON AN SML THE ONLY UNFAIR CRITICISM OF YOUR**
4 **CAPM SHE MADE?**

5 A. No. On page 31 of Ms. Ahern's testimony, she claims that I was incorrect to
6 compare the Value Line 5 year betas to the betas calculated from 1926-2007, i.e.
7 82 years. Once again, it is Ms. Ahern that is incorrect. She is wrong because she
8 ignored the point I explain on page 55 of my direct testimony. On lines 9-10 of
9 page 55, I am asked the question "DO THESE HISTORICAL ACTUAL
10 RETURNS FROM 1926-2007 AUTOMATICALLY EQUATE TO THE COST
11 OF EQUITY". My answer was "(n)o". I go on to explain that I specifically
12 adjusted the data obtained from 1926-2007 to make it applicable to the current
13 financial environment.

14

15 **Q. DID MS. AHERN STILL MORE INCORRECT CRITICISMS OF YOUR**
16 **CAPM APPROACH?**

17 A. Yes. In spite of the detailed explanation of the correctness of using the
18 compound, or geometric average to quantify historical actual returns on pages 51
19 to 52 of my direct testimony, Ms. Ahern has not yet given up on her invalid
20 argument about the arithmetic average.

21

22 Ms. Ahern's try at using the arithmetic average is an old trick that has been used
23 by unscrupulous investment advisors for years. Attached to this testimony is an

1 article entitled “Financial Advisers and Fuzzy Math⁴” which explains that the
2 arithmetic method is an invalid approach to quantifying returns that has been used
3 specifically to overstate actual investment returns.

4
5 Additionally, I have attached to this testimony an article entitled “The Difference
6 in Averaging⁵” from Value Line that correctly explains that the arithmetic method
7 overstates returns while the geometric averaging method is the correct method.

8
9 Furthermore, Ms. Ahern must know that if the SML is computed using arithmetic
10 average returns instead of geometric returns, the resulting line is no longer linear
11 and the zero beta intercept result is way above the risk free rate. All of this
12 merely provides additional proof of what should already be obvious: the
13 arithmetic average of historical returns is an invalid method of quantifying
14 historical actual returns. It serves to mislead investors or analyses based upon
15 those results.

16
17 **Q. ON PAGE 38 OF HER TESTIMONY, MS. AHERN CLAIMS THAT THE**
18 **9.66% RETURN DISCUSSED BY SBBI IS BASED UPON GEOMETRIC**
19 **MEAN RETURNS. IS THIS A CORRECT DESCRIPTION OF WHAT**
20 **SBBI HAS REALLY SAID?**

21 A. No. Ms. Ahern is misrepresenting her source. On page 57 of my direct
22 testimony, I provide a full in-context quote from SBBI. What the complete quote

⁴ See Exhibit No. ___ (JAR-13)

⁵ See Exhibit No. ___ (JAR-14)

1 shows that in the opinion of SBBI, assuming historical inflation rates the future
2 expected return on equity is 9.66%. As explained in that quote, this 9.66% is the
3 same answer whether the geometric or arithmetic averaging method is used.
4

5 **Q. ON PAGE 32 OF HER REBUTTAL TESTIMONY, MS. AHERN SAYS**
6 **THAT “THE ARITHMETIC MEAN RETURN IS APPROPRIATE FOR**
7 **COST OF CAPITAL PURPOSES PRECISELY BECASUSE IT**
8 **CAPTURES THE EFFECT OF CHANGING ECONOMIC CONDITIONS**
9 **ON RISK PREMIA OVER TIME.” IS THIS CORRECT?**

10 **A.** No. The arithmetic mean is inappropriate for cost of capital purposes and even if
11 someone wanted to use arithmetic means to capture the effect of changing
12 economic conditions that is way beside the point of any analysis that anyone has
13 or generally does propose in the context of a CAPM analysis. Ms. Ahern’s
14 statement is also wrong because simply knowing the arithmetic average says
15 absolutely nothing about how risky an investment may be. For example, if the
16 arithmetic average return over 6 years was 10.0%, merely knowing this does not
17 provide any information if the 10% annual average return was obtained from an
18 investment that earned exactly 10% in each of the six years, or from an
19 investment that earned 0% in 3 years and 20% in three years, or if the 10%
20 average return was earned in any one of a number of different ways. In fact,
21 merely knowing that the arithmetic average return averaged 10% for six years is
22 such a misleading number that it does not even tell anyone if there was a total
23 profit or total loss over the six years.

1

2 **Q. HOW COULD A SIX-YEAR ARITHMETIC AVERAGE RETURN OF**
3 **10% BE MEASURED IF AN INVESTOR EXPERIENCED A LOSS OVER**
4 **THE SIX YEARS?**

5 A. Suppose an investor started out with an investment of \$100 and incurred a loss of
6 90% in the first year. Such an investor would have an investment value of only
7 \$10 after the end of the first year. Then, assume the investor proceeded to earn a
8 return of 150% in the second year. If this happened, the \$10 balance at the end of
9 the first year would become \$25 at the end of the second year. Further assume
10 that this investor then proceeded to exactly break even in the remaining 4 years.
11 Such an investor would have started with an investment of \$100, ended up with
12 an investment of only \$25, for a net loss over the six years of \$75. Yet, the
13 arithmetic average of the returns over the six years would be $(-90\% + 150\% + 0\%$
14 $+ 0\% + 0\% + 0\%) / 6$, which equals an annual average return rate of 10%.

15

16 A measurement technique that could come to a conclusion that the average annual
17 return on an investment that declined from \$100 to \$25 over six years was
18 somehow actually a positive return of 10% is seriously wrong.

19

20 **Q. IF KNOWING THE ARITHMETIC AVERAGE IN AND OF ITSELF SAYS**
21 **NOTHING ABOUT EITHER THE RISKINESS OF AN INVESTMENT OR**
22 **EVEN WHETHER OR NOT AN INVESTMENT WAS PROFITABLE, IS**
23 **THERE ANY BASIS AT ALL FOR MS. AHERN'S CLAIM THAT**

1 **ARITHMETIC AVERAGES PROVIDE INSIGHT INTO VARIANCE AND**
2 **STANDARD DEVIATION OF RETURNS?**

3 A. While Ms. Ahern's comments about the potential use of arithmetic returns to get
4 an estimate of risk are irrelevant because they have not even been proposed as the
5 way to quantify risk, it could be possible to use arithmetic returns to measure risk.
6 Actually, for that matter, one could use time interval geometric returns as a
7 measure of risk also⁶. If one wanted to compute the variability of annual returns,
8 one could do this by examining the variation in annual returns over a number of
9 years. However, this fact is in no way connected with what method properly
10 quantifies actual returns that were earned. Among the key facts Ms. Ahern
11 improperly ignored are that a) the variability of returns that could be computed
12 from arithmetic returns ARE NOT AND SHOULD NOT be used to quantify risk
13 in the CAPM. Instead, risk is independently quantified from betas. Betas are
14 computed by regressing the weekly percentage change in a stock price compared
15 to the weekly percentage change in a broad stock index. Betas are NOT
16 computed from the arithmetic average of anything. Therefore, Ms. Ahern's
17 defense of the use of the arithmetic average because annual percentage change
18 data could be used to get some insights into risk is a very strange argument
19 indeed.

⁶ By "time interval" geometric returns what I mean is geometric return comparisons for multi-year periods, such as a series of geometric returns over a string of 5-year periods. Actually, annual arithmetic returns are nothing but geometric returns over one year, since arithmetic returns could be computed over any time period. For example, an annual arithmetic return is nothing but the geometric result of monthly arithmetic returns, monthly arithmetic returns are nothing but geometric monthly returns from daily arithmetic returns, etc.

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Q. ON PAGE 37 OF HER TESTIMONY, MS. AHERN DISCUSSES THE RELATIONSHIP BETWEEN BETA AND THE COEFFICIENT OF DETERMINATION. PLEASE COMMENT.

A. On page 37 of her testimony, Ms. Ahern criticizes my use of beta because "... beta is a measure of market or systematic, non-diversifiable risk and not of non-systematic, company-specific or diversifiable risk." What Ms. Ahern fails to explain is that the entire premise behind the CAPM method in the first place is that the only kind of risk for which investors are rewarded is precisely this non-diversifiable risk that is quantified by beta, not by R2.

The Nobel laureate William Sharpe, one of the originators of the Capital Asset Model explains in one of his textbooks the following regarding beta, market risk and return:

Market risk is related to the risk of the market portfolio and to the beta of the security in question. Securities with larger betas will have larger amounts of market risk. In the world of the CAPM, securities with larger betas will have larger expected returns. These two relationships together imply that securities with larger market risks should have larger expected returns.

Non-market risk is not related to beta. This means that there is no reason why securities with larger amounts of non-market risks should have larger expected returns⁷.

Q. DOES MS. AHERN PROVIDE A FINANCIAL SOURCE THAT SHE CLAIMS SUPPORTS HER MISCONCEPTION ABOUT THE CORREC

⁷ Sharpe F. William, Investments fifth edition, 1995, p.277.

1 **RISK MESUREMENT TO USE?**

2 A. Yes. On page 37, she references Investments: Analysis and Management by Jack
3 Clark Francis. She includes three pages from that book in her Exhibit (PMA-26).

4
5 **Q. DOES THE SOURCE MS. AHERN HAS PROVIDED HAVE THE SAME**
6 **MISCONCEPTION ABOUT HOW TO USE THE CAPM THAT MS.**
7 **AHERN HAS?**

8 A. No. On the contrary. Her source correctly recognizes that it is beta, not r squared
9 that measures the non-diversifiable risk. This source also correctly recognizes
10 that in order to experience the non-diversifiable risk, investors need to invest in
11 portfolios of stocks in contrast to making an investment that is concentrated in
12 only a few securities. However, this source in no way contradicts the use of beta
13 with CAPM.

