

STATE OF NEW HAMPSHIRE  
BEFORE THE  
PUBLIC UTILITIES COMMISSION

In the matter of

Northern Utilities, Inc.

Docket No. DG 17-070

Petition for Permanent Rate Increase

DIRECT TESTIMONY

OF

Dr. Pradip K. Chattopadhyay  
Assistant Consumer Advocate

December 20, 2017

## TABLE OF CONTENTS

I.	INTRODUCTION .....	3
II.	MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND REQUIRED RETURN ON EQUITY.....	8
III.	ESTIMATING COST OF EQUITY USING SEVERAL APPROACHES .....	28
	A. Discounted Cash Flow (DCF) Approach.....	30
	B. Capital Asset Pricing Model (CAPM).....	47
	C. Conclusion .....	55
IV.	SCHEDULES:	
	Schedule PKC-1 Credit Ratings	
	Schedule PKC-2 Common Equity Ratios	
	Schedule PKC-3 Stock Prices	
	Schedule PKC-4 Dividend Yield	
	Schedule PKC-5 Growth Components	
	Schedule PKC-6 "External Component" of COE	
	Schedule PKC-7 Expected Return on Equity and Retention Ratios	
	Schedule PKC-8 DCF ROE Estimates	
	Schedule PKC-9 Proxy Beta	
	Schedule PKC-10 CAPM Calculations	
	Schedule PKC-11 Value Line Market Return	
	Schedule PKC-12 Value Line's 3-5 Years' Growth Projections	
V.	ATTACHMENT 1: STATA RESULTS	

1 **I. INTRODUCTION**

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

3 A. My name is Pradip K. Chattopadhyay. My business address is 21 South Fruit  
4 Street, Suite 18, Concord, New Hampshire. I am employed as the Assistant Consumer  
5 Advocate/Rate and Market Policy Director with the New Hampshire Office of  
6 Consumer Advocate (OCA).

7 **Q. Please describe your formal education and professional experience.**

8 A. I have a Ph.D. in Economics from the University of Washington, Seattle, which I  
9 earned in 1997. I have also taken courses in City and Regional Planning with  
10 applications to Energy Planning from Ohio State University, Columbus OH, in 2001-02.  
11 I have taught several courses in economics at the University of Washington as an  
12 instructor and adjunct faculty at its Business School. I am also associated with the  
13 Southern New Hampshire University (SNHU) as an adjunct faculty, where I teach  
14 courses in economics.

15 From March 1998 to October 1999, I was a consultant with the National Council  
16 of Applied Economic Research, New Delhi, India. From November 1999 to August  
17 2001, I was the Economist at the Uttar Pradesh Electricity Regulatory Commission  
18 (UPERC) in India, and advised UPERC on tariff issues. From September 2001 to June  
19 2002, I worked at the National Regulatory Research Institute, Columbus, Ohio, as a

1 graduate research associate while pursuing advanced courses in Energy Planning in the  
2 City and Regional Planning Program at Ohio State University. From June 2002 to July  
3 2002, I worked at the World Bank, Washington D.C. as a short-term consultant/intern  
4 with its Energy and Water Division.

5 I worked at the New Hampshire Public Utilities Commission (Commission) from  
6 August 2002 to January 2007 in the capacity of a Utility Analyst. My responsibilities at  
7 the Commission as an analyst were in electric utility issues including analyzing and  
8 advising the Commission on rate design, cost of capital issues, wholesale market issues,  
9 and other regional matters. I briefly worked at the Massachusetts Department of  
10 Telecommunications and Energy (later reorganized into Department of Public Utilities  
11 (MA-DPU)) starting in January 2007 as an Economist. At MA-DPU, I represented the  
12 staff and examined gas demand estimation and forecasting, decoupling issues, and  
13 environmental remediation matters.

14 I returned to the Commission in June 2007 to join its Telecom Division as its  
15 Assistant Director, and continued in that position until December 2010. I was also  
16 helping other divisions as an expert witness in economics-related issues as well as  
17 advising the Commission on regional electric matters including FERC jurisdictional  
18 issues. I joined the Commission's Regional Energy Division in January 2010 as the  
19 Regional Energy Analyst, and was advising the Commission in that capacity until I  
20 joined the Antitrust and Utilities Division, Office of the Minnesota Attorney General, in  
21 August 2013.

1 I came back to New Hampshire in March 2014 and worked as an independent  
2 consultant until the end of August, 2014, representing the Minnesota Attorney General.  
3 I joined Liberty Utilities at the end of August, 2014 as a Forecasting Analyst for its  
4 Energy Procurement Department. I worked with Liberty Utilities for about three  
5 months, before starting my own consultancy firm. In December 2014, I joined the OCA  
6 as its Rate and Market Policy Director. I was later appointed the Assistant Consumer  
7 Advocate at the OCA.

8 **Q. Have you previously provided testimony before this Commission?**

9 A. Yes.

10 **Q. In which dockets did you testify?**

11 A. I provided testimony before the Commission in the following dockets:

- 12 • DE 03-200 – Rate design testimony which was about delivery rates for retail  
13 ratepayers of Public Service of New Hampshire (PSNH);
- 14 • DE 06-028 – Cost of capital testimony which was also about PSNH’s delivery  
15 rates;
- 16 • DT 07-027 – Status of competition in retail telephony under TDS;
- 17 • DG 08-009 – Cost of equity testimony related to gas delivery rates of National  
18 Grid NH;
- 19 • DE 09-035 – Cost of equity testimony in the matter of electric distribution  
20 rates (PSNH);

- 1 • DG 14-380 – Petition of Liberty Utilities (EnergyNorth Natural Gas)  
2 requesting approval of firm transportation contract (North East Direct  
3 (NED));
- 4 • DG 15-155 – Petition of Valley Green, LLC requesting franchise in City of  
5 Lebanon and Town of Hanover, New Hampshire;
- 6 • DG 15-289 – Petition of Liberty Utilities (EnergyNorth Natural Gas)  
7 requesting franchise in City of Lebanon and Town of Hanover, New  
8 Hampshire;
- 9 • DG 15-494 – Petition of Liberty Utilities (EnergyNorth Natural Gas)  
10 requesting approval of firm transportation contract (NED);
- 11 • DG 16-383 – Petition of Liberty Utilities (Granite State Electric) for Permanent  
12 Rate Increase;
- 13 • DE 16-384 – Petition of Unitil for Permanent Rate Increase;
- 14 • DG 16-852 – EnergyNorth’s Petition for Lebanon-Hanover Franchise  
15 Approval;
- 16 • DG 17-048 – EnergyNorth’s Distribution Service Rate Case.

17 **Q. Have you ever provided testimony and affidavits before other Commissions?**

18 A. Yes. I have testified on cost of capital before the Minnesota Public Utilities  
19 Commission in dockets G008/GR-13-316 and GR 13-617. I have also provided an  
20 affidavit before the Federal Energy Regulatory Commission in a FERC Docket ER 09-14-

1 000 on NSTAR's petition for ROE incentive adders on behalf of the New England  
2 Conference of Public Utilities Commissioners (NECPUC).

3 **Q. What is the purpose of your testimony?**

4 A. The purpose of my testimony is to recommend, for Northern Utilities, Inc.  
5 ("Northern Utilities"), the rate of return on equity in accordance with standards set  
6 forth in *Bluefield Water Works v. Public Service Comm'n*, 262 U.S. 679, 692-93 (1923)  
7 (*Bluefield*) and *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 605 (1944)  
8 (*Hope*). On advice of counsel, I understand that the standard set forth by the U.S.  
9 Supreme Court is that a public utility may be allowed to earn a return comparable to a  
10 return on investments in other enterprises having similar risks in order to allow the  
11 utility the opportunity to attract capital and to maintain its credit. "The return should  
12 be reasonably sufficient to assure confidence in the financial soundness of the utility  
13 and should be adequate, under efficient and economical management, to maintain and  
14 support its credit and enable it to raise the money necessary for the proper discharge of  
15 its public duties." *Bluefield*, 262 U.S. at 693. I also state my views on Northern Utilities'  
16 recommendations on cost of equity, and articulate reasons why I agree or disagree with  
17 those recommendations.

18 **Q. What Rates of Return on Equity and Return on Capital are the Company**  
19 **requesting in this case?**

1 A. The Company is requesting a return on common equity (ROE) of 10.30 percent.  
2 Based on the embedded cost of debt, and the requested capital structure, the Company  
3 is seeking approval of an 8.30 percent return on capital.

4 **Q. What do you recommend as the allowed ROE for the company?**

5 A. I am recommending a return of equity of 8.25 percent as a point estimate. Based  
6 on my analysis, I am also recommending a range of returns on equity that I consider  
7 reasonable for the company, i.e. 8.05 percent to 8.35 percent.

8 **Q. Please discuss how your testimony is organized.**

9 A. As for what follows, Section II briefly reports my analysis of implications of  
10 observed market-to-book ratios in the natural gas utility industry.<sup>1</sup> In Section III, which  
11 has three subsections, I use several approaches to derive estimates of the cost of equity  
12 and I conclude by stating my recommendation on the cost of equity. Section IV  
13 includes the schedules that inform the OCA's analysis. Finally, Section V provides  
14 Attachment 1, which includes the results of my STATA analysis discussed in Section II.

15

16 **II. MARKET-TO-BOOK RATIO, EXPECTED RETURN ON EQUITY AND**  
17 **REQUIRED RETURN ON EQUITY**

18 **Q. Why is it important to analyze observed market-to-book ratios of the natural**  
19 **gas utility industry and Northern Utilities' proxy group?**

---

<sup>1</sup> This ratio relates the market price of stock to its book value.

1 A. It is important to investigate market-to-book ratios essentially for three reasons.  
2 First, the current level of market-to-book ratio for a regulated company is very telling  
3 with respect to the divergence between the expected return on equity and the  
4 opportunity cost of equity. Second, whether or not the market-to-book ratio is  
5 significantly higher than one has implications for the application of the Discounted  
6 Cash Flow (DCF) approach to estimating the opportunity cost of equity. Finally, one of  
7 the DCF approaches that I have relied on uses market-to-book ratios as an input. What  
8 follows in this section is the discussion of the first two reasons mentioned above, but I  
9 also focus on empirical evidence backing the theoretical underpinnings discussed. The  
10 need for tracking the market-to-book ratios of the constituent companies in the proxy  
11 group is primarily taken up in detail in Subsection IIIA.

12 **Q. What is the relevance of the market-to-book ratio in the determination of the**  
13 **cost of equity?**

14 A. When the market-to-book ratio of a utility is significantly higher than one, it  
15 indicates that the return on equity that is *expected* by investors, which is greatly  
16 influenced by the allowed rate of return for a regulated entity, exceeds the true  
17 opportunity cost of equity. In other words, the return that investors *expect* to receive is  
18 greater than the return they would *require* in order to invest in the stock.

