

**BEFORE THE  
SURFACE TRANSPORTATION BOARD**

**REVISIONS TO THE BOARD'S )  
METHODOLOGY FOR )  
DETERMINING THE RAILROAD ) Docket No. EP 664 (Sub-No. 4)  
INDUSTRY'S COST OF CAPITAL )  
)**

**REPLY STATEMENT  
OF  
BENTE VILLADSEN  
ON BEHALF OF  
ASSOCIATION OF AMERICAN RAILROADS**

February 18, 2020

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**SURFACE TRANSPORTATION BOARD**

**Docket No. EP 664 (Sub-No. 4)**

**VERIFIED STATEMENT OF DR. BENTE VILLADSEN**

**I. INTRODUCTION AND SUMMARY**

1. I have been asked by the Association of American Railroads (AAR) to offer my opinions in reply to the opening comments of the Western Coal Traffic League (WCTL) in this proceeding.<sup>1</sup> Specifically, I have been asked to comment on the WCTL's criticisms of the Multi-Stage Discounted Cash Flow (MSDCF) model, and the WCTL's proposal to calculate the railroad industry's cost of equity (COE) by relying exclusively on the Capital Asset Pricing Model (CAPM). I have also been asked to comment on the WCTL's recommended Market Risk Premium (MRP) in their recommended CAPM and the WCTL's comments on my testimony in California and Oregon regulatory proceedings.
2. Based on my review of the comments made by the WCTL, I have reached the following conclusions and opinions:
  - Notwithstanding the flawed arguments put forward by the WCTL, each method for estimating the cost of equity has strengths and weaknesses. This is why regulators (backed by leading academics) rely upon multiple methods when determining the cost of equity.
  - The criticisms made by the WCTL of the MSDCF model are flawed. Discounted cash flow models, including MSDCF models, are a valuable source of information on the cost of equity, and are employed by various federal and state regulators. In previous statements submitted to this board, I detailed why there is no rationale for adjusting growth rates for buybacks, as proposed by the

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<sup>1</sup> Comments of the Western Coal Traffic League, Before the Surface Transportation Board, EP 664 (Sub-No. 4), January 15, 2020 (the "WCTL Opening Comments").

WCTL.<sup>2</sup> The WCTL's assertion that the STB's MSCDF should rely on dividends rather than cash flow is similarly misguided.<sup>3</sup>

- In my statement dated January 15, 2020 (my "Initial Verified Statement"), I outline potential improvements to the MSDCF model as used by the Surface Transportation Board ("STB" or "the Board").<sup>4</sup> These changes would improve the robustness of the MSDCF model used by the STB.
- By contrast, the WCTL advocates sole reliance on the CAPM, while proposing to adjust its inputs in a flawed and selective manner, would render the CAPM internally inconsistent and unrepresentative.
- Lastly, the WCTL's use of my prior testimonies in Oregon and California state proceedings, which involved electric utility rates, to critique the Board's implementation of the MSDCF model is misleading for two reasons. First, these testimonies implement two versions of a DCF model rather than one version and then combine the results, so the WCTL's focus on only one of the models misinterprets my testimony. Second, the electric utility industry is different from the railroad industry and hence the growth rates of the companies inherently will be different.

## **II. THE USE OF MULTIPLE METHODS IMPROVES THE COST OF CAPITAL ESTIMATE**

3. Cost of capital estimates are just that, estimates. Each method for calculating the cost of capital has strengths and weaknesses. It is therefore not surprising that academics, as well

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<sup>2</sup> See Verified Statement of Bente Villadsen on Behalf of Association of American Railroads, Before the Surface Transportation Board, Docket No. EP 664 (Sub-No. 2), September 5, 2014 ("2014 Villadsen V.S."), pp. 14-18.

<sup>3</sup> See WCTL Opening Comments, p. 22, referencing my application of dividend-based DCF models in an electric utility rate case. In contrast to the STB's regulation of the Class 1 Railroads, regulators of local distribution utilities often focus on dividend-based discounted cash flow models for two reasons: (1) the industries they regulate commonly have high dividend payout ratios and few if any share buybacks and (2) regulators rely on a combination of single- and multi-stage DCF models with the regulator exercising judgment in reaching the ultimate decision on what return to grant (*i.e.*, there are no prescribed standard implementations of models nor weightings applied to the model results in setting the ROE.). These two distinguishing factors mean that the use of dividend-based DCF models can be appropriate in context of state regulation of electric and gas utilities. However, the same circumstances do not apply to the railroad industry or the STB's mode of regulation—a fact that the WCTL does not address.

<sup>4</sup> See Verified Statement of Bente Villadsen on Behalf of Association of American Railroads, Before the Surface Transportation Board, Docket No. EP 664 (Sub-No. 4), January 15, 2020 (the "Initial Verified Statement").

as regulators including the STB have elected to analyze multiple methods when estimating the cost of capital.

**A. PREVIOUS DECISIONS BY THE STB HAVE CONCLUDED THAT USING MULTIPLE METHODS (INCLUDING THE MSDCF) IMPROVES THE COST OF CAPITAL ESTIMATE**

4. In its 2009 decision, the Board concluded:

[We] can improve our cost-of-capital determination by using a multistage DCF model in conjunction with CAPM to estimate the cost of equity for the railroad industry. Averaging the results of the commercially accepted Morningstar/Ibbotson multi-stage DCF with the results of CAPM establishes the best estimate of the railroad industry's cost of equity for our regulatory purposes.<sup>5</sup>

5. This continues to be true, as evidenced by ongoing statements by academics and decisions by regulators.

**B. THE ACADEMIC LITERATURE RECOMMENDS MULTIPLE METHODS**

6. The use of multiple methods has been a common theme in the corporate finance literature. Stewart Myers promoted the use of multiple models in his earlier research:

Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.<sup>6</sup>

And more recently, when commenting on the sole use of the CAPM, Professor Myers stated:

Analysts and decision makers should consider estimates from other [non-CAPM] models or sources whenever the estimates are informative.<sup>7</sup>

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<sup>5</sup> STB Decision in STB Ex Parte No. 664 (Sub-No. 1), January 23, 2009, p. 5.