14
15 The message is simple. If one accepts the principles of the CAPM method, then
16 one accepts, as I do, the generally accepted concept that investors are only
17 rewarded for taking non-diversifiable risks. Yes, those investors who want to
18 assume greater risk by not diversifying can (and do) take on larger risks. But,
19 those larger risks in aggregate average out (some investors do very well, while
20 others do very poorly). Because they average out, risks created through an
21 investor's failure to diversify add nothing to the cost of equity. Because they add
22 nothing to the cost of equity, in the process of balancing the interests of investors
23 and ratepayers, the Commission must ignore these non-diversifiable risks.

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**V. BOND DIFFERENTIAL, PRIVATE PLACEMENT PREMIUM,
SMALL UTILITY RISK PREMIUM, FLOTATION COST
ADJUSTMENT**

**Q. DOES MS. AHERN TAKE A POSITION ON YOUR
RECOMMENDATION TO EXCLUDE COST OF CAPITAL ADDERS
FOR THE BOND DIFFERENTIAL, PRIVATE PLACEMENT PREMIUM,
SMALL UTILITY RISK PREMIUM AND FLOTATION COST
ADJUSTMENT.**

A. Yes, Ms. Ahern expresses her disagreement with what I have explained is the correct position on these issues. However, it should first be pointed out that she has failed to put this disagreement in the proper context. She failed to note that the net result of my recommendation to exclude various additions to the cost of equity computation but at the same time make an addition to the cost of equity that had not been contemplated by the Commission produces a much smaller difference in the end result. As I testified on pages 28-29 of my direct testimony:

The 2001 Order allows for additions to the cost of equity computed from the comparative gas companies for:

- Bond Yield Differential
- Private Placement Premium
- Small-Utility Risk Premium
- Financing Costs

All the above adders are inappropriate. However, one adder which is actually

1 larger than any of the other ones and was omitted but should have been included
2 in the second stage of the DCF model is the increment to growth caused by sales
3 of new common stock above book value. After excluding the four above-listed
4 improper additions to the cost of equity and adding the impact of sales of new
5 common stock above book value, the results of the DCF method as applied to the
6 comparative gas companies changes from the 9.68% obtained by Staff to the
7 9.42% to 9.43% shown on my Exhibit JAR-2.

8
9 **Q. HAS MS. AHERN PROVIDED SPECIFIC REBUTTAL TO THE**
10 **TESTIMONY YOU PROVIDED ON PAGES 29 AND 30 OF YOUR**
11 **DIRECT TESTIMONY THAT EXPLAINS WHY THE PROPOSED BOND**
12 **DIFFERENTIAL IS INAPPROPRIATE?**

13 A. On page 19 of her rebuttal testimony, Ms. Ahern incorrectly states that “(i)t is
14 appropriate to include the bond yield differential in the cost of common equity
15 calculation in the leverage formula because the bond yield differential reflected in
16 the debt cost rate only compensates bond holders for the increased riskiness
17 inherent in Baa3 public utility bonds relative to the riskiness inherent in A rated
18 public utility bonds.” In the typical style that Ms. Ahern has frequently used in
19 her rebuttal testimony, she is completely wrong because she has only considered
20 part of the story. The starting point for the leverage formula is the overall cost of
21 capital for the comparative gas companies that was computed using the actual cost
22 of equity for the comparative group and the cost of debt as it would currently be if
23 these companies issued debt today. Then, this overall cost of capital is held

1 constant when determining what cost of equity and cost of debt would be
2 applicable to a capital structure containing an alternative level of common equity.
3 See page 15 of my direct testimony. By holding the overall cost of capital
4 constant, the cost of equity goes up when the common equity ratio goes down and
5 goes down when the common equity ratio goes up. This accounted-for change in
6 the cost of equity is exactly the same as the change in the cost of equity
7 concurrent with expected changes in the bond rating. Therefore, if a separate
8 adder were made as Ms. Ahern suggests, this would be entirely unfair because it
9 would represent a double-count of the effect.

10
11 **Q. ON PAGE 19 OF HER REBUTTAL TESTIMONY, MS. AHERN CLAIMS**
12 **THAT IN YOUR COMPUTATIONS ON EXHIBIT NO. ____ (JAR-8),**
13 **(PAGE 1) YOU HAVE “ASSUMED THAT THE 9.40% COMMON**
14 **EQUITY COST RATE IS EQUALLY APPLICABLE TO A UTILITY**
15 **WHOSE BONDS ARE RATED BAA3 AS IT IS TO A UTILITY WHOSE**
16 **BONDS ARE RATED A2 BY MOODY’S. IS SHE CORRECT?**

17 **A.** No. Ms. Ahern is misrepresenting my testimony. The leverage graph works by
18 starting with the computation of an overall cost of capital at a starting-point
19 capital structure. Then, the cost of equity that is required to keep the overall cost
20 of capital constant is computed. The result of these computations is that the cost
21 of equity applicable to capital structures with a lower percentage of common
22 equity have a higher cost of equity and capital structures with a higher percentage
23 common equity have a lower cost of equity.

1

2 **Q. DOES MS. AHERN PROVIDE ANY REBUTTAL TO YOUR**
3 **EXPLANATION OF WHY IT IS INAPPROPRIATE TO MAKE AN**
4 **ADDITION FOR PRIVATE PLACEMENT PREMIUM OR FINANCING**
5 **COSTS?**

6 A. No, instead of providing any rebuttal to my arguments, she just explains that she
7 would like to have a private placement premium. She provides no evidence that a
8 private placement premium even exists. On page 31 of my direct testimony, I
9 explain why the private placement premium is inappropriate, and provide a paper
10 prepared on behalf of the Federal Reserve of San Francisco that explains that a
11 private placement premium is improper. Ms. Ahern's testimony adds nothing of
12 substance to the issue.

13

14 As for flotation costs, I cover that topic on page 32 to 33 of my direct testimony.
15 Once again, Ms. Ahern's rebuttal testimony does not address the issues I
16 presented. Therefore, her discussion on the topic adds nothing of substance to the
17 issue.

18

19 **Q. STARTING ON PAGE 23 OF HER TESTIMONY, MS. AHERN ARGUES**
20 **IN FAVOR OF A SMALL UTILITY RISK PREMIUM. PLEASE**
21 **RESPOND.**

22 A. In her testimony, Ms. Ahern presents a quote from a textbook published in 1989
23 that claimed to believe in a small-firm premium. It is extremely important to note

1 that the quote she provided talks about small firms in general and does NOT talk
2 about whether or not the small firm effect would or would not be applicable to
3 utility companies. What Ms. Ahern failed to note is that since 1989, data showing
4 that whatever risk small firms have in comparison to large firms is already
5 expressed in the firms beta. In other words, small firms on average have higher
6 betas than large firms. This is a very important distinction because it means that
7 whatever effect on risk that is brought about by size, it is already captured by
8 beta. It also means that since regulated utility companies do not have unusually
9 high betas, if there is a small firm effect it is offset by other risk reducing
10 characteristics inherent in utility companies. It only makes sense that the risks
11 typically faced by small firms would not be replicated for a regulated public
12 utility. An unregulated small firm is more likely to have one or only a few key
13 products that could be subject to obsolescence, or could be vulnerable to attack
14 from a larger and more powerful competitor. However, regulated water and
15 wastewater utility companies need not fear competition because they have the
16 protection of territorial monopolies and because they have products that have no
17 chance of becoming obsolete.

18
19
20 **VI. REASONABLENES OF END RESULT**

21
22 **Q. ON PAGE 39 OF HER TESTIMOMY, MS. AHERN IS ASKED A**
23 **QUESTION ABOUT THE REASONABLENESS OF THE FL PSC**

1 **STAFF’S LEVERAGE FORMULA. PLEASE RESPOND.**

2 A. Ms. Ahern answers this question by stating that the 9.68% DCF result and the
3 11.40% CAPM result are both reasonable. I agree that the 9.68% DCF result is
4 reasonable, although it could be improved slightly. However, the 11.40% CAPM
5 result is not reasonable. It is a much higher result than is justified by the current
6 interest rate environment could possibly justify, how much higher this result is
7 than a reasonable DCF result further reinforces the inaccuracy of an arithmetic
8 average based CAPM. Consider that this 11.40% is higher than the
9 approximately 11.00% interest rate AIG has been forced to pay on its emergency
10 financings that were provided for it to avert bankruptcy.

11
12

13 **VII. PROBLEM WITH FORMULA IMPLEMENTATION**

14

15 Q. **DID MS. AHERN CORRECTLY IDENTIFY AN INADVERTENT**
16 **TRANSPOSITION OF NUMBERS IN YOUR TESTIMONY?**

17 A. Yes. On page 15 of her rebuttal testimony, she identified an inadvertent number
18 reversal in a hypothetical example that I had prepared. The hypothetical example
19 was supposed to have used a debt cost of 7.36%, but the number 7.63% was
20 entered in its place. That item should be fixed. Following is the correction:

21
22
23

Marginal Cost of Investor Capital
Average Water and Wastewater Utility

Capital Component	Ratio	Marginal Cost Rate	Weighted Marginal Cost
Rate Common Equity	46.37%	9.40%	4.36%
Total Debt	<u>53.63%</u>	7.36%	<u>3.95%</u>
Total	100.00%		8.31%

8

9 Because the above was only an illustration of a hypothetical example, the
10 correction has no impact whatsoever on any of the recommendations in my
11 testimony.

12

13 **VIII. DR. MORIN**

14

15 **Q. MS. AHERN CITES DR. ROGER MORIN AS AN AUTHORITY ON COST**
16 **OF CAPITAL. IS DR. MORIN AN INDEPENDENT AUTHORITY ON**
17 **COST OF CAPITAL?**

18

19 **A.** Dr. Morin is a company-sponsored cost of capital witness who has testified on
20 behalf of utility companies in hundreds of cases.