19 This has another important implication. While the DCF construct is predicated  
20 on using long-term expectations, in practice, the DCF method relies on investors'

1 expectations over the medium term. Analysts' projections about investors' sentiments  
2 on relevant variables are not available beyond three to five years into the future. The  
3 DCF method in practice therefore captures investors' medium-term expectations that  
4 the market-to-book ratio would continue to remain substantially higher than one, if to  
5 begin with the market-to-book ratio is significantly greater than one. I delve into this  
6 issue in greater detail when I discuss the characteristics of the DCF approach, especially  
7 as it is practically implemented; *see infra* at Pages 17-19. The methods in the current  
8 environment, therefore, will tend to produce estimates for ROE that reasonably exceed  
9 the "true" cost of equity.<sup>2</sup>

10 **Q. Please explain why the expected return on equity exceeds the cost of equity**  
11 **when the market-to-book ratio is significantly greater than one.**

12 A. This fundamental result stems from the seminal Discounted Cash Flow (DCF)  
13 analysis, which succinctly translates into the equation

14 
$$\frac{P}{B} = \frac{r_e - b_e r_e}{K - b_e r_e} \dots\dots\dots \text{Equation (1)}$$

---

<sup>2</sup> I use the phrase "true cost of equity" interchangeably with "cost of equity." I use both to refer to the opportunity cost associated with purchasing equity, i.e. the minimum return necessary to attract sufficient capital.

1 where  $r_e$  is the expected return on equity,  $B$  is the book value of stock,  $b_e$  is the expected  
2 retention ratio,  $P$  is the market stock price, and  $K$  is the cost of equity, i.e. the required  
3 return on equity.<sup>3</sup>

4 The DCF approach is based on the premise that the market price of a particular  
5 stock equilibrates to the sum of the stream of returns expected in the future from the  
6 stock by investors, discounted by the market cost of equity. This is an explicit way of  
7 modeling investor behavior, and is a well-accepted way of explaining observed investor  
8 behavior. Heuristically speaking, if the stock price is lower than the market-equilibrium  
9 price, the demand for the stock would be greater than the supply, and stock sellers  
10 would raise their price to take advantage of the situation. Likewise, if the price of the  
11 stock was higher than the market-equilibrium price, the demand would be less than the  
12 supply of stocks, putting pressure on the sellers to lower their price to reduce excess  
13 supply. It follows that when the expected return on equity is greater (smaller) than the  
14 cost of equity, the market-to-book ratio would be greater (smaller) than one.

15 **Q. Can you explain Equation (1) in greater detail?**

16 A. Yes. If the expected return on equity exceeds the market cost of equity, the price  
17 of the stock would have to be higher relative to the book value to ensure that the  
18 expected dividend, i.e.  $B(r_e - b_e r_e)$ , on the stock equals the minimum required dividend,

---

<sup>3</sup> Morin, R. *Regulatory Finance*, Utilities' Cost of Capital, Public Utilities Report, Inc. (1994), Page 248. The result holds even if we model new equity financing, as long as the growth in the number of outstanding stocks is reasonably low ceteris paribus, which in practice is generally true. Retention ratio is the proportion of earnings that is kept back as retained earnings; i.e. (net income less dividends)/net income.

1 i.e.  $P(K - b_e r_e)$ . A look at comparative statics is helpful. Everything else being equal, if  
2 the expected return on equity increases (decreases), the expected dividend would  
3 momentarily be higher (lower) than  $P(K - b_e r_e)$ . Ceteris paribus, this would trigger a  
4 greater (lower) demand for the stock than the supply, which would consequently lead  
5 to a higher (lower) market price for the stock. The adjustments would continue until  
6 Equation (1) holds, i.e. until there is equilibrium.

7 A simple numerical example would be helpful. Suppose the expected return on  
8 equity,  $r$ , is 10 percent, and the expected retention ratio,  $b$ , is 30 percent. Based on these  
9 numbers,  $r_e - b_e r_e$  is 7 percent.<sup>4</sup> However, if the cost of equity for the same stock,  $K$ , is 8  
10 percent, then  $(K - b_e r_e)$  must be 5 percent.<sup>5</sup> To ensure that 7 percent of the book value,  
11 i.e. the expected dividend, is exactly equal to 5 percent of the stock price, i.e. the  
12 minimum required dividend, the only way that equation (1) can hold is through an  
13 adjustment to the price of the stock until it is 40 percent higher than the book value of  
14 the stock, i.e. the market-to-book ratio is exactly equal to 1.4.

15 **Q. Please explain the difference between the cost of equity and the expected**  
16 **return on equity in greater detail.**

17 A. While the expected rate of return on equity for a regulated utility is an  
18 accounting return, i.e. it depends on the return allowed by the regulator as well as how

---

<sup>4</sup>  $(r_e - b_e r_e) = 10 - 0.30 * 10 = 10 - 3 = 7$ .

<sup>5</sup>  $(K - b_e r_e) = 8 - 0.30 * 10 = 8 - 3 = 5$ .

1 the utility performs operationally, the cost of equity is the opportunity cost of equity,  
2 which is the minimum return required to attract investment by investors.<sup>6</sup>

3 Ideally, a fair and reasonable return on equity for a regulated utility would equal  
4 the opportunity cost of equity. A look at a group of regulated utilities of comparable  
5 risk is instructive in estimating the opportunity cost of equity. Intrinsic to the  
6 determination of the allowed return is the need to avoid unnecessary wealth transfer  
7 from ratepayers to shareholders. To properly balance the interests of ratepayers and the  
8 financial viability of the utility, any approach to determine the cost of equity must  
9 reasonably target the need to encourage investment in the utility's equity at the least  
10 cost to its ratepayers.

11 The expected return on equity for investment in a regulated utility at any point  
12 in time is influenced by the return currently allowed on such investment, as authorized  
13 by the regulator in the previous determination of such return. It is also influenced by  
14 investors' expectations about possible changes in the future, especially with respect to  
15 operating efficiency and income opportunities. The expected return on equity for a  
16 regulated utility can be greater, lesser or the same as the cost of equity at any point in  
17 time.

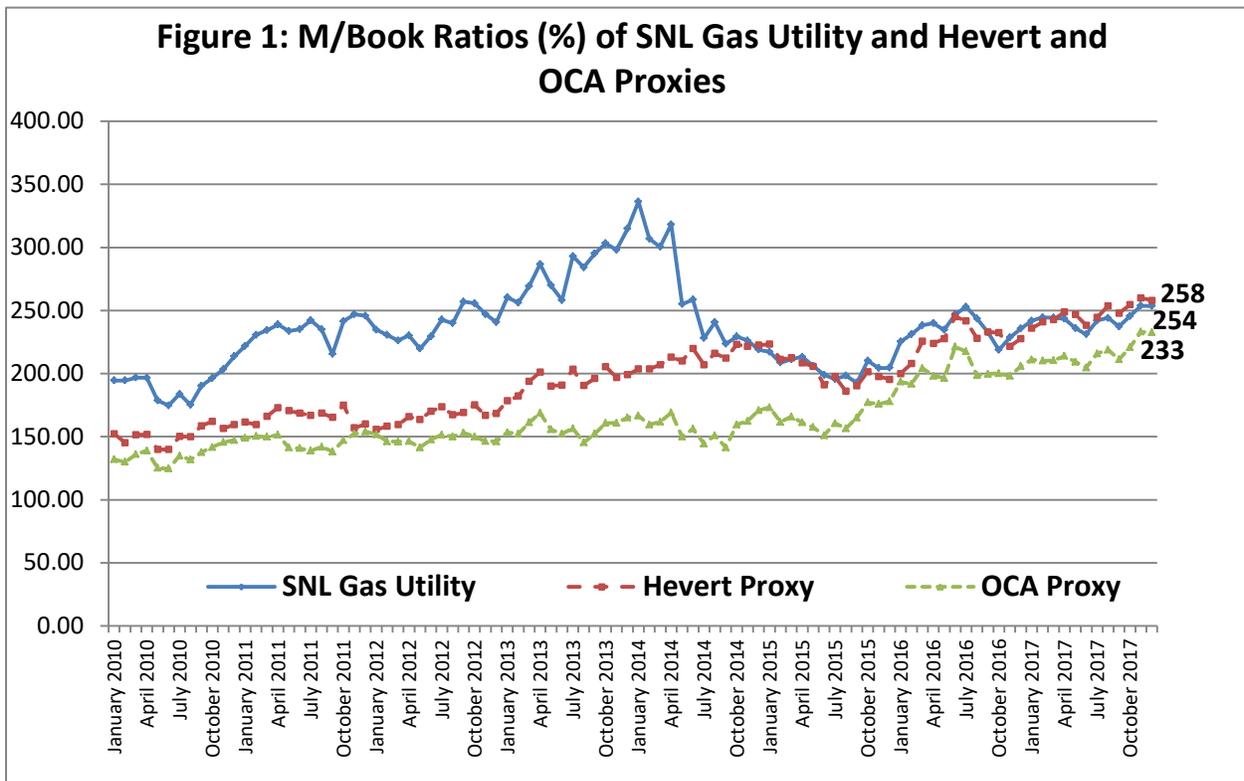
18 **Q. Have you analyzed the natural gas utility industry's market-to-book ratios?**

---

<sup>6</sup> "A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions in general." *Bluefield*, 262 U.S. at 693.

1 A. Yes, I have. But as the objective of my analysis is to recommend the rate of  
 2 return on Northern Utilities' equity, I have also analyzed the market-to-book for Mr.  
 3 Hevert's recommended proxy group and OCA's recommended proxy group. These are  
 4 depicted in Figure 1 below. As for the natural gas industry's situation, I have used  
 5 SNL's Index, i.e. SNL Gas Utility.

6 **Q. What do the natural gas utilities' market-to-book ratios indicate about the**  
 7 **relationship between the investors' expected return on equity and the cost of equity**  
 8 **in the current milieu?**



9

10 A. Figure 1 shows that the average market-to-book-ratio of SNL Gas Utility index as  
 11 well as Mr. Hevert's proxy group have remained persistently well above one over the

1 past six years; the average market-to-book ratios for SNL Gas Utility and Mr. Hevert's  
2 proxy group over the last six years have been 2.44 and 2.08, respectively.<sup>7</sup> As for the  
3 OCA's proxy group, the average market-to-book ratio for the corresponding period has  
4 been 1.74.

5 More importantly, as for the more current market-to-book ratios (beginning of  
6 December 2017), they are 2.54, 2.58 and 2.33 for SNL Gas Utility, Hevert's proxy group  
7 and the OCA's proxy group, respectively. This indicates that the true cost of equity  
8 currently is comfortably less than the return on equity expected by investors in natural  
9 gas utilities. In view of that, if the cost of equity is plainly estimated based on existing  
10 expected return on common equity, the resulting return would unreasonably benefit  
11 shareholders at the expense of ratepayers.

12 **Q. In view of the observed market-to-book ratio being considerably higher than**  
13 **one, do you have any recommendation on your preferred approach on estimating the**  
14 **cost of equity?**

15 A. Yes, I do. Out of the three primary methods that Mr. Hevert used to estimate his  
16 recommended cost of equity, the Capital Asset Pricing Model (CAPM) predominantly  
17 uses historical stock-price appreciation as the basis for measuring the expected return  
18 on common equity. Even when attempting to look at forward-looking estimates, the  
19 method relies considerably on the historical trends in stock prices. Not trivially, the

---

<sup>7</sup> Data downloaded from SNL on December 4, 2017.

