

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

PETITION OF THE WESTERN	)	
COAL TRAFFIC LEAGUE TO	)	236976
INSTITUTE A RULEMAKING	)	
PROCEEDING TO ABOLISH THE	)	EP 664 (Sub-No. 2)
USE OF THE MULTI-STAGE	)	ENTERED
DISCOUNTED CASH FLOW	)	Office of Proceedings
MODEL IN DETERMINING THE	)	November 4, 2014
RAILROAD INDUSTRY'S COST OF	)	Part of
EQUITY CAPITAL	)	Public Record

REPLY COMMENTS OF THE WESTERN COAL TRAFFIC LEAGUE

WESTERN COAL TRAFFIC LEAGUE

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OPENING COMMENTS OF THE WESTERN COAL TRAFFIC LEAGUE

Pursuant to the decisions that the Surface Transportation Board (“Board” or “STB”) served in the above-captioned proceeding on December 20, 2013, April 2, 2014, and June 16, 2014, the Western Coal Traffic League (“WCTL”) hereby submits its reply comments addressing the methodology that the Board should utilize to calculate the cost of equity (“COE”) portion of the railroad industry current cost of capital (“COC”).

WCTL’s reply comments primarily respond to the opening comments filed by the Association of American Railroads (“AAR”), but also address the opening comments of other parties as appropriate. WCTL’s comments are accompanied by Reply Verified Statements from Dr. Harvey A. Levine (“Levine RVS”) and Professor Alexander J. Triantis (“Triantis RVS”).

I. INTRODUCTION AND SUMMARY

The Board asked parties to “address how it determines the railroad industry’s cost of equity capital.” Decision served April 2, 2014, at 4. WCTL addressed that question in its opening comments (“WCTL Op.”), explaining that the STB should rely only on the Capital Asset Pricing Model (“CAPM”), modified to utilize a Market Risk Premium (“MRP”) that reflects the current investment environment and a Blume adjustment for the beta. WCTL and its expert witnesses showed that this approach will improve the accuracy of the Board’s COE and COC estimates, conform to mainstream practice in the financial/investment community, and track industry benchmarks.

The AAR confined its opening comments to a narrower question, whether to retain the Multi-Stage Discounted Cash Flow model (“MSDCF”), rather than the broader question posed by the Board. The AAR contends that the MSDCF should be retained. Its position is hardly surprising since the MSDCF value has surpassed the CAPM value for at least sixteen consecutive years, often by very substantial amounts in recent years, *e.g.*, 626 basis points in 2012 alone. *See, e.g.*, Levine RVS at 11; WCTL Op at 10.

What is surprising is the support, or rather lack thereof, that the AAR presented for its position. The AAR offered no corroboration that the MSDCF values are themselves in any way accurate, such as reference to industry benchmarks. Nor did the AAR show that a substantial segment of the financial/investment community actually uses the supposedly “commercially accepted” MSDCF to estimate the COE. The AAR and its expert, Dr. Villadsen of the Brattle Group, further avoided disclosing what they

consider to be accurate COE/COC values for either the railroad industry or even equities generally. Nor did they attempt to explain why the railroad industry should command a large premium relative to equities generally. *See, e.g.*, Levine RVS at 11-12.

The AAR instead advanced a narrow claim that using the higher MSDCF values makes the resulting hybrid MSDCF/CAPM average more accurate. But its claim could be true only if the CAPM values were already too low, which they are not, as WCTL explained in its Opening Comments. The AAR's logic is that since calculating the COC is difficult and all models have their limitations, any two models must necessarily yield a better answer than any single model. In other words, two wrongs not only can make a right, but always will. *See, e.g.*, Levine RVS at 2-3; Triantis RVS at 1.

However, just because models have limitations does not mean that all models are equally bad, that combining two models always improves accuracy, or that all information that might be available or manufactured has equal or even positive value. Triantis RVS at 1-5. A model can yield faulty information and do so repeatedly, rendering the model susceptible to displacement, as the CAPM has largely displaced DCF approaches to the COE. Here, the MSDCF has not made the railroad CAPM values any more accurate. Instead, it has made the already overstated CAPM values even higher. The result has benefited the AAR and its members, but only by sacrificing accuracy. *See, e.g.*, Levine RVS at 4-7; Triantis RVS at 4, 6.

The AAR purported to respond to WCTL's prior criticisms of the MSDCF by noting various "fixes" that produce similar or even higher COE values. These are not fixes at all, but simply efforts to exploit the MSDCF's existing distortions. Triantis RVS

at 7-8. The fact that the AAR has enough creativity to make an already flawed model even worse provides no reason to use a flawed model in the first place. Levine RVS at 8.

If the AAR had any interest in presenting a constructive MSDCF, it would at least mention what its retained expert has elsewhere depicted as her firm's standard MSDCF model. That model utilizes a narrower measure of cash flows, avoids any surge of cash flow at the start of the third stage, and smoothly transitions to the terminal growth rate over the second stage. Brattle's standard approach is actually very close to the MSDCF that WCTL presented six years ago to confirm the reasonableness of the CAPM results. *See* Exhibit 1. In fact, those MSDCF values were below the corresponding CAPM values, likely due to the high MRP employed by the Board in its CAPM.

Lacking any sound substance or logic in its own position, the AAR resorted to making contradictory claims that WCTL's criticisms of the MSDCF have somehow been both inconsistent and intransigent. WCTL's interest throughout has been in a credible COC. The problem is that the hybrid methodology has not yielded credible results, due largely to the flaws in the Ibbotson/Morningstar MSDCF as applied to the rail industry. Levine RVS at 2; Triantis RVS at 5-9. WCTL never supported use of a simple average. WCTL did note that a sound MSDCF could be useful as a sanity check and demonstrated that a sound MSDCF (one very similar to the standard Brattle model) confirmed the reasonableness of the CAPM approach. After six years, a sanity check of the Board's hybrid methodology is certainly in order, and it shows a disparity between MSDCF and CAPM that is too large to be dismissed. *See, e.g.*, Levine RVS at 3; Triantis RVS at 5-6.

The AAR's directive not to ignore good information presumes that the information is "actually informative" or good in the first place. Triantis RVS at 1. There is ample reason to be highly suspicious of the MSDCF, and the AAR failed to present meaningful support to the contrary. Bad information, such as the MSDCF, should not be used, and it should certainly not be used to dilute or distort good information. Levine RVS at 1-4; Triantis RVS at 1-2, 9-10.

The CAPM conforms to mainstream practice and values, but the MSDCF does not. Triantis RVS at 2-4 (citing practice of the Canadian Transportation Agency ("CTA") among others). Accordingly, the Board should rely solely on the CAPM, modified with a realistic MRP and a Blume adjustment for the beta.

II. ALL INFORMATION IS NOT EQUAL OR EVEN GOOD, AND BAD INFORMATION SHOULD NOT BE UTILIZED

The AAR seeks to supply a quasi-epistemological foundation for continued retention of the MSDCF. The AAR's argument is effectively that: determining the COE is difficult; much information is available; one should not discard useful information; one should instead use multiple models to incorporate more information; the MSDCF constitutes additional information, especially because it is "commercially accepted"; and so the MSDCF should be utilized and not discarded. AAR Opening Comments ("AAR Op.") at 22-31; Villadsen VS at 4-8.

As discussed *infra*, not all information is equal, some information is better than others, and some information, such as the Ibbotson MSDCF, is inaccurate, unreliable, and should be given no weight at all. Levine RVS at 1-7, 11-13; Triantis RVS

at 1-4 (AAR’s “argument implicitly assumes that the Ibbotson MSDCF produces informative and unbiased estimates,” but it instead “produces unreliable and biased estimates”). However, even if the AAR’s general premise were correct, it does not lead to the conclusion that one should consider only two models (the Ibbotson MSDCF and the Board’s version of the CAPM) and weight them equally. Under the circumstances posited by the AAR, one would want to consider additional models, maybe all models and all available information, in a multitude of weightings and permutations, and then attempt to balance them altogether. However, it would become difficult to identify them all, determine when one was being counted more than once, and then find a way to weigh or reconcile them altogether. For example, would one weigh them equally, try to find a weighted average, or employ a Monte Carlo analysis or other stochastic simulation? These become difficult questions, without readily apparent answers, unless the values happen to converge.¹ However, the notion that one would select two, and only two, values from the universe of possibilities, and weigh them equally together seems inherently implausible and arbitrary, especially when they are divergent.

¹ Where values do happen to converge (COE calculated under the CAPM and a more plausible MSDCF such as what WCTL proposed previously or the standard Brattle model, or the MRP calculated based on a 50-year history and credible surveys), then it is an indication that the values are sound and reliable. Disparate values call for critical examination, not blithe acceptance or averaging. *See, e.g.*, WCTL Comments in EP 664 filed Dec. 8, 2006, at 2 (“consider more than one methodology and seek to investigate and reconcile divergent results, which is exactly what the Board eschewed in its 2005 determination”), and accompanying Verified Statement of James E. Hodder at 2 (“there is an important benefit in using more than one methodology so as to obtain a cross-check on the reasonableness of the underlying assumptions” and “good practice ... to explore any substantial differences between the resulting estimates”).

Furthermore, if all information is valuable, and equally so, no potentially useful information should be discarded, and one has no basis or ability to weigh or evaluate the information, what might start out as information is effectively transformed into noise, and becomes devoid of meaning and useable information. Triantis RVS at 1. The AAR's approach is then ultimately one of nihilism.

The AAR also undermines its own logic by asserting that the MSDCF and CAPM values are "converging." AAR at 5, 40. The AAR's assertion rests entirely on a single year (2013), which is insufficient to establish a persistent trend. Levine RVS at 8; Triantis RVS at 5-6.² However, even if the values were converging as posited by the AAR, it still would not support the AAR's position on the need for multiple models. Converging values would lower the utility of using more than one model because including an additional model would have less or little impact on the result. If the values

² More specifically, the AAR premises its convergence theory on the 88 basis points disparity between the CAPM and the MSDCF in 2013. The 2013 disparity represents 14% of the 626 basis points disparity in 2012 and 22% of the average 412 basis points disparity for 2008-2012. Also, the MSDCF value has exceeded the CAPM value for at least sixteen consecutive years. The fact that the disparity was smaller in one year hardly demonstrates that it has disappeared.

It would be more useful if the AAR had attempted to explain why the disparity lessened in 2013, *e.g.*, whether the CAPM increase resulted from undue increases in its MRP, RFR, and beta components; whether the MSDCF decrease resulted from higher stock prices; whether the railroads' increased exploitation of their market power drove higher stock prices; whether those high stock prices drove higher betas and lower MSDCF COE, *etc.*

In WCTL's view, the convergence is illusory, especially as the CAPM values are themselves overstated. Triantis RVS at 5-6 (noting presence of high railroad beta in 2013). For example, Professor Damodaran derived a CAPM railroad industry COE of 8.43% as of January 2014, compared to the Board's CAPM COE of 12.52% for 2013. WCTL Op. at 6, n.7.

are close, then the second model reflects redundancy rather than new information. For this reason, one should not automatically average disparate results, but should consider which results are accurate and which are not, as WCTL and its experts previously recommended. “When using a multi-stage DCF approach as a cross-check on the CAPM estimate, an obvious warning flag that suggests closer analysis is when the two estimates are dramatically different.”³ WCTL and its experts also showed that a properly configured MSDCF (one similar to what Brattle normally utilizes) confirmed the reasonableness of the CAPM results for at least the 2002-2006 period, as discussed more fully *infra*.

In any event, there is a relatively straightforward path out of the morass that the AAR would seek to construct. The objective is to determine the opportunity cost of capital, meaning the return that investors need to expect to receive in order to invest in railroad equities as opposed to other equities. Villadsen VS at 4. One is more apt to capture those expectations if one utilizes the methods and inputs that the investors utilize, as opposed to methods and inputs that the investors do not utilize.⁴ As WCTL and its witnesses demonstrated on opening, the evidence is overwhelming that sophisticated, informed investors and CFOs rely on the CAPM and do not rely on the MSDCF, as WCTL demonstrated in its opening comments. *See also* Levine RVS at 2, 5-6, 8-9, 11;

³ WCTL Comments in EP 664 (Sub-No. 1) filed April 14, 2008, Verified Statement of James E. Hodder at 7 (copy attached as Exhibit 1). *See also* n.1, *supra* (discussing use of a second COE methodology as a cross-check).

⁴ Investors, of course, are always receptive to obtaining additional returns, and one should ensure that their expectations are reasonable.

Triantis RVS at 2-3. Utilizing a methodology that investors have largely discarded for determining the COE is a very suspect means for achieving accuracy, particularly in measuring the expectations of those investors.

III. THE IBBOTSON MSDCF DOES NOT CONSTITUTE GOOD INFORMATION FOR ESTIMATING THE RAILROAD INDUSTRY COE

As demonstrated below, the AAR has not shown that the MSDCF model constitutes good information for estimating the COE for the railroad industry.

A. The MSDCF is No Longer the Ibbotson/Morningstar MSDCF Model

As a threshold matter, it is appropriate to note that the Ibbotson/Morningstar MSDCF model is no longer actually the Ibbotson or Ibbotson/Morningstar MSDCF model. Morningstar announced that it would cease publishing the full yearbook data (which it had acquired from Ibbotson), and Duff & Phelps announced shortly thereafter that it would publish the data.⁵ Nonetheless, it may still be useful to continue to refer to the MSDCF model formerly known as the Ibbotson model as the Ibbotson MSDCF or Ibbotson/Morningstar model in order to distinguish it from other MSDCF models, including Brattle's own standard approach.

The change appears to reflect the fact that the MSDCF and associated data are extraneous to Morningstar's core purposes. See Triantis RVS at 3 (discussing Morningstar's own survey that showed limited use of MSDCF approach). The AAR has presented no evidence that Morningstar gives any weight to the MSDCF calculations in

⁵ See Villadsen VS at 37 n.53. Further explanations are available at <http://corporate.morningstar.com/ib/asp/subject.aspx?xmlfile=1414.xml> and http://www.duffandphelps.com/expertise/Pages/ValuationHandbook_Guide.aspx.

determining the COE for its own valuation purposes. In that regard, *Morningstar's Quantitative Equity & Credit Ratings* (July 2013) (copy attached as Exhibit 2) explains that Morningstar itself uses a simplified version of CAPM that sorts companies into one of four COE buckets (8%, 10%, 12%, and 14%) based on revenue cyclicalities, operating leverage, and financial leverage.⁶ Significantly, Morningstar places most companies in the average risk bucket (10%). Exhibit 2 at 21. While Morningstar's COE values for individual firms appear to be proprietary, it is difficult to imagine that the Morningstar analysis would support the 13%-17% railroad industry COE values assigned by the Board's MSDCF since 2007 or even the 12%-14% COE values produced by the Board's hybrid MSDCF/CAPM methodology since that date. *See also* Levine RVS at 12.

It is also appropriate to note that Duff and Phelps, the current publishers of the Ibbotson MSDCF, itself advised in 2013 that the CAPM should be applied with a 5% MRP. *Client Alert: Duff & Phelps Decreases U.S. Equity Risk Premium Recommendation to 5.0%, Effective February 28, 2013* (Duff & Phelps, March 20, 2013). Triantis RVS at 10.

⁶ In *Methodology to be Employed in Determining the Railroad Industry's Cost of Capital*, EP 664 (STB served Jan. 17, 2008) ("CAPM Decision"), the Board opted for the 1926-based MRP based in substantial part on Morningstar's use of that figure. *Id.* at 7-9 (noting that "some experts believe that the forward-looking equity-risk premium should be lowered," but opting "to follow [what the Board characterized as] the standard approach," while stating openness to using a different approach if it "becomes the industry norm").

B. The CAPM Approach is Dominant

Dr. Villadsen asserts that “[a]ll models have their advantages and disadvantages, and there is no consensus among academics or practitioners about which models are ‘best.’” Villadsen VS at 4-5. The first part of Dr. Villadsen’s statement may be true, there may be ongoing discussion, particularly among academics, regarding the limitations of the CAPM model and the appropriateness of various tweaks, Levine RVS at 11, and the MSDCF and even single-stage DCF models may continue to be used in some instances. However, there should be no question that the CAPM model has become the dominant model for estimating the COE, as explained in the WCTL Opening Comments (“Op.”) at 20-21 and the accompanying Triantis VS at 5-6 and authorities cited therein. *See also* Triantis RVS at 2-3 (noting that survey indicates that companies “continue to rely predominately on the CAPM” and MSDCF approaches “are infrequently used”).

Even Professor Stewart C. Myers, a principal of the Brattle Group, agrees. In a report cited by Dr. Villadsen in her statement, he wrote that the CAPM is “the model most widely used by U.S. corporations to estimate the cost of capital.” Stewart C. Myers, *Estimating the Cost of Equity: Introduction and Overview* (prepared for the Australian Pipeline Association for submission to the Australian Energy Market Commission, Feb. 17, 2013) (referred to as “Myers AER Report” by Dr. Villadsen), at 2; *see also* Levine RVS at 8-9, 11 (quoting Professor Myers).

Furthermore, Dr. Levine notes the recent article by W. Todd Brotherson, Kenneth M. Eades, Robert S. Harris, and Robert C. Higgins, “*Best Practices*” in

Estimating the Cost of Capital: An Update, 1 J. of Applied Finance 15 (2013), in which the authors reviewed the practices for estimating the COC at twenty leading firms, including UP. Levine RVS at 6 & n.12. The authors found that nineteen of the twenty firms relied on CAPM. Furthermore, only one of the twenty firms (5%) relied on a dividend discount (DCF) model, and did so as a check on the CAPM.

In short, theoretical debate may continue, but it should be clear that use of the CAPM is dominant in practice, and the norm is not to rely on a DCF approach to estimate the COE.