21

22 **Q. HAVE YOU HAD THE OPPORTUNITY TO PERFORM A DETAILED**
23 **ANALYSIS OF ANY OF THESE COST OF CAPITAL TESTIMONIES**
24 **FILED BY DR. MORIN?**

25 **A.** Yes, on numerous occasions. I have exposed many flaws in Dr. Morin's cost of
26 capital testimonies. For example, I have included as JAR-12 in this testimony a

1 copy of an evaluation of Dr. Morin's testimony that I filed in a Nova Scotia
2 Power case a few years ago.

3

4 **Q. HOW DID THE COMMISSION IN NOVA SCOTIA RULE?**

5 A. In Nova Scotia Power Incorporated's 2005 rate case the Nova Scotia Utility and
6 Review Board said the following in its decision:

7 The Board believes that an ROE of 9.50% to 9.60%, as recommended by Mr.
8 Rothschild and Mr. Gorman respectively, fairly represents an appropriate ROE.
9 The ROE of 11.2%, as recommended by Dr. Morin, is, in the opinion the Board,
10 too high given the current economic climate⁸.

11

12

13 **VIII. CONCLUDING REMARKS**

14

15 **Q. IS THERE ANYTHING YOU WOULD LIKE TO SAY IN CONCLUSION?**

16 A. Yes. The concept of a leverage formula as a way of streamlining the rate
17 proceedings for the numerous water and wastewater companies in Florida is a
18 creative, innovative approach. For it to work in a way that is fair to both investors
19 and ratepayers this must be done properly. To do this properly requires a
20 relatively sophisticated understanding of finance. My direct testimony in this
21 proceeding has correctly identified numerous problems with the earlier attempts at
22 the leverage graph computation. Specifically, the earlier leverage graph formula
23 was overly simplistic because it incorrectly failed to consider that not only does
24 the cost of equity change as the percentage of common equity in the capital

⁸ Nova Scotia Utility and Review Board Decision in case NSUARB-NSPI_P-881, page 79

1 structure changes, but the cost of debt changes as well. Also, the original formula
2 incorrectly failed to consider that the real-world impact of income taxes is a
3 critical part of the proper dynamic in capital structure selection. Completing the
4 task of appropriate implementation of the creative, innovative leverage graph
5 approach requires that these items be fixed.

6
7 My direct testimony shows the appropriate method to deal with the critical
8 problems with the leverage formula so it can truly accomplish what was initially
9 intended.

10
11 **Q. DOES THIS CONCLUDE YOUR SURREBUTTTAL TESTIMONY?**

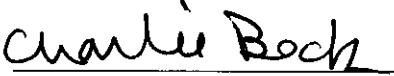
12 **A. Yes.**

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Direct Testimony of James A. Rothschild has been furnished by U.S. Mail to the following parties on this 26th day of September, 2008, to the following:

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4 **VI. EVALUATION OF THE TESTIMONY OF DR. MORIN**

5

6 **A. Summary**

7

8 Q. PLEASE SUMMARIZE THE TESTIMONY OF DR. MORIN.

9 A. Dr. Morin has recommended that Nova Scotia Power Company be allowed a return on equity

10 of 10.20% to 11.20%.¹ Based upon this range, the Company based its overall capital request on

11 the 10.20% low end of the range². Dr. Morin arrived at this recommendation based upon his

12 implementation of the DCF method, risk premium methods, and a comparable earnings method.

13

14 Q. PLEASE SUMMARIZE YOUR ANALYSIS OF DR. MORIN'S EVIDENCE.

15 A. An analysis of his evidence shows that each of the approaches he has relied upon to

16 determine the cost of equity contains significant errors that have caused him to overstate the cost

17 of equity. Following is a brief summary of the problems with Dr. Morin's testimony that are

18 explained in detail later in this section of my testimony.

19

DCF Method:

- 20 • Violating the assumptions of the constant-growth DCF model by failing to use
21 sustainable growth in constant growth form of DCF method.
22 • Skewing the results of his DCF method by eliminating companies for which the results
23 were too low without making a similar elimination of results that were too high.

24

25

26 Risk Premium and CAPM Methods:

¹ Appendix G, Page 8 lines 5-7.

² Appendix A revised, Table 13.

1 • Overstating historic actual performance by giving weight to arithmetic average and
2 arithmetic median rather than using the geometric averaging method.

3
4 • Failure to consider the decline in the risk premium that has been occurring over the last
5 several decades.

6
7
8
9 Comparable Earnings Method:

10
11 • Not an equity costing method. All it does is assume that whatever is the future expected
12 return on book equity is automatically the cost of equity.

13
14 As a result of the flaws in Dr. Morin's analysis, he has recommended a cost of equity range that
15 is higher than can be justified.

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B. Dr. Morin's DCF Method

Q. YOU HAVE EXPLAINED THAT THERE IS BOTH A CONSTANT-GROWTH FORM AND A NON-CONSTANT GROWTH FORM OF THE DCF MODEL. WHICH HAD DR. MORIN USED IN THIS PROCEEDING?

A. Dr. Morin has only used a constant growth rate form of the model, but applies the constant growth form by using non-constant growth rate inputs.

Q. DID DR. MORIN PROPERLY APPLY THE SIMPLIFIED OR CONSTANT DCF METHOD?

A. No. While the basic approach used by Dr. Morin to implement the DCF model is inherently flawed because he uses a growth rate indicator that is inappropriate for the formula he has selected, in this case he has introduced an even greater level of error in his DCF result. He did this by selectively excluding results that were too low without making any adjustment for companies whose results were too high.

Q. HOW DO YOU KNOW DR. MORIN INTRODUCED EVEN GREATER ERROR INTO HIS DCF ANALYSIS BY SELECTIVELY EXCLUDING RESULTS THAT WERE TOO LOW?

A. The following is where Dr. Morin selectively excluded companies from his analysis:

1 a) His Exhibit RAM-8 presents his DCF analysis of "Investment-Grade Vert. Integr.
2 Electric Utilities DCF Analysis: Value Line Growth Projections". The note on the bottom of this
3 schedule states that he excluded the results from Alliant, Energy East, IDACORP, and TECO
4 because his DCF results were "... less than the cost of debt..."

5 b) His Exhibit RAM-9 presents his DCF analysis of "Investment-Grade Vertically
6 Integrated Elect. Utilities DCF Analysis" Analysts' Growth Forecasts". The note on the bottom
7 of this exhibit states that he eliminated the results for Central Vermont, Cleco, and Green
8 Mountain Power because the results were less than the cost of debt.

9 c) His Exhibit RAM-10, Page 2 presents his DCF analysis of "Natural Gas Utilities DCF
10 Analysis: Value Line Growth Forecasts". The note at the bottom of this exhibit states that he
11 eliminated the results of Nicor because the DCF result was less than the cost of debt.

12

13 Q. DID DR. MORIN EXCLUDE ANY COMPANIES BECAUSE HIS DCF RESULTS
14 WERE TOO HIGH?

15 A. No. For example, on his Exhibit RAM-8, he left in his DCF result of 19.8% for
16 Northeast Utilities, on Exhibit RAM 9, he left in the 16.1% result for Empire District Electric,
17 and on Exhibit RAM-10, Page 2 he left in his 16.4% result for UGI Corp. In other words, Dr.
18 Morin caused an upward bias his conclusion by eliminating results that were too low while
19 keeping results that were too high.

20

21 Q. WHAT WOULD DR. MORIN'S DCF RESULTS HAD BEEN IF HE HAD NOT
22 EXCLUDED ANY COMPANIES SIMPLY BECAUSE THE RESULT WAS TOO LOW?

1 A. I do not know. Dr. Morin was asked to provide the necessary information both in
2 information requests (UARB IR-76 and 77) and as a follow-up during a technical conference.
3 Both times, he refused to provide the necessary information.

4

5 Q. IF ONE WANTED TO EXCLUDE RESULTS THAT ARE KNOWN TO BE TOO LOW
6 WITHOUT PRODUCING A BIASED ANSWER HOW COULD THIS BE DONE?

7 A. Yes. One approach that could be reasonable would be to exclude an equal amount of low
8 result and high results. That way a central tendency to the data could be determined.

9

10 Q. IF AN EQUAL NUMBER OF LOW DCF RESULTS AND HIGH DCF RESULTS WERE
11 EXCLUDED FROM DR. MORIN'S GROUP, WHAT WOULD HIS RESULTS HAVE BEEN?

12 A. The results Dr. Morin would have obtained would have been as follows:

13

14 1) Exhibit RAM-8, Electric Utilities based on Value Line would have been 9.1% instead of
15 9.9%;

16 2) Exhibit RAM-9, Electric Utilities based on Value Line Forecasts would have been 8.9%
17 instead of 9.9%;

18 3) Exhibit RAM-10, Page 1 of 2 Gas Utilities based on Analysts' forecasts would remain at
19 the 9.3% shown by Dr. Morin, and

20 4) Exhibit RAM-10, Page 2, Gas Utilities based upon Value Line forecasts would drop from
21 11.5% to 11.0%.

22

1 The results of Dr. Morin's DCF analysis thus modified to remove his upward bias produces an
2 average DCF result of 9.575% instead of the average 10.15% he obtained. In other words, even
3 though there are many other problems with Dr. Morin's approach to determining the cost of
4 equity, in this case essentially all of the difference between the cost of equity requested by NSPI
5 and what I recommend could be attributed simply to the upward bias Dr. Morin built into his
6 interpretation of the DCF results.

7

8 Q. WHY IS THE GROWTH RATE INDICATOR HE USED INAPPROPRIATE FOR USE IN
9 THE DCF FORMULA HE SELECTED?

10 A. One approach used by Dr. Morin to determine the growth rate he used in his DCF method
11 was to examine only the earnings per share growth rate forecast made by Value Line. The Value
12 Line earnings per share growth rate he used is the growth in earnings per share from the average
13 actual earnings per share from 2001-2003 to the average earnings per share forecast by Value
14 Line for 2007-2009. The second approach used by Dr. Morin was to use the analysts' earnings
15 per share forecast for growth from the most recently completed fiscal year (generally 2003) to
16 five years later (generally 2008). Neither of these approaches measures the long-term
17 sustainable growth rates in earnings, dividends, book value, and stock price that are **required** in
18 the implementation of the constant-growth form of the DCF model.