1 betas, under the CAPM approach, are generally based on historical prices.<sup>8</sup> In a climate  
2 of market-to-book ratios being significantly greater than one, if historically prices have  
3 tended to appreciate significantly because allowed returns (that are to begin with higher  
4 than the true cost of equity) have moved further away from the true cost of equity, the  
5 method will tend to produce estimates that will be further away from the true cost of  
6 equity.

7 As for the Risk Premium Method (RPM), Mr. Hevert uses historically allowed  
8 returns on equity to calculate the risk premiums. Using historical data on allowed  
9 returns and treasury yields to inform cost of equity (which is inherently a forward-  
10 looking concept) is inappropriate. Even setting that issue aside, to the extent allowed  
11 returns have captured the impact of price appreciation resulting from greater  
12 divergence between allowed returns and the true cost of equity, the method is  
13 susceptible to producing estimates that will have the same problem that the CAPM  
14 approach has.

15 In contrast, the forward looking DCF approach tends to correct somewhat for the  
16 deviation between stock prices and book values. While the growth component is  
17 influenced positively by price appreciation, the dividend yield component is negatively  
18 influenced by price appreciation, thus producing a cost of equity estimate that relative  
19 to the other methods is more in line with the true market cost of equity. It is true that  
20 investors' medium-term expectation about ongoing sales in shares and the persistence

---

<sup>8</sup> In finance, beta for a stock is a measure of the stock's volatility relative to the broader market volatility.

1 in a greater-than-one market-to-book ratio, and our reliance in practice on expectations  
2 of growth over the medium-term, tend to produce a higher DCF estimate of cost of  
3 equity than the true cost of equity. However, investors understand that a continuing  
4 divergence in the stock price and the book value is unsustainable in the long-run. That  
5 understanding gets somewhat reflected in the forward-looking DCF method, even as it  
6 is usually implemented. In view of that, I recommend reliance on methods that are  
7 based on the DCF approach.

8 **Q. Do you have any additional observations on the application of DCF in**  
9 **estimating the cost of equity?**

10 A. Yes. Myron J. Gordon, who popularized the use of the DCF method for  
11 estimating ROE, states that “the perfect capital markets cost of capital can be measured  
12 without bias only in the special and uninteresting case where the allowed rate of return  
13 already is equal to the cost of capital. When the allowed rate of return is above (below)  
14 the “true” cost of capital, the measured cost of capital is biased up (down).”<sup>9</sup> In the  
15 traditional model (wherein debt is valued at embedded cost), while the conclusion that  
16 the allowed rate of return is above (below) the cost of capital when the market-to-book  
17 value ratio is above (below) one remains true,<sup>10</sup> the estimate of the cost of capital is not  
18 problematic as long as the inputs to that estimation are reflected reasonably accurately.  
19 With respect to the practical implementation of DCF approach to the estimation of cost

---

<sup>9</sup> See Gordon, M. J. “The Cost of Capital to a Public Utility”, 1974, Pages 9-10.

<sup>10</sup> *id.* at 8.

1 of equity though, there are compelling reasons to conclude that the approach as  
2 proposed by the company leads to an upward-biased estimate of the cost of equity,  
3 precisely due to the reliance on biased inputs.

4 First, the standard DCF model is based on the premise that all key variables like  
5 the stock price, book value, earnings, and dividends grow at the same rate in the long-  
6 run, and in the absence of external financing, market price converges to the book value.  
7 Theoretically, a market-to-book ratio that is significantly greater than one at any point  
8 in time implies that investors in general expect the price over earnings ratio to decrease  
9 in the long-run. This translates into a growth projection for stock price that lags the  
10 growth projection for earnings growth. Under the standard DCF construct, since in the  
11 long-run, both the stock price and earnings are premised to grow at the same rate, the  
12 long-term equilibrium growth lies somewhere between the expected earnings growth  
13 and the expected growth in price. In the current environment, the exclusive use of  
14 earnings growth projections, theoretically, leads to an upward-biased estimate of the  
15 DCF growth component, and consequently produces an upward-biased estimate of the  
16 opportunity cost of equity.<sup>11</sup>

---

<sup>11</sup> It is instructive to consider Roger Morin's *Regulatory Finance, Utilities' Cost of Capital*, Public Utilities Report, Inc. (1994) at 123. Dr. Morin states that the "[a]pplication of the standard DCF model would result in a downward-biased estimate of the cost of equity to a public utility whose current market-to-book ratio is less than 1 and that is expected to converge toward 1 by investors." This is because investors recognize that a continuous divergence away from a market-to-book ratio equal to one is unsustainable. Investors' expectation about increase or decrease in the market-to-book ratio affects the growth component of the DCF model, biasing its result positively or negatively. When the market-to-book ratio is less than one, it is reasonable to assume that the investors expect the ratio to increase. The expected growth increase in market-to-book ratio results in price appreciation that exceeds the growth in earnings and application of the standard DCF approach will lead to a downward-biased estimate of the cost of equity. In contrast, when the market-to-book ratio is significantly greater than one, it is reasonable to assume that the investors expect the ratio to decrease. In that case, the expected decrease in the

1           Second, very importantly, analysts' growth estimates have been shown to be  
2 overly optimistic and overstate the actual reported earnings. It is instructive to look at  
3 "The Cost of Capital - A Practitioner's Guide," by David C. Parcell, prepared for the  
4 Society of Utility and Regulatory Financial Analysts (2010 edition), pages 142-43,  
5 specifically for the insight that follows:

6           A study by Dreman and Berry concluded that consensus  
7 estimates of EPS differ significantly from actual reported  
8 earnings. They also concluded that the average error  
9 appears to be increasing over time and that analysts are  
10 optimistic on average. They conclude "These findings  
11 question the use of finely calibrated earnings forecasts that  
12 are integral to the most common valuation/models and  
13 indirectly question the valuation methods themselves"  
14 (Dreman and Berry, 1995, 30). A similar study by Clayman  
15 and Schwartz compared Zacks Investment Research EPS  
16 projections with actual EPS for 399 companies for the period  
17 1982-1992. They concluded that analysts' forecasts of EPS  
18 overstated actual EPS by as much as fifty percent. They  
19 conclude "... market participants should take analysts'  
20 innate overestimation biases into account when making  
21 stock valuation judgments" (Clayman and Schwartz, 1994,  
22 68). Still another study by Chopra (1998) concluded  
23 'Analysts' forecasts of EPS and growth in EPS tend to be  
24 overly optimistic. He concluded that analysts' forecasts of  
25 EPS over the past 13 years have been more than twice actual  
26 growth rate.<sup>12</sup>

27

---

market-to-book ratio results in price appreciation that lags the growth in earnings and the application of the standard DCF approach using expected growth in earnings as a proxy for the growth component will produce an upward-biased estimate of the cost of equity (k).

<sup>12</sup> Not surprisingly, one research thread on investors' projection of earnings growth has been to explain the "optimistic bias in earnings forecasts by security analysts." The explanations include strategic reporting bias, selection bias, cognitive bias, and bias due to skewed distribution of earnings and analysts' efforts to produce more accurate forecast. See Gu, Z. and Shuang Wu J, "Earnings skewness and analyst forecast bias," *Journal of Accounting & Economics* 35(2003) 5-29, at 6.

1           It is important that in determining the cost of equity, at the least, the DCF growth  
2 variable input should not be solely based on earnings growth projections or any other  
3 solitary variable's growth projections; I discuss this issue in greater detail in Subsection  
4 IIIA to further support this conclusion.

5 **Q.     Are you aware that the Company's witness Mr. Hevert appears to disagree that**  
6 **market-to-book-ratios in excess of unity indicate that investors' expected earnings**  
7 **exceed investors' requirements?**

8 A.     Yes. In his rebuttal testimony in Docket DE 16-383, which was filed earlier this  
9 year, Mr. Hevert examined the empirical relationship between market-to-book ratio and  
10 the most recent twelve-month Return on Average Common Equity (*see* Docket DE 16-  
11 383, Mr. Hevert's Rebuttal Testimony, Bates pages 380-81, and Attachment RBH-8) to  
12 contend there is no basis to conclude that "market-to-book ratios in excess of unity  
13 demonstrate earnings in excess of investors' requirements." Since the DCF theory  
14 actually models the relationship between *expected* return on equity and market-to-book  
15 ratio, not between the *actual earned* return on equity and market-to-book ratio, it is not  
16 entirely clear to me whether indeed Mr. Hevert was trying to make the point that  
17 market-to-book-ratios in excess of unity do not indicate that investors' *expected* earnings  
18 exceed investors' requirements. But, since Mr. Hevert's discussion in the referenced  
19 testimony was in response to the OCA's similar discussion about the theoretical  
20 relationship that equation (1) captures in this instant testimony, it is important that I  
21 share my thoughts about whether Mr. Hevert's empirical treatise in his rebuttal

1 testimony, DE 16-383, at Bates pages 380-81, informs the issue of whether market-to-  
2 book ratios in excess of unity indicate that investors' expected earnings exceed their  
3 earnings requirement.

4 **Q. Please provide your thoughts on the aforementioned empirical evidence that**  
5 **Mr. Hevert had provided in Docket DE 16-383.**

6 A. I respectfully conclude that Mr. Hevert's analysis was devoid of any merit. It is  
7 evident that Mr. Hevert, in conducting the empirical analysis, has not captured the  
8 essence of the DCF theory that informs the finding that market-to-book ratios greater  
9 than one demonstrate that *expected* earnings are in excess of investors' requirements.  
10 First, using *actual* earned returns, as an explanatory variable in the regression, does not  
11 conform with the DCF's theoretical construct and has no value in demonstrating that  
12 the DCF's implication for the relationship between market-to-book ratio and *expected*  
13 return on equity does not hold. The proper approach would be to examine the  
14 relationship between current market-to-book ratios and the *expected returns on equity* if  
15 one is to objectively examine the veracity of the DCF-construct's implied relationship  
16 between market-to-book ratios and expected returns on equity.

17 Second, not trivially, the econometric framework that Mr. Hevert employs is  
18 overly simplistic and is not informed at all by the importance of the true cost of equity  
19 inherent to the theoretical DCF construct. His analysis models the market-to-book ratio  
20 as *only* a function of the most recent twelve-month Returns on Average Common Equity  
21 (ROACE). The correct approach would be to not only replace ROACE with *expected*

1 returns on equity as an explanatory variable, but also to use at least some explanatory  
2 variables as a proxy for the cost of equity, if the DCF theoretical construct is to be  
3 acknowledged carefully, as explained later.

4 **Q. Did you conduct any empirical analysis to vindicate the DCF based theoretical**  
5 **relationship between market-to-book ratio and expected return on equity?**

6 A. Yes. I used an Ordinary Least Squares (OLS) regression approach to capture the  
7 relationship between market-to-book ratio and *expected* return on equity. This approach  
8 was also used by Mr. Hevert in this instant docket, albeit, for a different purpose. OLS  
9 regression is a commonly used method for estimating the unknown coefficients in a  
10 linear regression model with the goal of minimizing the sum of residual squares; the  
11 residual is the difference between the actual and the predicted value of the dependent  
12 variable. The specific linear relationships modeled (OLS1 and OLS2) are discussed  
13 later. The relationships essentially model the market-to-book ratio as the dependent  
14 variable, and the expected return on equity as an independent variable, while using  
15 other explanatory variables as well.