<sup>6</sup> Stewart Myers, "On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment," *Financial Management*, Autumn 1978, p. 67.

<sup>7</sup> Stewart Myers, "Estimating the Cost of Equity: Introduction and Overview," paper submitted to the *Australian Energy Regulator* on behalf of the Australian Pipeline Industry Association, February 2013, p. 12 ("Myers AER Report").

7. In the most recent edition of their standard Corporate Finance textbook, Professors Jonathan Berk and Peter DeMarzo discuss the need to consider alternative models:

Although most firms, and most investors, appear to use the CAPM, other methods are used as well. The choice of method depends on the organization and the sector. It is not difficult to see why different organizations choose to use different techniques. All the techniques we covered are imprecise. Financial economics has not yet reached the point where it can provide a theory of expected returns that gives a precise estimate of the cost of capital. Consider, too, that all techniques are not equally simple to implement. Because the tradeoff between simplicity and precision varies across sectors, practitioners apply the techniques that best suit their particular circumstances.<sup>8</sup>

8. Similarly, in their most recent text, Professor Stephen Ross and his co-authors state that, “[w]hile we have been critical of the DDM’s practical application, DDM provides some important intuition and can be a useful check on the CAPM estimates.”<sup>9</sup>

9. Regulatory practitioner texts also caution against the reliance on any one model. According to Roger Morin:

The advantage of using several different approaches is that the results of each one can be used to check the others. **If the cost of equity estimation process is limited to one methodology, such as DCF or CAPM, it may severely bias the results.** One major problem that results from using only one methodology is the lack of corroborating evidence. There is simply no objective cross check on the result. All the market data and financial theories available should be used in making an estimate.

**There is no single model that conclusively determines or estimates the expected return for an individual firm.** Each methodology possesses its own way of examining investor behavior, its own premises, and its own set of simplifications of reality. Each method proceeds from different fundamental premises that cannot be validated empirically. Investors do not necessarily subscribe to any one method, nor does the stock price reflect the application of any one single method by the price-setting investor.<sup>10</sup>

10. Similarly, Leonardo Giamossino and Jonathan Lesser recommend relying on multiple models:

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<sup>8</sup> Jonathan Berk and Peter DeMarzo, “Corporate Finance” (5<sup>th</sup> Edition), p. 511.

<sup>9</sup> Stephen Ross, Randolph Westerfield, Jeffrey Jaffe and Bradford Jordan, “Corporate Finance” (12<sup>th</sup> Edition, 2020), p. 406. As used by these authors, the acronym “DDM” refers to a dividend discount model, a type of discounted cash flow model.

<sup>10</sup> Roger Morin, “New Regulatory Finance,” 2006, p. 429 (emphasis added).

Regardless of the model used, the cost of equity cannot be directly observed. Instead, it must be inferred from other data. **Applying different models to estimate ROE can thus be useful, as it provides regulators with more information.** In addition to asset pricing models like the CAPM, regulators commonly use discounted cash flow (DCF) models to estimate ROE, based on the premise that the value of a firm's stock today equals the sum of all future dividend payments and capital appreciation.<sup>11</sup>

**C. NORTH AMERICAN REGULATORS RELY ON MULTIPLE METHODS**

**1. Recent Decisions by Federal Regulators Highlight Reliance on Multiple Methods**

*a) Federal Energy Regulatory Commission*

11. Until recently, the Federal Energy Regulatory Commission (FERC) relied solely on one implementation of a DCF model to calculate return on equity (ROE) for electric transmission entities.<sup>12</sup> In October, 2018, FERC proposed that new ROE's for a group of New England Transmission Owners (NETO) should be an equally-weighted average of four models: DCF, CAPM (with forward-looking market risk premium), Expected Earnings and Risk Premium models.<sup>13</sup> According to FERC:

[W]e believe that averaging the results of the three methods that produce zones of reasonableness—the DCF, CAPM, and Expected Earnings methodologies—will produce a composite zone of reasonableness that most accurately captures the cost of equity that informs the ROE that the Commission must award to a utility so that the ROE can provide the return to investors necessary to satisfy their expectations. Additionally, the Risk Premium methodology should be included in the calculation of the average return of the composite zone of reasonableness for the same reason.<sup>14</sup>

Moreover, any methodology has the potential for errors or inaccuracies. Therefore, relying exclusively on any single methodology increases the risk that the Commission could authorize an unjust and unreasonable ROE. [...] There is significant evidence indicating that combining estimates from different models is more accurate than relying on a single model. The Commission concludes that, by providing four different approaches to estimating the cost of equity and determining ROEs, using these models together reduces the risk associated with relying on only one model; that is, the risk of

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<sup>11</sup> Leonardo Giacchino and Jonathan Lesser, "Principles of Utility Corporate Finance," 2011, p. 244.

<sup>12</sup> *Coakley Mass. Attorney Gen. v. Bangor Hydro-Elec. Co.*, Order Directing Briefs, 165 FERC ¶ 61,030, issued October 16, 2018 ("FERC 2018 NETO Briefing Order"), at ¶ 3.

<sup>13</sup> FERC 2018 NETO Briefing Order, at ¶¶ 15-18.