19

20 Q. WHY ARE ANALYSTS' FIVE-YEAR CONSENSUS GROWTH RATES NOT
21 INDICATIVE OF LONG-TERM SUSTAINABLE GROWTH RATES?

22 A. These short-term earnings per share growth rate forecasts are not indicative of future
23 sustainable growth rates in part because the sources of cash flow to an investor are dividends and

1 stock price appreciation. While both stock price and dividends are impacted in the long-run by
2 the level of earnings a company is capable of achieving, earnings growth over a period as short
3 as five years is rarely in synchronization with the cash flow growth from increases in dividends
4 and stock price. For example, if a company experiences a year in which earnings are temporarily
5 below investor expectations, stock prices generally do not decline at the same percentage that
6 earnings decline, and dividends are usually not cut just because of a temporary decline in a
7 company's earnings. Unless both the stock price and dividends mirror every down swing in
8 earnings, they cannot be expected to recover at the same growth rate that earnings recover.
9 Therefore, growth rates such as five-year projected growth in earnings per share are not
10 indicative of long-term sustainable growth rates in cash flow. As a result, they are inapplicable
11 for direct use in the simplified DCF method.

12
13 Q. PLEASE ELABORATE ON WHY THE USE OF FIVE-YEAR EARNINGS PER SHARE
14 GROWTH RATES IN THE DCF MODEL IS IMPROPER?

15 A. A raw, unadjusted, five-year earnings per share growth rate is usually a very poor proxy for
16 either short-term or long-term cash flow growth that an investor expects to receive. When
17 implementing the DCF method, the time value of money is considered by equating the current
18 stock price of a company to the present value of the future cash flows that an investor expects to
19 receive over the entire time that he or she owns the stock. The discount rate required to make the
20 future cash flow stream, on a net present value basis, equal to the current stock price is the cost
21 of equity. The only two sources of cash flow to an investor are dividends and the net proceeds
22 from the sale of stock at whatever time in the future the investor finally sells. Therefore, the

1 DCF method is discounting future cash flows that investors expect to receive from dividends and
2 from the eventual sale of the stock.

3 Five-year earnings growth rate forecasts are especially poor indicators of cash flow growth even
4 over the five years being measured by the five-year earnings growth rate number. This is
5 because, for different reasons, the five-year earnings per share growth rate is not indicative of
6 growth in either of the two cash flow sources to an investor.

7
8 Q. WHY IS A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR
9 INDICATOR OF THE FIVE-YEAR CASH FLOW EXPECTATION FROM DIVIDENDS?

10 A. The board of directors changes dividend rates based upon long-term earnings expectations
11 combined with the capital needs of a company. Most companies do not cut the dividend simply
12 because a company has a year in which earnings were below sustainable trends, and similarly
13 they do not increase dividends simply because earnings for one year happened to be above long-
14 term sustainable trends. Therefore, over any given five-year period, earnings growth is
15 frequently very different from dividend growth. In order for earnings growth to equal dividend
16 growth, at a minimum, earnings per share in the first year of the five-year earnings growth rate
17 period would have to be exactly on whatever long-term earnings trend line is expected by
18 investors. Since earnings in most years are either above or below the trend line, the earnings per
19 share growth rate over most five-year periods is different than what is expected for earnings
20 growth.

21
22 Q. IS A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATOR OF
23 FUTURE STOCK PRICE GROWTH?

1 A. Yes. If a company happens to experience a year in which earnings decline below what
2 investors believe are consistent with the long-term trend, then the stock price does not drop
3 anywhere near as much as earnings drop. Similarly, if a company happens to experience a year
4 in which earnings are higher than the investor-perceived long-term sustainable trend, then the
5 stock price will not increase as much as earnings. In other words, the P/E (price/earnings) ratio
6 of a company will increase after a year in which investors believe earnings are below sustainable
7 levels, and the P/E ratio will decline in a year in which investors believe earnings are higher than
8 expected. Since it is stock price that is one of the important cash flow sources to an investor, a
9 five-year earnings growth rate is a poor indicator of cash flow both because it is a poor indicator
10 of stock price growth over the five years being examined and is equally a poor predictor of
11 dividend growth over the period.

12

13

14 Q.WHAT CHARACTERISTICS MUST A GROWTH RATE HAVE IN ORDER FOR IT TO
15 BE A VALID INDICATOR OF THE GROWTH RATE TO USE IN THE CONSTANT
16 GROWTH DCF FORMULA?

17 A. **The only proper growth rate to use in the simplified version of the DCF model is a**
18 **growth rate that investors expect is sustainable for many years into the future.** A long-term
19 sustainable growth rate in cash flow is a very special type of growth rate. Short-term, five-year
20 earnings per share growth rates, such as those reported by First Call/IBES, are frequently
21 substantially different from future sustainable growth rates.

22

1 Q. PLEASE SUMMARIZE WHY A FUTURE ORIENTED "B X R" METHOD IS SUPERIOR
2 IN PROVIDING A LONG-TERM SUSTAINABLE GROWTH RATE THAN A FIVE-YEAR
3 EARNINGS PER SHARE GROWTH RATE FORECAST?

4 A. The primary cause of sustainable earnings growth is the retention of earnings. A company is
5 able to create higher future earnings by retaining a portion of the prior year's earnings in the
6 business and purchasing new business assets with those retained earnings. There are many
7 factors that can cause short-term swings in earnings growth rates, but the long-term sustainable
8 growth is caused by retaining earnings and reinvesting those earnings.

9 Factors that cause short-term swings include anything that causes a
10 company to earn a return on book equity at a rate different from the long-term sustainable rate.
11 Assume, for example, that a particular utility company is regulated so that it is provided with a
12 reasonable opportunity to earn 10.0% on its equity. If the company should experience an event
13 such as the loss of several key customers, or unfavorable weather conditions which cause it to
14 earn only 6.0% on equity in a given year, the drop from a 10% earned return on equity to a 6%
15 earned return on equity would be concurrent with a very large drop in earnings per share. In fact,
16 if a company did not issue any new shares of stock during the year, a drop from a 10% earned
17 return on book equity to a 6% earned return on book equity would result in a 40% decline in
18 earnings per share over the period.³ However, such a drop in earnings would not predict the
19 long-term sustainable earnings per share growth rate. If the drop were caused by weather
20 conditions, the drop in earnings would be immediately offset once normal weather conditions
21 return. If the drop is from the loss of some key customers, the company would replace the lost

³ By definition, earned return on equity is earnings divided by book value. Therefore, whatever level of earnings is required to produce earnings of 6% of book would have to be 40% lower than the level of earnings required to produce a return on book equity of 10%.

1 earnings by filing for a rate increase to bring revenues up to the level required for the company to
2 be given a reasonable opportunity to recover its cost of equity.

3 For the above reasons, changes in earnings per share growth rates that are caused by non-
4 recurring changes in the earned return on book equity are inconsistent with long-term sustainable
5 growth. However, changes in earnings per share from the periodic reinvestment of retained
6 earnings cause of sustainable earnings growth. The "b x r" term in the DCF equation computes
7 sustainable growth because it measures only the growth which a company can expect to achieve
8 when its earned return on book equity "r" remains in equilibrium. If analysts have sufficient data
9 to be able to forecast varying values of "r" in future years, then a complex, or multi-stage DCF
10 method must be used to accurately quantify the effect. Averaging growth rates over sub-periods,
11 such as averaging growth over the first five years with a growth rate expected over the
12 subsequent period will not provide an appropriate representation of the cash flows expected by
13 investors in the future and, therefore, will not provide an acceptable method of quantifying the
14 cost of equity using the DCF method. The choices are either a constant growth DCF, in which
15 one "b x r" derived growth rate should be used, or a complex DCF method in which the cash
16 flow anticipated in each future year is separately estimated.

17

18 Q. WHEN REJECTING THE USE OF SHORT-TERM ANALYSTS CONSENSUS
19 EARNINGS PER SHARE GROWTH RATE FORECASTS, ARE YOU SAYING THAT
20 ANALYSTS' CONSENSUS EARNINGS PER SHARE GROWTH RATES ARE USELESS AS
21 AN AID TO PROJECTING THE FUTURE?

22 A. No. **Analysts' EPS growth rate are, however, very dangerous if used in a simplified**
23 **DCF without proper interpretation.** While they are not useful if used in their "raw" form, they

1 can be useful in computing estimates of what earned return on equity investors expect will be
2 sustained in the future, and as such, are useful in developing long-term sustainable growth rates.
3 But, the growth rate from an arbitrary starting year is, in and of itself, as useless as attempting to
4 measure the average slope of a mountain based upon the slope encountered over the last five
5 minutes of hiking on a jagged trail up the mountain. In my implementation of the simplified
6 DCF method, I use the Zacks five-year earnings per share growth only to help determine what
7 earned return on book equity investors anticipate will be achieved in five years. Then, I consider
8 the resultant earned return on book equity as one of the inputs to determine the value of "r" that I
9 use in the "b x r" growth rate computation. In this way, I give consideration to analysts'
10 consensus growth rate, but do so in a way that results in a long-term sustainable cash flow
11 growth rate rather than making the erroneous assumption that a five-year earnings per share
12 growth rate is somehow an indicator of cash flow growth remember, cash flow received by an
13 investor is in the form of either dividends or stock price appreciation.

14

15 Q. DO ARTICLES IN BUSINESS LITERATURE DEFINITELY SHOW THAT
16 INVESTORS ARE AWARE OF THE SERIOUS BIASES CONTAINED IN THE
17 RECOMMENDATIONS OF MANY ANALYSTS' REPORTS?

18 A. Yes. There have been countless articles that appeared in both business publications and the
19 popular press throughout the last year that show these biases. *Business Week*, a widely read and
20 important business publication, contained numerous articles that reported on the problems with
21 securities analysts. These include:

22 1. A cover story entitled "How Corrupt is Wall Street" appeared in the May 13, 2002 issue of
23 *Business Week*.