16 **Q. Briefly describe your empirical approach and also discuss how it is informed**  
17 **by the DCF theory.**

18 A. Before I delve into the analysis, it is important to emphasize that as far as the  
19 DCF theory goes, the relationship between expected returns and market-to-book ratio is  
20 not linear. We, therefore, need careful judgment in analyzing the results. For example,  
21 using equation (1), we find that the derivative of the market-to-book ratio with respect

1 to *expected* return yields  $\frac{(1-b_e)K}{(K-b_e r_e)^2}$ . The derivative is clearly a function of  $K, b_e$ , and  $r_e$ .

2 Also, strictly speaking, the derivative cannot be uniquely estimated for an entire group  
3 of Value Line companies. With that caveat, using an OLS regression to investigate the  
4 relationship between market-to-book ratio and *expected* return on equity using  
5 company-wise data is still generally helpful, and one would expect the market-to-book  
6 ratio would be positively related to the *expected* return on equity, everything else held  
7 constant, if the DCF theory is to be validated.

8 The OLS regressions between market-to-book ratio and *expected* return on equity  
9 were conducted using data from US electric and gas utilities analyzed by Value Line.  
10 To get a proxy for the cost of equity, I have used Value Line betas and a volatility  
11 measure which is calculated as the difference between the high price and low price  
12 Value Line projections for 2016-18 *relative to* the sum of those prices as additional  
13 independent variables. Also, I have used a variable representing the share of regulated  
14 gas in a company's total assets to see whether there are differences between gas and  
15 electric utilities. The construct is in the same vein as James H. Vander Weide and  
16 Willard T. Carleton (1988), who, in examining the relationship between growth and  
17 price/earnings ratio, used betas, stability of the firm's five-year historical Earnings Per  
18 Share (EPS), standard deviation in EPS projection, etc. as a proxy for the cost of equity.<sup>13</sup>

---

<sup>13</sup> Vander Weide, J. and Carleton, W.T., "Investor growth expectations: Analysts versus history", Page 78-82, Spring 1988, The Journal of Portfolio Management.

1 I have used the econometric software STATA to conduct two OLS regressions  
2 that I have reported below. Both regressions model the key variables, market-to-book  
3 ratio (M-to-B ratio) and logarithm of expected return on equity (ln(EROE)), as the left-  
4 hand side variable and a right-hand side (RHS) variable respectively.<sup>14</sup> The semi-  
5 logarithmic form helps capture a non-linear relationship between the market-to-book  
6 ratio and *expected* return on equity in all regressions. OLS1 also models BETA, PVAR,  
7 and RGA as the other RHS variables.<sup>15</sup> OLS2 models only PVAR and RGA as  
8 additional explanatory variables.<sup>16</sup> When the aforementioned regressions are run  
9 based on all observations per Value Line's universe of Gas and Electric utilities, one  
10 cannot rule out the possibility of heteroscedasticity.<sup>17</sup> However, using an outlier

---

<sup>14</sup> The dataset is based on Value Line one-pagers that were available latest on October 31, 2017.

<sup>15</sup> OLS1 is formulated as

$$\text{M-to-B Ratio} = \alpha_1 + \beta_1 \times \ln(\text{EROE}) + \beta_2 \times \text{BETA} + \beta_3 \times \text{PVAR} + \beta_4 \times \text{RGA} + \varepsilon_1,$$

OLS2 is formulated as

$$\text{M-to-B Ratio} = \alpha_2 + \beta_5 \times \ln(\text{EROE}) + \beta_6 \times \text{PVAR} + \beta_7 \times \text{RGA} + \varepsilon_2.$$

where ln(EROE) is the natural logarithm of expected return on equity, RGA is share of regulated gas in total assets, BETA is Value Line betas, and PVAR is the ratio of difference between 52-week high and low prices *and* the sum of the two. Also,  $\varepsilon_1$  and  $\varepsilon_2$  are the residual error terms for the two regressions.

The  $\beta$ s are the coefficients that linearly relate a variable on the right-hand side with the one on the left-hand side of the equation. For example,  $\beta_1$  is the coefficient that linearly relates ln(EROE) with M-to-B Ratio. A positive  $\beta_1$  indicates that Expected ROE is positively related to M-to-B Ratio based on the OLS1 regression. The intercept terms are represented by  $\alpha_1$  and  $\alpha_2$  respectively in the two regressions.

<sup>16</sup> OLS2 was prompted because OLS1 did not produce statistically significant results for BETA even at the 10 percent level of statistical significance. Dropping BETA as an independent variable reduces the  $R^2$  only marginally.

<sup>17</sup> When an ordinary least square regression produces residuals that are not random and are systematically related to some of the independent variables, we get heteroscedasticity. Such a regression yields biased estimates of the regression coefficients. Since a crucial assumption underlying OLS regression is that residuals are randomly distributed, i.e. they exhibit homoscedasticity, it becomes imperative that any OLS regression that produces a

1 determination diagnostic approach known as “Cook’s distance,” both OLS1 and OLS2  
 2 after dropping outliers yield results, for which the null hypothesis of homoscedasticity  
 3 cannot be rejected. As reported in Table 1, the regressions results are based on 1)  
 4 running OLS1 and OLS2 after omitting AvanGrid (AGR), Scana (SCG) and WGL  
 5 Holdings (WGL) from the sample, and 2) running OLS1 and OLS2 after omitting only  
 6 Scana (SCG). I have used STATA’s Cook’s distance diagnostics to inform the  
 7 omissions.<sup>18</sup>

8 **Q. Please provide the finding of the analysis.**

9 A. Table 1 below reports the findings.

Table 1: OLS Regression Coefficients: Market-To-Book Ratio And Ln(Expected ROE)				
Outliers omitted	AGR, SCG, and WGL		SCG	
	OLS1	OLS2	OLS1	OLS2
R <sup>2</sup>	0.70	0.68	0.71	0.71
Dependent Variable	M-to-B Ratio	M-to-B Ratio	M-to-B Ratio	M-to-B Ratio
Intercept	-3.97 (-6.13)	-3.69 (-5.96)	-3.54 (-6.05)	-3.48 (-6.02)
Ln(Expected ROE)	2.20 (9.33)	2.24 (9.47)	2.05 (9.06)	2.11 (10.00)
BETA	0.63 (1.34)	-	0.35 (0.80)	-
PVAR	3.38 (2.18)	4.05 (2.73)	4.59 (3.06)	4.88 (3.36)
RGA	0.25 (1.85)	0.26 (1.88)	0.27 (1.96)	0.28 (2.06)
The numbers in the brackets are t-statistics				

10  
 11 Using a null hypothesis of a coefficient being zero, the relationship between market-to-  
 12 book ratio and expected return on equity is comfortably statistically significant at the 1-

---

statistically significant level of heteroscedasticity be corrected for heteroscedasticity to yield unbiased estimates of the regression coefficients.

<sup>18</sup> Intuitively, Cook’s distance measures the influence of an observation by addressing both leverage and discrepancy. While leverage is a measure of how much deleting a particular observation affects the estimated regression coefficients, discrepancy captures the impact on the sum of residual squared errors when an observation is removed. See Attachment 1 for the STATA results.

1 percent level and is positive for all regressions. The R-squares for the regressions range  
 2 from 0.69 to 0.71.

3 **Q. Do you have additional observations?**

4 A. Yes. Using the averages for the other independent variables, we can calculate the  
 5 expected returns on equity that produce market-to-book ratios of 1.10 and 2.1  
 6 respectively. These are reported in Table 2 below.

Table 2: Implications of the Empirical Results				
Outliers omitted	AGR, SCG, and WGL		SCG	
	OLS1	OLS2	OLS1	OLS2
EROE when M/B=1.1	6.39%	6.46%	6.17%	6.29%
M/B ratio when EROE is approx. 8.25%	1.64	1.63	1.70	1.68
EROE when M/B ratio is 2.1	10.16%	10.18%	10.06%	10.09%

7

8 Based on the econometric finding, the return on equity expected with a market-  
 9 to-book ratio of 1.1 is roughly around 6.35 percent, and at a market-to-book ratio of 2.1,  
 10 the return on equity expected is roughly 10.15 percent.<sup>19</sup> Also, it is instructive to see  
 11 that at an expected return on equity for the proxy gas utility of approximately 8.25  
 12 percent, the market-to-book ratio is approximately 1.65.

13 The important takeaway from my analysis is that even with my recommended  
 14 allowed return of 8.25 percent, the market-to-book ratio would still be significantly  
 15 above one. As will be discussed later in Subsection III.B, this has implications for

<sup>19</sup> If one uses the OCA proxy's averages for the other independent variables, the expected return at market-to-book ratio of 1.1 for OLS1 and OLS2 is roughly 5.75 percent, and at a market-to-book ratio of 2.1, the expected return on equity is roughly 9.2 percent.

1 whether a flotation cost adjustment (as supported by the Company's witness) is  
2 reasonable or not.

3 **Q. How do your results compare with that obtained by Mr. Hevert in Docket DE**  
4 **16-383?**

5 A. In his Docket DE 16-383 rebuttal testimony, Mr. Hevert investigated the  
6 relationship between implied return on equity and market-to-book ratio to contend that  
7 at market-to-book ratios of near about 1, the implied ROE is absurdly low and therefore  
8 he disagreed that market-to-book ratios in excess of unity demonstrate earnings in  
9 excess of investors' requirements.<sup>20</sup> As I have discussed already, Mr. Hevert's  
10 application of the DCF theory to model his econometric analysis is misplaced and  
11 should be ignored. A proper modeling, where the relationship between the *expected*  
12 ROE and market-to-book ratio is investigated, as was done above, clearly demonstrates  
13 that the *expected* returns on equity are very realistic at market-to-book ratios of 1 and 1.1,  
14 i.e. around 6 percent.

15 **Q. Do you believe that your analysis validates that when the difference between**  
16 **the expected return on equity and the true cost of equity is higher, the market-to-**  
17 **book ratio is higher?**

18 A. Yes, I do.

19 **Q. Please elaborate.**

---

<sup>20</sup> At market-to-book ratios of 1 and 1.1, Mr. Hevert's analysis concluded that the ROEs are respectively 0.79 percent and 1.94 percent.

1 A. The statistically significant (at 1 percent level) positive OLS relationship between  
2 expected return on equity and market-to-book ratio indicates that the market-to-book  
3 ratio rises when the expected return on equity increases, *ceteris paribus*. Essentially, as  
4 the difference between expected return on equity and the true cost of equity increases,  
5 the market-to-book ratio increases.