C. No Evidence that the Ibbotson MSDCF is Commercially Accepted

The AAR repeatedly refers to the Ibbotson MSDCF as being a “commercially accepted” model. WCTL agrees that Ibbotson, Morningstar, and Duff & Phelps are or were well-regarded compilers and publishers of financial data. However, it is a very different thing to say that the Ibbotson MSDCF is generally used in the financial/investment community to calculate the COE or that its calculations are assigned significant weight.

The AAR presented no evidence to that effect in its Opening Comments. As shown above, there is no basis on which to conclude that Morningstar assigns any weight to the Ibbotson MSDCF methodology in its own evaluations. In addition, WCTL on opening presented evidence from a number of sources showing that MSDCF models in general, not just the particular Ibbotson MSDCF, are generally not used in the financial/investment community to calculate the COE. WCTL Op. at 20-21; Triantis VS at 3-6; *see also* the article by Brotherson, *et al.*, on the best practices of twenty firms

discussed in Levine RVS at 6 & n.12. Indeed, the information that WCTL presented indicates that the CAPM became dominant long before 2009, when the Board adopted its hybrid average. Triantis VS at 5.⁷

The AAR has simply failed to establish the current commercial acceptance of the Ibbotson MSDCF. The fact that the model and its underlying data continues to be published by a reputable firm does not establish that it is recognized and utilized as a credible and reliable indicator of the COE, especially where superior data is available.

Dr. Villadsen provides a few examples where regulatory and other government agencies use a blend of DCF and CAPM models, including the New York Public Service Commission, the British Columbia Utilities Board, and a handful of state ad valorem taxation authorities. Villadsen VS at 34-37.⁸ Several comments are in order.

First, the economic regulators cited by Dr. Villadsen (including FERC and other jurisdictions that may rely solely on some DCF methodology) appear to regulate primarily gas and/or electric utilities that have relatively modest growth rates, much less resulting disparity between the initial and terminal growth rates, relatively high dividend payout ratios (meaning the definition of cashflow is less problematic, and buyouts are apt to be less of an issue), and typically pervasive rate regulation, generally used to guard

⁷ The AAR and NS criticize shippers generally for having opposed use of the CAPM around the time of the Staggers Act, nearly 35 years ago. AAR Op. at 7-9; NS Op. at 3, n.10. However, the DCF, not CAPM, was dominant around the time of the Staggers Act. Triantis VS at 5. The AAR and NS would have the Board ignore the dominance achieved by the CAPM since that time as well as the Nobel Prize awarded in 1990 (Triantis VS at 3) for its development.

⁸ The AAR refers to “a growing group of regulatory agencies” (AAR Op. at 30), but any growth is undocumented and appears modest in any event.

against rate discrimination. A DCF analysis is more likely to be probative under those circumstances. *See, e.g.*, Brattle study for the CTA at 51 (“DCF estimates are more robust for large, rate regulated companies in relatively stable segments of an industry.”); Myers AER Report at 7. Modern railroads are usually quick to note that they face very different conditions, *e.g.*, most rates are not subject to regulation, differential pricing is not only allowed, but encouraged, growth rates have been significant, buybacks are substantial, and anything approaching a return to “re-regulation” would reverse the progress that the industry has achieved, *etc.*

Second, ad valorem tax assessment is not the same thing as economic regulation. The authorities confront multiple industries, not just railroads. Taxing authorities may be inclined to follow the Board’s treatment, and the AAR’s suggestion that the Board follow these agencies may create circularity. Efforts to calculate property taxes for railroads using a different COE methodology than is used for other industries might also present impermissible discrimination under 49 U.S.C. § 11501. *See, e.g., CSX Transp., Inc. v. Georgia State Bd. of Equalization*, 552 U.S. 9 (2007).

Third, utilizing a DCF analysis or even a multi-stage DCF analysis does not require utilizing the Ibbotson MSDCF with its underlying assumptions. Indeed, WCTL demonstrated in 2008 that a soundly-constructed MSDCF could, and did, return results very close to, and even lower than, those under the Board’s CAPM methodology.

Finally, the AAR’s and Dr. Villadsen’s review of the frequency of use of multiple models to determine the railroad COE omits any mention of the recent decision by the Canadian Transportation Agency to utilize only the CAPM, and not to incorporate

any DCF component, despite full awareness of the Board’s approach.⁹ The CTA engaged in a lengthy and thorough review and analysis, in which it had the benefit of not only the Board’s *MSDCF Decision*,¹⁰ but also a study commissioned from the Brattle Group, where Dr. Villadsen was the second author. The CTA found that the CAPM was “clearly superior,” *CTA Decision* at ¶ 209, and decided to utilize it exclusively:

CAPM is the only cost of equity model that was (at least partially) accepted by all stakeholders. The CAPM also has theoretical support, is widely used in regulatory settings, has been systematically chosen by the Agency in each of the last 19 years, and has an intuitively rational way of characterizing risks (risk-free asset; equity market risk; company-specific non-diversifiable risk). Its three components react in different ways to market information (rapidly for the risk-free rate; moderately rapidly for the company-specific risk; and slowly for the equity market risk), providing both responsive and stable elements in the estimation of the cost of equity. Finally, relying solely on the CAPM would reduce uncertainty in the regulatory environment in which the Agency's cost of equity estimates are applied.

Accordingly, the Agency determines that, in the interest of providing greater certainty and transparency, it will use the CAPM alone to estimate the cost rate of equity for federally-regulated railway companies, and the practice of annually assessing the results of three models and applying judgement regarding the appropriate weight to assign to each will be discontinued.

⁹ CTA Decision No. 425-R-2011, *Review of the methodology used by the CTA to determine the cost of capital for federally-regulated railway companies* (Dec. 9, 2011), available at <https://www.otc-cta.gc.ca/eng/ruling/425-r-2011> (“*CTA Decision*”).

¹⁰ *Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry’s Cost of Capital*, EP 664 (Sub-No. 1) (STB served Jan. 23, 2009) (“*STB Decision*”).

Id. at 215-216. Dr. Villadsen's failure to make any reference to the CAPM-only approach taken by the CTA is conspicuous.

D. The MSDCF's General Flaws

The AAR also faults WCTL for not challenging the validity of multi-stage DCF models generally. AAR Op. at 32.

The criticism is misplaced. WCTL's opening comments discussed at length the numerous flaws in MSDCF models generally, including the reliance on a snapshot of the stock price and on growth projections that are unlikely to prove accurate, especially at the high levels utilized by the Board, and the relative superiority of the CAPM, including its direct linkage to the risk-reward relationship and the ability to confirm the soundness of each of the inputs. WCTL Op. at 14-20; Levine VS at 4-8, 13-16; Triantis VS at 3-4, 6-18; Levine RVS at 4, 8-11; Triantis RVS at 6-7. In particular, WCTL quoted the Brattle study done for the CTA, for which Dr. Villadsen was the second author:

Moreover, the DCF model is highly sensitive to growth rate estimates, which can vary widely among analysts – and that variation may increase in times of greater economic uncertainty. As such, the reliability of DCF methods can be questionable in times of economic turmoil or when an industry is in transition.

CTA Decision at ¶ 207 (quoting the Brattle study); *see also* AECC Op. App. A at 9-11.¹¹

¹¹ Dr. Villadsen offers some contradictory defenses for use of the analyst forecasts. Villadsen VS at 18; AAR Op. at 39-40. In particular, she contends that: (a) a dated analyst forecast is not relevant because the company in question has only a small weight; (b) use of the median forecast value means that extreme values are ignored; (c) even though there only a few forecasts, they provide additional information (apparently

Beyond that, WCTL’s opening comments explained and documented that the general MSDCF approach is not commonly utilized in the financial and investment community to determine the COE. WCTL Op. at 20-21; Triantis VS at 5-6. The CTA thus followed the overwhelmingly predominant practice of relying only on the CAPM. Levine RVS at 5-6 (discussing the Brotherson survey).

The AAR also criticizes WCTL for not offering alternatives, but provides very little in the way of details. AAR Op. at 32. The AAR criticism rests on a false narrative.¹² WCTL originally proposed CAPM as an alternative methodology to the single-stage DCF, and has shown that it has become the dominant model in use and is theoretically sound. WCTL also previously offered two versions of a MSDCF that confirmed the reasonableness of the CAPM results, but the AAR criticized them at the time, claiming that they were made for litigation. However, it turns out that, as explained *infra*, that the models WCTL offered are actually quite close to what Dr. Villadsen and

regardless of whether they are the median). The reality is that there are only a few forecasts, they vary widely, some are very dated, use of a median among a small number of forecasts means that a single forecast can prove critical, and the forecasts are in large part subjective and the forecasts are generally unlikely to prove reliable over the long-term. WCTL Op. at 16-19; Triantis RVS at 6-7.

¹² Another AAR distortion is its claim that WCTL once supported averaging the CAPM and MSDCF estimates. AAR Op. at 4. WCTL supported using MSDCF as a check as explained *supra*, but not as a simple average, especially when the values are divergent. The AAR’s claims that the Ibbotson MSDCF is “a market-tested technique” and WCTL has not “offer[ed] an alternative” (AAR Op. at 5) are similarly misguided. The evidence is that the market uses CAPM and not MSDCF, and CAPM is the alternative that WCTL offered, originally to the SSDCF, which the AAR staunchly defended, despite its impossible assumption that high growth rates could continue in perpetuity. It is the AAR that has been seeking the highest possible COE estimates.

Professor Myers depict as Brattle's standard MSDCF model. Nothing more can or should be required of WCTL.

In addition, the AAR criticizes WCTL for being more concerned about the results of the MSDCF than the methodology itself. AAR Op. at 19. This criticism is also unwarranted.¹³ WCTL demonstrated on opening that the MSDCF-type approach is not generally relied upon for COE estimates in the financial and investment community and that the growth rate projections that are critical for the model are very suspect and generally unreliable. Notwithstanding this basic problem, it is theoretically possible that the MSDCF could produce credible or useful results. Whether that theoretical potential is actually realized often depends on the actual results. However, the disparity between the MSDCF and CAPM values is too substantial and persistent and not explainable by any downwards bias in the CAPM. WCTL Op. at 8-14. *See also* Arkansas Electric Cooperative Corporation Opening Comments ("AECC Op."), Appendix A ("App. A") at 8-9; Levine VS at 13-15.

E. The Ibbotson MSDCF "Fixes" Proposed by the AAR Only Exacerbate its Flaws

The AAR and Dr. Villadsen purport to offer three "fixes" ostensibly designed to address flaws in the MSDCF previously noted by WCTL. AAR Op. at 36-39; Villadsen VS at 25-31, 38-40. However, the AAR fixes, rather predictably (and

¹³ The AAR also asserts that "[t]ellingly, WCTL never discusses the possibility that CAPM is too low." WCTL addressed that possibility at length on opening. WCTL Op. at 10-14; Levine VS at 8-13; Triantis VS at 6-15; Triantis RVS at 5.

seemingly intentionally), have little impact, and in some cases even increase the resulting COE.¹⁴

Dr. Villadsen's first proposed fix is to phase-in the reduction to the terminal growth rates over the second stage, so that the transition does not suddenly occur at the start of the third stage. Villadsen VS at 26-28. However, Dr. Villadsen insists on combining the phased-in reduction of the growth rate with a phase-in of the surge in cashflows that otherwise occurs at the start of the third stage, when cashflow is redefined as earnings (with no deferred taxes, and capital expenditures deemed to match depreciation). The surge in cashflows at the start of the third stage is a separate problem with the Ibbotson MSDCF,¹⁵ and Dr. Villadsen's pairing of the two changes causes them

¹⁴ Dr. Villadsen concludes that making the changes that she considers would have too small of an impact to justify the changes. Villadsen VS at 25, 32. However, the AAR and its witness have "stacked the deck" by considering only narrow (and complicated) changes to the Ibbotson MSDCF, and not, as explained *infra*, use of a more standard MSDCF model, such as the type that Brattle normally employs.

¹⁵ Dr. Villadsen seems to offer two somewhat contradictory defenses for the redefinition of cash flows in the third stage. Villadsen VS at 12-13. The first is that the model's assumption would actually be realistic if economic depreciation were used instead of accounting depreciation. But if the model needs to be changed, it is either defective generally or not a good fit for the industry. The second (which the Board has supported) is to the effect that the large capital expenditures would continue only if they yielded growth in excess of the terminal growth rate. This assertion is inconsistent with the need of railroads to make large capital expenditures that do not involve expanding capacity or increasing volume. For example, the Federal Railroad Administration calculates that the "majority of this [railroad] investment is for upkeep to ensure a state of good repair" and only "15 to 20 percent of capital expenditures, on average, are used to enhance capacity." Federal Railroad Administration, *Freight Rail Today*, available at www.fra.dot.gov/Page/P0362. Dr. Villadsen's attempted defenses for the model thus confirm that the model does not accurately depict the railroad industry. Triantis RVS at 8-9.

to essentially cancel each other out, the net result being a very modest (less than 1 percentage point) decrease in the COE. Triantis RVS at 7-8.

Dr. Villadsen's second proposed fix purports to address stock buybacks and includes two adjustments. The first adjustment purports to adjust the growth in cashflows to reflect the reduction in shares due to buybacks. This adjustment varies by stage. In the first stage, the adjustment is provided to total cashflows, but in the second stage the adjustment applies only to growth in earnings before extraordinary items. The phase-in of the surge in the cashflow redefinition that would occur in the third stage is unaffected. The second adjustment is to increase the level of cashflows in each year to reflect the (unspecified) amount of "stock repurchases in that year." The dollar value of buybacks is calculated by interpolating (extrapolating may be the better term) from Value Line data during the first stage, but the buybacks are deemed to phase out to zero in the second stage so as to maintain consistency with the other (dubious) assumptions. Villadsen VS at 28-30.

The various assumptions in Dr. Villadsen's "fix" for buybacks are all questionable, but the second adjustment, namely, expanding the measure of cashflows to reflect the dollar value of the buybacks, is fundamentally defective. The Board opted for the Ibbotson MSDCF model in substantial part because it already purports to "account[] for **all** of the relevant cash flows a reasonable investor is likely to anticipate, **including share repurchases** and earnings' reinvestments to obtain greater future cashflows, along

with dividends.”¹⁶ The Board later elaborated that the “model does not explicitly account for stock options and stock repurchases because it focuses on a broader measure of free cash flow that is potentially available to equity investors. Although the model does not assume that these cash flows are actually paid out to equity investors, it does assume that investors will ultimately benefit from these flows through specific distributions of stock price appreciation.” *MSDCF Decision* at 12. Indeed, the broad measure of cashflows was one of the supposed virtues of the Ibbotson MSDCF compared to the alternative approaches that WCTL identified. *Id.*¹⁷ By expanding the available cashflow to include the substantial distributions that are actually made to stockholders through buybacks, Dr. Villadsen has simply engaged in a double-count (available cashflow plus distribution cashflow). *Triantis RVS* at 7. Stated differently, Dr. Villadsen causes railroad stockholders to have their cake (total available cashflow) and eat it, too (buybacks). An adjustment that causes the model to utilize more than 100% of available cashflow is a poor means for improving accuracy.

Significantly, Dr. Villadsen notes earlier in her statement that “[t]he cash distributed to shareholders is larger than the forecasted free cash flow to shareholders,”

¹⁶ *Use of a Multi-Stage Discounted Cash Flow Model in Determining the Railroad Industry’s Cost of Capital*, EP 664 (Sub-No. 1) (STB served Aug. 11, 2008) (“*MSDCF Notice*”), at 5 (emphasis added).

¹⁷ WCTL’s first model defined cashflows as dividends plus buybacks. The second model reflected free cashflow, with additional adjustments beyond the Ibbotson model to reflect changes in working capital, amortization, and new debt. Both were opposed and rejected as being too narrow. *MSDCF Decision* at 12. WCTL explained that the railroads are unlikely to achieve the growth rates posited in the Ibbotson MSDCF without, for example, a related increase in working capital. The Ibbotson MSDCF thus overstates available cashflow, even assuming the model is otherwise correct.

and then appears to assert that the Ibbotson MSDCF model is actually conservative in this respect. Villadsen VS at 16. Distributions in excess of free cash flow can be temporarily supported by retained earnings, additional borrowing, reduction in working capital, liquidation of assets, *etc.*, but they are not apt to be sustainable for the long-term, especially for firms operating in what the railroads claim is a competitive and capital-intensive industry. Furthermore, one of the motives for conducting buybacks is that their discontinuation carries little stigma compared to dividend cuts.¹⁸ Basing a long-term DCF valuation on cash flows that are not sustainable will lead to overstated cash flows and overstated COE discount rates, rather than accuracy.

Dr. Villadsen's third proposed fix is to extend the second stage from five years to ten years. *Id.* at 30-31. This change actually increases the COE value, but the increase is due to the deferral of the terminal growth rate¹⁹ and the other changes that Dr. Villadsen has made, particularly phasing-in the increase in cashflow that otherwise occurs at the start of the third stage and double-counting cashflow with the buybacks. Because of the other adjustments, the effect of the longer second stage is to increase the resulting COE on average. Triantis RVS at 7-8.

¹⁸ "Investors know that managers are reluctant to reduce dividends and will not increase dividends unless they are confident that the payment can be maintained;" in contrast, "[a]nnouncement of a share repurchase is not a commitment to continue repurchases in later years." Richard A. Brealey, Stewart C. Myers, and Franklin Allen, *Principles of Corporate Finance* (11th ed. 2014) at 403, 405.

¹⁹ In particular, Dr. Villadsen's third "fix" causes the initial cashflow in the third stage to reflect fifteen years of escalation at a high growth rate (founded upon projections of only three-to-five years), rather than ten. Extending the length of the second stage diminishes the significance, on a net present value basis, of the lower terminal growth rate. Triantis RVS at 7-8.