1 a) The article mentions that Merrill Lynch, Solomon Smith Barney, Morgan Stanley Dean Witter
2 along with 10 other firms are being investigated by the US Securities and Exchange Commission
3 for unethical practices.⁴

4 b) According to the article, New York State Attorney General Eliot Spitzer made public e-mail
5 exchanges at Merrill where, e-mail messages uncovered by Dr. Spitzer showed that "...analysts
6 disparage stocks as 'crap' and 'junk' that they were pushing at the time. The e-mails are so
7 incendiary that they threaten to thrust Wall Street into the sort of public-relations nightmare that
8 Philip Morris, Ford, Firestone, and Arthur Andersen have endured in recent years."⁵

9 c) The article features the following quote from David Komansky, the CEO of Merrill Lynch, by
10 placing it in bold letters and large print:

11
12 We have failed to live up to the high standards that are our tradition, and I want to take this
13 opportunity to publicly apologize to our clients, our shareholders, and our employees.⁶
14

15 In the above quote, Dr. Komansky was responding to what *Business Week*
16 describes as "...the analyst debacle..."⁷

17 2. The cover of the July 29, 2002 issue of *Business Week* features the article entitled "THE
18 ANGRY MARKET." The Cover summarizes the article by saying "THE BLUNT MESSAGE:
19 Investors are re-pricing stocks to reflect a more honest picture of earnings, options, and the
20 future." In a discussion about the inaccurate and misleading earnings reporting done by many
21 companies, *Business Week* says:

22
23 Brokerage-house analysts aren't much help either. They tend to do what companies want. For
24 example, only six of the 21 analysts that have given First Call their estimates for AOL Time
25 Warner Inc.'s 2003 earnings actually provided GAAP figures.
26

27 3. A cover article in the August 5, 2002 issue of *Business Week* is entitled "INSIDE THE
28 TELECOM GAME. How a small group of insiders made billions as the industry collapsed."
29 The article discusses the buy recommendations consistently made by Dr. Grubman on these
30 companies, and says on page 34:

31
32 Now, investors are questioning whether Grubman was motivated by his true opinions – or by the
33 millions of dollars he received from supporting his telecom clique.
34

35 4. "HOW TO FIX CORPORATE GOVERNANCE" is the cover article in the in the May 6,
36 2002 issue of *Business Week*. Page 76 of this article says:

37
38 If investors have learned anything from this crisis, it's that Wall Street's analysts are often loath
39 to put a bad spin on a stock. Historically, "sell" ratings have constituted fewer than 1% of
40 analysts' recommendations, according to Thompson Financial/First Call...It's more a case of an
41 inherently conflicted system, that is now the focus of a Justice Department investigation.

⁴ May 13, 2002 *Business Week*, page 37.

⁵ *Business Week*, May 13, 2002 page 39

⁶ *Business Week*, "How Corrupt is Wall Street" May 13, 2002 page 42

⁷ *Ibid*, page 42.

1
2 “Investors need to realize that the free research they’re getting is often just a marketing tool’,
3 says Kent Womack, a professor at Dartmouth College’s Amos Tuck school of business.”

4
5 5. A June 10, 2002 issue of *Fortune* had an article entitled “In Search of the Last
6 Honest Analyst”. The *Fortune* article noted:

7
8 In fact, stock research sank so low during the bubble that it actually became a contrary indicator
9 of a stock’s performance. Researchers at the University of California and Stanford reviewed
10 almost 40,000 stock recommendations from 213 brokerages during the year 2000. The most
11 highly rated stocks had a –31% return for the year, according to the study. Meanwhile, the
12 stocks least favorably recommended (that is, the sells) soared an annualized 49% -- a differential
13 of 80 percentage points.⁸

14
15 6. A September 24th, 2002 *Wall Street Journal* article entitled “Will Grubman Case Tone Down
16 the Exaggeration by Analysts?” states the following:

17
18 During the 1980s and 1990s, analysts often served as quasiadvocates for companies that hired
19 their firms for investment-banking work, accompanying them on road shows to sell their stock,
20 setting up one-on-one meetings between management and institutional investors, and proffering
21 their access to management to give an unofficial version of the companies’ view of business
22 developments.⁹

23
24 7. On October 22, 2002, a *Wall Street Journal* article entitled “Massachusetts Claims
25 CSFB Stock Reports Led Investors Astray” appeared on pages C-1 and C-10. Following are
26 some highlights from this article:

27
28 The complaint [by the Secretary of the Commonwealth of Massachusetts] alleges CSFB
29 misled investors by allowing its investment-banking division – in particular, star Frank
30 Quattrone – to exert undue influence on the firm’s research department.

31 The complaint which echoes one filed earlier this year by Elliott Spitzer against Merrill
32 Lynch & Co. will no doubt add to investor concern that Wall Street peddled research it didn’t
33 believe only to get its hands on the much more lucrative investment-banking fees.
34 ‘The presumption that every firm engaged in this behavior is fair,’ says Roy Smith, a professor
35 of finance at New York University and a former partner at Goldman Sachs Group, Inc. ‘It
36 reminds me of how we used to talk in the locker room after a football game. That talk happens
37 all the time, but it would sure be embarrassing if anyone ever recorded it.’¹⁰

38
39

⁸ Fortune.com, “In Search of the Last Honest Analyst” June 2002 page 1 of 2

⁹ Wall Street Journal “Will Grubman Case Tone Down The Exaggeration by Analysts?”
September 24, 2002, starting on pages C-1 and C-3.

¹⁰ Wall Street Journal, October 22, 2002, page C-1 and C-10.

1 Q. HAS ALL THE UNFAVORABLE PRESS REGARDING EQUITY ANALYSTS
2 RESULTED IN POSITIVE REFORM IN THE INDUSTRY?

3 A. No. A *Business Week* editorial published on September 8, 2003 called "The Myth of
4 Independence" states that the new independent research firms also have conflicts of interest to
5 deal with and "Many hire analysts with little or no track record, raising questions about the
6 quality of their research."

7
8 Q. ONE OF THE GROWTH RATES THAT DR. MORIN RELIES UPON IS VALUE LINE
9 FORECASTED EARNINGS PER SHARE GROWTH RATES. IS THE VALUE LINE
10 EARNINGS PER SHARE GROWTH RATE SUFFICIENTLY NORMALIZED TO MAKE IT
11 AN ACCURATE INDICATOR OF LONG-TERM SUSTAINABLE GROWTH RATES?

12 A. A. No, because Value Line's method results in only a very incomplete normalization
13 of the base period earnings it uses in its earnings per share five-year forecast. The Value Line
14 earnings per share forecast of the type presented by Dr. Morin is defined by Value Line as the
15 earnings per share growth from "Est'd '01-'03 to '07-'09". The procedure used by Value Line is
16 to average the earnings per share from the 2001-03 base period and relate that three-year average
17 to the earnings per share it expects will be achieved, on average, over the future 2007-2009 time
18 period. The method used by Value Line does not assure the appropriate normalization of
19 earnings per share in the base period, because there is not even an attempt by Value Line to make
20 the average earned return on book equity in the base period reflective of the normal expected
21 return on book equity. In fact, in the case of all the gas companies covered by Value Line, the
22 average earned return on book equity from 2001-2003 is lower than Value Line expects in the
23 2007-2009 period.

1 **C. Dr. Morin's Risk Premium Method**

2

3 Q. PLEASE BRIEFLY DESCRIBE THE RISK PREMIUM METHOD.

4 A. The risk premium method estimates the cost of equity by analyzing the historic difference
5 between the cost of equity and a related factor such as the rate of inflation or the cost of debt.

6

7 Q. PLEASE COMMENT ON THE RISK PREMIUM METHODS AS PRESENTED BY DR.
8 MORIN.

9 A. Dr. Morin applies the risk premium method by computing the difference in the returns earned
10 by common stocks as compared to the return earned on bonds in a variety of different ways.

11 However, these approaches rely upon one of two common flaws: they either rely upon the use of
12 an arithmetic average to compute historic actual differences in earned returns, or they rely upon a
13 risk premium computed from Dr. Morin's flawed approach to the DCF method.

14 In addition to improperly computing the risk premium for the reasons stated above, Dr.
15 Morin's risk premium approach is also flawed because he incorrectly concludes that the risk
16 premium between debt and equity are constant, when they are not. As I have shown earlier in
17 this testimony, empirical evidence, financial theory, and financial articles all show that the risk
18 premium as measured against interest rates has been anything but constant. It is risk premiums
19 measured against the inflation rate, not interest rates, which have shown to be reasonably
20 constant.

21

22

1 Q. PLEASE EXPLAIN THE PROBLEMS CAUSED BY USING THE ARITHMETIC
2 METHOD TO QUANTIFY THE RISK PREMIUM.

3 A. As will be explained in detail later in this testimony, textbooks, the U.S. Securities and
4 Exchange Commission ("SEC"), and Value Line have all recognized that the only proper way to
5 measure long-term historic actual earned returns is to use the geometric mean, not the arithmetic
6 mean put forward by Dr. Morin. In contrast, Dr. Morin used the arithmetic mean. The
7 arithmetic mean is specifically identified by several sources as a method that will specifically
8 result in an answer that is upwardly biased.

9

10 Q. IS THERE A MATHEMATICAL RELATIONSHIP BETWEEN THE GEOMETRIC
11 AVERAGE AND THE ARITHMETIC AVERAGE?

12 A. Yes. Page 24 of the third edition of *Stocks for the Long Run* by Professor Jeremy J. Siegel ©
13 2002 contains the following:

14 The geometric return is approximately equal to the arithmetic return minus one-half of the
15 variance σ^2 of yearly returns $r_G = r_A - 1/2 \sigma^2$.