6

### 7 III. ESTIMATING COST OF EQUITY USING SEVERAL APPROACHES

8 Q. Which approaches have you used to estimate the cost of equity?

9 A. While I have relied primarily on the DCF construct to estimate the cost of equity  
10 for the utility, I have also estimated the cost of equity using the CAPM construct. As for  
11 the DCF construct, I have used the standard DCF approach (Subsection III.A), where  
12 the cost of equity is estimated as the sum of the dividend yield and a measure of the  
13 growth component. As for the CAPM approach (Subsection III.B), while I have derived  
14 an estimate of the cost of equity, for reasons I discuss later, I do not base my point-  
15 estimate recommendation on that method. The CAPM estimation is nevertheless useful  
16 as it provides a check on the reasonableness of the DCF estimates.<sup>21</sup> In each of these  
17 subsections I comment on Mr. Hevert's analysis to the extent it is relevant to my  
18 recommendation. I should also add that unlike Mr. Hevert, I did not use the RPM to  
19 derive an estimate of the cost of equity. While I have discussed briefly why previously,

---

<sup>21</sup> When the market-to-book ratio remains consistently significantly higher than 1, the CAPM estimate tends to be upward biased and provides some direction towards what would be a reasonable allowed return on equity, even when one bases that allowed return on the DCF construct.

1 I discuss the reasons a little bit more in what follows. Finally, in Subsection III.C, I  
2 conclude with additional observations and my recommendation on the cost of equity  
3 for Northern Utilities.

4 **Q. Apart from your preference for the DCF approach due to market-to-book ratio**  
5 **consideration, are there other reasons why you rely primarily on the DCF construct to**  
6 **estimate the cost of equity?**

7 A. Of the methods that Mr. Hevert used to estimate his recommended cost of  
8 equity, CAPM and RPM predominantly use historical data as the basis for measuring  
9 the expected return on common equity. Compared to attempts at forward-looking  
10 estimations, these methods rely to a great extent on the historical trends in stock prices  
11 or other relevant variables. This may provide insight into what returns investors expect  
12 based on past experience, but it has limited value in assessing what returns are  
13 necessary to attract needed capital going forward. While the CAPM model relies on  
14 betas that are based on historical stock prices, Mr. Hevert's RPM approach relies on  
15 regressing risk premiums on 30-year Treasury yields using historic data for the period  
16 January, 1980 to April 28, 2017. Of course, Mr. Hevert also relies on historically allowed  
17 returns on equity to calculate historical risk premiums.<sup>22</sup> By contrast, the DCF approach  
18 is essentially forward looking. Also, the fundamental underlying construct behind the  
19 DCF analysis, i.e. that the value of a common stock equates to the sum of the discounted  
20 stream of future income from that stock, is widely accepted. Further, regarding the

---

<sup>22</sup> While the reliance on historical data is problematic, as was discussed before, allowed return on equity in itself is not necessarily a good measure of the true cost of equity at any point in time.

1 techniques that are used to estimate the cost of equity for regulated utilities, the DCF  
2 model is the most commonly used model for estimating the cost of common equity for  
3 public utilities.<sup>23</sup> It should be noted that, as Mr. Hevert has acknowledged in his  
4 testimony, the Commission in New Hampshire has exclusively relied on the DCF  
5 construct previously.

6

### 7 **III.A Discounted Cash Flow Approach**

8 **Q. Which DCF model do you use to estimate the cost of equity?**

9 A. I use a single-stage DCF model to derive estimates for the cost of equity for a  
10 group of companies that forms a reasonable proxy for Northern Utilities. The two  
11 essential elements of this method are the dividend yield and the growth component.  
12 While I discuss the estimation of both elements later in detail, it is important to point  
13 out that the growth component of the DCF equation tends to be the most critical  
14 element in the use of the DCF methodology. A couple of things render the estimation of  
15 the growth component somewhat challenging. First, while the growth component of  
16 the single-stage DCF model is in principle meant to be based on long-term projections,  
17 in practice, it is based at most on three-to-five-years' projections, since long-term  
18 projections are seldom available. Second, "it is reasonable to believe that investors, as a  
19 group, do not utilize a single growth estimate when they price a utility's stock."<sup>24</sup> While

---

<sup>23</sup> Parcell, D. "*The Cost of Capital - A Practitioner's Guide*," prepared for the Society of Utility and Regulatory Financial Analysts (2010 edition), at 124.

<sup>24</sup> *Id.* at 146.

1 growth projections by equity analysts are available on variables like earnings,  
2 dividends, and book value per share, among other things, what weight one should give  
3 to different projections is often a matter of contention. Unlike Mr. Hevert's approach,  
4 which relies only on earnings growth to estimate the growth component, I have relied  
5 on three estimates for the growth component: (1) the average of the growth rates in  
6 earnings per share (EPS), book value per share (BVPS), and dividends per share (DPS);  
7 (2) earnings growth only; and (3) sum of internal growth rate, i.e.  $br$ , and the external  
8 growth component, i.e.  $sv$ .<sup>25</sup> Of course, I strongly disagree with Mr. Hevert's sole  
9 reliance on earnings growth projections for reasons already discussed above, but also I  
10 do not believe that investors rely only on earnings growth rates when they price a  
11 utility's stock. I discuss this in greater detail later.

12 **Q. Briefly describe the single-stage DCF method.**

13 A. The single-stage DCF model is typically represented by the equation,  $K = \frac{D_1}{P} + g$   
14 where  $K$  is the estimate of the cost of equity,  $\frac{D_1}{P}$  is next period's dividend yield, i.e. next  
15 period's dividend divided by the stock price, and  $g$  is the expected (constant) growth  
16 rate in dividends. The model is based on the premise that since cash dividends are the  
17 only income from a share of stock held in perpetuity, the value of that stock is the  
18 present value of its stream of cash dividends, where the discount rate is the market's  
19 required return, i.e.,  $K$ . Expected future dividends are represented by applying a

---

<sup>25</sup> The alternative is based on the formula,  $br + sv$ , where  $b$  is the retention ratio,  $r$  is the expected return on equity,  $s$  is the expected funds raised from the sale of stock as a fraction of existing equity, and  $v$  is  $(1-(B/P))$ , where  $B$  is the book value of the share and  $P$  is the price of the share.

1 constant growth rate to the current observable dividend, to obtain the functionally  
2 elegant expression for  $K$  as shown above.

3 **Q. What criteria did you use to select the DCF proxy group?**

4 A. When choosing my recommended sample, I effectively began with Mr. Hevert's  
5 universe of gas and electric companies (Value Line Central, East and West Electric  
6 Utilities and Natural Gas Utilities) that he subjected to his proxy screening analysis. I  
7 find that all but the fourth (bulleted) criterion that was used by him are reasonable.<sup>26</sup>  
8 To ensure that the companies selected for Northern Utilities' proxy are predominantly  
9 regulated gas utilities, I only included them in the proxy group if at least 50 percent of  
10 the revenues over 2014-16 on average are attributable to regulated natural gas business  
11 and at least 75 percent of the assets on average are attributable to regulated natural gas  
12 business over 2014-16.

13 **Q. Why do your criteria differ from that of Mr. Hevert's criteria?**

14 A. In creating a reasonably "pure play" proxy that is comparable to Northern  
15 Utilities it is important that these companies exhibit a fairly high percentage of *regulated*  
16 *assets* and have the majority of their revenue coming from regulated natural gas  
17 operations. A sufficiently high cut-off for share of regulated net operating income as a  
18 percentage of total net operating income may seem like an appropriate screen at first  
19 glance, but such a metric is prone to exaggerate the role of regulated operations when  
20 the non-regulated segment of a company is reporting significant losses on net operating  
21 income. For such a company, measuring the regulated share in total net operating

---

<sup>26</sup> See Mr. Hevert's Testimony, Bates page 000416-000417.

1 income would tend to overstate its importance and may incorrectly allow the  
2 company's inclusion in the proxy, even as that company may be fundamentally  
3 different from a regulated company since it is exposed to significant market risks given  
4 a substantial presence in the non-regulated arena or a non-gas activity. In contrast, if  
5 the non-regulated segment of the company is reporting significant income, such an  
6 analysis may eliminate the company from the proxy, even though that company may  
7 otherwise consist predominantly of its regulated business. Such a company's foray into  
8 a non-regulated arena may be so insignificant that the company's risk profile actually  
9 matches that of a regulated company better than the one included erroneously by  
10 relying on net-income variable like net operating income. Accordingly, to better assess  
11 whether a company should be included in a proxy for Northern Utilities, I believe we  
12 should strive to have it sufficiently reflective of a "pure play" regulated natural gas  
13 utility. I find that cut-offs of at least 75 percent for regulated natural gas assets and at  
14 least 50 percent for regulated natural gas revenues are reasonable, given the dearth of  
15 standalone companies that are publicly traded and consist solely of regulated natural  
16 gas business. Also, as I rely not only on earnings projections but also on dividends and  
17 book value projections in my DCF analysis, since to the best of my knowledge  
18 dividends and book value projections are covered only by Value Line Survey, I only  
19 consider companies that are covered by Value Line Survey.

20 **Q. What is your recommended DCF proxy?**

1 A. Using information predominantly provided by the Company in response to data  
2 requests about the percentages discussed above, and applying the mentioned cut-offs, I  
3 determined that the appropriate proxy group consists of Atmos Energy Corporation  
4 (ATO), One Gas, Incorporated (OGS), Spire Incorporated (SR), Northwest Natural Gas  
5 (NWN), and Southwest Gas (SWX).<sup>27</sup>

6 **Q. Do you believe that the group listed above is a reasonable proxy for Northern**  
7 **Utilities?**

8 A. Yes, I do. The screening criteria go a long way in ensuring that my proxy group  
9 reasonably reflects the risk profile of Northern Utilities' natural gas utility business. For  
10 example, the proxy group's average percentage of assets subject to natural gas utility  
11 regulation is 93 percent and the average percentage of revenue subject to regulated  
12 natural gas business is 85.1 percent over 2014-16, which are reasonably close to  
13 complete regulation as is the case for the distribution business of Northern Utilities in  
14 New Hampshire.

15 Also, a check (see Schedule PKC-1) reveals that the S&P credit-ratings for the  
16 group range between BBB+ to A+. The rating associated with Unifil Corporation

---

<sup>27</sup> Mr. Hevert does not subject One Gas, Incorporated (OGS) to his screening analysis. It appears that the screening was done before Value Line included OGS in its universe of Gas Utilities. While SNL segment analysis is unavailable for OGS, the Company's 10-K filings indicate that it is a "100 percent regulated natural gas distribution utility." One Gas, Incorporated is therefore included in the proxy, per the screening that the OCA has relied on. Also, in responding to data request OCA 1-7, Mr. Hevert indicates that the share of regulated gas utility business in total revenue for Chesapeake Utilities Corporation (CPK) is comfortably higher than 50 percent, but a closer look reveals that the calculations assumed that CPK does not have any revenues from regulated electric utility business over the period 2014-16. That assertion is incorrect. The Annual reports filed before SEC show that as for regulated energy, electric distribution revenues were approximately \$75 million, \$79 million, and \$84 million for years 2014, 2015, and 2016 respectively. Accounting for that, the share of regulated gas utility business in total revenue for CPK is less than 50 percent. Based on this analysis, Chesapeake is not included in the OCA's proxy group.

1 (Northern Utilities' parent) is BBB+. As for the capital structure, the company has  
2 proposed a common equity ratio of 51.7 percent. A look at the proxy group indicates  
3 that over 2014 to 2016 while the average equity ratio has been 54.3 percent, the range is  
4 47 to 61 percent (see Schedule PKC-2). It is reasonable to conclude that the proxy  
5 group's cost of equity estimates would inform Northern Utilities' allowed return on  
6 equity.