<sup>14</sup> *Id.* at ¶ 36.

misidentifying the just and reasonable ROE by relying on a flawed cost of equity estimate.<sup>15</sup>

12. In a different proceeding—this one involving the transmission-owning members of the Midcontinent Independent System Operator, Inc. (MISO)—in November 2019, FERC determined that its ROE analyses would rely upon the equally-weighted results from its established DCF model (with certain modifications) and a CAPM model (with a forward looking market risk premium).<sup>16</sup> FERC stated that “[t]hese models are the two methods most commonly used by investors for estimating the cost of equity.”<sup>17</sup> According to FERC:

The evidence indicates that neither remaining model is conclusively superior to the other model. **Each model has unique aspects, and advantages and disadvantages that make it preferable to the other model in some respects, but not other respects.** Parties point out, for example, that the DCF model is the only one that incorporates direct inputs from investors pertaining to the market value of electric utilities’ common equity capital; however, parties also argue that investors base their decisions on factors more closely aligned with those contained within the CAPM. **Accordingly, we find that, on balance, the evidence does not indicate that there is a clearly superior model for estimating cost of equity that should be given more weight than the others.**<sup>18</sup>

*b) Federal Communications Commission*

13. In May 2013, the staff of the Wireline Competition Bureau prepared a report to assist the Federal Communications Commission (FCC) as it considered prescribing a new authorized rate of return for certain telecommunications providers (herein, the FCC Staff Report).<sup>19</sup> The Staff Report stated:

As the cost of equity reflects the uncertain expectations of investors, there is potential for introducing significant errors into the estimates, and **no single model can be counted on exclusively to provide a precise estimate of the cost of equity. Each**

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<sup>15</sup> *Id.* at ¶ 38.

<sup>16</sup> *Ass’n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, FERC Opinion No. 569, 169 FERC ¶ 61,129, Issued November 21, 2019 (“FERC Opinion No. 569”), at ¶¶ 18, 425-427.

<sup>17</sup> FERC Opinion No. 569, ¶ 18.

<sup>18</sup> *Id.* at ¶ 426 (emphasis added).

<sup>19</sup> Prescribing the Authorized Rate of Return: Analysis of Methods for Establishing Just and Reasonable Rates for Local Exchange Carriers, Wireline Competition Bureau Staff Report, WC Docket No. 10-90, 28 FCC Rcd 7123, May 16, 2013 (“FCC Staff Report”).



**methodology has conceptual shortcomings, requires the use of informed judgment, and involves measurement error.**

Outside of the regulatory context, CAPM is the most widely used model for determining the cost of equity. DCF, however, is the most widely used in regulation, and was used in the Commission's 1990 represcription. At that time the Commission chose DCF over CAPM for determining the cost of equity, but stated that "[w]e continue to believe that the CAPM approach has the potential to provide estimates of the cost of equity capital with the same reliability as the DCF approach." We use both methods in this Staff Report to estimate the cost of equity.<sup>20</sup>

14. Thus, in 2013 the FCC Staff was recommending the use of both the CAPM and DCF-based models. The use of multiple models is not a new regulatory practice. Indeed, the use of multiple models is an accepted practice that has been highlighted to the STB in various earlier proceedings.<sup>21</sup>

15. In March 2016, the FCC released its decision concerning the allowed rate of return for certain telecommunications infrastructure providers. In line with the Staff Report, the FCC relied upon the results of both the DCF and CAPM models when determining the allowable return on equity. According to the FCC, "both the DCF and the CAPM have different strengths and weaknesses and the value of performing both analyses is that these models have the potential to provide corroborating evidence."<sup>22</sup> Apropos of the discussion in Section III below, it is also noteworthy that the FCC (and the Staff Report) calculate the MRP using historical data from 1928 onwards.<sup>23</sup>

## **2. Various U.S. State and Canadian Provincial Regulators Include Multiple Methods When Determining the ROE**

16. Similar to federal regulators, various state regulators rely upon multiple methods. I have included below several examples where public information is available on the methods

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<sup>20</sup> FCC Staff Report, ¶¶ 56-57 (emphasis added).

<sup>21</sup> For example, the FCC's use of multiple models is noted in the Reply comments of the Association of American Railroads, Before the Surface Transportation Board, Docket No. EP 664 (Sub No. 2), November 4, 2014, p. 6.

<sup>22</sup> Report and Order, Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking, WC Docket No. 10-90 et. al., March 30, 2016 ("FCC Rate of Return Reform Order"), p. 122.

<sup>23</sup> FCC Rate of Return Reform Order, p. 236. *See also* FCC Staff Report, p. 26.

used to calculate ROE. As many state regulatory commissions do not explicitly state which methods were relied upon, I cannot provide a comprehensive review, but instead cite prominent examples.

*a) New York State Public Service Commission*

17. The New York State Public Service Commission (NYSPSC) has repeatedly affirmed its reliance on a specific methodology, which focuses on a 2/3 and 1/3 weighting of the DCF and CAPM results, respectively. In April 2017, the NYSPSC issued an order establishing rates for gas service again affirming the use of multiple methods. The DCF model comprises a two-stage DCF computation.<sup>24</sup>
18. Recent prepared testimony by staff at the New York Department of Public Service provided further background into why multiple methods are adopted, including a two-stage DCF model:

The DCF has long been the principal equity costing methodology in New York. In fact, for close to 25 years, the Commission has consistently issued cost of equity determinations with the same two-third DCF and one-third CAPM weightings. During this time, Staff ROE testimony has consistently noted the numerous reasons why the DCF has been, and should continue to be, the preferred methodology. Its preferability over the CAPM methodology was particularly evident **when a frequently used version of the CAPM began producing counterintuitive results in the wake of the volatility in the credit markets that followed the collapse of Lehman Brothers in September 2008.**<sup>25</sup>

Estimating the cost of equity requires using methodologies that are not perfect. Of all the approaches available, however, the DCF and the CAPM are by far the least flawed and, between the two, the DCF is superior. In fact, the Commission has noted the relative strengths of the DCF methodology in many of its previous rate orders. [...] **the method offers the significant benefit of reliance on readily available, objective data to measure an indicator of real importance to investors.**<sup>26</sup>

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<sup>24</sup> State Of New York Public Service Commission, “Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of National Fuel Gas Distribution Corp. for Gas Service,” Case 16-G-0257, April 20, 2017, pp. 52-53.