16 Investors can be expected to realize geometric returns only over long periods of time.
17 The average geometric return is always less than the average arithmetic return except when all
18 yearly returns are exactly equal. This difference is related to the volatility of yearly returns.
19

20 As correctly explained above, the only reason the arithmetic average is higher than the
21 geometric average is because of the volatility of yearly returns. Therefore, from the perspective
22 of the cost of equity to allow a regulated utility, the correct return is the geometric return. The
23 geometric return, if allowed, will be the return the utility company is given a reasonable
24 opportunity to earn. If there is a difference between the geometric return and the arithmetic
25 return, for a regulated utility this difference will occur simply because a utility company's stock

1 price will fluctuate up and down even though the allowed return on equity remains fixed at least
2 until the next rate case.

3

4 Q. HAVE YOU DR. MORIN'S CLAIM THAT THE GEOMETRIC AVERAGE IS THE
5 CORRECT AVERAGE TO USE WHEN MEASURING HISTORIC RETURNS, BUT THE
6 ARITHMETIC AVERAGE IS SOMEHOW CORRECT FOR FORECASTING FUTURE
7 RETURNS?

8 A. Yes, I have seen this argument. But, given that the difference between the geometric return
9 and the arithmetic return is due to volatility and not the true return actually being achieved, such
10 an argument that claims a different measurement technique applies to historic data than to
11 forecast data is incorrect. Consider the following example. Assume that the Canadian
12 Government issued a 30-year bond 15 years ago that pays an annual interest rate of 5.0% on the
13 face amount of the bond. Further assume that although interest rates fluctuated over the last 15
14 years, the current interest rate demanded by investors happens to be 5% today. Under these
15 assumptions, over the last 15 years, the price of the bond has gone up in some years and gone
16 down in other years. But, if the current interest rate demanded by investors on this bond is still
17 the same 5% as was demanded by investors at the time of the original issuance, the bond will be
18 selling for the same price as it did when originally issued 15 years ago. Because of this
19 fluctuation, if the total return (price appreciation or price depreciation plus the 5% interest
20 income) is measured using the arithmetic average, then the measured return will include the 5%
21 real return actually obtained by investors plus an additional illusory return cause by volatility
22 rather than an actual return received by the investor. From the perspective of the investor who is
23 forecasting the return on this 5% government bond with 15 years remaining, we know with

1 certainty that the accurate forecasted future return will be 5% per year. We also can be confident
2 that interest rates will fluctuate over the next 15 years. Therefore, this fluctuation will cause the
3 arithmetic return measurement to be higher than the 5% annual return even though the 5% return
4 is the only possible return an investor who holds this bond to maturity could get.

5

6 Q. IS IT THE 5% RETURN ON THE TREASURY BOND OR IS IT THE ARITHMETIC
7 AVERAGE RETURN THAT IS ANALAGOUS TO THE ALLOWED RETURN ON EQUITY
8 TO A REGULATED UTILITY COMPANY?

9 A. The 5% coupon return is the return that is analogous to the allowed return. Therefore, even if
10 we were to attempt to satisfy the investor who was incorrectly led to believe that he or she would
11 achieve the arithmetic average and not the geometric average, the return based upon the
12 geometric average should form the return allowed. Then, an investor who wishes to be fooled
13 into achieving a higher return than is achieved by the geometric average will continue to be
14 under the misconception that he or he is earning more than the geometric average. This can
15 happen because the stock price fluctuation will still produce annual returns that, under the
16 arithmetic average method, will appear to be higher than the allowed geometric return.

17 Consider the problem that would develop if allowed returns were errantly set based upon the
18 arithmetic average rather than the geometric average. If a utility company is allowed to earn a
19 return on rate base equal to the arithmetic average, then the normal stock price fluctuations
20 would cause the new arithmetic average measured result to continue to exceed the old allowed
21 arithmetic average. A repetition of the error caused by using the arithmetic average, if repeated
22 in the next rate case, would cause yet a further ratcheting up of the allowed return in each future
23 rate case where this mistake to use the arithmetic average is repeated.

1

2 Q. CAN YOU PROVIDE A MATHEMATICAL EXAMPLE THAT SHOWS WHY RISK
3 PREMIUM BASED UPON HISTORIC ARITHMETIC RETURNS ARE IMPROPER?

4 A. Yes. As previously stated, arithmetic average returns overstate the actual returns received by
5 investors because arithmetic returns measure volatility, not actual returns earned by investors.

6 The more variable historic growth rates have been, the more his method exaggerates actual
7 growth rates. Arithmetic average returns ignore the impact of compound interest. For example,

8 if a company were to have a stock price of \$10.00 in the beginning of the first year of the

9 measurement period and a \$5.00 stock price at the end of the first year, an arithmetic average

10 approach would conclude that the return earned by the investor would be a loss of 50% [$(\$5-$

11 $\$10)/(\$10)$]. If, in the second year, the stock price returned to \$10.00, then the arithmetic

12 average would compute a gain of 100% in the second year [$(\$10-\$5)/(\$5)$]. The arithmetic

13 average approach would naively average the 50% loss in the first year with the 100% gain in the

14 second year to arrive at the conclusion that the total return received by the investor over this two

15 year period would be 25% per year [$(-50\% + 100\%)/2$ years]. In other words, the arithmetic

16 average approach is so inaccurate that it would conclude the average annual return over this two

17 year period was 25% per year even though the stock price started at \$10.00 and ended at \$10.00.

18 The geometric average would not make such an error. It would only consider the compound

19 annual return from the beginning \$10.00 to the ending \$10.00, and correctly determine that the

20 annual average of the total returns was not 25%, but was zero.

21 In order to protect investors from misleading data, the SEC requires mutual funds to

22 report historic returns by using the geometric average only. The arithmetic average is not

23 permitted. The geometric average, or SEC method, has the compelling advantage of providing a

1 true representation of the performance that would have actually been achieved by an investor
2 who made an investment at the beginning of a period and re-invested dividends at market prices
3 prevailing at the time the dividends were paid.
4

5 Q. DOES THE FINANCIAL COMMUNITY COMPUTE HISTORIC ACTUAL
6 ACHIEVED RETURNS BASED UPON ARITHMETIC MEANS OR GEOMETRIC MEANS?

7 A. As shown earlier in this testimony, the financial community (as represented by articles from
8 *The Wall Street Journal* and from *Business Week*) refers to geometric averages when evaluating
9 historic returns. Additionally, an article on page 92 of the August 16, 1999 issue of *Fortune*
10 magazine refers to the return that is equal to the geometric mean from Ibbotson Associates as
11 "...the oft-quoted calculation..." of historic actual returns on common stocks. The article does
12 not even mention the number that is equal to the historic arithmetic return.
13

14 Q. DO FINANCIAL TEXTBOOKS SUPPORT THE USE OF THE GEOMETRIC AVERAGE
15 FOR COMPUTING HISTORIC ACTUAL RETURNS?

16 A. Yes. For example, the textbook *Valuation. Measuring and Managing the Value of*
17 *Companies*, by Copeland, Koller, and Murrin of McKinsey & Co. , John Wiley & Sons, 1994, in
18 a description of how to use the Ibbotson Associates data states the following on pages 261-262:

19 We use a geometric average of rates of return because arithmetic averages are biased by
20 the measurement period. An arithmetic average estimates the rates of return by taking a simple
21 average of the single period rates of return. Suppose you buy a share of a nondividend-paying
22 stock for \$50. After one year the stock is worth \$100. After two years the stock falls to \$50
23 once again. The first period return is 100 percent; the second period return is -50 percent. The
24 arithmetic average return is 25 percent $[(100 \text{ percent} - 50 \text{ percent})/2]$. The geometric average is
25 zero. (The geometric average is the compound rate of return that equates the beginning and
26 ending value.) **We believe that the geometric average represents a better estimate of**
27 **investors' expected returns over long periods of time.** [Emphasis added]
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Similarly, in another textbook discussion that specifically addresses the use of the Ibbotson data, *Financial Market Rates & Flows*, by James C. Van Horne, Prentice Hall, 1990, states the following on page 80:

The geometric mean is a geometric average of annual returns, whereas the arithmetic mean is an arithmetic average. For cumulative wealth changes over long sweeps of time, the geometric mean is the appropriate measure.

The textbook *Investments* by Nancy L. Jacob and R. Richardson Pettit, Irwin, 1988, puts it well when it says:

The existence of uncertainty as reflected in a distribution of possible values makes the **expected value**, or arithmetic average rate of return, a misleading and biased representation of the wealth increments which will be generated from multiperiod investment opportunities.

The average *annual* rate of wealth accumulation over the investment period, termed the **average annual geometric rate of return**, correctly measures the average annual accumulation to wealth when multiple periods are involved.

[Emphasis is contained in the original]

B. Q. HAS VALUE LINE SAID ANYTHING REGARDING THE USE OF AN ARITHMETIC AVERAGE OR A GEOMETRIC AVERAGE?

A. Yes. On May 9, 1997, Value Line issued a report entitled "The Differences in Averaging". This report was contained on pages 6844-6845 of the "Value Line Selection & Opinion" portion of its weekly mailings to subscribers. This report says that:

(t)he arithmetic average has an upward bias, though it is the simplest to calculate. The geometric average does not have any bias, and thus is the best to use when compounding (over a number of years) is involved.

The Value Line report then goes on to provide examples that show why the arithmetic average overstates the achieved returns while the geometric average produces the correct result.