7 **Q. Please explain why you used data from November 16, 2017 to December 15,**  
8 **2017 to measure the dividend yields for the proxy's constituent companies.**

9 A. Investors' expectations about how companies will fare in the future are captured  
10 in the most recently observed market price and dividend data. Data from fairly long  
11 historical periods are unlikely to reflect investors' current expectations. That said, it is  
12 also true that some smoothing of the price trend is useful as it filters possible transitory  
13 and temporary changes that characterize daily movements in prices. I have, therefore,  
14 in preparing this testimony, used daily pricing data from the most recent month to  
15 calculate the average price (Schedule PKC-3), which in conjunction with the annualized  
16 dividend helps measure the dividend yield (Schedule PKC-4) component of the DCF-  
17 based cost of equity.

18 **Q. You had indicated earlier that you do not agree that investors use only**  
19 **expected earnings growth rates to inform the DCF growth component. Please**  
20 **elaborate further.**

1 A. It is unreasonable to assume that investors use a single growth estimate when  
2 pricing a utility's stock. Mr. Hevert explains his disagreement with the use of other  
3 growth rates (expected dividends and book value per share growth rates) in his  
4 testimony, but does not provide empirical support that investors actually exclusively  
5 use expected earnings growth rates to inform the DCF growth component. The  
6 empirical papers that Mr. Hevert cites in his testimony (Bates pages 422-424), do not  
7 directly speak to the issue of whether is it indeed proper to exclusively rely on expected  
8 earnings growth rates for the growth component in his DCF analysis. Later in my  
9 testimony, I discuss why the OCA does not agree with Mr. Hevert's position, and why  
10 the OCA contends that it is wholly appropriate to use expected dividends and book  
11 value growth rates along with expected earnings growth rates to inform the DCF  
12 growth component. Before explaining that contention, it is nevertheless useful to  
13 investigate the papers cited by Mr. Hevert as noted above, to see whether they provide  
14 any support for the exclusive use of expected earnings growth rates in setting the DCF  
15 growth component.

16 **Q. Briefly discuss the empirical papers furnished by Mr. Hevert and comment on**  
17 **whether they provide support for solely using expected earnings growth rates to**  
18 **represent the DCF growth component.**

19 A. Mr. Hevert utilizes five empirical papers to support his use of expected earnings  
20 growth rates to represent the DCF growth component:

- 1 • Vander Weide, J. H. and Carleton, W. *Investor Growth Expectations: Analysts vs.*  
2 *History*, The Journal of Portfolio Management (Spring 1998).
- 3 • Christophi, A. and Christophi, P. (et al.) *Evaluating Common Stocks Using Value*  
4 *Line's Projected Cash Flows and Implied Growth Rate*, Journal of Investing (Spring  
5 1999).
- 6 • Harris, R., *Using Analysts' Growth Forecasts for Estimate Shareholder Required Rate of*  
7 *Return*, Financial Management (Spring 1986).
- 8 • Harris, R. and Marston, F., *Estimating Shareholder Risk Premia Using Analysts'*  
9 *Growth Forecast*, Financial Management (Summer 1992), at 21.
- 10 • Brigham, E. F. and Shome, D. K. (et al.), *The Risk Premium Approach to Measuring a*  
11 *Utility's Cost of Equity*, Financial Management (Spring 1985).

12 I discuss the papers below.  
13

14 The article by Carleton and Vander Weide only looks at historical growth rate in  
15 dividends (*see* page 79). As for analysts' growth forecasts, earnings growth is the only  
16 variable that the article investigates. The paper does provide evidence that it is better to  
17 use growth expectations rather than historical data to measure the growth component.  
18 It does not, however, at all investigate whether analysts' earnings growth forecasts are  
19 better than their dividends growth forecasts in capturing investors' expectations. It also  
20 does not, more importantly, even remotely demonstrate that investors use only  
21 earnings and not dividends growth in forming their investment decisions.

1           In the paper by Christofi, Lori and Moliver (1999), the word “dividend” appears  
2 few times in that article, but none of those references are about expectations of growth  
3 in dividends. More importantly, the paper has nothing to say about whether investors  
4 form their investment decisions only based on earnings and not dividends.

5           The articles by Harris - Harris (1996) and Harris and Marston (2001) - also did  
6 not investigate how dividends growth expectations perform. The articles rely solely on  
7 EPS growth expectations to measure the growth component of DCF by noting in  
8 footnote 7 (both Harris (1986)) and Harris and Marston (1992)) that “[while] the model  
9 calls for expected growth in dividends, no source of data on such projections is readily  
10 available.” Most importantly again, these articles have nothing to offer on whether  
11 investors form their investment decisions based *only* on earnings and *not* dividends.

12           Brigham, Shome and Vinson (1985) is in the nature of investigating whether risk  
13 premiums used to estimate cost of capital in the CAPM framework should be based on  
14 future expectations or past realized holding period returns. The article does not at all  
15 inform whether in representing the DCF growth component only earnings growth  
16 expectations matter.

17           Finally, as for Charles Phillips, *The Economics of Regulation*, 1969, Chapter 9, while  
18 it points out how the market is also valuing utilities based on earnings per share, it  
19 nowhere discredits the importance of dividends and more importantly has nothing to  
20 offer on whether *only* earnings growth forecasts should be used to estimate the DCF  
21 growth component. The references are clearly not useful if it is meant to show that

1 investors demonstrably form their investment decisions based solely on expectations of  
2 growth in earnings, not dividends.

3 In conclusion, Mr. Hevert has not provided any persuasive evidence that only  
4 earnings growth expectations matter in forming investors' opinion about the DCF  
5 growth component.

6 **Q. Please discuss evidence from research and market realities.**

7 A. Both market realities and research indicate that not all investors are alike and  
8 they do not care only about earnings growth. While providing a review of dividend  
9 policy theories and evidence, Malkawi, Rafferty and Pillai (2010) survey academic  
10 research that argues why dividends matter to investors.<sup>28</sup> Different researchers have  
11 provided empirical support for different theories. To note just a couple of them, some  
12 have argued that dividends are sought as investors prefer "bird in the hand" dividends  
13 rather than "two in the bush" future capital gains. Others have argued that investors  
14 care about after-tax return and the differential tax treatment of capital gains and  
15 dividends influences their demand for shares. In informing why dividends matter,  
16 some of the theories and empirical analysis directly stress how different investors may  
17 view dividends differently. For example, investors whose dividends are taxed higher  
18 than their capital gains may prefer earnings driven stocks rather than dividends paying  
19 stocks, or how institutional investors as opposed to individual investors are more

---

<sup>28</sup> See Malkawi and Rafferty et al., "Dividend Policy: A Review of Theories and Empirical Evidence", International Bulletin of Business Administration, ISSN: 1451-243X Issue 9 (2010). Even managers need to carefully consider dividends policy because investors not only view dividends as being a return to shareholders but also watch movements in dividends to infer about the health of the firm. See "Topics in Finance Part VII – Dividend Policy" Judy Laux, American Journal of Business Education – November 2011, Volume 4, Number 11.

1 attracted towards dividend-paying stocks, etc. It also remains true that companies pay  
2 out dividends in billions of dollars in the marketplace suggesting that companies  
3 recognize that investors value them. Also, it is well known that the main attraction of  
4 utility stocks is indeed their dividend income.<sup>29</sup> I believe it is inappropriate to assume  
5 that only earnings growth expectations matter to investors, particularly ones interested  
6 in utilities.<sup>30</sup>

7 **Q. What measures of the growth component do you consider?**

8 A. Since the DCF estimate is derived from the concept that cash dividends are the  
9 only income from a share of stock held to infinity, in principle, it is the growth in  
10 dividends that should be used for the growth component. Investors, however, have  
11 different expectations about growth and no single indicator captures the expectations of  
12 all investors. Also, whether growth in dividends per share (DPS) is sustainable or not is  
13 pertinent and its sustainability is affected by how both earnings per share (EPS) and  
14 book value per share (BVPS) perform in the future. Sustainability of growth in  
15 dividends under the DCF construct assumes that EPS, DPS and BVPS are all expected to  
16 grow at the same rate in the future. Value Line five-year projections for the growth rates  
17 in earnings, dividends and book value, however, reveal that these financial variables  
18 are expected to grow at significantly different rates over the next three to five years. In  
19 view of that, sole reliance on either dividends growth rate, book value growth rate or  
20 earnings growth rate is unlikely to produce a reliable measure of the DCF growth

---

<sup>29</sup> See Value Line's One-pager on the Natural Gas Utility dated September 1, 2017.

<sup>30</sup> Parcell, *supra* note 22, at 146.

1 component. I instead use the average of the three expected growth rates as one of the  
2 measures for the growth component to represent the growth component in the DCF  
3 analysis. One may reasonably assume that the sustainable long-run growth rate to  
4 which earnings, dividends and book value growth rates may converge in the future is  
5 represented by their average, rather than just one of those variables, as Mr. Hevert's  
6 analysis suggests. I have used the average of the Value Line five-year projections for  
7 growth in DPS and BVPS *and* the average of the Value Line, Yahoo Finance, Zacks and  
8 SNL median long-term projections for EPS growth rates to calculate the growth  
9 component. While in principle the single-stage DCF model is meant to be based on  
10 long-term projections, its application however is based on at most five-year projections,  
11 as truly long-term projections are seldom available.

12 I have also considered a second measure of the growth component, which is  
13 based on estimates for the internal and external components for growth, retention ratio,  
14 expected return on common equity, market-to-book ratio, and growth in the number of  
15 outstanding shares (called retention growth). Finally, even though I have reservations  
16 about Mr. Hevert's sole reliance on earnings growth as a measure of the growth  
17 component, I considered and applied that approach to my proxy to derive another DCF  
18 estimate for the cost of equity (see Schedule PKC-5 for the calculation of the growth  
19 components. Also, see Schedules PKC-6 and PKC-7 for the inputs for external and  
20 internal growth components, and Schedule PKC-12 for the calculation of the Value Line  
21 3-5 years growth projections for EPS, DPS, and BVPS).

1 **Q. Please explain how you estimate the growth component based on the retention**  
2 **ratio, expected return on common equity, market-to-book ratio, and growth in the**  
3 **number of outstanding stocks.**

4 A. I have used Value Line's expectation regarding retention ratios and returns on  
5 equity for five years into the future to derive estimates for  $b$  and  $r$  and have used them  
6 to calculate the expected internal growth component, i.e.,  $br$ . To account for growth  
7 expectations from external financing and derive estimates of the external growth  
8 component, I have also used the latest market-to-book ratios from Yahoo Finance and  
9 the average of Value Line's five-year projections for the number of outstanding shares.  
10 That is helpful in calculating the external growth component, i.e.  $s_e v$ ;  $s_e$  = expected  
11 funds raised from sale of stock as a fraction of existing equity, and  $v = \left(1 - \frac{B}{P}\right)$ .<sup>31</sup> The  
12 revised formulation for the growth component can be alternatively expressed as  
13  $b_e r_e + g_e \left(\frac{P}{B} - 1\right)$ , where  $g_e$  is the expected growth rate in the number of outstanding  
14 shares. In short, the growth component can be viewed as the sum of the "internal"  
15 growth rate, i.e.  $b_e r_e$ , and the "external" growth rate, i.e.  $g_e \left(\frac{P}{B} - 1\right)$ .