<sup>25</sup> Prepared Testimony of Staff Finance Panel, Before the State of New York Public Service Commission, In the Matter of Orange and Rockland Utilities, Inc. Cases 18-E-0067 and 18-G-0068, May 2018, pp. 65-66 (emphasis added).

<sup>26</sup> *Id.*, p. 66 (emphasis added).

While the DCF has one input of primary controversy (growth), two CAPM inputs (beta and the market risk premium) are dependent on estimates which are contested and volatile.<sup>27</sup>

Although the Recommended Decision in the GFC acknowledges the weakness of the DCF methodology, no methodology is absolutely perfect. **Each methodology has its strengths and weaknesses, and that is why most cost of equity experts do not rely on only one methodology to arrive at a ROE result.** This is one of the reasons we do not rely solely on one methodology, and weight the DCF methodology two-thirds and CAPM one-third.<sup>28</sup>

19. Put simply, as acknowledged by staff at the New York Department of Public Service, there are strengths and weaknesses in all models used to calculate the cost of equity. For this reason, the NYSPSC continues to use multiple models when calculating the cost of equity.

*b) California Public Utilities Commission*

20. In December 2019, the California Public Utilities Commission (CPUC) issued a determination of allowable ROE, which prescribed the analysis of multiple models. According to the CPUC:

We attempt to set the ROE at a level of return commensurate with market returns on investments having corresponding risks and adequate to enable a utility to attract investors to finance the replacement and expansion of a utility's facilities to fulfill its public utility service obligation. To accomplish this objective, we have consistently evaluated analytical financial models as a starting point to arrive at a fair ROE.<sup>29</sup>

In the final analysis, it is the application of informed judgment, not the precision of financial models, which is the key to selecting a specific ROE estimate. We affirmed this view in D.89-10-031, noting that it is apparent that all these models have flaws and, as we have routinely stated in past decisions, the models should not be used rigidly or as definitive proxies for the determination of the investor-required ROE. Consistent with that skepticism, we found no reason to adopt the financial modeling of any one party. The models are helpful as rough gauges of the realm of reasonableness.<sup>30</sup>

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<sup>27</sup> *Id.*, pp. 79-80.

<sup>28</sup> *Id.*, pp. 145-146 (emphasis added).

<sup>29</sup> Decision on Test Year 2020 Cost of Capital for the Major Energy Utilities, Before the Public Utilities Commission of the State of California, Application 19-04-014 et al., Decision 19-12-056, December 19, 2019, p. 16.

<sup>30</sup> *Id.*, p. 25.

*c) Alberta Utilities Commission*

21. In its 2016 determination of an appropriate return on equity (ROE), the Alberta Utilities Commission (AUC) relied upon multiple methods, including DCF and CAPM methods.<sup>31</sup> Some of the DCF-based estimates put forward by experts (and ultimately relied upon by the AUC), were based on MSDCF models.

22. In its more recent 2018 determination, the AUC continued to rely upon multiple methods when determining an appropriate ROE, including the use of both CAPM and DCF (including MSDCF) models.<sup>32</sup> When considering the CAPM-based estimates submitted by experts, the AUC stated that:

[T]he relatively wide range of betas, and interest rates still being lower relative to average historical rates, continue to be factors that will lead the Commission to assign relatively less weight to the CAPM ROE results.<sup>33</sup>

*d) British Columbia Utilities Commission*

23. In May of 2013, the British Columbia Utilities Commission (BCUC) released its most recent generic decision regarding the appropriate methodology for determining cost of capital for a benchmark low-risk utility. The BCUC established that “**the DCF and CAPM should be given equal weight in determining the ROE,**”<sup>34</sup> because both have solid theoretical foundations and “explicitly recognize the opportunity cost of capital.”<sup>35</sup>

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<sup>31</sup> AUC 2016 Generic Cost of Capital Decision, 20622-D01-2016, October 7, 2016, ¶ 315 (“AUC 2016 Decision”). As electric and gas distribution utilities typically distribute a high proportion of their earnings as dividends and to date have had virtually no buybacks, DCF models for electric utilities often discount dividends. Unlike the case in the railroad industry, dividends are more likely to approximate cash flow to shareholders for distribution utilities.

<sup>32</sup> AUC 2018 Generic Cost of Capital Decision, 22570-D01-2018, August 2, 2018, ¶ 491 (“AUC 2018 Decision”).

<sup>33</sup> *Id.*, ¶ 486.

<sup>34</sup> BCUC Generic Cost of Capital Proceeding (Stage 1) Decision, Decided May 10, 2013, p. 80 (“BCUC 2013 Decision”) (emphasis added).

<sup>35</sup> *Id.*, p. 56.