1 Ibbotson Associates has also said that it is the geometric average that is "... the correct average
2 to compare with a bond yield..."¹¹

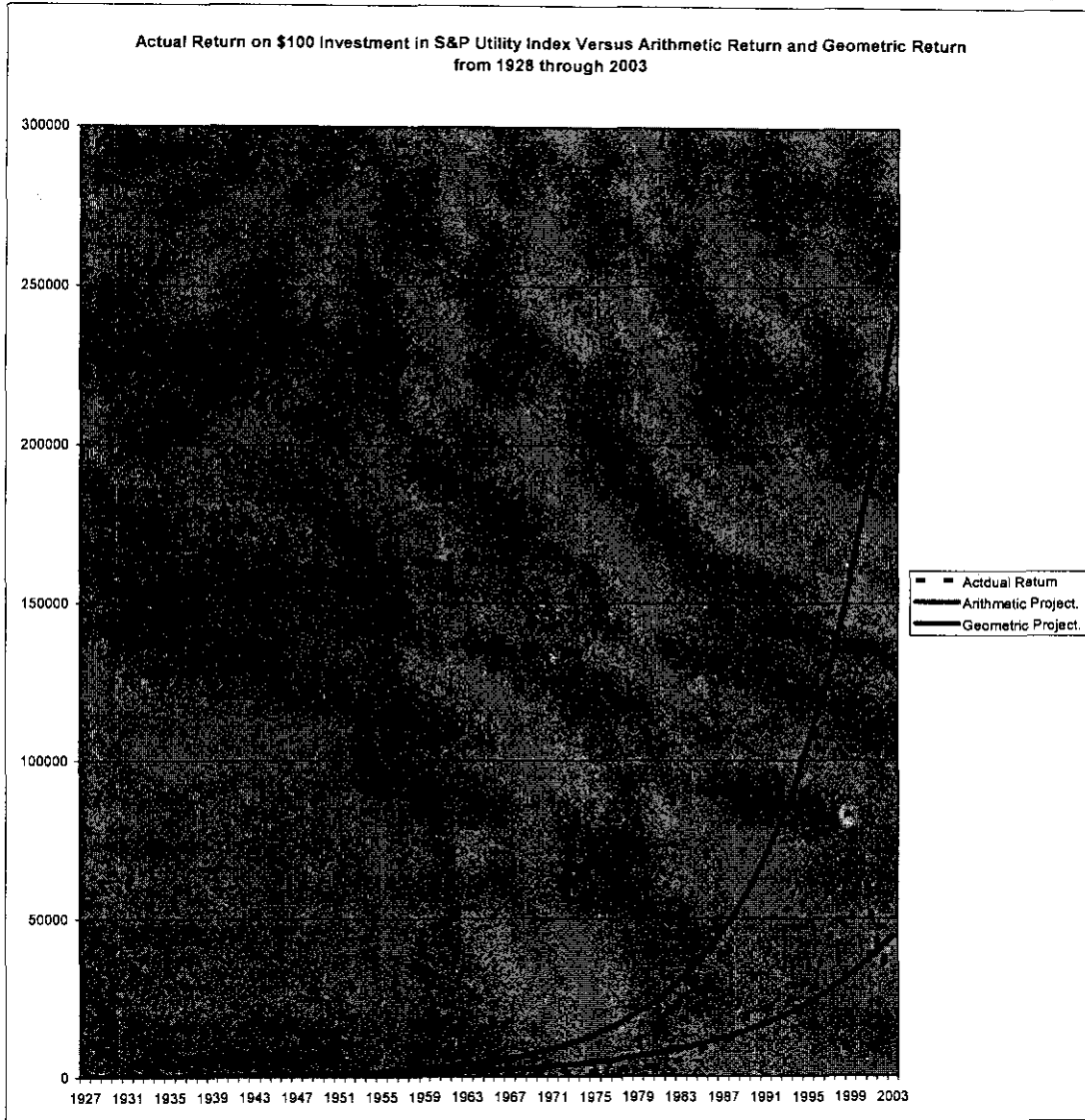
3 Therefore, when Dr. Morin chose to give weight to the arithmetic average, he chose a
4 method that both a financial textbook and Value Line have specifically noted to be biased. The
5 more weight that is given to the arithmetic average result, the larger the upward bias in the risk
6 premium method.

7

8 Q. HAVE YOU COMPARED GRAPHICALLY THE CAPITAL APPRECIATION GROWTH
9 RATE USING THE ARITHMETIC AVERAGE METHOD WITH THE CAPITAL
10 APPRECIATION GROWTH RATE THAT IS OBTAINED USING THE SEC METHOD?

11 A. Yes. In the following graph I show the actual movement of the S&P Utility index from 1928
12 through 2003. I also show how the index would have behaved on a year-by-year basis using the
13 average growth obtained from the SEC method and using the arithmetic average historic growth
14 rate methodology. The graph illustrates that the arithmetic average calculation of historic actual
15 returns deviates at an ever-increasing rate over time from the actual S&P Utility Index,
16 overstating the total return from 1928-2003 by about 500%. By contrast, the historic actual
17 returns computed using the SEC method is a dramatically more reasonable track of the growth of
18 the S&P utility over time and thus is the proper measure of historic actual return rates realized by
19 investors.

¹¹ Page 75 of Stocks, Bonds, Bills, and Inflation 1986 Yearbook.



1 In the above chart, the top line shows that if \$100 had been invested in public utility common
2 stocks from the beginning of 1928 through 2003 and had earned the arithmetic return, the \$100
3 would have grown to about \$238,000. The dotted line in the graph shows what actually would
4 have happened to a real \$100 investment if it had been invested in public utility common stocks.
5 As shown on the graph, the \$100 investment would have actually grown to about \$44,000.
6 While the increase from \$100 to \$44,000 is a very sizeable return, it is far less than the \$238,000
7 return that would have been achieved if the arithmetic return methodology had been achieved.
8 The smooth line that ends at the same place as the dotted actual return line is the ongoing value
9 of \$100 invested in 1928 that grew at the geometric return rate. Note that the \$100 invested at
10 the geometric return rate is, by 2003, exactly equal to the actual return. Therefore, the geometric
11 return accurately measures the actual return that was achieved from 1928 through 2003, but the
12 arithmetic average return exaggerates the actual return by over five times.

13
14 Q. HOW MUCH HIGHER IS THE RISK PREMIUM DIFFERENCE BASED UPON AN
15 ARITHMETIC AVERAGE THAN IT IS BASED UPON A GEOMETRIC AVERAGE?

16 A. From 1928 to 2003, the arithmetic average method (to which Dr. Morin gives weight)
17 produced an indicated risk premium that was 2.13% higher for public utility stocks versus public
18 utility bonds than the risk premium indicated by using the SEC, or geometric average method.

19 The arithmetic median method is essentially identical to the arithmetic mean method and
20 therefore produces an error that is similar to the error produced by the arithmetic average
21 method.

22

23 Q. HAVE RISK PREMIUMS BEEN STABLE OVER THE YEARS?

1 A. No. This is yet another important problem with Dr. Morin's approach to the risk premium
2 method. As I have previously stated, U.S. Federal Reserve Chairman Alan Greenspan has noted
3 that risk premiums have declined. Dr. Morin failed to see this downtrend because he only
4 examined changes from one year to the next without examining the bigger picture.

5

6 Q. DR. MORIN CITES IBBOTSON ASSOCIATES IN HIS EVIDENCE. WHAT DOES
7 IBBOTSON ASSOCIATES SAY IS THE CURRENT APPROPRIATE RISK PREMIUM?

8 A. Yes. Page 189 of the "Stocks, Bonds, Bills, and Inflation" 2004 Yearbook by Ibbotson

9 Associates says:

10 Long-term Market Predictions

11

12 Ibbotson and Chen believe that stocks will continue to provide significant returns over the long
13 run, averaging around 9.22 percent per year, assuming historical inflation rates. The geometric
14 equity risk premium, based on the supply side earnings model, is calculated to be 3.84 percent.

15

1

2 **E. Comparable Earnings Method**

3 Q. PLEASE BRIEFLY DESCRIBE THE COMPARABLE EARNINGS METHOD.

4 A. A method in which a group of companies are chosen that are allegedly in the same risk
5 category as the subject company. The future expected return on book equity is estimated. This
6 future expected return on equity is equated the cost of equity without any mechanism to
7 determine whether or not this future expected return on equity is more than is needed to attract
8 capital on reasonable terms.

9

10 Q. PLEASE EXPLAIN THE COMPARABLE EARNINGS METHOD PRESENTED BY Dr.
11 Morin.

12 A. Dr. Morin examined the actual earned returns achieved by three different groups of
13 companies: Canadian Electric Utilities (Exhibit RAM-11), Transmission and Distribution
14 Electric Utilities (Exhibit RAM-12), and a group of Canadian high quality industrial companies.
15 After selecting the companies, he presents the historic return on book equity achieved by these
16 companies.

17

18 Q. DO ACTUAL EARNED RETURN RATES EQUATE TO THE COST OF EQUITY?

19 A. No. The overriding problem with Dr. Morin's comparable earnings analysis is that it did not
20 address the cost of equity at all. It simply considered the returns on book equity that were
21 achieved. The earned return on book equity is an entirely different concept from the cost of
22 equity. A company raises capital at prices approximating its market value, not its book value.
23 Yet, the returns being examined in the comparable earnings method are returns on book, not

1 returns on market. The DCF model, when properly applied, measures the returns investors are
2 demanding on the market value of their investment, not the book value. The DCF approach is
3 proper because, in contrast to the Comparable Earnings method, the DCF method focuses on the
4 returns investors expect to be able to achieve on the capital they provide.

5

6 **G. Conclusion on Analysis of Dr. Morin Testimony**

7 Q. PLEASE SUMMARIZE YOUR ANALYSIS OF DR. MORIN'S TESTIMONY.

8 A. Dr. Morin recommends that the Company be allowed a return on equity of 10.2%-11.2%.

9 This is his recommendation even though the numbers behind his DCF analysis support a cost of
10 equity of approximately 9.5%. To exaggerate his DCF indicated cost rate, Dr. Morin had to bias
11 his DCF results by excluding the results for companies in which the indicated result was too low
12 without making a corresponding elimination of a similar number of companies that were on the
13 high end of his results. His Risk Premium method was developed based upon an improper
14 mathematical approach to quantifying historic actual returns, or through the continued
15 application of his flawed approach to the DCF method Dr. Morin's approach to the risk premium
16 method also overstates the cost of equity because he fails to consider the significant downtrend
17 in risk premiums that has been occurring. His Comparable Earnings method is not really an
18 equity costing method at all as no consideration was given to investor's reactions to the earned
19 returns on book equity.