Dr. Villadsen then concludes her analysis by stating that “I do not believe the Board needs to expend its limited resources pursuing some kind of ‘best’ MSDCF model” because the “elaborations ... are complex and prone to create controversy” and make a “tiny difference.” *Id.* at 31-32. WCTL agrees and adds that Dr. Villadsen’s machinations demonstrate that an already flawed model can be made more complicated and worse, but in no way demonstrate that the Ibbotson model should actually be utilized to determine the railroad industry COE. As stated by Dr. Levine, “eliminating the MSDCF does not require revamping what is no longer in use.” Levine RVS at 8.

F. The Standard Brattle MSDCF Differs from the Ibbotson MSDCF, But Closely Resembles the MSDCF WCTL Previously Proposed

As explained above, Dr. Villadsen’s “fixes” do not address the core problems in the Ibbotson MSDCF, but simply exploit and actually exacerbate them. What is more interesting and significant is what Dr. Villadsen ignores in considering the soundness of the Ibbotson MSDCF and its underlying assumptions. Specifically, Dr. Villadsen gives no consideration to what she elsewhere describes as her firm’s standard MSDCF model:

Another example of more recent multi-stage DDMs [Dividend Discount Models] used is the version frequently estimated by *Brattle*, where company-specific growth rates are used for the first five years while the long-term GDP growth rate is used from year 10 onwards. In the in-between years (6-10), the model assumes that the growth rates converge linearly from the company-specific rates to the GDP growth rate. Similarly, Professor Myers’ report suggests that in many industries it is important to look at the total cash flow that accrues to shareholders rather than on a per share basis, because stock buyback programs make the per share figures less reliable. In this model, the fundamental variable being

determined is the market value (total price) of a company rather than the price per share, and instead of looking to dividends per share the model uses total cash flow to shareholders.

Bente Villadsen, *et al.*, *Estimating the Cost of Equity for Regulated Companies*, Prepared for Australian Pipeline Industry Association (Brattle, Feb. 17, 2013), at 30 (footnote omitted).²⁰ In his accompanying report, Professor Myers stated that the Brattle approach uses ten years in the second stage. Myers, AER Report at 8.

The measure of cashflow, “total cash flow to shareholders,” in the standard Brattle MSDCF appears to consist of dividends plus buybacks. Professor Myers clearly recommends what he terms this “aggregate cash payout” approach consisting of dividends plus repurchases in his report that accompanied Dr. Villadsen’s report for the Australian Pipeline Industry Association. Myers AER Report at 9-10.²¹ Moreover, the definition of cashflow appears to remain constant throughout the Brattle model. In particular, there is no discussion of any redefinition at the start of the third stage, and thus there is no surge at the start of the third stage, as there is in the Ibbotson MSDCF.

Triantis RVS at 7-8. In addition, the second stage effectuates a smooth transition from

²⁰ The report is available on the Brattle website at http://www.brattle.com/system/publications/pdfs/000/004/809/original/Estimating_the_Cost_of_Equity_for_Regulated_Companies_Villadsen_et_al_Feb_17_2013.pdf?1378772131. The omitted footnote references the 11th edition of Brealey, Myers, and Allen’s *Principles of Corporate Finance*, which discusses dividends plus buybacks as an appropriate measure of cashflows.

²¹ Professor Myers recognizes the need to take into account buybacks in defining cashflows, but does not clearly address the need to adjust the growth rate projections to reflect the declining number of shares going forward.

the stage one growth rate to the terminal growth rate starting in year six and concluding in year ten (or year fifteen, according to Professor Myers).

The standard Brattle MSDCF is thus constructed in a manner that avoids the problems in the Ibbotson MSDCF model, *i.e.*, the overly broad definition of cashflows, the redefinition of cashflows in the third stage, and the use of a putative industry-average growth rate in the second stage instead of a smooth transition to the terminal growth rate. Because the standard Brattle MSDCF avoids the Ibbotson MSDCF problems at the outset, there is thus no need for any of the various “fixes” proposed by Dr. Villadsen, *i.e.*, modifying the phase-in during the second stage to include the expanded cashflow measure that otherwise occurs during the third stage (but which should not occur at all), and adjusting for buybacks through a double-count of the available cashflow. The model does fail, however, to address the overstatement in the growth rate associated with reduction in the total shares outstanding. The model also remains dependent on the accuracy of the analyst growth rates (albeit to a lesser extent than the Ibbotson model).

The standard Brattle model is then very closely aligned with the first MSDCF “Modified Payout” model described in the Hodder Verified Statement and implemented in the Crowley/Fapp Verified Statement submitted with the comments that WCTL filed in EP 664 (Sub-No. 1) on April 14, 2008 (copy attached as Exhibit 1). This

model defined cashflow as dividends plus buybacks (averaged over three years),²² used the IBES growth rates for the first five years, used a ten-year second phase with a linear transition from the initial growth rate to the terminal growth rate, and then used the terminal growth rate for the economy as a whole starting year 15.²³ The WCTL/Hodder/Crowley/Fapp approach thus conformed closely to the standard Brattle MSDCF. Significantly, it yielded a COE that was generally below the STB CAPM for the 2002-2006 period.

WCTL also proposed a second version of the MSDCF that defined cashflow as Free Cash Flow to Equity (“FCFE”) as earnings plus depreciation, amortization, deferred taxes, and net new debt, less change in capital expenditures and working capital. It yielded results closer to the CAPM.

For convenience, the following table is taken from the data presented in WCTL’s filing at p. 9, modified to include the average values for the 2002-2006 period:

²² A clear specification of how the standard Brattle model defines the initial cash flows (*e.g.*, whether and how dividends and buybacks are averaged or smoothed) could not be found.

²³ The WCTL model was similarly conservative in growth rates for earnings per share that did not adjust for the reduction in total shares outstanding due to stock buybacks.

Table 1 Comparison of COE Results for 2002-2006 Under CAPM, MSDCF (Modified Payout), and MSDCF Free Cash Flow to Equity			
Year	STB CAPM	MSDCF COE Modified Payout	MSDCF FCFE
2002	10.05%	10.41%	11.64%
2003	9.93%	7.84%	10.10%
2004	10.38%	7.22%	8.87%
2005	10.61%	8.81%	9.92%
2006	11.08%	9.52%	9.84%
Average	10.41%	8.76%	10.07%

WCTL’s analysis demonstrated and confirmed the reasonableness of the CAPM model, and the analysis also showed that the CAPM COE values were relatively stable.²⁴ The CAPM results also appear conservative (in the sense of being higher) relative to the MSDCF alternatives, although that is attributable in large part to use of the Ibbotson 1926-based MRP. In other words, a lower MRP would have decreased the difference between the CAPM and the Modified Payout MSDCF.

The AAR opposed WCTL’s MSDCF as constituting a biased model that was made for litigation, and the Board chose the Ibbotson model that the AAR sponsored because it was supposedly independent and commercially accepted. However, the similarity of the WCTL models to what can now be determined to be the standard Brattle MSDCF approach indicates that no litigation bias was present. Furthermore, the closeness of the results compared to those under the CAPM (which would have been

²⁴ “[C]areful applications of the CAPM tend to give estimates of the cost of equity that are sensible and reasonably stable over time.” Myers, AER Report at 3, *quoted in* Levine RVS at 8-9. Nonetheless, the Board’s claimed that greater stability was a reason to combine the MSDCF with the CAPM and equated stability with precision. *MSDCF Notice* at 2; *MSDCF Decision* at 14-15.

closer still if the CAPM employed a more representative MRP), indicates that: (a) the CAPM results are reasonable, (b) a MSDCF approach need not result in a significant disparity compared to a CAPM analysis, and (c) the disparity probably reflects the particular characteristics of the Ibbotson MSDCF model, rather than the use of a MSDCF-type approach itself.

Dr. Villadsen concludes her analysis of the alleged flaws in the MSDCF model as follows:

In my opinion, the search for a MSDCF perfectly tailored to the railroad industry is misguided as there are many standard financial techniques of which the Board has reviewed and selected two.... I emphasize that it is important to take a comprehensive view of the cost of equity estimation for the railroad industry (or any industry) and evaluate the allowed return on equity rather than the results from one of two relied upon models.

Villadsen VS at 32. However, Dr. Villadsen, notwithstanding her credentials and experience, has simply failed to take anything approaching such a “comprehensive” view. In particular, she has considered only limited, cosmetic tweaks to the Ibbotson MSDCF, rather than use of what she herself has described as the type of MSDCF that Brattle frequently employs. Nor has she given any explicit consideration to whether it makes any sense for the railroad industry to have a cost of equity that so vastly exceeds the expected returns for equities in general. Levine RVS at 10-12. She also has not given any consideration to the possibility that the CAPM values may be overstated.

G. The AAR's Claim that the CAPM is Backwards-Looking, Whereas the MSDCF is Forwards-Looking, is Unfounded

The AAR claims that a virtue of the MSDCF model is that it is forwards-looking, whereas the CAPM is backwards-looking, and combining the two thus creates a more complete or robust estimate. AAR Op. at 23; Villadsen VS at 10-11. This distinction is an oversimplification and, ultimately, a significant distortion.

As explained by Dr. Levine and Professor Triantis, both models rely heavily on historical information. To the extent that the MSDCF model might appear to rely more on prospective information, it is really relying on guesses that are informed by historical information, but the guesses are still likely to prove to be inaccurate. “For the AAR to characterize the MSDCF as a futuristic model and the CAPM as an historic model is pure folly.” Levine RVS at 4; Triantis RVS at 6-7 (explaining that analyst growth rates “are heavily influenced by recent corporate performance” and “ultimately dependent on subjective beliefs”).

The Ibbotson MSDCF relies on five years of historical data to establish the initial level of cashflows. The Ibbotson MSDCF then utilizes long-term earnings projections, but those are projections only for the next three-to-five years, which is not long-term at all compared to the length of the model (at least ten years before the terminal growth rate) or the 20-year Treasury bond used as the RFR in the Board's CAPM. While the AAR may view the projected growth rates as being forward looking, they are apt in practice to reflect in substantial part an extrapolation from past trends. Accordingly, the projections are not purely prospective. Levine RVS at 3-4; Triantis RVS at 6-7.

Moreover, the projections are likely to prove inaccurate over their specified period, as explained in WCTL's Opening Comments at 17-18 (citing analyses by Fama and French, Cusatis and Woolridge, and McKinsey & Company). There is thus even less reason to think that the projections will prove accurate over the ten-year period utilized by the Ibbotson MSDCF (or the fifteen-year period used under Dr. Villadsen's third "fix"). Saying that the MSDCF is forwards-looking is thus a convenient way of stating that it rests on a guess as to the future, and a not very reliable one at that. The Board has acknowledged that a DCF approach should not be utilized unless the estimates are believed to be accurate and reliable. *MSDCF Decision* at 14; *see also* Triantis VS at 17 and Levine VS at 20.

The characterization of the CAPM as backwards-looking is also distorted. The risk-free rate ("RFR"), meaning the twenty-year Treasury bond for present purposes, represents the expected value today of the future yield, and is thus inherently forwards-looking. Levine RVS at 3-4; Triantis RVS at 10. Moreover, it represents the consensus of the market as a whole based on the interactions between all buyers and sellers, rather than the view of a few analysts (or at most two analysts under Dr. Villadsen's construction of the median value) that do not have any direct "skin in the game."

The AAR then treats the MRP as representing a depiction of nearly eighty years of historical data going back to 1926. Villadsen VS at 20; AAR Op. at 25-26. However, Dr. Villadsen and Brattle have elsewhere disagreed with the characterization of the MRP and its underlying data as "backward looking":

However, we do not think it is correct to characterize the use of historical data as ‘backward looking’. Rather, as we note above, the premise is that the past is the best guide to the future. Moreover, the ERP estimate will only be *based* on the historical data. As we discuss above, economists have recognized that there are a number of events that have taken place in the past that may affect the historical ERP that some of these events may not be repeated, and so the historical data should be revised to account for these events and make a better forward-looking ERP estimate.

Dan Harris, Bente Villadsen, and Francesco Lo Passo, *Calculating the Equity Risk Premium and the Risk-Free Rate* (Brattle Group, Prepared for NMa, OPTA, Nov. 26, 2012), at 29 (original emphasis) (available on the Brattle Group’s website).

Moreover, it is the AAR that successfully advocated using the 1926-based Ibbotson figure on the basis that one needed to go back that far in order to obtain an accurate measure of the long-term relationship between equities and the RFR. *CAPM Decision* at 8 (“The railroads argue that a 50-year period is too short and that our proposal thereby understates the market-risk premium.”). In attacking the MRP as being too dated, the AAR is seeking to disparage a creation of its own making, supposedly intended to best measure the persistent difference between the expected return in equities and the RFR. However, a major problem with the AAR’s approach is that there is substantial evidence that use of the 1926-based data reflects actual returns that surpassed expected returns. See *Triantis VS* at 10-11; *WCTL Op.* at 33-35.²⁵ This issue can be

²⁵ Dr. Villadsen purports to acknowledge the possibility that actual historical returns may exceed the returns that were expected in the past. “Even after the fact, realized returns and risk measurements are only point observations from the distribution of outcomes that were possible at the time of the investment.” *Villadsen VS* at 4. See also *Levine RVS* at 4, 8-9; *Triantis RVS* at 10.

addressed by using a shorter period, such as fifty years, to measure the MRP and/or use of a figure that reflects current expectations based on survey data. Indeed, the survey MRP data is inherently “forward looking” in a similar manner as the analyst forecasts utilized in the MSDCF, except that the MRP surveys reflect to a substantial extent the views of persons who have actual responsibility for making large-scale investment decisions.²⁶ Levine RVS at 4. As explained in WCTL’s Opening Comments, both MRP approaches (a more recent historical approach and the surveys) lead to a very similar MRP figure not exceeding 4.7%, which is very close to the 5% MRP currently specified by Duff & Phelps. Triantis RVS at 10.

The third component of the CAPM is the beta. The AAR criticizes the beta for reflecting five years of historical data.²⁷ However, the purpose is to utilize a measurement period long enough to give a fuller picture of the relative degree of systematic risk, rather than rely on a shorter period that may be less representative, although some compilers utilize a shorter period, such as two or three years. *MSDCF*

²⁶ The analysts project the earnings of individual firms, while the MRP surveys reflect the market as a whole and are thus more amenable to being linked to macroeconomic reality, as opposed to firm-specific considerations. Levine RVS at 6-7 (noting that CAPM is amenable to benchmarking), 11 (quoting Professor Myers that the CAPM is “simple and logical”).

²⁷ For example, Dr. Villadsen asserts that “the CAPM estimates, which are based on five years of historical information, by definition will change relatively little from year to year.” Villadsen VS at 9; AAR Op. at 25. However, the Board stated that stability was such an important factor that justified use of the hybrid average. *MSDCF Notice* at 2, *MSDCF Decision* at 14-15. Nonetheless, the CAPM COE increased by over two percentage points (or 22%) in 2013, due in substantial part to the increased beta, undermining Dr. Villadsen’s claim that the CAPM cannot change significantly from year to year. Triantis RVS at 5. Even so, the AAR uses the increased value in 2013 as the predicate for its convergence theory, discussed at 7 & n.2, *supra*.

Decision at 19 (finding “that a 5-year period is more common and will provide a more forward-looking estimate that will better and more quickly reflect the changing nature of the rail industry”). In contrast, the MSDCF relies on a single day’s snapshot of stock prices. In addition, the consensus is that the beta is made more accurate and representative of the long-term trend by including a Blume adjustment. *WCTL Op.* at 40-45, *Levine VS* at 23-24, *Triantis VS* at 8-9, *CTA Decision* at ¶ 380.

In short, the AAR’s claim that the MSDCF is forwards-looking and the CAPM is backwards-looking is an inaccurate oversimplification. *Triantis RVS* at 6-7. The COE is inherently a forwards-looking concept, the CAPM is the dominant model for estimating a firm’s COE, and the CAPM has supplanted the DCF approach because it is recognized as providing a more accurate estimate of the COE. *Levine RVS* at 1-4, 6, 8, 11; *Triantis RVS* at 2-3. To the extent that the Board’s CAPM is backwards-looking, it is only because the AAR has convinced the Board to apply the CAPM in a manner that is more backward-looking. The AAR should be allowed to complain about problems of its own making, and the Board should adopt the changes (more contemporary MRP and Blume adjustment) that would make the CAPM more forwards-looking.

H. No Showing by the AAR that the MSDCF COE Values are Credible or Realistic, Either Alone or in Conjunction with the CAPM Values

The AAR and its expert made no effort to demonstrate that the Ibbotson MSDCF COE values, standing alone, were in any way accurate, credible, or plausible. Indeed, Dr. Villadsen directly states “that the relevant question is not whether the [railroad COE] as derived from MSDCF is appropriate, but if the combined CAPM and

MSDCF estimate adopted by the Board is appropriate.” Villadsen VS at 21-22. But if the CAPM is already at or above relevant benchmarks, and the MSDCF values are higher, and generally substantially so, then the combined CAPM and MSDCF is not going to increase accuracy and representativeness, but will instead undermine them. Levine RVS at 4; Triantis RVS at 2 (stating the models’ “biases do not offset each other in any way”), (“current STB practice ... exacerbates error rather than mitigating it”); *see also* AECC Op., App. A at 12.

In particular, the AAR and Dr. Villadsen made no attempt to explain why the MSDCF and the combined MSDCF/CAPM values should indicate that railroad investors should require or expect a return such a substantial premium relative to equities generally, *e.g.*, the 10% average value used by Morningstar. As explained by Dr. Levine, the railroads’ traffic volumes are generally reflective of the economy as a whole, and there is little reason to think that the railroad industry should be viewed as substantially riskier than equities generally. Levine VS at 4-7; Levine RVS at 5-6, 9-10. Nonetheless, the MSDCF has produced a substantial premium relative to the CAPM in recent years, such as 452 basis points in 2011 and 626 basis points in 2012, despite CAPM betas in excess of 1.15 in those years. Levine RVS at 11. The AAR has identified no factor that could explain suppression in the CAPM values to that extent, *id.* at 12,²⁸ and there is much reason to think that the CAPM values are themselves overstated.