16 **Q. Do you employ any outlier-determination approach?**

17 A. Yes.

18 **Q. Please describe your outlier-determination approach.**

---

<sup>31</sup> Gordon, *supra* note 8 at 30.

1 A. I apply two outlier determination screenings. First, I have omitted any ROE  
2 estimate for a company in the proxy group that is below the current yield on "Utility A"  
3 preferred stock, i.e. 5.83 percent (Value Line Investment Survey, Selection and Opinion,  
4 Dec. 22, 2017, Page 2597). Second, I have employed the statistical outlier-determination  
5 approach that cost of equity estimates lying outside the bandwidth of the mean plus or  
6 minus two times the variance are not statistically representative of the proxy. In terms  
7 of probabilistic distribution terminology, the second screening criterion effectively  
8 mimics the widely-used statistical confidence interval of 95 percent.

9 **Q. What are the DCF estimates for your proxy?**

10 A. The single-stage DCF estimate, based on the average expected growth rates in  
11 earnings, dividends and book value produces an average of 8.00 percent. Schedule  
12 PKC-8 provides the calculations. All estimates pass the screenings mentioned above.  
13 When only the EPS growth rate is used for the growth component, the single-stage  
14 DCF method produces an average of 8.39 percent; again none of the individual  
15 estimates fail the outlier determination screenings. When only the "internal-plus-  
16 external" growth approach is used, the DCF method produces an average of 8.74  
17 percent; none of the individual estimates fail the outlier determination screenings.

18 I also subjected all of the fifteen DCF estimates derived from all of the DCF  
19 methods to the afore-mentioned outlier determination screenings. The average All-  
20 Methods DCF estimate, after eliminating the outlier, is 8.13 percent.

1 **Q. While Mr. Hevert provides DCF estimates using the multi-stage**  
2 **DCF approach, you have not done so. Why?**

3 A. The Multi-Stage approach relies on one's judgment over how growth rates will  
4 pan out in the future. It is no different from the kind of judgment I have applied with  
5 respect to weighting different growth estimates even though they are all derived from  
6 applying the single-stage DCF approach. Also, one of the primary uses of the Multi-  
7 Stage DCF approach is for a company that is not in a sufficiently stable environment.  
8 Certainly, with respect to Northern Utilities, like most regulated gas companies, there is  
9 no reason to believe that is the case. I, therefore, do not conduct a Multi-Stage-DCF  
10 estimation for the return on equity.

11 **Q. Mr. Hevert recommends adjustment for flotation costs in his estimates of the**  
12 **cost of equity. Do you agree with those adjustments?**

13 A. No. As I have noted already, the DCF approach, informed by equity analysts'  
14 projections, in practice relies on investors' expectations about earnings and dividends  
15 and other relevant variables over three to five years. Even with reasonable treatment of  
16 the DCF growth component, the approach tends to internalize the medium term  
17 expectation that the market-to-book ratio will persist at levels relatively close to what is  
18 currently being observed. Given the reliance at best on medium term expectations, we  
19 tend to derive estimates of the ROE that are sufficiently above the true cost of equity in  
20 a setting where the stock prices are significantly above the book value.<sup>32</sup> Flotation cost

---

<sup>32</sup> Despite several rates cases and Commissions setting new ROEs since the beginning of 2010, we have not witnessed a consistently significant movement towards a market-to-book ratio being one; while the SNL Gas

1 is effectively small enough that my recommended return on equity, which relies on  
2 investors' expectations of persistence in the market-to-book ratio being significantly  
3 greater than one, already accounts for such costs adequately. Any further adjustment  
4 would simply unnecessarily transfer wealth from ratepayers to shareholders.

5 **Q. Are you suggesting that flotation cost adder should be allowed only if the**  
6 **market-to-book ratio was close to one?**

7 A. Let's assume that the market-to-book ratio is actually close to one. If a new  
8 issuance is on the horizon out of necessity and there is a real risk of dilution hinting that  
9 the allowed return on equity in place at that time is not fair and trails the opportunity  
10 cost of equity, it may become necessary that a flotation cost recovery mechanism be  
11 allowed. Actually, anything that will help to instill investors' confidence in the utility  
12 would be worthwhile during such times. It may well be the case though, that something  
13 more fundamental than mere allowance of flotation cost would be needed. It would be  
14 in the interest of both the investors and the ratepayers to allow an upward adjustment  
15 to the allowed return on equity more generally for such a utility, if it is evident that the  
16 company is otherwise prudent in its operations.

---

Utility's M/B ratio has increased approximately from 1.95 to 2.54, Mr. Hevert's proxy's M/B ratio has increased approximately from 1.52 to 2.58 over 2010 to 2017 (as per data downloaded on December 4, 2017). Interestingly, there have been 185 gas rate-case decisions on ROEs since the year 2010 in the US, and the average allowed-return on equity has fallen only from 10.22 percent to 9.75 percent between 2009 and 2017 (source: RRA's Regulatory Focus: Major Rate Case Decisions, October 26, 2017). As I have explained before, even as Commissions try to set the allowed return to be close to the true cost of equity, the application of different methodologies including the DCF approach, given current realities, tends to capture the persistence in the market-to-book ratio being greater than one enough that they produce estimates of cost of equity that comfortably exceed the true cost of equity.

1 **Q. Since flotation costs are real regardless of whether the market-to-book ratio is**  
2 **greater than one or not, are you ignoring those costs in recommending disallowing**  
3 **flotation cost adder when market-to-book ratio is significantly higher than one?**

4 A. Not at all. If a utility issues stocks and successfully sells them to raise the book  
5 value it needs, it must be true that investors expect a return on investment that is at  
6 least the cost of equity otherwise they would not have purchased the stock. Since an  
7 investor is completely aware that the utility's receipt per new share is definitely lower  
8 than the price paid for that stock (due to issuance cost), by buying the stock he or she  
9 reveals that the return on the book value is at least equal to the required return on the  
10 price of the stock. The mere fact that the stocks were bought by investors reveals that  
11 the allowed return on the book value adequately compensates for issuance costs. In an  
12 environment of market-to-book ratios being significantly greater than one, given the  
13 size of flotation costs relative to the market-to-book leverage, even with a reasonable  
14 application of the DCF approach to determine the cost of equity, the market-to-book  
15 ratio continues to remain sufficiently higher than one. Even without a flotation cost  
16 adder, one can conclude that going forward the utility will have little issue with  
17 attracting equity when it needs additional funds to ensure reliable service for the rate  
18 payers without compromising its financial viability.

19 **Q. Do you agree with Mr. Hevert that there is a need to adjust the return on**  
20 **equity upward due to the consideration of small-size premium?**

1 A. No. Even though he does not recommend an explicit adjustment for small-firm  
2 effect, Mr. Hevert devotes part of his testimony on why he thinks the allowed return on  
3 equity should build in some slack for such an adjustment, and he considers “the effect  
4 of small size in determining where the Company’s ROE falls within the range of  
5 results.” It is the OCA’s position that the Commission should not allow any  
6 accommodation of the small size premium. First, empirically there is counter-evidence  
7 indicating that the small-firm effect is too dependent on the time-period chosen for  
8 analysis, and is dependent on the month of January for high stock price returns.  
9 Second, there is also counter-evidence that the size effect may not apply to regulated  
10 utility operations.<sup>33</sup>

### 11 **III.B Capital Asset Pricing Model (CAPM)**

12 **Q. Briefly describe the CAPM method.**

13 A. The CAPM method recognizes that common equity capital is more risky than  
14 debt from an investor's standpoint, and that investors require higher returns on stocks  
15 than on bonds to be compensated for the additional risk. The cost of common equity  
16 under CAPM is represented by the following equation:  $K = R_f + \beta_s * (R_M - R_f)$  where  $K$   
17 is the cost of equity,  $R_f$  is the yield on risk free securities,  $R_M$  is the expected return on  
18 the overall market and  $(R_M - R_f)$  is the equity risk premium demanded by shareholders  
19 to accept equity relative to debt. The coefficient  $\beta_s$  is the average beta of a group of

---

<sup>33</sup> See for example, Block, S.B., “A Study of Financial Analysts: Practice and Theory,” Association for Investment Management Research (July/August 1999); and Wong, A., “Utility Stocks and the Size Effect: An Empirical Analysis,” Journal of the Midwest Finance Association (1993).

1 comparable-risk companies that is used to adjust the risk premium to measure risks  
2 specific to the regulated utility in question.

3 **Q. What is Mr. Hevert's estimate of the cost of equity based on the CAPM**  
4 **method?**

5 A. Mr. Hevert derives two sets of CAPM estimates of the cost of equity (*see* Mr.  
6 Hevert's Testimony, Bates page 000438, Table 6). The pure Bloomberg estimates are  
7 9.53 percent and 9.99 percent, and the pure Value Line estimates are 11.31 percent and  
8 11.77 percent. He also estimates two other sets of CAPM estimates that mix Bloomberg  
9 data with Value Line betas and Value Line data with Bloomberg betas. While the  
10 Bloomberg data/Value Line betas based estimates are 10.77 percent and 11.23 percent,  
11 the Value Line data/Bloomberg betas based estimates are 9.99 percent and 10.45  
12 percent.<sup>34</sup>

13 **Q. Do you agree with Mr. Hevert's CAPM approach? Please explain.**

14 A. No. First, as I have already noted, Mr. Hevert's estimates are actually not ex-  
15 ante. The betas are estimated using historical stock prices. Since the CAPM approach  
16 relies on betas that are based on historical data, it cannot provide a truly forward-  
17 looking estimate of the cost of equity. Second, I do not agree even with his approach to  
18 measure ex-ante risk premiums. The disagreement is both with respect to how he  
19 measures risk-free return and how he calculates market returns. I discuss these

---

<sup>34</sup> In response to OCA 5-1, Mr. Hevert has updated these numbers. For current treasury yield and projected yield, the pure Bloomberg numbers are 9.97 percent and 10.43 percent respectively. For the pure Value Line, the numbers are 11.59 percent and 12.04 percent respectively. The Bloomberg data/Value Line betas based estimates are 11.46 percent and 11.91 percent, and the Value Line data/Bloomberg betas based estimates are 10.08 percent and 10.54 percent.

1 considerations below, but as an initial observation, I disagree with his mixing market  
2 return estimates from one source with betas from the other. While Value Line betas are  
3 based on a market return assumed to be that of the NYSE Composite Index, the  
4 Bloomberg betas are based on the S&P 500 Index. Only the pure estimates are the ones  
5 that are relevant; i.e. coupling Value Line betas with Value Line estimates of market  
6 return, and Bloomberg betas with Bloomberg estimates of market return.

7 **Q. Why do you disagree with Mr. Hevert's specification of the risk-free rate?**

8 A. I do not agree that the yield on 30-year Treasury bond is a reasonable proxy for  
9 the risk-free rate. Strictly speaking, the risk-free return is best captured by short-term  
10 Treasury bills, but in recognition that utility rates are usually set for longer periods and  
11 interested investors typically have relative long investment time horizons, longer-term  
12 bonds are used to capture the risk-free rate when applying CAPM to estimate the cost  
13 of equity.