24. The BCUC confirmed its preference for multiple methods in 2016 in a decision regarding FortisBC, when it stated that the experts generally found that “decisions should be informed by use of multiple financial models and other indicators of investor expectations where appropriate. The Panel agrees it should consider the “totality of information resulting from applying multiple tests.”<sup>36</sup>
25. The decisions recognize that both models have advantages and shortcomings and found that the most helpful DCF estimates were the multi-stage estimates.<sup>37</sup> The decision notes that the DCF model assumes “unlike the CAPM, that investors hold realistic investment horizons; both short and long-term investors estimate all dividends that the firm will provide over its lifetime.”<sup>38</sup> However, any estimates from this model are only as accurate as the growth rate assumptions used, and these assumptions can be “strong, and hence unlikely to correspond to reality.”<sup>39</sup> On the other hand, CAPM estimates, despite strong theoretical underpinnings, might be, for instance, adversely impacted by imprecise estimates of the risk premium if there is a lack of “conditioning on the current state of the capital markets.”<sup>40</sup>

### **III. THE CAPM IMPLEMENTATION ADVOCATED BY WCTL RELIES ON SELECTIVE AND INTERNALLY-INCONSISTENT INPUTS**

26. In addition to ignoring overwhelming academic evidence and regulatory practice regarding the importance of relying on multiple methods for estimating the cost of equity, the WCTL ignores important finance principles and selectively interprets evidence regarding the implementation of the single model it advocates the STB rely on: the CAPM.

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<sup>36</sup> FortisBC Inc., Application for its Common Equity Component and Return on Equity for 2016 – Decision, August 10, 2016, Section 5.2.1.

<sup>37</sup> See *Id.*, p. 71.

<sup>38</sup> *Id.*, p. 67.

<sup>39</sup> *Id.*, p. 69.

<sup>40</sup> *Id.*, p. 65.

27. Specifically, the WCTL implies without evidence that the historical average market risk premium (MRP) estimated over the full historical period wherein reliable stock and bond return data is available (*i.e.*, 1926 to the present) is too high, while selectively and misleadingly characterizing the “recommended MRP” from a single source (Duff & Phelps) as the “current MRP.”<sup>41</sup> Further, compounding the bias inherent in its selective focus on Duff & Phelps’ recommended MRP—which incorporates the subjective judgment of its publisher in determining how to weight various pieces of evidence—the WCTL fails to apply that MRP in conjunction with Duff & Phelps’ recommended risk-free rate,<sup>42</sup> thus introducing internal inconsistency into its proposed CAPM implementation.

**A. THE WCTL PROVIDES NO SUPPORT FOR ITS IMPLICATION THAT THE BOARD’S MRP ESTIMATE IS INCONSISTENT WITH CURRENT INVESTOR EXPECTATIONS**

28. In past STB proceedings related to the cost of capital methodology for the Class 1 Railroads, the WCTL has repeatedly argued against the Board’s practice of estimating the MRP using all the available data (starting in 1926) in the University of Chicago Center for Research in Security Prices (CRSP) database, advocating instead that a shorter period (specifically, 50 years) be used for estimating the MRP.<sup>43</sup> The Board has consistently rejected the WCTL’s assertions that the full period historical average represents an upwardly-biased estimate of the market risk premium under current conditions, citing the substantial evidence presented in the records of those proceedings that industry best

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<sup>41</sup> WCTL Opening Comments, p. 18.

<sup>42</sup> As discussed further below, Duff & Phelps has advocated, for a significant portion of the time it has been issuing its recommendations, using as the risk-free rate a “normalized 20-year U.S. Treasury yield” that has exceeded contemporaneous yields on 20-year government bonds.

<sup>43</sup> *See, e.g.*, Methodology to be Employed in Determining the Railroad Industry’s Cost of Capital, STB EP 664 Decision, January 17, 2008, pp. 7-9; Petition of the Western Coal Traffic League to Institute a Rulemaking Proceeding to Abolish the Use of the Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry’s Cost of Equity Capital, STB EP 664 (Sub-No. 2) Decision, October 31, 2016, pp. 17-18.

practices favor including all available data in the historical average, and recognizing that the WCTL's proposed alternative averaging periods are arbitrary and unsupported.<sup>44</sup>

29. In the instant docket, the WCTL again opposes the Board's use of an MRP calculated as the historical average excess return of stocks over bonds from 1926 to the present. However, rather than arguing to shorten the averaging period, the WCTL now advocates replacing the historical average altogether with what it refers to as "a current MRP."<sup>45</sup>
30. While I agree that inputs to the CAPM should "reflect[] current investor expectations,"<sup>46</sup> I take issue with the WCTL's unsupported implication that the Board's estimate based on an established and industry-standard historical average methodology fails to meet this criterion. In fact, in statements I made to the Board in a prior related docket,<sup>47</sup> I presented substantial academic and market evidence that the premiums required by investors to take on risk have been *at least as high* as their long-term historical average levels starting with onset of the great financial crisis of 2008-2009 and continuing through the ensuing period characterized by sustained historically low interest rates.<sup>48</sup>
31. Consider, for example, the forward-looking MRP estimates calculated and disseminated by Bloomberg, which applies a multi-stage DCF analysis to infer investors' expectations for future market returns based on contemporaneous market prices, dividends, and earnings growth expectations for the S&P 500. Figure 1 below reports the annual average Bloomberg forward-looking MRP for each year since 2009,<sup>49</sup> compared to the historical average relied on by the Board in each of those years.

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<sup>44</sup> *Id.*

<sup>45</sup> WCTL Opening Comments, pp. 5-6.

<sup>46</sup> *Id.* p. 5.

<sup>47</sup> 2014 Villadsen V.S., November 4, 2014 Reply Verified Statement of Bente Villadsen ("2014 Villadsen Reply V.S."), and July 23, 2015 Oral Hearing Testimony ("2014 Villadsen Hearing Testimony").

<sup>48</sup> 2014 Villadsen Reply V.S., pp. 13-21.

<sup>49</sup> Note that Bloomberg's default is to report the forward-looking MRP by subtracting prevailing 10-year Treasury Bond yields (as the proxy for the risk-free rate) from the calculated expected market return. To promote a more direct apples-to-apples comparison with the Board's historical average MRP, I have reported the Bloomberg MRP in relation to annual average 20-year Treasury yields.