²⁸ The AAR’s low-interest rate theory is discussed next. For present purposes, it is sufficient to note that Dr. Villadsen identifies an impact of only 50 basis points in 2011-2012, Villadsen VS at 25, which could explain only a small portion of the divergence.

Norfolk Southern (“NS”) takes a more extreme position in asserting that the Board should continue using more than one model in the interests of “regulatory consistency.” NS Opening Comments (“Op.”) at 2-4. NS’s position is effectively that the agency should continue using an inaccurate measure because it has done so in the past. If estimating the COE is difficult, it can only be because it is possible to develop a poor answer, and one cannot determine if an estimate is unreliable without reviewing the evidence, especially in terms of the reasonableness of the underlying assumptions and results. The COE is a consequential matter, and considering whether its methodology is accurate should be an ongoing responsibility of the Board, especially when its two chosen methodologies yield divergent results over a sustained period of time.²⁹

Moreover, NS’s focus on regulatory consistency does not square with its own actions, alone and/or in conjunction with other railroads, in asking the Board to revisit its established regulatory approaches in other areas, such as the existence of a separate revenue adequacy constraint, the use of replacement costs to measure revenue adequacy (more than once), the consideration of geographic and product competition in ascertaining market dominance, limitations on including and the methodology for allocating revenues on cross-over traffic, *etc.* Regulatory consistency appears to be a

²⁹ NS also asserts that “[t]he Board does not use the COE in any way to determine the level of returns that railroads must be guaranteed.” NS Op. at 2. The statement may be true with respect to overall revenues, but the COE is certainly a key input to determining stand-alone cost (whether an individual rate is unreasonable), variable cost/jurisdictional threshold and market dominance (whether a shipper may challenge a rate and how much rate relief it may receive), ratios for the three-benchmark test, whether a carrier is revenue adequate (at least for now), and potentially elements of a revenue adequacy constraint.

principle that NS invokes only when doing so suits its purposes, *i.e.*, when the status quo benefits NS.

III. THE BOARD SHOULD UTILIZE THE CAPM, WITH A MORE REALISTIC MRP AND A BLUME ADJUSTMENT

WCTL explained in its opening comments that the Board should estimate the COE using only the CAPM, but the CAPM should be modified to utilize a more realistic MRP and also a Blume adjustment to the beta. WCTL Op. at 30-45. These matters were largely ignored by the AAR (and NS), which contended only that the flawed MSDCF should be retained. However, some other parties addressed various aspects of the CAPM, and it is thus appropriate for WCTL to respond to these comments, with some brief treatment of matters noted in its opening comments.

A. Reliance on Only the CAPM Conforms to Standard Practice

While the AAR claims that it is standard practice to rely on more than one model, WCTL demonstrated on opening that the standard and common practice in the financial/investment community is to rely solely on the CAPM. The community views the CAPM as the superior model, and even Professor Myers has recognized the CAPM's dominance. Levine RVS at 8; Triantis RVS at 2-3.

The AAR has produced no evidence that the Ibbotson MSDCF or other MSDCF is commonly relied upon in the financial/investment community to estimate the COE. The evidence is that the MSDCF is not relied upon. *See, e.g.*, Brotherson, Eades, Harris, and Higgins, “*Best Practices*” in *Estimating the Cost of Capital: An Update*, 1 J. of Applied Finance 15 (2013), *discussed in* Levine RVS at 6 & n.12 (noting that nineteen

of twenty leading firms relied on the CAPM, and one only relied on a dividend discount (DCF) model, and that was as a check on the CAPM).

Furthermore, even if one wanted to utilize a MSDCF approach, one would need to decide which MSDCF model to utilize, *e.g.*, the Ibbotson MSDCF model or the standard Brattle MSDCF model (very similar to the MSDCF noted by WCTL in EP 664 (Sub-No. 1)), whether to adjust the growth rates for stock buybacks, *etc.* One would also have to determine whether the growth rates utilized by the MSDCF are reliable, for which the AAR has presented no supporting evidence.

As WCTL noted in its opening comments, an additional benefit of the CAPM is that it could be modified to incorporate a surrogate or proxy for BNSF such as assigning additional weight to the beta for UP, which BNSF most closely resembles, or including a beta value for BNSF's parent, Berkshire Hathaway, Inc., thereby making the estimate far more representative of the industry as a whole. Levine RVS at 7. The Alliance for Rail Competition made a similar point in its Opening Comments. An approach that requires one to ignore 30% of the industry is of dubious value, especially if one is seeking not to throw away valuable information.

Accordingly, the Board should rely solely on the CAPM and not utilize the MSDCF. This position is also supported by Concerned Shipper Associations, Olin Corporation, and AECC.

B. The CAPM is Not Tainted by Unduly Low Interest Rates

The AAR and Dr. Villadsen attempt to construct an argument that starting in 2008, and perhaps continuing through 2012, the CAPM has had a downwards bias

because of unduly low interest rates. The supporting evidence appears to consist entirely of the observation that there was an increased spreads between corporate and Treasury bond yields over that period, perhaps due to expansionist monetary policies that lowered Treasury bond yields. Villadsen VS at 22-25.

The claim is defective in numerous respects. First, the corrective adjustment posited by Dr. Villadsen (1.1% in 2008-2009, and no more than 0.5% in subsequent years; Villadsen VS at 25), is very modest in view of the substantial disparity between the MSDCF COE and CAPM COE values for the railroad industry calculated by the Board using its hybrid methodology. Appropriate adjustments to the CAPM COE to reflect a more accurate (less backwards looking) MRP would dwarf the adjustments contemplated by Dr. Villadsen.

Second, the available data for railroad debt does not reflect spreads of the magnitude discussed by Dr. Villadsen. As part of its annual cost of capital decisions, the Board determines the cost of debt (“COD”)³⁰ as well as the RFR, reflecting the rate on 20-year Treasury bonds. It is thus a simple matter to calculate the resulting spread as the difference between the railroad COD and the RFR. The railroad spread is not nearly as large or persistent as that noted by Dr. Villadsen for corporates generally. The following

³⁰ NS’s expert witness, Professor Cornell, misstates how the Board measures the COD. He asserts that “[t]he cost of investment grade debt is readily identifiable by the interest rate that a company pays on recently issued debt; its measurement is straightforward and relatively uncontroversial.” Cornell VS at 28. In fact, the Board looks to the interest rate implied by the outstanding payment rate and the prices for all outstanding railroad debt over the past year (to the extent information is available). Professor Cornell’s approach invites distortion to the extent that the maturity and other qualities of the debt (collateral, *etc.*) issued in the past year differ from those of the outstanding railroad debt as a whole.

table compares the spread between the Board’s COD and RFR with that noted by Dr. Villadsen between A-rated corporates and 20-year Treasury bonds (presumably the same measure as the RFR) on page 24 of her VS:

Table 2 Comparison of Basis Point Spreads Between Railroad Cost of Debt (“COD”) and A-Rated Corporate Bonds Relative to RFR/20-Year Treasuries		
Year	Spread Between Railroad COD and RFR	Spread Between A-Rate Corporate Bonds and 20-year Treasuries
2003-2007	64 ³¹	106
2008	221	265
2009	161	263
2010	58	166
2011	37	183
2012	75	180
2013	56	161

The spread between the railroad COD and the RFR is far more modest than discussed by Dr. Villadsen, and the increase in the railroad spread was also smaller and/or briefer and was effectively reversed by 2010. The data shows similar increases in the railroad and corporates spreads for 2008 relative to 2003-2007 (157 for railroads and 159 basis points for corporates), although the railroad COD yield was still 44 points below that for corporates in 2008, reflecting the low railroad baseline spread for 2003-2007. However, the railroad COD declined by 61 basis points in 2009 (compared to only 2 basis points for general corporates). By 2010, the railroad spread was only 58 basis points, one-half of the general corporate spread (106 basis points) identified by Dr. Villadsen for the 2003-2007 baseline for A-rated corporates, and even below the baseline

³¹ The railroad baseline COD/RFR spread for 2003-2007 of 64 basis points includes a spread of only 4 basis points in 2003 and 21 basis points in 2004.

spread of 64 basis points for railroads. The railroad COD spread remained at low levels in subsequent years (37 basis points in 2011, 75 basis points in 2012, and 56 basis points in 2013). The railroad data thus does not reflect the spreads depicted by Dr. Villadsen. Triantis RVS at 10-11.

Third, the core of Dr. Villadsen's concern seems to be that spreads had grown to be too large compared to the historical norm, such that the CAPM COE is understated relative to long-term trends because of temporary conditions. Significantly, Dr. Villadsen and her colleagues took the opposite view in responding elsewhere to a "NERA claim that the WACC in the Brattle report is too low," when they asserted that "NERA fail to account for the significant fall in both nominal and real risk-free rates which have occurred since 2009.... In this particular case, the risk-free rate has dropped substantially since 2009 and 2010."³² Furthermore, the concern expressed by Dr. Villadsen is effectively that the CAPM has become too forwards-looking and insufficiently representative of the past. That concern is contrary to her contention elsewhere is that "[t]he backward-looking nature of CAPM means that it may not capture contemporaneous changes in the market, an industry or a company." Villadsen VS at 20-21, *quoted in* AAR Op. at 26. The AAR thus relies on the sort of contradictory assertions that it unfairly seeks to impute to WCTL.

³² Dan Harris, Bente Villadsen, and Jack Stirzaker, *The WACC for the Dutch TSOs, DSOs, water companies and the Dutch Pilotage Organisation* (Brattle Group, Prepared for NMA, March 4, 2013) (available on the Brattle Group's website), at 32, 33.

Fourth, and related, the objective of the COE estimation is to measure the opportunity cost of investing in railroad equities. If the Treasury rate has declined, then it is reasonable to expect that an investor needs less of a total return to be induced to invest instead in railroad equities. Ignoring the posited decline in the RFR would thus result in offering the investor excessive inducement. Dr. Villadsen's analysis may thus be further confirmation that the MSDCF values have been overstated for the five-year period. Moreover, if the RFR is too low to be sustained, then the RFR will eventually increase, and the COE will increase along with it.

Fifth, Dr. Villadsen's assertions that the CAPM COE has been suppressed by monetary policy are, as explained by Professor Triantis, contradicted by the relatively high CAPM in 2013, "the second highest since the STB began utilizing the CAPM, and higher than the 2006 value when the RFR was 5%." Triantis RVS at 11. He further notes the importance of "look[ing] at the overall cost of equity rather than simply the RFR in isolation," and concludes that the evidence does not indicate "that monetary policy has distorted the cost of equity emerging from the CAPM." *Id.*

There should be a very strong basis, which the AAR has not provided, for overriding the directly observable RFR, especially as the RFR is the most tangible element of the CAPM. In any event, the AAR has certainly not provided a basis for concluding that railroad investors needed a 15.95% return in 2008, as estimated by the CAPM, or even a 13.17% combined MSDCF/CAPM average return, in order to be induced to invest in railroad equities.

C. The Board Should Utilize a More Realistic MRP

WCTL explained in its opening comments that the Board should apply the CAPM using a more realistic MRP, such as one based on a 50-year historical average or one reflecting current surveys of financial professionals, both of which would support a MRP no higher than 4.7% in the current environment. WCTL Op. at 31-40; Levine VS at 13, 24; Triantis VS at 12-15; Triantis RVS at 5, 10-11.

Dr. Villadsen has elsewhere recognized the limitations in relying on an excessively dated MRP without appropriate adjustment. “[E]conomists have recognized that there are a number of events that have taken place in the past that may affect the historical ERP,” and “some of these events may not be repeated, and so the historical data should be revised to account for these events and make a better forwards-looking ERP estimate.” Harris, Villadsen, and Lo Passo, *Calculating the Equity Risk Premium and the Risk-Free Rate*, *supra*, at 29. Use of 50-year historical or survey MRP would also generally conform to 5% MRP now recommended by Duff & Phelps.

Compared to the 1926-based Ibbotson MRP, which yielded a figure of just under 7% for 2013, the recommended MRP would better reflect current expectations and better capture the opportunity cost of investing in equities generally, which is how a forwards-looking COE estimate should operate.

D. The Board Should Utilize a Blume Adjustment for the Beta

The Blume adjustment to the beta reflects mainstream financial practice and contributes to accuracy, as WCTL explained in its opening comments. WCTL Op. at 40-45; Levine VS at 23-24; Triantis VS at 8-9; Triantis RVS at 5, 11.

A Blume adjustment is also responsive to Dr. Villadsen’s concern that the CAPM be more forwards-looking and less backwards-looking. Dr. Villadsen’s work elsewhere has made use of a Vasicek adjustment to the beta. *See, e.g., The WACC for the Dutch TSOs, et al., supra*, at 18. The CTA considered both the Vasicek and Blume adjustments, which provided similar adjustments on average, but adopted the Blume adjustment as it was “simpler, more easily understood, and easier to implement.” *CTA Decision* at ¶ 376, *discussed in WCTL Op.* at 41, n.35.

A Blume adjustment would also help address some of the concerns with the beta portion of the CAPM noted in the AECC Op., App. A at 3-8, 14.

IV. AN ENVIRONMENTAL IMPACT STATEMENT IS NOT NEEDED

The Board stated in its April 2, 2014 decision at 5 that “[t]his action will not significantly affect either the quality of the human environment or the conservation of energy resources.” It would seem difficult to disagree with the Board’s conclusion since all the Board has done so far is to issue a notice and invite comments, and has not issued any proposal of its own.

Nonetheless, Friends of the Earth, Inc., supported by Western Organization of Resource Councils Inc. and Northern Plains Resource Council Inc. (collectively, “FOE”), has filed comments, including a supporting Verified Statement from Gerald W. Fauth III (“Fauth VS”), challenging the finding of no significance. The FOE/Fauth theory is that change in the COE methodology will result in a change in railroad coal rates, which will in turn result in a change in the volume of coal transported by rail,

which will have a significant effect on coal volumes transported and burned, which will have a significant impact on the environment.

However, the FOE theory is completely speculative with no real facts or solid analysis to support any of the assertions. Indeed, Mr. Fauth carefully employs terms such as “could have” (pp. 8, 22), “could result” (p. 9), “may have” (pp. 11, 15, 16) in his statement, rather than “will” or “likely.” Mr. Fauth’s analysis is thus inherently speculative and does not constitute a showing sufficient to require the Board to alter its initial analysis.³³

Moreover, there is reason to be very skeptical of Mr. Fauth’s and FOE’s conjectures. For example, Mr. Fauth posits that NS has been constrained by revenue adequacy, but only one coal rate case has been brought against NS invoking the constraint, and that case settled. No other coal rate case has been brought against NS for over ten years. Moreover, very few rate cases in general have been brought in recent years,³⁴ indicating that a modified COE methodology is unlikely to have a significant impact on coal volumes.

³³ See, e.g., *Hammond v. Norton*, 370 F. Supp. 2d 226, 246 (D.D.C. 2005) (EIS need not address “remote and highly speculative consequences”); *All Indian Pueblo Council v. United States*, 975 F.2d 1437, 1444 (10th Cir. 1992) (NEPA “does not require agencies to analyze the environmental consequences of alternatives it has in good faith rejected as too remote, speculative”), quoted in *Colorado Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999); *Concerned About Trident v. Rumsfeld*, 555 F.2d 817, 829 (D.C.Cir. 1977) (“NEPA does not mandate that every conceivable possibility which someone might dream up must be explored in an EIS.”), quoted in *The Ocean Conservancy v. Gutierrez*, 394 F. Supp. 2d 147, 164 (D.D.C. 2005).

³⁴ The recent coal rate cases are Intermountain Power Authority (2010, 2012), Southern Mississippi Electric Power Association (2008), Arizona Electric Power Cooperative

While a revised COE may have a significant bearing on the rates that some shippers pay their carriers, it is a very different thing to say that changes in those rates will result in significant increases in volumes. Notably, Mr. Fauth presents no evidence to that effect, and the Board's regulations specify that "[n]o environmental documentation will normally be prepared ... for ... [r]ate, fare, and tariff actions." 49 C.F.R. § 1105.6(c)(3). The Board has jurisdiction to consider a rate case only where the shipper is captive and there is no effective competition. Accordingly, the volumes shipped in such a situation are unlikely to be sensitive to the rates.³⁵

In short, FOE has said nothing to disturb the Board's finding that "[t]his action will not significantly affect either the quality of the human environment or the conservation of energy resources."

(2008), and Seminole Electric Power Cooperative (2008). Four rate cases in over six years is not a large number.

³⁵ A shipper that could induce a carrier to offer reasonable rates by withholding shipments would have little reason to engage in a protracted and expensive rate case. If a volume reduction was a significant consequence of the high rates, it would be in the railroads' interests to find a way to move those volumes, independent of any litigation, which would reduce the impact of any COE change on coal volumes. While coal shippers need no longer address product and geographic competition for market dominance purposes, the explanation is in large part that if such competition were effective, coal shippers would exercise such options and avoid bringing rate cases in the first place. It is only when such measures are ineffective (meaning market dominance is present) that shippers become willing to bear the substantial cost, risk, and disruption of bringing a rate case before the Board.

V. CONCLUSION

For the reasons stated above and in WCTL's Opening Comments, the Board should estimate the COE by relying solely on the CAPM, modified to include a more reasonable MRP and a Blume-adjusted beta.