Financial Advisers and Fuzzy Math

By KAJA WHITEHOUSE

Dow Jones Newswires

Next time your financial adviser makes a prediction for an average rate of return during an investment pitch, you might want to doublecheck the math.

Some financial advisers rely too heavily on a formula known as arithmetic average, which can be misleading when investing for the long term. Financial advisers who use this formula may be overstating your potential profit and leading you to take risks you might otherwise avoid, academics and other financial professionals say. Errors tend to widen when it comes to very volatile securities like emerging-markets stocks.

Arithmetic math involves a very simple formula, which is probably why so many people rely on it. To decide an average return, you add up all the return percentages and divide the results by the number of percentages.

It's a perfectly valid way to determine an average, as long as it's used to frame a stand-alone one-year return, said Knut Larsen, a partner with Brigus Group, a Toronto education service for financial advisers.

The classic example to illustrate the flaws with arithmetic math goes like this: You start with an investment of \$100 and it grows 100% the first year and loses 50% the next year. To calculate the total return using arithmetic math, you would add the returns from both years—in this case 100 minus 50—and divide them by two, or the number of returns.

That leaves you with the illusion of a 25% profit, when in reality you're right back where you started—with \$100. After rising 100% the first year, you had \$200; but a drop of 50% cut that in half, back down to \$100.

The alternative is known as geometric average, or compound annual return. This takes compounding and volatility into consideration.

Unfortunately, geometric average is a complicated formula, involving cube roots, so it may not be possible to figure out the results without a spreadsheet. But the point is to educate yourself on the issue, not to memorize complex formulas, Mr. Larsen said. Simply understanding when one formula should be used over the other, and knowing the flaws of arithmetic math is a good start, he said.

S&P 500 index annual returns from 1927 until now are lower using geometric math.

When comparing the two results, the arithmetic average generally ends up being higher than the geometric average, said Campbell Harvey, a finance professor with Duke University's Fuqua School of Business. For example, annual returns on the S&P 500 index from 1927 until now are about 12% using arithmetic math, and 10% using geometric math. That's a two percentage point difference.

The deviation isn't always enough to get worked up about, but it depends on factors such as volatility, and even fees and interest. For example, the greater the volatility of the security in question, the greater the spread will be between the two results, Mr. Harvey said.

He recalls feeling struck once by an advertisement touting Brazilian stocks at-

tached to data showing "incredible returns" of about 50% a year. Knowing Brazil is a volatile market, Mr. Harvey went back and applied geometric math to the returns. His findings produced an average return closer to zero.

Volatility can affect the portfolio in negative ways because a severe drop makes it that much harder to catch up on the reduced amount, even if returns are phenomenal thereafter. But when using arithmetic average, all that is known is the one-year average return, not total results.

Misleading return projections using arithmetic math are common in the insurance world, said Peter Katt, an insurance analyst in Mattawan, Mich. Some products require high return forecasts to make the products work, and this is one way to get around that, he said, adding that consumers need to educate themselves.

"I deal with very bright clients and advisers, and they have no idea what I'm talking about" when referring to the different formulas for calculating results, he said.

It may seem like a lot of financial hocus-pocus, but sometimes the misrepresentations aren't intentional, Mr. Larsen said. He published a primer on the subject this summer after bumping into a financial adviser who legitimately didn't know the effects arithmetic math was having on his planning. The adviser had a client who suffered a portfolio loss of 45%, and the adviser believed the client would need an annual return of 15% a year to get back to the original investment in three years. In reality, he would have to prepare for a return of more like 22% a year, according to Mr. Larsen's calculations.

The Differences in Averaging

One of the frequent questions we receive is related to the proper procedure to calculate the average return of an investment (stock, mutual fund, or anything else). This article will briefly examine how to compute the average change of a specific investment 1) over a set period of time, 2) over a number of years, and 3) annualizing returns over a period shorter than a year.

Averaging Calculations

There are actually three averaging methods: arithmetic, geometric, and harmonic. These formulas are shown below:

Arithmetic:	$(y_1 + y_2 + \dots + y_n) / n$
Geometric:	$((1+y_1) * (1+y_2) * \dots * (1+y_n)) - 1)^{1/n}$
Harmonic:	$(1 / ((1/n) * ((1+y_1) + (1+y_2) + \dots + (1+y_n)))) - 1$

In each case n is the number of years of data and each y is the ending price divided by the beginning price minus 1. Stated simply, the geometric mean is the n^{th} root of the product of the individual averages. Since there are often negative returns involved in this sort of calculation, one is added to each term. At the end, the one is subtracted to get back to the decimal fraction number.

The arithmetic average has an upward bias, though it is the simplest to calculate. The geometric average does not have any bias, and thus is best to use when compounding (over a number of years) is involved. Lastly, the harmonic average has a downward bias.

But since it is rarely used, we will focus on the arithmetic and geometric averages in the following discussion.

Over a Set Period of Time

The simplest way to compute the price change is to take the ending price and divide it into the beginning price. After subtracting one from the result, you are left with the holding period yield. This calculation produces the decimal fraction equivalent of the percentage change. A change in price from 4 to 5, would be computed as $(5 \div 4) - 1$, which yields .25, or 25%.

The holding period return is independent of time. That means that it can be

These figures are shown in the table below:

Year	Price	% Price Change
0	\$10	—
1	20	100%
2	10	-50%

Price change from year 0 to year 2: 0%

Arithmetic Average: 25%
 Geometric Average: 0%

One of the more interesting observations that arises from such an example is the asymmetric nature of the returns. Notice that in this example, the stock only has to fall half as much in year two as it rose in year one to completely wipe out any paper gains the investor had during the interim. This nature highlights the importance of using the geometric return. As shown, the arithmetic average indicates that the stock had an average annual return of 25% over the past two years. However, the true return, which is corroborated by the geometric mean, is zero.

computed on an annual basis, over a ten-year period, or any other time frame.

Compounding: Averages Over a Number of Years

Now assume we have been watching a stock for two years, and we want to compute the annual return for each year, and the average annual return for the two-year period. Let's say this stock was initially priced at \$10, rose to \$20 by the end of year 1, but fell back down to \$10 by the end of year two. From the above-mentioned example, we know how to find the price change for the first and second year. Then we can also find the total price change over the two year period.

Another interesting point is that the asymmetry magnifies as the price changes increase in size. For example, let's say the stock price increased to \$50 before falling back to \$10.

Year	Price	% Price Change
0	\$10	—
1	50	400%
2	10	-80%

Price change from year 0 to year 2: 0%

Arithmetic Average: 160%
 Geometric Average: 0%

Originally, the stock had to fall 50% to wipe a 100% gain. But in the second scenario, the stock had to drop only 80% to wipe out a phenomenal 400% gain. This growing discrepancy between the different averaging techniques highlights the importance of accurately measuring and portraying investment results. Again we see that the geometric average portrays the true return accurately.

Annualizing Returns
 An annualized holding period return figure can be computed by taking the

$1/n^{\text{th}}$ root of the holding period return, where n is the length of the sub-period relative to the year. (For a three-month period, n would equal .25, or one-fourth of the year. For a two-year period, n would equal 2.) Below are two examples that show how this operation is performed.

Let's say you wanted to figure out the annualized return of a stock that rose 5% in the first quarter. The annualized return would then be computed as $(1.05)^{1/25}$, or 21.6%.

We can also compute an average annualized return figure from a period longer than a year. For example, if the stock rose 20% for two straight years, the cumulative growth rate would be 44% $(1.20 * 1.20)$. This figure could be dissected into the average annual rate using the same formula shown above $(1.44)^{1/2}$, which we can verify as 1.20, or 20%.

Roger J. Bas
 Analyst

Timely Income Stocks

For equity investors with more of an eye for current income, we've screened our database for issues that combine high estimated dividend yields and above-average relative year-ahead performance potential, without undue investment risk.

This roster includes only those equities whose dividend yields are at least 2.7%, which is 70 basis points above the 2.0% median for all stocks in Value Line's universe. Ranks here must be no less than 2 (Above Average) for Timeliness and no less than 3 (Average) for Safety.

Although the focus here is on current income and near-term price performance; we shape our criteria to ensure solid potential returns for longer-term investors as well. Accordingly, we require a minimum projected three- to five-year total return potential of 15%, compared with the median of 14.6% for all stocks under our review. In addition, our analyst's projection for capital appreciation had to be at least 55%, which is in line with the current median price appreciation potential for all stocks in the Value Line universe.

Given the relatively stringent criteria applied here, this is a fairly short list which encompasses stocks from a fairly diverse group of industries. This list would seem to be a good starting point for income-minded investors with both short- and long-term investment perspectives. As always, though, we urge investors to consult the individual and supplementary analyses in *Ratings & Reports* before committing to any of the issues listed in the table below.

Ratings & Reports Page	Ticker	Company Name	Div'd Yld.	Recent Price	Time-liness	Safety	3-5 Yr. App. Pot.	3-5 Yr. Avg. Ret.	P/E
2141	AC	Alliance Capital Mgmt.	8.9%	27	2	3	75%	19%	10.3
816	ARV	Arvin Ind.	3.0	26	2	3	65	16	13.0
535 1580	MO	Philip Morris	4.6	39	2	3	65	18	13.4
525	KWR	Quaker Chemical	4.4	16	2	3	55	15	13.1
315	TBY	TCBY Enterprises	3.4	5 1/4	2	3	70	17	17.6
802	CTC	Telecom. de Chile ADR	2.8	32	1	3	70	17	15.0
591	TRN	Trinity Inds.	2.9	26	2	3	130	25	8.3
429	MRO	USX-Marathon Group	2.7	28	2	3	80	18	13.3
1401	X	USX-U.S. Steel Group	3.4	29	2	3	105	22	6.8
575	UIC	United Industrial Corp.	3.9	7 1/4	2	3	60	16	9.6

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