**Figure 1**  
**Comparison of Bloomberg and STB MRP**

Year	STB Historical Average MRP	Bloomberg Forward-looking MRP
	[1]	[2]
2009	6.67%	7.76%
2010	6.72%	7.05%
2011	6.62%	7.19%
2012	6.70%	8.11%
2013	6.96%	6.97%
2014	7.00%	6.73%
2015	6.90%	6.92%
2016	6.94%	7.21%
2017	7.07%	6.74%
2018	6.91%	7.19%
<b>Average</b>	<b>6.85%</b>	<b>7.19%</b>

Sources and Notes:

[1]: STB EP 558 Annual Cost of Capital Decisions

[2]: Bloomberg. Annual averages of daily data, calculated relative to 20-year Treasury Bond yields procured from the Federal Reserve System website.

32. Bloomberg’s forward-looking MRP is a standardized and commercially-provided example of estimating investors’ current expectations for future returns on the market portfolio based on a market-wide application of DCF analysis. These techniques are grounded in the same fundamental finance principles that underpin the use of DCF analyses to estimate the cost of equity for particular stocks or industries, and have in some instances been accepted in regulatory contexts as a complement or alternative to historical average estimates of the MRP.

33. For example, in a recent decision establishing the cost of equity for electric transmission utilities based on an equal weighting of CAPM and “two-step” DCF model results, FERC elected to “estimate the CAPM expected market return using a forward-looking approach,



based on applying the DCF model to dividend paying members of the S&P 500.”<sup>50</sup> In applying this methodology to a CAPM analysis performed using the July 1, 2015 – December 31, 2015 study period deemed relevant in that proceeding, FERC estimated a forward-looking expected market return of 11.81%, from which it subtracted the 2.96% average yield on 30-year risk-free Treasury bond yields to derive an MRP of 8.85%.<sup>51</sup> By way of comparison, FERC’s forward-looking MRP estimate for the 2<sup>nd</sup> half of 2015 is nearly 200 basis points higher than the historical average MRP calculated using data from the years 1926 - 2015 (6.90%).<sup>52</sup>

34. In articulating its views on what constitutes a reasonable estimate of the “current MRP,” WCTL does not propose deriving a forward-looking estimate based on market-wide application of DCF principles, nor does it even consider the results of such analyses available from commercial financial data providers such as Bloomberg. Rather, it relies exclusively and selectively on the “recommended MRP” values periodically disseminated by a single publisher: Duff & Phelps.<sup>53</sup>
35. While Duff & Phelps is a respected publisher of financial data and analysis, it is certainly not the only institution that exercises its judgment in making periodic recommendations regarding expected market returns and other inputs to cost of equity calculations. For example, the New York Public Service Commission has endorsed (and its Staff experts consistently rely on) “required market return estimates published monthly by Merrill Lynch in its *Quantitative Profiles Report*” to derive an *ex ante* (i.e., forward-looking) MRP input

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<sup>50</sup> FERC Opinion No. 569, at ¶ 260.

<sup>51</sup> FERC Opinion No. 569, at ¶¶ 513-515, citing February 13, 2019 Initial Brief Commission Trial Staff in Docket No. EL15-45-000, at Attachment A to Affidavit of Trial Staff Witness Robert J. Keyton, page 6, columns (c)-(e).

<sup>52</sup> Note that FERC uses 30-year Treasury bond yield as the proxy for the risk-free rate. FERC’s Opinion No. 569 endorsed MRP of 8.85% would be higher if expressed relative to average yields on the STB’s preferred 20-year Treasury bond over the same study period.

<sup>53</sup> WCTL Opening Comments, pp. 17-18.

for its CAPM analysis.<sup>54</sup> In a recent rate proceeding, the NYSPSC Staff relied on Merrill Lynch required market return estimates averaging 11.1% for Feb – April 2019 in estimating the MRP at 8.31%,<sup>55</sup> which is 140 basis points higher than the historical average MRP calculated using data from the years 1926 - 2018 (6.91%).<sup>56</sup>

36. The WCTL provides no indication that it evaluated or even considered any of the many potential alternatives to Duff & Phelps’s recommendations—be they analytical methods such as those produced by Bloomberg (or the one adopted by FERC) or recommendations published by other respected institutions—as a basis for selecting a forward-looking or “current” estimate of the MRP. As the examples described above illustrate, it is misleading of the WCTL to imply that its selectively-chosen MRP recommendations constitute evidence that currently prevailing risk premiums are below the levels derived from the long-term historical average.

**B. THE WCTL INCORRECTLY APPLIES ITS SELECTIVELY-CHOSEN MRP ESTIMATES WITH INTERNALLY-INCONSISTENT RISK-FREE RATES**

37. Further compounding the problem of selectively focusing on a single publisher’s recommendation, the WCTL applies Duff & Phelps’s recommendations incorrectly. Specifically, the WCTL ignores the fact that Duff & Phelps specifies that its MRP recommendations are only to be applied in conjunction with its corresponding recommendations for the risk-free rate. Indeed the very document that the WCTL cites as its source for Duff & Phelps’s historical recommendations bears the subtitle “Duff &

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<sup>54</sup> New York Public Service Commission, May 2019 Testimony of Staff Finance Panel in Cases 19-E-0065 and 19-G-0066, pp. 98-99 (FP-26).

<sup>55</sup> *Id.*

<sup>56</sup> I note that the NY PSC Staff witnesses follow NY PSC precedent in relying on an average of 10-year and 30-year Treasury bond yields to estimate the risk-free rate. The result in this case (2.79%) was very similar to the average yield on 20-year Treasury bonds over the same time period the Staff witnesses analyzed, namely 2.81%.