Respectfully submitted,

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Dated: November 4, 2014

Its Attorneys

REPLY VERIFIED STATEMENT OF
HARVEY A. LEVINE

REPLY VERIFIED STATEMENT

OF

DR. HARVEY A. LEVINE

My name is Harvey A. Levine. My initial Verified Statement in this proceeding, EP 664 (Sub-No. 2), was included in the “Opening Comments of the Western Coal Traffic League,” dated September 5, 2014. In that Statement, I included an overview of my qualifications, along with a resume, and thus do not repeat such information herein. The purpose of this second Verified Statement is to respond to the Opening Comments of the Association of American Railroads (AAR),³⁶ and the Verified Statement of its expert witness, Dr. Bente Villadsen of the Brattle Group, as they relate to the issues that I initially addressed.

I. THE DUBIOUS AAR FOUNDATION

Initially, I offer four concerns with the underlying foundation of the AAR submission.

³⁶ Opening Comments of the Association of American Railroads, Before the Surface Transportation Board, Docket No. EP 664 (Sub No. 2), September 5, 2014.

First, I am puzzled by the AAR's premise that there is no way to *test the predicted estimates* for the cost of equity.³⁷ The AAR may be correct in a technical sense that the cost of equity does not lend itself to precise or scientific determination. The same could be said of many, perhaps most, "economics" determinations, but is ultimately inconsequential. The fact is that investment and financial decisions are made all the time, and those decisions need to take into account, or at least not distort, the cost of equity. The CAPM has become the dominant model for estimating the cost of equity because it produces what the AAR should recognize is useful information. Even if the resulting decisions may be less than perfect, they plainly pass the "test" of functional soundness, as otherwise we would have little to show in terms of an economy and society. The AAR's suggestions to the effect that both MSDCF and the CAPM are both limited to the point of being questionable value and that they should consequently be averaged together does not reflect the consensus of business professionals, who have opted for the CAPM for financial and investment decisions. The AAR's suggestions do, however, lead to my second general observation and concern with the AAR philosophy.

A second puzzlement is the AAR's underlying logic that averaging two "bads" results in a "good." On one hand, the AAR states that because *all*

³⁷ Ibid. p. 2.

*financial techniques used to estimate the cost of equity are inherently imprecise,*³⁸ and *every technique has different strengths and weaknesses,*³⁹ the proper course of action for the Board would be to continue to average the imprecise results of two flawed models. In the mind of the AAR, the rationale of the averaging approach is that it can *harness the strengths of each model while mitigating the known weaknesses, resulting in a more reliable estimate of an inherently undetectable figure.*⁴⁰ But in espousing such a philosophy, the AAR does not provide evidence that the strengths of each model cancel the weaknesses of the other model. Rather, the AAR implicitly assumes that the two models are equal in strengths and weaknesses, and by averaging them, more information would be added to the calculation, resulting in an improved output. The AAR supports this notion by quoting Stewart Myers, Professor of Finance at MIT's Sloan School of Management, who stated that: *Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.*⁴¹ Yet, the AAR provides no evidence that the MSDCF is accompanied with more useful information than the CAPM, and as I have discussed in my Opening Comments, I believe that the opposite is true. Thus, a superior CAPM, or even the Board's current CAPM with its limitations, is far preferable to the average of the CAPM and an inferior MSDCF.

³⁸ Ibid., p. 2.

³⁹ Ibid. p. 3.

⁴⁰ Ibid.

⁴¹ Ibid.

Third, much of what the AAR has espoused seems to be based on the mistaken premise that the MSDCF is a forward-looking model, compared with the supposedly backward-looking approach of the CAPM. As the AAR has stated: *A disgruntled WCTL launched a campaign to encourage the Board to ignore the valuable information provided by the forward-looking MSDCF model and instead rely just on the backward-looking CAPM.*⁴² The AAR goes on to quote its witness, Dr. Villadsen, who stated that . . . *CAPM relies on historical information to determine the risk factor for the railroad industry, while a multi-stage DCF model uses forward-looking growth estimates and contemporaneous cash flow and stock price information.*⁴³ But the reality is that both models employ historic information to project future investor behavior, and in fact, some CAPM historic data are more current than MSDCF historic data. Current risk-free interest rates can be easily obtained from the Treasury Department (on-line), as well as from a host of financial institutions. The most recent betas are more current than railroad cash flows that are usually available 3-6 months after the prior year's end. And risk-premium rates, although historic under the Board's current approach, tend to exhibit relative small changes from year to year, and are also available on a "real-time" basis (although the Board also could, and should, employ available survey data on the risk premiums currently used by Chief Financial Officers and others). In essence, both the MSDCF and the CAPM are forward thinking in that they

⁴² Ibid.

⁴³ Ibid., p. 4.

project future measures such as risk-free interest rates, investment risk, risk-premium rates, and railroad cash flow. Similarly, they both use historic information and relationships to make such projections. In reality, the historic relationships within the CAPM are far steadier and more reliable as the basis for future projections than are five-years of railroad cash flow information, and then pure speculation as to what the next 10-plus years will bring. For the AAR to characterize the MSDCF as a futuristic model and the CAPM as an historic model is pure folly.

Fourth, and finally, the AAR reliance on the quote that *only a fool throws away useful information*, is hypocritical. I don't disagree with the quote. In fact, I endorse it. But the AAR has ignored a significant body of useful information on forming its positions regarding the determination of the railroad cost of equity capital (COEC). Presented below are some examples of useful information that the AAR has, and continues, to ignore:

1. The CAPM is used as the sole determinant of railroad cost of equity capital in Canada. The Canadian Transportation Agency adopted the CAPM after much research, analysis, and debate. The two major railroads in Canada, the CN and CP, are members of the AAR and operate lines in the U.S., and the largest U.S. railroads operate segments in Canada.
2. There are long, historical records of the three CAPM components that have been collected and recorded by highly respected financial

institutions. These data are publicly available and allow for a market (nation-wide) cost of equity capital. Consider the market data over the past six years, when the Board used the MSDCF and CAPM.

of ⁴⁶ <u>Capital</u>	20-Year ⁴⁴ Market Risk ⁴⁵ Market Cost			
	<u>Year</u>	<u>Bond Rate</u>	+	<u>Premium Rate</u> = <u>Equity</u>
	2008	4.36%		10.8%
	2009	4.11		10.8
	2010	4.03		10.8
	2011	3.62		10.2
	2012	2.54		9.2
	2013	3.12		10.1

As shown above, the market CAPM rates (cost of equity capital) have been rather consistent, and fall around 10 percent. These calculations should not be ignored in that, putting aside for the moment the overstatement in the market risk premium, they provide

⁴⁴ U.S. Treasury Department, 20-year maturities, website. (Adopted by STB in annual CAPM calculations.)

⁴⁵ Ibbotson data adopted by STB in annual CAPM calculations.

⁴⁶ A beta of 1.0 was employed, representing market risk as a whole.

a sound benchmark for Board determinations, assuming, as I believe, that the risk of investment in railroads mirrors the market as a whole. Thus, the market COEC can, and should, be used as a “default” and benchmark for the railroad industry.

3. The AAR ignores the “useful information” that the CAPM has wide acceptance in the financial and business communities, as I stated in my Opening Comments. Most recently, a comprehensive study of the best practices used by financial and business entities (including the UP) concluded that, *CAPM is currently the preferred model for estimating the cost of equity*, relied on exclusively by 90% of the leading firms surveyed.⁴⁷
4. The AAR ignores that it has become common practice to implement the CAPM with a lower Market Risk Premium than the Board has utilized and also with a Blume adjustment to the beta, as discussed in my Opening Comments.
5. The AAR ignores the transparency and ease of benchmarking the CAPM. The inputs to the CAPM are publicly available and easily obtainable from a variety of credible sources, and used by financial analysts and corporate management throughout the country.

Investors make decisions based on CAPM data and since the

⁴⁷ W. Todd Brotherson, et al., “Best Practices in Estimating the Cost of Capital: An Update,” Journal of Applied Finance, No. 1, 2013, pp. 17, 19, 32. Only one of the twenty firms surveyed relied at all on the dividend discount model, and that was as a check on the CAPM.

COEC is an opportunity cost, comparative CAPM inputs and results are as accessible to the Board, the railroad industry, and railroad customers, as they are to the investors.

6. Finally, the AAR ignores the fact that virtually a third of the railroad industry (BNSF) is excluded from the MSDCF determination, but can readily be included in the CAPM calculation. As I discussed in my Opening Comments, the beta for the BNSF's parent company is around 0.27, while the beta for the BNSF's comparable railroad (UP) is about 1.04. An average of the two betas, or the midpoint of the two betas, or even an "in-between" beta based on BNSF relative revenue to Berkshire Hathaway, could readily be adopted by the Board. Such is not the case with the MSDCF.

II. THE THREE (FOUR) REASONS

The AAR provides *three reasons, the Board should stand fast*.⁴⁸ In fact, the AAR offers four such reasons. First, it opines that multiple models benefit from the relative strengths of each model, especially when one is based on historic data while the other is forward-looking.⁴⁹ I have already discussed this fallacy, above. Second, the AAR professes *overwhelming support for the use of multiple*

⁴⁸ Ibid., p. 4.

⁴⁹ Ibid.

models,⁵⁰ while not providing evidence of such support, and in fact (as stated above), ignoring the high popularity of the CAPM as the preferred model by the business and financial communities, and the use of exclusively the CAPM by the Canadian Transportation Agency. Third, the AAR proclaims the MSDCF to be reasonable in that its results in 2013 were close to the results of the CAPM,⁵¹ while ignoring rather huge deviations between the two models in the five prior years. In no year is the difference in the outcomes of the two models supposed to approach the realities between 2008 and 2012. And finally, the AAR claims that replacing the current MSDCF model with a revamped MSDCF model would be onerous and require the Board to address *a wide range of complex issues in tailoring a model for the railroad industry*.⁵² However, eliminating the MSDCF does not require revamping what is no longer in use.

III. RATIONALE FOR USING THE CAPM FOR RAILROADS

In my Opening Comments I discussed the rationale of the CAPM as the preferred model to determine the railroad COEC, and I will not repeat that discussion in this Statement. Rather, I have found additional support for the CAPM in a review of alternative models undertaken by Stewart C. Myers, a

⁵⁰ Ibid.

⁵¹ Ibid., p. 5.

⁵² Ibid.

principal of the Brattle Group, for the Australian Pipeline Industry Association (APIA).⁵³ Professor Myers confirms that the CAPM is *the model most widely used by U.S. corporations to estimate the cost of capital*,⁵⁴ and that *careful applications of the CAPM tend to give estimates of the cost of equity that are sensible and reasonably stable over time*.⁵⁵ He offers four reasons of caution regarding the CAPM that should not be major hurdles to the Board. First, he warns that betas and risk-premium data are statistics that are subject to a degree of error (confidence limits), and thus a final calculation is actually within a statistical range. But as Professor Myers also states, statistical ranges also apply to other models,⁵⁶ and it is my contention that the statistical probabilities of betas and risk-premium spreads are more reliable than for projections of “average” railroad cash flows. Even if not the case, the issue of statistical ranges applies to all forecasts and all models, and should not impede the Board’s use of the CAPM.

Second, Professor Myers claims that the CAPM has historically underestimated the returns to low-risk firms with betas under 1.0, and states that in a regulatory environment, the matter has been addressed by the use of an

⁵³ Stewart C. Myers, “Estimating the Cost of Equity: Introduction and Overview,” for the Australian Pipeline Industry Association (APIA), February 17, 2013, accompanying the Brattle Group, Inc., “Estimating the Cost of Equity for Regulated Companies.”

⁵⁴ *Ibid.*, p. 2. Dr. Myers cites J.R. Graham and C. Harvey (2001), “The theory and practice of corporate finance: Evidence from the field,” *Journal of Financial Economics* 60, 187-243, and J.R. Graham and C. Harvey (2002), “How do CFOs make capital budgeting and capital structure decisions?,” *Journal of Applied Corporate Finance* 15, 8-23.

⁵⁵ *Ibid.*, p. 3.

⁵⁶ *Ibid.*, p. 3.

“empirical CAPM.”⁵⁷ In this case, the railroad betas have recently been over 1.0, and thus not prone to Professor Myers’s assertion, but if the Board desires, it could adopt a Blume adjustment or other mechanism to achieve better correlation with historic results.

Third, Professor Myers discusses the potential mismatch between CAPM inputs that are based on a widely-diversified market, with the investment in a particular company and/or industry.⁵⁸ But investing in the railroad industry is somewhat akin to investing in the general economy. The demand for railroad transportation is a “derived” demand in that it derives from the demand for a multitude of products and services to be available at various locations throughout the country. This is precisely why the weekly railroad carload reports published by the AAR are used by many entities, including the U.S. government, as a concurrent indicator of the nation’s economic activity. Container traffic (general merchandise) constitutes the largest percentage of railroad traffic, while bulk commodities (coal, grain, petroleum, building materials, etc.) and automobiles dominate the remaining traffic. The third concern about the CAPM – diversified market versus more narrow industry – does not apply to the railroad industry, and should not be an issue with the Board’s use of the CAPM.

And fourth, Professor Myers warns of a *mechanical application* of the CAPM because in such times when interest rates have been forced to

⁵⁷ Ibid., pp. 3-4.

⁵⁸ Ibid., p. 4.

extraordinary low levels by the government, *routine implementations of the CAPM have yielded costs of equity less than the regulated company's cost of debt – an impossible result.*⁵⁹ However, the phenomena has never even been close to occurring when the CAPM has been used by the Board over the past six years, particularly as the railroads have continued to enjoy a very low cost of debt, and if benchmarked, as I have suggested in my Opening Comments, the CAPM would never be mechanically and/or routinely applied.

In summary, the four concerns of Professor Myers can readily be addressed by the proper application of a CAPM, given all the other “useful” information to check, validate, or adjust initial CAPM results.

From an academic perspective, it may make sense to use multiple models in estimating the COC and COEC, as in academia continuous study toward the goal of perfection is the lifeline of research and ensuing publication. In fact, there are other COC and COEC models discussed in academia.⁶⁰ But to a regulatory agency tasked with applying a standard of capital attractiveness, reasonableness and transparency should be at the core of its decision-making. The CAPM, as Professor Myers states, is *simple and logical*.⁶¹ There is no need to employ a MSDCF that is far from simple, far from transparent, and far from reliable.

⁵⁹ *Ibid.*, p. 5.

⁶⁰ The Comparable Earnings Model is popular and is one that I previously suggested would be an apt benchmark for CAPM calculations. Professor Myers, in his paper for APIA, discusses the Fama-French Three-Factor Model and Dividend Discount models.

⁶¹ *Ibid.*, p. 2.

Consider the comparative results of the COEC for the U.S. market as a whole, and the railroad industry using both the CAPM (with its high Market Risk Premium and without a Blume beta adjustment) and MSDCF as presented below.

<u>Year</u>	<u>U.S. Market</u>	<u>Railroad</u>	
		<u>CAPM</u>	<u>MSDCF</u>
2008	10.8%	10.4%	16.0%
2009	10.8	11.4	13.3
2010	10.8	11.8	14.1
2011	10.2	11.3	15.8
2012	9.2	10.3	16.5
2013	<u>10.1</u>	<u>12.5</u>	<u>13.4</u>
Average	10.3%	11.3%	14.8%

The experience over the past six years is that on average, the railroad COEC according to the CAPM was about 10% higher than the market as a whole, and according to the MSDCF, about 47% higher. This is useful information that the AAR ignores, but more importantly, it reveals the illogical calculations of the MSDCF. Rhetorically speaking, is it possible, let alone probable, that investors have required returns from the railroad industry that are almost 50% greater than from the market as a whole (and even greater with a more reasonable market risk premium)? Is it likely that in the recent period of very low interest rates that the

COEC to the railroad industry was as much as eight times higher than the cost of debt? Do railroad costs of equity capital in the 15% and 16% range pass the “sanity test” when investors are hard pressed to earn a 0.5% return on their bank deposits? Have any of the major railroads had difficulty in attracting capital over the past six years? Are not the UP and BNSF less risky and more profitable than the market as a whole? These, and other, rhetorical questions come to mind when comparing the results of the market and railroad MSDCF results since 2008.

In conclusion, I suggest that that Board not allow its annual determination of the railroad COC to be overtaken by academic theories that result in unnecessarily complicating what is, at best, a forecast of market factors. Rather, there is a long history of these alternative risk/return measures that readily are evident in the CAPM. With four dominant railroads operating in the U.S., with one of the two largest railroads being part of a conglomerate, and with the railroad business being reflective of markets in general, the CAPM is clearly the preferred model for determining the railroad COEC, and together with a process of benchmarking its results, should be retained by the Board as the sole model for its annual calculation.

REPLY VERIFIED STATEMENT OF
ALEXANDER J. TRIANTIS

Reply Verified Statement of Prof. Alexander J. Triantis

The opening comments filed by the Association of American Railroads (AAR) and its expert, Dr. Villadsen, contain a number of statements and opinions that are contrary to widely held beliefs and practice for cost of equity estimation. My reply comments address these issues.

Estimates don't necessarily improve when multiple models are used

AAR's central argument appears to be that since the CAPM does not produce perfect estimates of the cost of equity, the STB would be well served by averaging the CAPM estimate with the estimate inferred from the Ibbotson MSDCF model. This argument implicitly assumes that the Ibbotson MSDCF model produces informative and unbiased estimates of the cost of equity. However, as I explained in my opening statement dated September 5, 2014, the Ibbotson MSDCF as applied by the STB produces unreliable and biased estimates of the cost of equity for the railroad industry. Specifically, I noted that "the MSDCF unnecessarily introduces noise into the estimation process."