14 It should be understood that long-term bonds are not risk-free for two main  
15 reasons: default (credit) risk and interest rate risk. As for the interest rate risk, the  
16 longer termed a default-free bond is, the greater is its interest rate risk. The 10-year  
17 Treasury long-term bond is my preferred metric for the risk-free rate when conducting  
18 CAPM analysis for regulated companies. It strikes a reasonable balance between  
19 choosing a truly risk-free interest rate instrument (like the shortest of short term  
20 Treasury bills) and a consideration that investors have relatively long investment

1 horizons and that regulated utility rates are usually set for longer terms than just a few  
2 months.<sup>35</sup>

3 As for relying on the 10-year Treasury bond yield to measure the risk-free rate,  
4 since the easily available *market based* yield at any point in time is inherently based on  
5 future expectations of *market participants* about the economy, I do not find it appropriate  
6 to use any information about what *analysts* think the yields are going to be in the future,  
7 either near-term or long-term.<sup>36</sup> Also, it is appropriate to rely on the most recently-  
8 observed yields. I discuss my approach in detail later.

9 **Q. You stated that you do not agree with Mr. Hevert's approach to calculate**  
10 **market returns. Please explain why.**

11 A. My reservation about Mr. Hevert's approach again stems from the overreliance  
12 on earnings growth projections that tend to be upward biased as discussed before in the  
13 section on DCF estimation of the proxy's cost of equity. As already noted, I also do not  
14 agree that the market-return estimates associated with the projected-yield are  
15 warranted (*see* Table 6 of Mr. Hevert's testimony).

16 Additionally, even if those were warranted, I disagree with Mr. Hevert that the  
17 market premiums associated with the *projected-yield* based cost of equity estimations  
18 should be the difference between the DCF estimate of market return and the *observed*

---

<sup>35</sup> For a good discussion on the determination of risk-free rate, see Damodaran, A. "What is the Risk Free Rate? A Search for the Basic Building Block," Stern School of Business, New York University, December 2008.

<sup>36</sup> Yields observable at any point in time in the market place is akin to price being observable in the market place at any point in time. In a competitive environment, they contain all the information about what economic agents expect will happen in the future, and are the best indicators to use when one is trying to estimate forward looking measures like the "risk-free" return or the cost of equity.

1 *yield* on bond. In estimating the *projected-yield* based cost of equity for the proxy, the  
2 market premium for the proxy should more appropriately be the proxy's beta times the  
3 difference between DCF estimate of market return and the *projected-yield*.  
4 Even if one were to agree with Mr. Hevert's approach to rely on the projected bond  
5 yield, his approach results in an overstated cost of equity, given the mechanics he  
6 employs.<sup>37</sup>

7 **Q. What approach did you use to estimate the market returns?**

8 A. First, as already noted before, it is not appropriate to use projections on bond-  
9 yields to measure the "risk-free return" component of the CAPM approach. The OCA as  
10 mentioned before finds it reasonable to use the currently observed yields on the 10-year  
11 Treasury bond. Second, as for Bloomberg market return estimates, it is important that  
12 *only* market return information from Bloomberg is relied upon. Likewise, *only* market  
13 return information from Value Line should be used to derive the Value Line estimates.  
14 It should be recognized that the market portfolio as used by Bloomberg and Value Line  
15 are very different and the betas associated with one source should not be used to derive  
16 CAPM cost of equity estimates that relies on market data from the other. Therefore, in  
17 estimating the cost of equity using CAPM, the OCA has only relied on two CAPM

---

<sup>37</sup> Limiting the analysis to only the "pure" Bloomberg and Value Line estimations as reported in Table 6 of Mr. Hevert's testimony, given that the Bloomberg and Value Line betas for Mr. Hevert's proxy are 0.631 and 0.75, the projected bond yield is 3.43 percent, and the DCF ex-ante market risk premiums for Bloomberg and Value Line are respectively (13.37-3.43) and (14.09-3.43), i.e. 9.94percent and 10.66 percent, the CAPM projected-yield based cost of equity estimates are 3.43 *plus* 0.631×9.94 and 3.43 *plus* 0.75×10.66, respectively. Therefore, the projected yield-based pure Bloomberg CAPM estimate of ROE is 9.70 percent, and the pure Value Line estimate of ROE is 11.42percent. Mr. Hevert's corresponding estimates, i.e. 9.99percent and 11.77percent (see Table 6, Mr. Hevert's Testimony) are overstated by 29 and 35 basis points respectively.

1 estimates that are entirely based only on Bloomberg data and Value Line data,  
2 respectively.

3 The OCA's CAPM estimate of the cost of equity is the *average* of the pure  
4 Bloomberg and Value Line estimates (*see* Schedule PKC-10). The pure Bloomberg uses  
5 the data furnished by Mr. Hevert (Schedule RBH-5, Mr. Hevert's testimony; updated  
6 per data request OCA 5-1) to derive a CAPM estimate (CAPM Method 1, *see* Schedule  
7 PKC-8) that uses only earnings growth projections as reported in Schedule RBH-5 of  
8 Mr. Hevert's testimony. The OCA's pure Value Line CAPM estimate (CAPM Method 2,  
9 *see* Schedule PKC-8), however, uses information on earnings growth, dividends growth  
10 and book value growth projections. Doing so is important and reasonable, as that  
11 ensures that the OCA's CAPM estimate is not entirely predicated on earnings growth  
12 projections. Finally, I reject the small size premium adjustment (explicitly or otherwise)  
13 for reasons discussed in Subsection III.A. The OCA's CAPM estimation is discussed  
14 below in detail by going through the inputs one-by-one.

15 **Q. What beta measures do you use for your sample?**

16 A. I use Value Line and Bloomberg beta estimates for the companies in my DCF  
17 sample (*see* Schedule PKC-9). The proxy beta for the Bloomberg application is 0.63,  
18 while for the Value Line estimation, it is 0.72.

19 **Q. How do you calculate the equity risk premium?**

20 A. Two key elements in the determination of the equity risk premium are the risk-  
21 free rate and the expected return on the market portfolio. As a proxy for the risk-free

1 rate, as already discussed earlier, the OCA relies on the average of the current yields on  
2 the 10-Year Treasury bond observed over the last month. The average yield over  
3 November 17, 2017 to December 15, 2017 has been 2.36 percent.

4 As for the expected market returns, it is helpful to discuss the Bloomberg  
5 approach and the Value Line approach separately. As for Bloomberg, I rely on the long-  
6 term growth expectations furnished by Mr. Hevert and his application of the DCF  
7 approach, which produces an estimate of the expected market return of 14.07 percent  
8 (Company's response to OCA 5-1).<sup>38</sup>

9 In the case of Value Line, I use not only earnings growth projections, but also  
10 latest Value Line dividends and book value growth projections to derive three capital-  
11 weighted estimates of the expected market return. While the starting group of  
12 companies is same as the S&P 500 companies analyzed by Mr. Hevert (Company  
13 response to OCA 5-1), to ensure that we are consistently looking at the same companies  
14 as a group in deriving the EPS, DPS, and BVPS projections, I only use companies for  
15 which the data is fully available for not only the aforementioned projections, but also  
16 for market capitalization, betas, and dividend yields. Schedule PKC-11 reports the  
17 OCA analysis. The number of companies that are subjected to that analysis is 408. The  
18 resulting expected market returns for this Value Line sample are 14.21 percent, 10.06  
19 percent and 10.76 percent respectively for EPS and DPS and BVPS 3-5 years' growth

---

<sup>38</sup> This reliance on Mr. Hevert's Bloomberg analysis should not be construed as OCA's agreement with the approach. The use of Mr. Hevert's Bloomberg estimate should be viewed in conjunction with OCA's Value Line estimation to produce a solitary CAPM estimate that represents an upwardly biased estimate of the cost of equity.

1 projections. The average of these returns represents the estimate of the expected market  
2 return for the Value Line sample, i.e. 11.67 percent.

3 As for the Bloomberg and Value Line market risk premiums, their derivations  
4 differ in a crucial way. To derive the Bloomberg market risk premium, the average  
5 bond yield is simply subtracted from the Bloomberg estimate of market return. To  
6 derive the Value Line market risk premium, however, the difference between Value  
7 Line market return and the bond yield is *divided* by the market-capitalization weighted  
8 mean of Value Line betas of the 408 companies that constitute the OCA's Value Line  
9 sample. Doing so is appropriate, as the market proxy in the derivation of the Value  
10 Line betas (that would be associated with a beta of one) is potentially different from the  
11 group of companies that is used to estimate the Value Line market return.

12 **Q. What are your estimates for market-risk premium?**

13 A. As explained above, the Bloomberg estimate of the equity risk premium is 14.07  
14 percent *less* 2.36 percent, i.e. 11.71 percent. The Value Line estimate of equity risk  
15 premium, however, is (11.67 percent *less* 2.36 percent) divided by 1.001, which is the  
16 market-capitalization weighted mean beta of the Value Line sample. The Value Line  
17 estimate of equity risk premium is therefore 9.30 percent.<sup>39</sup>

18 **Q. What are the Bloomberg and Value Line estimates of the cost of equity for**  
19 **Northern Utilities' proxy?**

20 A. As for Bloomberg, using the recent average yield on 10-year Treasury bond, and  
21 the Bloomberg beta of 0.63, the proxy's cost of equity is estimated to be 2.36 *plus*

---

<sup>39</sup> All numbers reported here are rounded.

1 0.63×11.71 percent, i.e. 9.74 percent. The corresponding Value Line calculation yields  
2 2.36 plus 0.72×9.30 percent, i.e. 9.06 percent.

3 **Q. What is your CAPM cost of equity estimate for Northern Utilities?**

4 A. As has been discussed above, the OCA relies on the average of the two estimates  
5 noted above to derive its CAPM estimate of Northern Utilities' cost of equity, i.e. 9.40  
6 percent. While the OCA's recommended point-estimate is strictly based on DCF  
7 approaches, the CAPM estimate, even as a biased estimate of the cost of equity,  
8 provides a useful check as to the reasonability of the DCF based estimate, and  
9 ultimately that of the OCA's recommended allowed return on equity.

10

### 11 **III.C Conclusion**

12 **Q. Please summarize your cost of equity estimates.**

13 A. The table below reports the cost of equity estimates based on the different  
14 methodologies that the OCA relied on.

Table 3: Summary of Cost of Equity Estimates	
DCF (traditional: EPS, BVPS & DPS average)	8.00
DCF (traditional: EPS)	8.39
DCF ( $g=br+sv$ Method)	8.74
DCF (All Methods)	8.13
CAPM	9.40

15

16 **Q. What is your recommendation on the allowed rate of return on equity?**

17 A. The table above summarizes estimates of cost of equity that the OCA's analysis  
18 produced. The OCA recommends using solely the DCF approach in estimating the cost

1 of equity, for reasons that were discussed in Section II and Subsection IIIA. As stated  
2 earlier, the CAPM based cost of equity was estimated mainly as a check. Based on these  
3 estimates, the OCA recommends a point estimate of allowed return on equity of 8.25  
4 percent. With respect to what constitutes a reasonable range of allowed return on  
5 equity, the OCA recommends a range of 8.05 to 8.35 percent.

6 **Q. Does this conclude your testimony?**

7 A. Yes, it does.