Phelps Recommended U.S. Equity Risk Premium (ERP) **and Corresponding Risk-Free Rates ( $R_f$ )**.”<sup>57</sup>

38. This is important because Duff & Phelps’ recommendations have frequently relied on so-called “normalized” 20-year bond yields, as “prox[ies] for a longer-term sustainable risk-free rate” during periods when prevailing yields were “deemed to be abnormally low” in Duff & Phelps’s judgment.<sup>58</sup> And contrary to WCTL’s attempt to inconsistently rely on Duff & Phelps’s MRP values while dismissing the corresponding normalized risk-free rate recommendations,<sup>59</sup> Duff & Phelps itself clearly rejects WCTL’s “pick and choose” approach. For example, Duff & Phelps’s December 31, 2018 recommendation reads (in relevant part) as follows.

**The Duff & Phelps recommended U.S. ERP as of December 31, 2018 was developed in relation to (and should be used in conjunction with) a 3.5% “normalized” risk-free rate.** Some valuation professionals may prefer to use a spot (current market) risk-free rate, but the end result is that the base cost of equity capital [3.5% + 5.5% = 9.0%] should be approximately the same. **Therefore, were one to use the spot yield-to-maturity on 20-year U.S. Treasuries as of December 31, 2018 (instead of a normalized 3.5%) one would have to increase the ERP assumption accordingly.**<sup>60</sup>

39. To put this in numerical context, the “spot” 20-year U.S. Treasury yield as of December 31, 2018 was 2.87%, 63 basis points below Duff & Phelps’s 3.5% normalized risk free rate recommendation. Thus, according to Duff & Phelps, a party wishing to apply its

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<sup>57</sup> See <https://www.duffandphelps.sg/-/media/assets/pdfs/publications/valuation/coc/erp-risk-free-rates-jan-2008-present.ashx?la=en-sg&hash=0174E90D51B4B5E723FD2367D8E6180A2DE4121>, as cited in WCTL Opening Comments, p. 18, footnote 12 (emphasis added).

<sup>58</sup> *Id.*

<sup>59</sup> WCTL Opening Comments, p. 18, footnote 13. See also WCTL Opening Comments, Exhibit A, which applies selected Duff & Phelps’ MRP recommendations together with annual average spot (actual) Treasury yields computed according to the Board’s standard methodology.

<sup>60</sup> <https://www.duffandphelps.com/insights/publications/valuation/us-equity-risk-premium-recommendation-increased> (emphasis added).

recommendation using spot yields (as the WCTL attempts to do in its calculations) would have to adjust Duff & Phelps's recommended MRP upward from 5.5% to 6.13%.<sup>61</sup>

40. Naturally, this principle also applies not just to the dates of Duff & Phelps's announcements, but to the ranges of dates during which the publisher intended them to apply. Consider, for example, Duff & Phelps's 5.50% MRP recommendation developed in relation (and designed to be used in conjunction with) a 4.00% normalized 20-year Treasury yield risk-free rate (for an recommended expected market return of 9.50%), which the WCTL's citation indicates was in effect from January 31, 2016 through November 14, 2016.<sup>62</sup> The average 20-year Treasury bond yield during that date range was 2.10%,<sup>63</sup> which is 190 basis points below Duff & Phelps's normalized recommendation. Thus, if a cost of equity analysis sought to apply the CAPM using spot treasury yields from that period as the risk-free rate, Duff & Phelps own guidance would be to adjust its recommended MRP upward to 7.40%.<sup>64</sup>

41. In summary, the WCTL's selective reliance on published MRP recommendations from a single source is entirely insufficient to support its implication that the Board's historical average is unrepresentative of "a current MRP," particularly so because the WCTL applies Duff & Phelps's assumptions in an incorrect and internally inconsistent manner. The WCTL has made no attempt to engage with the body of evidence related to forward-looking estimation of the MRP. As such, in my opinion, the Board should place no weight on the WCTL's misleading statements regarding the flawed implementation of the CAPM it advocates.

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<sup>61</sup> Expected market return ("base cost of equity capital" in Duff & Phelps's terminology) of 9.0%, less spot 20-year Treasury yield of 2.87%, equals adjusted Duff & Phelps recommended MRP of 6.13%.

<sup>62</sup> See <https://www.duffandphelps.sg/-/media/assets/pdfs/publications/valuation/coc/erp-risk-free-rates-jan-2008-present.ashx?la=en-sg&hash=0174E90D51B4B5E723FD2367D8E6180A2DE4121>, as cited in WCTL Opening Comments, p. 18, footnote 12.

<sup>63</sup> Constant maturity treasury yield data obtained from the Board of Governors of the Federal System website, at <https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15>, accessed Feb 7, 2020.

<sup>64</sup> Expected market return ("base cost of equity capital" in Duff & Phelps's terminology) of 9.50%, less spot 20-year Treasury yield of 2.10%, equals adjusted Duff & Phelps recommended MRP of 7.40%.

**IV. THE WCTL'S DISCUSSION OF MY ELECTRIC UTILITY TESTIMONY IS SELECTIVE AND MISLEADING**

42. The WCTL states (correctly) that, in other testimony concerning the cost of capital, I have employed (a) a multi-stage dividend discount model with tapered growth and that (b) the initial growth rates in one testimony were below 8 percent.<sup>65</sup> However, the statements by the WCTL are selective and misleading. The WCTL appears to use the selective sections of specific testimonies to level two criticisms against the MSDCF relied upon by the Board. Neither of these are valid.

43. First, the WCTL appears to argue that, as my testimony filed in specific jurisdictions other than the STB did not apply the same MSDCF, this makes the MSDCF somehow less appropriate.<sup>66</sup> Second, it asserts that lower growth rates for unrelated companies in unrelated industry sectors also somehow makes the MSDCF methodology less appropriate. Below I explain why these arguments are flawed and why the WCTL's choice to look at selective portions of prior testimony is misleading.