While I don't dispute Dr. Villadsen's notion that one shouldn't throw away information, the underlying logic behind this statement requires that the information is - to be redundant - actually informative. AAR and Dr. Villadsen do

not appear to explicitly acknowledge that there are biases in the MSDCF technique, and that the errors in estimating the many input assumptions required by the MSDCF model effectively get aggregated into a large estimation error for the resulting cost of equity inferred from the model. Once the bias and large errors are recognized, the argument that estimates improve by using additional models no longer holds true. Instead, the opposite occurs, as use of the MSDCF contributes to distortion rather than accuracy.

On page 9 of her report, Dr. Villadsen states “For example, it is possible that one assumption in the current environment has a slight upward bias while another assumption has a slight downward bias, so that the offsetting biases lead to an accurate overall result.” While she does say that this is “possible”, and not likely, I still view this statement as suggesting the hope of an idealistic outcome that comes from combining model estimates, as opposed to the reality that we have seen in recent years where biases do not offset each other in any way.

The CAPM has widespread support in practice; MSDCF does not

The AAR opening statement (page 4) notes that there is “overwhelming support for the use of multiple models.” As I presented in my opening statement, there is instead overwhelming support for the use of the CAPM alone. Despite Dr.

Villadsen’s assertion that “best practices use multiple models...,” survey evidence

does not indicate that companies are typically using multiple models, but rather that they continue to rely predominantly on the CAPM. If companies did not consider the CAPM to be reliable and informative, they would not rely on it so heavily and would make considerable use of other models. Furthermore, the MSDCF approach in general, and thus the Ibbotson model itself in particular, are infrequently used. The companies that are using the CAPM to determine the cost of equity are investing billions of dollars in new capital and corporate acquisitions every year. The fact that they have chosen to apply the CAPM to guide their decisions, rather than employ two or more models and average out their estimates, speaks to their confidence in the CAPM. It is unclear to me why the STB should deviate from this common practice consistently followed by financial professionals across various industries. The AAR's insistence on using a specific variant of the MSDCF approach that appears to consistently yield estimate values that depart significantly from those produced by the CAPM seems particularly suspect, especially in the absence of any demonstration that the CAPM values are actually inaccurate

It should also be noted that Morningstar has chosen to no longer provide cost of equity estimates based on the MSDCF. This follows evidence from its own cost of capital survey in 2010 that shows that few companies use the MSDCF model.⁶² In

⁶² M. Barad, "Capturing Industry Risk within Cost of Capital Analysis," *BVUpdate* (March 2011) (also available from Morningstar's website).

contrast, several major financial data providers supply beta and MRP estimates, providing clear confirmation of the importance of the CAPM model and its widespread use.

It is also the case that the Canadian Transportation Agency (CTA) utilizes the CAPM as its sole methodology to estimate the cost of equity, following an extensive review of evidence that included a study coauthored by Dr. Villadsen. The Agency cited many advantages of using the CAPM to provide greater certainty and transparency, and to adapt to changing market information.

Harness the strengths while mitigating the known weaknesses

AAR suggests (on page 3) that by using multiple models, one would “harness the strengths while mitigating the known weaknesses.” As mentioned earlier, I don’t see how merely averaging out estimates from two models would necessarily accomplish this mitigation of weaknesses. In fact, current STB practice ignores apparent weaknesses in the models and in so doing exacerbates error rather than mitigating it. Since the MSDCF values have exceeded the CAPM values in recent years, use of the MSDCF would appear to reflect an assumption, tacit or otherwise, that the CAPM has produced values that are too low. But there is no convincing support for this assumption, and significant basis to conclude, as discussed later in this statement as well as in my original statement, that the STB

has implemented the CAPM in a way that has produced values that are overstated, particularly recently.

With regards to the MSDCF model, its weaknesses are numerous and unfortunately are not easily mitigated, particularly given the way STB currently applies the model. With regards to the CAPM model, the strengths of the CAPM model are well accepted, leading to its widespread use in practice. However, I have also identified in my opening statement two weaknesses of the current application of the CAPM model by the STB. The first weakness is the use of a beta that does not incorporate the well-known and frequently utilized Blume adjustment. The second weakness is the use of a Market Risk Premium (MRP) that is too high relative to common practice. Addressing these two weaknesses will achieve the goal of harnessing the strength of the most widely used model while addressing known weaknesses of the current application of the model.

Convergence of estimates is illusory

AAR argues (on pages 5 and 40) that because the cost of equity estimates in 2013 from the CAPM and MSDCF are relatively close, they are somehow converging to the same (and presumably accurate) value. This is a strong and inappropriate conclusion. While the MSDCF doesn't provide as large of an upward biased estimate in 2013 as in previous years, especially 2012, it continues to provide an

estimate that is consistently higher than the CAPM. Furthermore, the estimates are closer to one another in 2013 largely because of a very high beta estimate, the highest beta by far since the STB began utilizing the CAPM in 2006. As I discussed in my opening statement, high beta estimates based on historical data are upward biased relative to the forward-looking betas that are observed. If the Blume adjustment were applied, as is appropriate, the beta estimate would be lower, and the CAPM would be significantly lower than the MSDCF estimate for 2013. Use of a more recent MRP would also lower the CAPM estimate for the cost of capital, not only in 2013, but in all years since 2006.

Looking back not simply at one year but at many years of evidence, it appears clear that the MSDCF is consistently high, which begs the question of why this is the case. The answer lies with the issues I outlined in my opening statement. I'll outline each again, and will refer to statements of AAR and Dr. Villadsen that relate to these issues.

First, any attempt to divide up a long horizon into three simple stages is a rough approximation to start off with. It forces strong assumptions about constant growth rates over long periods of time, which loses the flexibility that analysts and investors typically build into their DCF models.

Second, the procedure uses an EPS growth estimate based off of the median of typically disperse estimates provided by a few analysts. These estimates are based on recent history of the company's performance, and adjusted based on guidance provided by companies and on analysts' own opinions. These estimates are unlikely to prove accurate in practice, especially over the period of time employed by the MSDCF. AAR does not address these shortcomings in its statement. Instead, it touts the MSDCF as being a fundamentally different approach from the CAPM in that it is forward-looking rather than backwards-looking. In fact, both models are forward-looking in theory. In practice, they both use historical information to try to estimate key parameters. In the case of MSDCF, the analyst growth rate estimates that are such a crucial driver of the resulting cost of equity are heavily influenced by recent corporate performance. While analysts make adjustments to the recent trajectory of earnings growth, since the median estimate is used in AAR's approach, the growth estimate is ultimately dependent on the subjective beliefs of only those analysts whose estimates are closest to the median.

Third, EPS growth rates are biased upwards when a firm repurchases its shares. Dr. Villadsen puts forth an argument that there is an offsetting effect due to a simultaneous adjustment to the cash flow. However, this argument is unclear and potentially misleading. The adjustment made appears to rest on a double counting of the cash flow by aggregating a measure of the payout projected to be made to

shareholders through the buybacks with the preexisting measure of cash that the original model posits is available to be made to shareholders.

Fourth, the STB's use of a single growth rate in the second stage that drops suddenly at the terminal date is unrealistic and produces an upward biased cost of equity. Dr. Villadsen discusses using a second-stage where the growth rate is phased-in gradually toward the terminal growth rate, which is preferable. This phased-in approach appears to be the standard approach of the Brattle Group and has appeared in other testimony/reports that she has (co-)authored. However, she applies some of the terminal period shortcuts to cash flow estimation that are inaccurate, as I describe below. As a result, her conclusion that the effect on the cost of equity is not large is misleading. She also suggests (on pages 31-32 of her testimony) that the second growth period should be much longer than five years, which increases the cost of equity by projecting high growth rates for an extended period of time. It is unlikely that high EPS growth will be sustained in the rail industry for such a long time period.

Fifth, the cash flow earnings metric used in the terminal value differs from that in the earlier stages in ways that upward bias the cash flow and lead to a cost of equity estimate that is too high. The STB currently assumes that during the terminal period, capital expenditure and depreciation are equal in value each year, and that deferred taxes are equal to zero. Dr. Villadsen supports this practice by

explaining that in steady-state, there will be “no growth capital,” and only “maintenance capital,” and therefore that capital expenditure each year is merely equal to depreciation. This is not necessarily the case in an environment with positive inflation where new capital may be more expensive than the book value of existing capital. Capital expenditures, like all cash flows in the analysis, are in nominal (not real) dollars, and depreciation is based on historical costs, not replacement costs. Given the long depreciation horizon of many fixed assets in the rail industry, the impact of this on cash flows can be quite significant. Furthermore, capital expenditures associated with maintenance of existing capacity, rather than capacity expansion, appear to be quite significant in the railroad industry and will likely decrease the free cash flow for an extended period of time.⁶³

Dr. Villadsen also believes that “because deferred taxes are linked to capital expenditures, this amount is expected to disappear as capital expenditures approach maintenance levels in the long term steady-state equilibrium” (page 12 of her statement). The tax system is based on accelerated depreciation, which allows companies to reduce taxable income in the early years of holding an asset, and thus defer taxes into later years. This benefits companies due to the time value of money. However, tax payments do not disappear, they are merely deferred into

⁶³ Federal Railroad Administration, *Freight Rail Today*, available at www.fra.dot.gov/Page/P0362.

the future. Deferred taxes represent a significant liability for railroad companies, and this liability correspondingly reduces the terminal value of equity, or equivalently the cash flows that drive this equity value. By ignoring the negative impact of deferred taxes in the terminal period, the cash flows are upward biased, and thus so is the cost of equity inferred from the MSDCF calculation.

Back to the CAPM, done right

Given all these issues with the MSDCF, one should not have confidence in the cost of equity estimates that emerge from the Ibbotson MSDCF model. Errors in each of the input assumptions all feed into a much larger potential error in the single output that is being backed out of the model, namely the cost of equity. While one might hope that the errors could offset each other, each error here appears to have an upwards bias. This is inherently a challenging and unstable model structure to be using to estimate the cost of equity for the railroad industry.

The CAPM requires inputs as well, though fewer, and with a long history of usage that informs how best to apply the model. The risk-free rate (RFR) is directly observable. The MRP can be estimated based on historical experience. As discussed in my initial report, using the past fifty years to estimate the MRP provides the benefit of a sufficiently long time period to reflect periods of

economic recessions and recovery, as well as high and low interest rates, while at the same time not going too far back in time as to reflect periods with significantly different market and institutional characteristics. In addition, the reasonableness of the estimated MRP can be confirmed through available surveys. These surveys are useful in that they provide a direct measure of current expectations of future (what Dr. Villadsen describes as forward looking) returns, whereas historical data may reflect actual (ex post) returns, as opposed to expected (ex ante) returns that reflect the opportunity cost of capital. A level of 4.7% or less for the MRP appears appropriate under both approaches. It is also the case that Duff and Phelps, which acquired the maintenance of the Morningstar MSDCF model, currently recommends that an MRP of 5% should be used in the CAPM.⁶⁴

AAR's contention that the risk premium has increased and/or that the RFR has been artificially suppressed since the financial crisis of 2008 is based on looking only at one class of corporate bonds, and making an adjustment for default risk that is not well-founded. Bonds of railroad companies don't appear to reflect a higher risk premium or spread relative to the RFR, despite the higher risk assessment of these companies, at least as reflected in a higher beta estimate. Indeed, the cost of equity determined by the CAPM was quite large in 2013, the second highest since the STB began utilizing the CAPM, and higher than the 2006

⁶⁴ Duff and Phelps, "Duff & Phelps Decreases U.S. Equity Risk Premium Recommendation to 5.0%, Effective February 28, 2013" (March 20, 2013).

value when the RFR was 5%. It is appropriate to look at the overall cost of equity rather than simply the RFR in isolation, and it doesn't appear from this evidence that monetary policy has distorted the cost of equity emerging from the CAPM.

The STB should rely simply on the CAPM, the most widely used model for making corporate investment decisions, and employ Blume-adjusted beta estimates as well as a reasonable MRP below 5%, which are typical norms used in practice.

EXHIBIT 1

WCTL COMMENTS IN EP 664 (SUB-NO. 1), FILED APRIL 14, 2008

REPLY VERIFIED STATEMENT

OF

DR. HARVEY A. LEVINE

My name is Harvey A. Levine. My initial Verified Statement in this proceeding, EP 664 (Sub-No. 2), was included in the “Opening Comments of the Western Coal Traffic League,” dated September 5, 2014. In that Statement, I included an overview of my qualifications, along with a resume, and thus do not repeat such information herein. The purpose of this second Verified Statement is to respond to the Opening Comments of the Association of American Railroads (AAR),¹ and the Verified Statement of its expert witness, Dr. Bente Villadsen of the Brattle Group, as they relate to the issues that I initially addressed.

I. THE DUBIOUS AAR FOUNDATION

Initially, I offer four concerns with the underlying foundation of the AAR submission.

First, I am puzzled by the AAR’s premise that there is no way to *test the predicted estimates* for the cost of equity.² The AAR may be correct in a technical sense that the cost of equity does not lend itself to precise or scientific determination. The same could be said of many, perhaps most, “economics” determinations, but is ultimately inconsequential. The fact is that investment and

¹ Opening Comments of the Association of American Railroads, Before the Surface Transportation Board, Docket No. EP 664 (Sub No. 2), September 5, 2014.

² Ibid. p. 2.

financial decisions are made all the time, and those decisions need to take into account, or at least not distort, the cost of equity. The CAPM has become the dominant model for estimating the cost of equity because it produces what the AAR should recognize is useful information. Even if the resulting decisions may be less than perfect, they plainly pass the “test” of functional soundness, as otherwise we would have little to show in terms of an economy and society. The AAR’s suggestions to the effect that both MSDCF and the CAPM are both limited to the point of being questionable value and that they should consequently be averaged together does not reflect the consensus of business professionals, who have opted for the CAPM for financial and investment decisions. The AAR’s suggestions do, however, lead to my second general observation and concern with the AAR philosophy.

A second puzzlement is the AAR’s underlying logic that averaging two “bads” results in a “good.” On one hand, the AAR states that because *all financial techniques used to estimate the cost of equity are inherently imprecise*,³ and *every technique has different strengths and weaknesses*,⁴ the proper course of action for the Board would be to continue to average the imprecise results of two flawed models. In the mind of the AAR, the rationale of the averaging approach is that it can *harness the strengths of each model while mitigating the known weaknesses, resulting in a more reliable estimate of an inherently undetectable figure*.⁵ But in espousing such a philosophy, the AAR does not provide evidence that the strengths of each model

³ *Ibid.*, p. 2.

⁴ *Ibid.* p. 3.

⁵ *Ibid.*

cancel the weaknesses of the other model. Rather, the AAR implicitly assumes that the two models are equal in strengths and weaknesses, and by averaging them, more information would be added to the calculation, resulting in an improved output. The AAR supports this notion by quoting Stewart Myers, Professor of Finance at MIT's Sloan School of Management, who stated that: *Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.*⁶ Yet, the AAR provides no evidence that the MSDCF is accompanied with more useful information than the CAPM, and as I have discussed in my Opening Comments, I believe that the opposite is true. Thus, a superior CAPM, or even the Board's current CAPM with its limitations, is far preferable to the average of the CAPM and an inferior MSDCF.

Third, much of what the AAR has espoused seems to be based on the mistaken premise that the MSDCF is a forward-looking model, compared with the supposedly backward-looking approach of the CAPM. As the AAR has stated: *A disgruntled WCTL launched a campaign to encourage the Board to ignore the valuable information provided by the forward-looking MSDCF model and instead rely just on the backward-looking CAPM.*⁷ The AAR goes on to quote its witness, Dr. Villadsen, who stated that . . . *CAPM relies on historical information to determine the risk factor for the railroad industry, while a multi-stage DCF model uses forward-looking growth estimates and contemporaneous cash flow and stock price information.*⁸ But the reality is that both models employ historic information to project future investor

⁶ Ibid.

⁷ Ibid.

⁸ Ibid., p. 4.

behavior, and in fact, some CAPM historic data are more current than MSDCF historic data. Current risk-free interest rates can be easily obtained from the Treasury Department (on-line), as well as from a host of financial institutions. The most recent betas are more current than railroad cash flows that are usually available 3-6 months after the prior year's end. And risk-premium rates, although historic under the Board's current approach, tend to exhibit relative small changes from year to year, and are also available on a "real-time" basis (although the Board also could, and should, employ available survey data on the risk premiums currently used by Chief Financial Officers and others). In essence, both the MSDCF and the CAPM are forward thinking in that they project future measures such as risk-free interest rates, investment risk, risk-premium rates, and railroad cash flow. Similarly, they both use historic information and relationships to make such projections. In reality, the historic relationships within the CAPM are far steadier and more reliable as the basis for future projections than are five-years of railroad cash flow information, and then pure speculation as to what the next 10-plus years will bring. For the AAR to characterize the MSDCF as a futuristic model and the CAPM as an historic model is pure folly.

Fourth, and finally, the AAR reliance on the quote that *only a fool throws away useful information*, is hypocritical. I don't disagree with the quote. In fact, I endorse it. But the AAR has ignored a significant body of useful information on forming its positions regarding the determination of the railroad cost of equity capital (COEC). Presented below are some examples of useful information that the AAR has, and continues, to ignore:

1. The CAPM is used as the sole determinant of railroad cost of equity capital in Canada. The Canadian Transportation Agency adopted the CAPM after much research, analysis, and debate. The two major railroads in Canada, the CN and CP, are members of the AAR and operate lines in the U.S., and the largest U.S. railroads operate segments in Canada.
2. There are long, historical records of the three CAPM components that have been collected and recorded by highly respected financial institutions. These data are publicly available and allow for a market (nation-wide) cost of equity capital. Consider the market data over the past six years, when the Board used the MSDCF and CAPM.

<u>Year</u>	<u>20-Year⁹ Bond Rate</u>	<u>Market Risk¹⁰ Premium Rate</u>	<u>Market Cost of¹¹ Equity Capital</u>
2008	4.36%	6.47%	10.8%
2009	4.11	6.67	10.8
2010	4.03	6.72	10.8
2011	3.62	6.62	10.2
2012	2.54	6.70	9.2
2013	3.12	6.96	10.1

As shown above, the market CAPM rates (cost of equity capital) have been rather consistent, and fall around 10 percent. These calculations should not be ignored in that, putting aside for the moment the overstatement in the market risk premium, they provide a sound benchmark for Board determinations, assuming, as I believe, that the

⁹ U.S. Treasury Department, 20-year maturities, website. (Adopted by STB in annual CAPM calculations.)

¹⁰ Ibbotson data adopted by STB in annual CAPM calculations.

¹¹ A beta of 1.0 was employed, representing market risk as a whole.

risk of investment in railroads mirrors the market as a whole. Thus, the market COEC can, and should, be used as a “default” and benchmark for the railroad industry.

3. The AAR ignores the “useful information” that the CAPM has wide acceptance in the financial and business communities, as I stated in my Opening Comments. Most recently, a comprehensive study of the best practices used by financial and business entities (including the UP) concluded that, *CAPM is currently the preferred model for estimating the cost of equity*, relied on exclusively by 90% of the leading firms surveyed.¹²
4. The AAR ignores that it has become common practice to implement the CAPM with a lower Market Risk Premium than the Board has utilized and also with a Blume adjustment to the beta, as discussed in my Opening Comments.
5. The AAR ignores the transparency and ease of benchmarking the CAPM. The inputs to the CAPM are publicly available and easily obtainable from a variety of credible sources, and used by financial analysts and corporate management throughout the country. Investors make decisions based on CAPM data and since the COEC is an opportunity cost, comparative CAPM inputs and results are as

¹² W. Todd Brotherson, et al., “Best Practices in Estimating the Cost of Capital: An Update,” Journal of Applied Finance, No. 1, 2013, pp. 17, 19, 32. Only one of the twenty firms surveyed relied at all on the dividend discount model, and that was as a check on the CAPM.

accessible to the Board, the railroad industry, and railroad customers, as they are to the investors.

6. Finally, the AAR ignores the fact that virtually a third of the railroad industry (BNSF) is excluded from the MSDCF determination, but can readily be included in the CAPM calculation. As I discussed in my Opening Comments, the beta for the BNSF's parent company is around 0.27, while the beta for the BNSF's comparable railroad (UP) is about 1.04. An average of the two betas, or the midpoint of the two betas, or even an "in-between" beta based on BNSF relative revenue to Berkshire Hathaway, could readily be adopted by the Board. Such is not the case with the MSDCF.

II. THE THREE (FOUR) REASONS

The AAR provides *three reasons, the Board should stand fast*.¹³ In fact, the AAR offers four such reasons. First, it opines that multiple models benefit from the relative strengths of each model, especially when one is based on historic data while the other is forward-looking.¹⁴ I have already discussed this fallacy, above. Second, the AAR professes *overwhelming support for the use of multiple models*,¹⁵ while not providing evidence of such support, and in fact (as stated above), ignoring the high popularity of the CAPM as the preferred model by the business and financial

¹³ *Ibid.*, p. 4.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

communities, and the use of exclusively the CAPM by the Canadian Transportation Agency. Third, the AAR proclaims the MSDCF to be reasonable in that its results in 2013 were close to the results of the CAPM,¹⁶ while ignoring rather huge deviations between the two models in the five prior years. In no year is the difference in the outcomes of the two models supposed to approach the realities between 2008 and 2012. And finally, the AAR claims that replacing the current MSDCF model with a revamped MSDCF model would be onerous and require the Board to address *a wide range of complex issues in tailoring a model for the railroad industry*.¹⁷ However, eliminating the MSDCF does not require revamping what is no longer in use.

III. RATIONALE FOR USING THE CAPM FOR RAILROADS

In my Opening Comments I discussed the rationale of the CAPM as the preferred model to determine the railroad COEC, and I will not repeat that discussion in this Statement. Rather, I have found additional support for the CAPM in a review of alternative models undertaken by Stewart C. Myers, a principal of the Brattle Group, for the Australian Pipeline Industry Association (APIA).¹⁸ Professor Myers confirms that the CAPM is *the model most widely used by U.S. corporations to estimate the cost of capital*,¹⁹ and that *careful applications of the CAPM tend to give*

¹⁶ *Ibid.*, p. 5.

¹⁷ *Ibid.*

¹⁸ Stewart C. Myers, "Estimating the Cost of Equity: Introduction and Overview," for the Australian Pipeline Industry Association (APIA), February 17, 2013, accompanying the Brattle Group, Inc., "Estimating the Cost of Equity for Regulated Companies."

¹⁹ *Ibid.*, p. 2. Dr. Myers cites J.R. Graham and C. Harvey (2001), "The theory and practice of corporate finance: Evidence from the field," *Journal of Financial Economics* 60, 187-243, and

*estimates of the cost of equity that are sensible and reasonably stable over time.*²⁰ He offers four reasons of caution regarding the CAPM that should not be major hurdles to the Board. First, he warns that betas and risk-premium data are statistics that are subject to a degree of error (confidence limits), and thus a final calculation is actually within a statistical range. But as Professor Myers also states, statistical ranges also apply to other models,²¹ and it is my contention that the statistical probabilities of betas and risk-premium spreads are more reliable than for projections of “average” railroad cash flows. Even if not the case, the issue of statistical ranges applies to all forecasts and all models, and should not impede the Board’s use of the CAPM.

Second, Professor Myers claims that the CAPM has historically underestimated the returns to low-risk firms with betas under 1.0, and states that in a regulatory environment, the matter has been addressed by the use of an “empirical CAPM.”²² In this case, the railroad betas have recently been over 1.0, and thus not prone to Professor Myers’s assertion, but if the Board desires, it could adopt a Blume adjustment or other mechanism to achieve better correlation with historic results.

Third, Professor Myers discusses the potential mismatch between CAPM inputs that are based on a widely-diversified market, with the investment in a

J.R. Graham and C. Harvey (2002), “How do CFOs make capital budgeting and capital structure decisions?,” *Journal of Applied Corporate Finance* 15, 8-23.

²⁰ *Ibid.*, p. 3.

²¹ *Ibid.*, p. 3.

²² *Ibid.*, pp. 3-4.

particular company and/or industry.²³ But investing in the railroad industry is somewhat akin to investing in the general economy. The demand for railroad transportation is a “derived” demand in that it derives from the demand for a multitude of products and services to be available at various locations throughout the country. This is precisely why the weekly railroad carload reports published by the AAR are used by many entities, including the U.S. government, as a concurrent indicator of the nation’s economic activity. Container traffic (general merchandise) constitutes the largest percentage of railroad traffic, while bulk commodities (coal, grain, petroleum, building materials, etc.) and automobiles dominate the remaining traffic. The third concern about the CAPM – diversified market versus more narrow industry – does not apply to the railroad industry, and should not be an issue with the Board’s use of the CAPM.

And fourth, Professor Myers warns of a *mechanical application* of the CAPM because in such times when interest rates have been forced to extraordinary low levels by the government, *routine implementations of the CAPM have yielded costs of equity less than the regulated company’s cost of debt – an impossible result.*²⁴ However, the phenomena has never even been close to occurring when the CAPM has been used by the Board over the past six years, particularly as the railroads have continued to enjoy a very low cost of debt, and if benchmarked, as I have suggested in my Opening Comments, the CAPM would never be mechanically and/or routinely applied.

²³ *Ibid.*, p. 4.

²⁴ *Ibid.*, p. 5.

In summary, the four concerns of Professor Myers can readily be addressed by the proper application of a CAPM, given all the other “useful” information to check, validate, or adjust initial CAPM results.

From an academic perspective, it may make sense to use multiple models in estimating the COC and COEC, as in academia continuous study toward the goal of perfection is the lifeline of research and ensuing publication. In fact, there are other COC and COEC models discussed in academia.²⁵ But to a regulatory agency tasked with applying a standard of capital attractiveness, reasonableness and transparency should be at the core of its decision-making. The CAPM, as Professor Myers states, is *simple and logical*.²⁶ There is no need to employ a MSDCF that is far from simple, far from transparent, and far from reliable.

Consider the comparative results of the COEC for the U.S. market as a whole, and the railroad industry using both the CAPM (with its high Market Risk Premium and without a Blume beta adjustment) and MSDCF as presented below.

<u>Year</u>	<u>U.S. Market</u>	<u>Railroad</u>	
		<u>CAPM</u>	<u>MSDCF</u>
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2011	10.2	11.3	15.8
2012	9.2	10.3	16.5
2013	<u>10.1</u>	<u>12.5</u>	<u>13.4</u>
Average	10.3%	11.3%	14.8%

²⁵ The Comparable Earnings Model is popular and is one that I previously suggested would be an apt benchmark for CAPM calculations. Professor Myers, in his paper for APIA, discusses the Fama-French Three-Factor Model and Dividend Discount models.

²⁶ Ibid., p. 2.

The experience over the past six years is that on average, the railroad COEC according to the CAPM was about 10% higher than the market as a whole, and according to the MSDCF, about 47% higher. This is useful information that the AAR ignores, but more importantly, it reveals the illogical calculations of the MSDCF. Rhetorically speaking, is it possible, let alone probable, that investors have required returns from the railroad industry that are almost 50% greater than from the market as a whole (and even greater with a more reasonable market risk premium)? Is it likely that in the recent period of very low interest rates that the COEC to the railroad industry was as much as eight times higher than the cost of debt? Do railroad costs of equity capital in the 15% and 16% range pass the “sanity test” when investors are hard pressed to earn a 0.5% return on their bank deposits? Have any of the major railroads had difficulty in attracting capital over the past six years? Are not the UP and BNSF less risky and more profitable than the market as a whole? These, and other, rhetorical questions come to mind when comparing the results of the market and railroad MSDCF results since 2008.

In conclusion, I suggest that that Board not allow its annual determination of the railroad COC to be overtaken by academic theories that result in unnecessarily complicating what is, at best, a forecast of market factors. Rather, there is a long history of these alternative risk/return measures that readily are evident in the CAPM. With four dominant railroads operating in the U.S., with one of the two largest railroads being part of a conglomerate, and with the railroad business being reflective of markets in general, the CAPM is clearly the preferred model for

determining the railroad COEC, and together with a process of benchmarking its results, should be retained by the Board as the sole model for its annual calculation.

Reply Verified Statement of Prof. Alexander J. Triantis

The opening comments filed by the Association of American Railroads (AAR) and its expert, Dr. Villadsen, contain a number of statements and opinions that are contrary to widely held beliefs and practice for cost of equity estimation. My reply comments address these issues.

Estimates don't necessarily improve when multiple models are used

AAR's central argument appears to be that since the CAPM does not produce perfect estimates of the cost of equity, the STB would be well served by averaging the CAPM estimate with the estimate inferred from the Ibbotson MSDCF model. This argument implicitly assumes that the Ibbotson MSDCF model produces informative and unbiased estimates of the cost of equity. However, as I explained in my opening statement dated September 5, 2014, the Ibbotson MSDCF as applied by the STB produces unreliable and biased estimates of the cost of equity for the railroad industry. Specifically, I noted that "the MSDCF unnecessarily introduces noise into the estimation process."

While I don't dispute Dr. Villadsen's notion that one shouldn't throw away information, the underlying logic behind this statement requires that the information is - to be redundant - actually informative. AAR and Dr. Villadsen do not appear to explicitly acknowledge that there are biases in the MSDCF technique, and

that the errors in estimating the many input assumptions required by the MSDCF model effectively get aggregated into a large estimation error for the resulting cost of equity inferred from the model. Once the bias and large errors are recognized, the argument that estimates improve by using additional models no longer holds true. Instead, the opposite occurs, as use of the MSDCF contributes to distortion rather than accuracy.

On page 9 of her report, Dr. Villadsen states “For example, it is possible that one assumption in the current environment has a slight upward bias while another assumption has a slight downward bias, so that the offsetting biases lead to an accurate overall result.” While she does say that this is “possible”, and not likely, I still view this statement as suggesting the hope of an idealistic outcome that comes from combining model estimates, as opposed to the reality that we have seen in recent years where biases do not offset each other in any way.

The CAPM has widespread support in practice; MSDCF does not

The AAR opening statement (page 4) notes that there is “overwhelming support for the use of multiple models.” As I presented in my opening statement, there is instead overwhelming support for the use of the CAPM alone. Despite Dr. Villadsen’s assertion that “best practices use multiple models...,” survey evidence does not indicate that companies are typically using multiple models, but rather that they continue to rely predominantly on the CAPM. If companies did not consider the

CAPM to be reliable and informative, they would not rely on it so heavily and would make considerable use of other models. Furthermore, the MSDCF approach in general, and thus the Ibbotson model itself in particular, are infrequently used. The companies that are using the CAPM to determine the cost of equity are investing billions of dollars in new capital and corporate acquisitions every year. The fact that they have chosen to apply the CAPM to guide their decisions, rather than employ two or more models and average out their estimates, speaks to their confidence in the CAPM. It is unclear to me why the STB should deviate from this common practice consistently followed by financial professionals across various industries. The AAR's insistence on using a specific variant of the MSDCF approach that appears to consistently yield estimate values that depart significantly from those produced by the CAPM seems particularly suspect, especially in the absence of any demonstration that the CAPM values are actually inaccurate

It should also be noted that Morningstar has chosen to no longer provide cost of equity estimates based on the MSDCF. This follows evidence from its own cost of capital survey in 2010 that shows that few companies use the MSDCF model.¹ In contrast, several major financial data providers supply beta and MRP estimates, providing clear confirmation of the importance of the CAPM model and its widespread use.

¹ M. Barad, "Capturing Industry Risk within Cost of Capital Analysis," *BVUpdate* (March 2011) (also available from Morningstar's website).

It is also the case that the Canadian Transportation Agency (CTA) utilizes the CAPM as its sole methodology to estimate the cost of equity, following an extensive review of evidence that included a study coauthored by Dr. Villadsen. The Agency cited many advantages of using the CAPM to provide greater certainty and transparency, and to adapt to changing market information.

Harness the strengths while mitigating the known weaknesses

AAR suggests (on page 3) that by using multiple models, one would “harness the strengths while mitigating the known weaknesses.” As mentioned earlier, I don’t see how merely averaging out estimates from two models would necessarily accomplish this mitigation of weaknesses. In fact, current STB practice ignores apparent weaknesses in the models and in so doing exacerbates error rather than mitigating it. Since the MSDCF values have exceeded the CAPM values in recent years, use of the MSDCF would appear to reflect an assumption, tacit or otherwise, that the CAPM has produced values that are too low. But there is no convincing support for this assumption, and significant basis to conclude, as discussed later in this statement as well as in my original statement, that the STB has implemented the CAPM in a way that has produced values that are overstated, particularly recently.

With regards to the MSDCF model, its weaknesses are numerous and unfortunately are not easily mitigated, particularly given the way STB currently applies the model.

With regards to the CAPM model, the strengths of the CAPM model are well

accepted, leading to its widespread use in practice. However, I have also identified in my opening statement two weaknesses of the current application of the CAPM model by the STB. The first weakness is the use of a beta that does not incorporate the well-known and frequently utilized Blume adjustment. The second weakness is the use of a Market Risk Premium (MRP) that is too high relative to common practice. Addressing these two weaknesses will achieve the goal of harnessing the strength of the most widely used model while addressing known weaknesses of the current application of the model.

Convergence of estimates is illusory

AAR argues (on pages 5 and 40) that because the cost of equity estimates in 2013 from the CAPM and MSDCF are relatively close, they are somehow converging to the same (and presumably accurate) value. This is a strong and inappropriate conclusion. While the MSDCF doesn't provide as large of an upward biased estimate in 2013 as in previous years, especially 2012, it continues to provide an estimate that is consistently higher than the CAPM. Furthermore, the estimates are closer to one another in 2013 largely because of a very high beta estimate, the highest beta by far since the STB began utilizing the CAPM in 2006. As I discussed in my opening statement, high beta estimates based on historical data are upward biased relative to the forward-looking betas that are observed. If the Blume adjustment were applied, as is appropriate, the beta estimate would be lower, and the CAPM would be significantly lower than the MSDCF estimate for 2013. Use of a more recent MRP

would also lower the CAPM estimate for the cost of capital, not only in 2013, but in all years since 2006.

Looking back not simply at one year but at many years of evidence, it appears clear that the MSDCF is consistently high, which begs the question of why this is the case. The answer lies with the issues I outlined in my opening statement. I'll outline each again, and will refer to statements of AAR and Dr. Villadsen that relate to these issues.

First, any attempt to divide up a long horizon into three simple stages is a rough approximation to start off with. It forces strong assumptions about constant growth rates over long periods of time, which loses the flexibility that analysts and investors typically build into their DCF models.

Second, the procedure uses an EPS growth estimate based off of the median of typically disperse estimates provided by a few analysts. These estimates are based on recent history of the company's performance, and adjusted based on guidance provided by companies and on analysts' own opinions. These estimates are unlikely to prove accurate in practice, especially over the period of time employed by the MSDCF. AAR does not address these shortcomings in its statement. Instead, it touts the MSDCF as being a fundamentally different approach from the CAPM in that it is forward-looking rather than backwards-looking. In fact, both models are forward-looking in theory. In practice, they both use historical information to try to estimate

key parameters. In the case of MSDCF, the analyst growth rate estimates that are such a crucial driver of the resulting cost of equity are heavily influenced by recent corporate performance. While analysts make adjustments to the recent trajectory of earnings growth, since the median estimate is used in AAR's approach, the growth estimate is ultimately dependent on the subjective beliefs of only those analysts whose estimates are closest to the median.