**A. IN BOTH THE TESTIMONY EXAMPLES CITED BY THE WCTL, MULTIPLE MODELS ARE EMPLOYED**

44. As is common in U.S. state regulatory proceedings, my testimonies rely on multiple methods, consider the jurisdiction's precedents,<sup>67</sup> and look to the industry at issue. Specifically, I commonly implement multiple versions of the DCF / Multi-stage DCF model as well as of the CAPM to ensure the inclusion of a range (as many commissions prefer).

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<sup>65</sup> WCTL Opening Comments, p. 11. The reports referenced include (i) Testimony before the Public Utility Commission of the State of Oregon (UE 335) relating to the Cost of Capital, February 15, 2018 ("Oregon Testimony", available [here](#)), and (ii) Testimony before the Public Utilities Commission of the State of California (U 338-E) relating to SCE's Base ROE ("California Testimony", available [here](#)).

<sup>66</sup> In previous testimony I have explained why growth rates should not be adjusted for buybacks. This includes detailed illustrative examples. See 2014 Villadsen V.S., pp. 14-18.

<sup>67</sup> See, for example, page 14 of my California Testimony.

45. In the PGE rate case, I implemented two different versions of the DCF model (one-stage and three-stage models), as well as two versions of the CAPM and a risk premium model. The results and recommendation reflect these models.<sup>68</sup> Importantly, I do not simply rely on a multi-stage model using a tapered growth and a dividend yield. Instead my recommendation reflects a combination of the single-stage DCF that relies exclusively on company specific growth and a multi-stage DCF. Therefore, it is misleading to discuss only the multi-stage DCF model and not the single-stage DCF model as indicative of my position. The use of both a single-stage and multi-stage DCF model means that one model reflects the company-specific growth forever, while the other model converges to the GDP growth. Thus, the ‘at issue’ middle stage is a combination of company-specific and converging growth in my prior testimony, while the Board’s MSDCF uses industry growth. Put simply, my PGE testimony does not simply focus on a single implementation of the MSDCF as implied by the WCTL.

46. Similarly, in the SCE rate case, I implemented a single-stage and a multi-stage version of the DCF and explicitly stated that (1) “the dividend yield is more likely underestimated than over estimated going forward.”<sup>69</sup> In that testimony, I also derived estimates of the representative cost of equity according to two versions of the CAPM and a risk premium model.<sup>70</sup> Again, the results and recommendation reflect all these models and the DCF results reflect the combined results from single-stage DCF using analysts’ growth rates and a multi-stage DCF. Thus, my analysis in that testimony similarly reflects a combined result.

47. Importantly, the reliance on specific models must be viewed in the light of their use and the industry. Electric utilities pay a large proportion of their earnings / cash flow as dividends and rarely engage in share buybacks. Thus, dividends are much closer to cash flow than they are for railroads. Lastly, utility-allowed return on equity is usually

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<sup>68</sup> Oregon Testimony, p. 27.

<sup>69</sup> California Testimony, p. 52.

<sup>70</sup> California Testimony, p. 14.

determined for a forecasted period and will generally remain in place until the next rate case. In contrast, the Board determines the cost of equity for railroads *ex post* each and every year. Put simply, context matters when evaluating analytical approaches to estimating the cost of equity. The WCTL's misleading statements about my past testimonies ignore the context in which they were submitted.

**B. THE LOWER GROWTH RATES IN THE SELECTED TESTIMONY ARE A SIMPLE FUNCTION OF THE ANALYSTS' ASSESSMENT OF THE RELEVANT INDUSTRIES AT THE TIME**

48. The observation that some industries have lower growth rates is a simple function of the analysts' assessment of an industry at the time and has no bearing on the accuracy of the models employed. To the extent that parties are concerned about large movements in growth rates between periods, in my Initial Verified Statement I outlined how the growth rate can be smoothed without damaging the theoretical and mathematical robustness of the model. Notwithstanding the comments in my Initial Verified Statement, the existing MSDCF model is a robust and accepted method for calculating the cost of equity.
49. It is noteworthy that the growth rates referenced in the testimony cited by the WCTL were sourced from *IBES* (as are the growth rates employed by the STB) and supplemented by growth rate data sourced from Value Line Investment Survey.

**V. CONCLUSION**

50. Estimating the cost of capital is difficult. The cost of capital represents the expected return that a rational investor would require to make her indifferent between investments that are expected to have equivalent risk profiles. But clearly, it is impossible to ever "know" these expectations of rational investors. The best one can do is to estimate the parameters relating to the cost of capital using the techniques of modern finance.
51. All financial techniques used to estimate the cost of equity are inherently imprecise. The results vary from year to year and are sensitive to assumptions that are just that, assumptions. As a result, it is important to use more than one model to estimate the cost

of equity. Two commonly used methods for regulatory purposes are the Capital Asset Pricing Model (CAPM) and a Discounted Cash Flow (DCF) model.

52. The CAPM and MSDCF models employed by the STB take different paths towards estimating the cost of equity. Combining the models improves the estimation. The use of multiple models is recommended by leading academics and is observed in recent regulatory decisions. The WCTL ignores these broadly accepted principles, and instead advocates sole reliance on a flawed implementation of the CAPM based on internally inconsistent inputs.

53. It is the combined return on equity estimate—rather than the results from any one model—that matters for the purpose of assessing the cost of equity for the railroad industry. Therefore, the results from the MSDCF cannot, and should not, be viewed in isolation. Moreover, the criticisms made by the WCTL of the MSDCF model are flawed, as has been demonstrated in this statement and my earlier testimony to the STB.



VERIFICATION

I, Bente Villadsen, declare under penalty of perjury, that the foregoing statement is true and correct to the best of my knowledge and belief and that I am qualified and authorized to file this statement.

Executed: 2/18/2020



BENTE VILLADSEN