Third, EPS growth rates are biased upwards when a firm repurchases its shares. Dr. Villadsen puts forth an argument that there is an offsetting effect due to a simultaneous adjustment to the cash flow. However, this argument is unclear and potentially misleading. The adjustment made appears to rest on a double counting of the cash flow by aggregating a measure of the payout projected to be made to shareholders through the buybacks with the preexisting measure of cash that the original model posits is available to be made to shareholders.

Fourth, the STB's use of a single growth rate in the second stage that drops suddenly at the terminal date is unrealistic and produces an upward biased cost of equity. Dr. Villadsen discusses using a second-stage where the growth rate is phased-in gradually toward the terminal growth rate, which is preferable. This phased-in approach appears to be the standard approach of the Brattle Group and has appeared in other testimony/reports that she has (co-)authored. However, she applies some of the terminal period shortcuts to cash flow estimation that are inaccurate, as I describe below. As a result, her conclusion that the effect on the cost

of equity is not large is misleading. She also suggests (on pages 31-32 of her testimony) that the second growth period should be much longer than five years, which increases the cost of equity by projecting high growth rates for an extended period of time. It is unlikely that high EPS growth will be sustained in the rail industry for such a long time period.

Fifth, the cash flow earnings metric used in the terminal value differs from that in the earlier stages in ways that upward bias the cash flow and lead to a cost of equity estimate that is too high. The STB currently assumes that during the terminal period, capital expenditure and depreciation are equal in value each year, and that deferred taxes are equal to zero. Dr. Villadsen supports this practice by explaining that in steady-state, there will be “no growth capital,” and only “maintenance capital,” and therefore that capital expenditure each year is merely equal to depreciation. This is not necessarily the case in an environment with positive inflation where new capital may be more expensive than the book value of existing capital. Capital expenditures, like all cash flows in the analysis, are in nominal (not real) dollars, and depreciation is based on historical costs, not replacement costs. Given the long depreciation horizon of many fixed assets in the rail industry, the impact of this on cash flows can be quite significant. Furthermore, capital expenditures associated with maintenance of existing capacity, rather than capacity expansion, appear to be quite significant in the railroad industry and will likely decrease the free cash flow for an extended period of time.²

² Federal Railroad Administration, *Freight Rail Today*, available at www.fra.dot.gov/Page/P0362.

Dr. Villadsen also believes that “because deferred taxes are linked to capital expenditures, this amount is expected to disappear as capital expenditures approach maintenance levels in the long term steady-state equilibrium” (page 12 of her statement). The tax system is based on accelerated depreciation, which allows companies to reduce taxable income in the early years of holding an asset, and thus defer taxes into later years. This benefits companies due to the time value of money. However, tax payments do not disappear, they are merely deferred into the future. Deferred taxes represent a significant liability for railroad companies, and this liability correspondingly reduces the terminal value of equity, or equivalently the cash flows that drive this equity value. By ignoring the negative impact of deferred taxes in the terminal period, the cash flows are upward biased, and thus so is the cost of equity inferred from the MSDCF calculation.

Back to the CAPM, done right

Given all these issues with the MSDCF, one should not have confidence in the cost of equity estimates that emerge from the Ibbotson MSDCF model. Errors in each of the input assumptions all feed into a much larger potential error in the single output that is being backed out of the model, namely the cost of equity. While one might hope that the errors could offset each other, each error here appears to have an

upwards bias. This is inherently a challenging and unstable model structure to be using to estimate the cost of equity for the railroad industry.

The CAPM requires inputs as well, though fewer, and with a long history of usage that informs how best to apply the model. The risk-free rate (RFR) is directly observable. The MRP can be estimated based on historical experience. As discussed in my initial report, using the past fifty years to estimate the MRP provides the benefit of a sufficiently long time period to reflect periods of economic recessions and recovery, as well as high and low interest rates, while at the same time not going too far back in time as to reflect periods with significantly different market and institutional characteristics. In addition, the reasonableness of the estimated MRP can be confirmed through available surveys. These surveys are useful in that they provide a direct measure of current expectations of future (what Dr. Villadsen describes as forward looking) returns, whereas historical data may reflect actual (ex post) returns, as opposed to expected (ex ante) returns that reflect the opportunity cost of capital. A level of 4.7% or less for the MRP appears appropriate under both approaches. It is also the case that Duff and Phelps, which acquired the maintenance of the Morningstar MSDCF model, currently recommends that an MRP of 5% should be used in the CAPM.³

AAR's contention that the risk premium has increased and/or that the RFR has been artificially suppressed since the financial crisis of 2008 is based on looking only at

³ Duff and Phelps, "Duff & Phelps Decreases U.S. Equity Risk Premium Recommendation to 5.0%, Effective February 28, 2013" (March 20, 2013).

one class of corporate bonds, and making an adjustment for default risk that is not well-founded. Bonds of railroad companies don't appear to reflect a higher risk premium or spread relative to the RFR, despite the higher risk assessment of these companies, at least as reflected in a higher beta estimate. Indeed, the cost of equity determined by the CAPM was quite large in 2013, the second highest since the STB began utilizing the CAPM, and higher than the 2006 value when the RFR was 5%. It is appropriate to look at the overall cost of equity rather than simply the RFR in isolation, and it doesn't appear from this evidence that monetary policy has distorted the cost of equity emerging from the CAPM.

The STB should rely simply on the CAPM, the most widely used model for making corporate investment decisions, and employ Blume-adjusted beta estimates as well as a reasonable MRP below 5%, which are typical norms used in practice.

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April 14, 2008



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BY HAND

The Honorable Anne K. Quinlan
Acting Secretary
Surface Transportation Board
395 E Street, SW
Washington, D C 20423-0001

222077

Re. STB Ex Parte No. 664 (Sub-No 1), *Use of a Multi-Stage Discounted Cash Flow Methodology In Determining the Railroad Industry's Cost of Capital*

Dear Secretary Quinlan:

Enclosed are an original and ten copies of the comments of the Western Coal Traffic League ("WCTL") in the above-captioned proceeding. Also enclosed are three CDs containing the electronic workpapers of the WCTL's expert witnesses as well as copies of the text of the filing.

Please contact the undersigned if there are any questions relating to this matter.

Sincerely,

Robert D. Rosenberg

Robert D. Rosenberg
An Attorney for the Western Coal
Traffic League

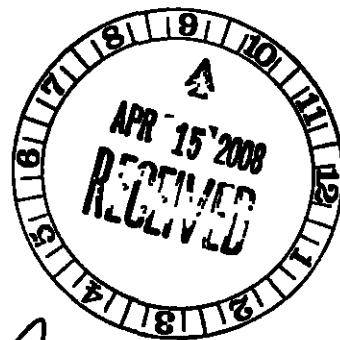
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BEFORE THE
SURFACE TRANSPORTATION BOARD



222077

In the Matter of.

USE OF A MULTI-STAGE
DISCOUNTED CASH FLOW
METHODOLOGY IN DETERMINING
THE RAILROAD INDUSTRY'S COST
OF CAPITAL

STB Ex Parte No. 664 (Sub-No. 1)

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COMMENTS OF THE WESTERN COAL TRAFFIC LEAGUE

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**BEFORE THE
SURFACE TRANSPORTATION BOARD**

In the Matter of.

USE OF A MULTI-STAGE
DISCOUNTED CASH FLOW
METHODOLOGY IN DETERMINING
THE RAILROAD INDUSTRY'S COST
OF CAPITAL

STB Ex Parte No. 664 (Sub-No 1)

COMMENTS OF THE WESTERN COAL TRAFFIC LEAGUE

The Western Coal Traffic League ("WCTL" or "League")¹ hereby submits its comments regarding the Advance Notice of Proposed Rulemaking ("ANPR" or "Notice") that the Surface Transportation Board ("STB" or "Board") served in this proceeding on February 11, 2008

I. SUMMARY

As explained more fully below and in the accompanying Verified Statements of Thomas D. Crowley and Daniel L. Fapp of L.E. Peabody & Associates, Inc.

¹WCTL is a voluntary association, whose regular membership consists entirely of utility shippers of coal mined west of the Mississippi River that is transported by rail. WCTL members presently ship and receive in excess of 140 million tons of coal by rail each year. WCTL's members are: Alliant Energy, Ameren Energy Fuels and Services, Arizona Electric Power Cooperative, Inc., Austin Energy (City of Austin, Texas), CLECO Corporation, CPS Energy, Kansas City Power & Light Company, Lower Colorado River Authority, MidAmerican Energy Company, Minnesota Power, Nebraska Public Power District, Omaha Public Power District, Texas Municipal Power Agency, Western Farmers Electric Cooperative, Western Fuels Association, Inc., Wisconsin Public Service Corporation, and Xcel Energy

("Crowley/Fapp VS," attached as Exhibit A) and Dr James E Hodder ("Hodder VS," attached as Exhibit B), calculating a cost of capital ("COC"), and specifically a cost of equity ("COE"), for the railroad industry using a multi-stage discounted cash flow ("MSDCF") model with a measure of cash flow broader than dividends is complicated by sharp year-to-year fluctuations or lumpiness in the underlying cash flows for the four railroads (BN, CSX, NS, and UP) that meet the Board's screening criteria

The fluctuations can be addressed by normalization or averaging that smooths out the annual fluctuations. Using a three-year averaging period and measuring cash flows under either a modified cash payout approach (that tracks dividends and stock buybacks less cash inflows from the exercise of stock options) or broader free cash flow to equity ("FCFE") approach, the MSDCF analysis yields COE values for the 2002-2006 period that are generally consistent with the results under a CAPM analysis.

In fact, the results under the MSDCF analysis are generally lower than those under the CAPM, sometimes by as much as 200 to 300 basis points. That the CAPM values are higher than the MSDCF values is generally to be expected in light of the Board's decision in Ex Parte No 664, *Methodology to be Employed in Determining the Railroad Industry's Cost of Capital* (STB served Jan 17, 2008), to implement CAPM using a historic market risk premium ("MRP"), rather than a significantly lower prospective MRP. The DCF methodology is inherently prospective in design in that it seeks to calculate future cash flows, and is unlikely to match the results of a CAPM

analysis that focuses on historical rather than prospective returns. This difference in perspective is an additional reason for the Board to revisit its treatment of the MRP. For example, the Board could consider use of a blend of the historic and prospective MRPs.

While the 2002-2006 MSDCF results thus provide further validation of the CAPM results, WCTL does not believe it would be worthwhile for the Board to receive and consider evidence concerning MSDCF calculations along with CAPM calculations as part of its annual railroad industry COC determinations at this time. Because of the underlying lumpiness and need for averaging, the MSDCF values are unlikely to be particularly stable. For example, over the 2002-2006 period, the MSDCF values fluctuate considerably more than the CAPM values. Combining the MSDCF and CAPM values is thus more likely to reduce stability and precision than to increase them. Considering MSDCF along with CAPM will also require additional time and resources, which will contribute to delay, expense, and controversy, without necessarily contributing to greater accuracy. That said, it would make some sense for the Board to revisit the matter after a period of time such as five years, when it has more experience working with CAPM, or if the CAPM results should reveal sharp fluctuations that appear to have little linkage to changes in inflation or risk.

II. THE BOARD'S NOTICE AND WCTL'S PRIOR MSDCF SUBMISSIONS

The Board's Notice observes that the record in Ex Parte No. 664 addressed use of a discounted cash flow ("DCF") method to determine the cost of capital, but

indicates that some additional matters or aspects need to be addressed. First, the model needs to be a MSDCF and not a single-stage DCF (“SSDCF”) model. Second, it needs to focus not merely on dividends, but instead incorporate a “broader measures of cash flow or shareholder returns.” Third, the model needs to be limited to only those firms that passed the established screening criteria, *i.e.*, the Morningstar/Ibbotson three-stage model is unsatisfactory as it includes other firms. Fourth, when used in combination with CAPM, it needs to “enhance the precision” of the COE estimate, *i.e.*, “result in a lower variance than reliance on the CAPM approach alone.” In addition, the Notice invites comment on other criteria, including what it refers to as atypically large railroad capital investment, and on other features of an appropriate MSDCF model. Notice at 3-4

WCTL’s instant filing addresses the matters noted in the Board’s Notice. However, it is appropriate to note that WCTL’s earlier filings were largely responsive to most of the concerns stated in the Board’s Notice. First, WCTL’s December 8, 2006 filing in Ex Parte No. 664 presented, through Professor Hodder’s VS, a MSDCF that included only the four railroads (BNSF, CSX, NS, and UP) that met the Board’s screening criteria. Professor Hodder and Messrs. Crowley and Fapp elaborated upon and modified that model in their further filings in Ex Parte No. 664. While that MSDCF considered only dividends, dividends were the focus of the attention of the Board and the Association of American Railroads (“AAR”) at that time. Moreover, only one carrier (BNSF) engaged in stock buybacks during the 2002-2005 period, although the other

railroads are now engaging in buybacks as well. Indeed, as explained *infra*, introducing a measure of cash flow that is broader than dividends presents certain complications

In addition, WCTL and its witnesses addressed in Ex Parte No. 664 the deficiencies of the Morningstar/Ibbotson 3-stage DCF model, including not only its inclusion of additional carriers, but also its unrealistic assumption that growth during the second five-year period would match industry average growth during the first five-year period when that growth was more than double the expected growth rate of the general economy.

Nonetheless, WCTL's experts have engaged in the analysis requested by the Board in its Notice.

III. IMPLEMENTING MSDCF WITH A BROADER CASH FLOW MEASURE

A. The Modified Payout and FCFE Approaches

In response to the Board's directive that the MSDCF not be confined to dividends, WCTL's witnesses have considered two alternative measures of cash flow. The first is modified cash payout, and the second is free cash flow to equity ("FCFE")
Crowley/Fapp VS at 6-7, 14-15; Hodder VS at 3-4, 6

Modified cash payout is a relatively narrow measure that considers dividends and stock buybacks (those being the distributions to stockholders) less dollars paid to exercise stock options (those being a cash flow, sometimes quite significant, from stockholders, typically rail management). Modified cash payout thus reflects distributions

that are made directly to (and from) common equity stockholders. Crowley/Fapp VS at 6-7; Hodder VS at 3-4.

In contrast, FCFE is a broader measure that reflects earnings, plus depreciation, amortization, deferred taxes, and net new debt, less change in capital expenditures and working capital. In essence, the adjustments are designed to convert accounting earnings to actual cash flow. Crowley/Fapp VS at 14-15.

In both instances, a yield (equivalent to the dividend yield under the Board's prior SSDCF methodology) is determined by from the relevant cash flows and then applied in the MSDCF model to estimate the COE, much as a dividend growth model determines the COE using dividends as the initial cash flow. Crowley/Fapp VS at 6-7, 12-16.

B. Cash Flow Lumpiness and the Need for Averaging

Review of the inputs used in the modified payout and FCFE approaches reveals very sizeable fluctuations, or lumpiness, in the railroads' cash flows in recent years. Crowley/Fapp VS at 7, 12, 14, 16; Hodder VS at 4-6.² For example, for BNSF (the only carrier that engaged in stock buybacks in recent years until 2006), the modified payout ratio in 2004 was 23.6%, but nearly quadrupled to 92.9% in 2005. The BNSF

²See the Crowley/Fapp electronic workpapers for the COE calculations. In particular, the the 2006 modified payout and FCFE calculations show the relevant ratios for each carrier for 2004-2006.

FCFE ratio also experienced a large change in those two years, growing from 20.6% in 2004 to 73.1% in 2005.

The UP data also reveals sharp fluctuations. From 2004 to 2005, the UP modified payout ratio went from 34.4% to 5.1% (essentially, a reduction to a seventh of the prior value). However, the UP FCFE experienced an even more abrupt change, going from 108.8% in 2004 to negative 21.8% in 2005.

The Eastern carriers also had sharp fluctuations as well as some negative values in those years. For example, CSX's modified payout ratio was slightly negative (-0.4%) in 2005, but its FCFE ratio was negative 44.4% that year. NSC's modified payout ratio was -2.2% in 2004 and 0% in 2005, and its FCFE was negative 18.6% in 2005.

One of the advantages of the dividend growth model that then emerges is that dividends are relatively stable, whereas broader measures of cash flow are not. Hodder VS at 6-7. Indeed, one of the common explanations for using buybacks rather than increasing dividends to distribute cash to stockholders is that significant stigma can attach to the subsequent reduction of a dividend, whereas stock buyback programs are usually limited in duration or amount, meaning that there is less or no expectation that they will continue indefinitely. Crowley/Fapp VS at 5.

The variability or lumpiness in the MSDCF inputs, especially for recent years (2002-2006), can be addressed at least in part by using a multiple-year average to

normalize or smooth out the sharp year-to-year fluctuations. Crowley/Fapp VS at 7, 12, 16; Hodder VS at 5. A three-year averaging period serves to produce realistic results for the 2002-2006 period discussed *infra*.

C Other Aspects of MSDCF Implementation

WCTL's witnesses have continued using most elements of their prior MSDCF approach, including relying on the truncated I/B/E/S forecast to govern growth for the first five years of the model, and a ten-year transition or phase-in such that the terminal growth rate applies starting at year fifteen. Crowley/Fapp VS at 7-11, Hodder VS at 3. WCTL notes that a five-year phase-in would lower the MSDCF result where the growth rates for the firm are higher than that for the general economy.

For the terminal growth rate, WCTL has utilized the Blue Chip economic forecast figure of 5% for growth in gross domestic product. Dr. Myers previously recommended this source, and it appears to be in line with other forecasts. Crowley VS at 10-11.³

³In its Notice of Proposed Rulemaking in Ex Parte No. 664, the Board proposed to use of the 4.6% GDP growth figure from the Social Security Administration ("SSA") as its terminal growth rate. The most recent (2008) SSA Trustee Report, available at <http://www.ssa.gov/OACT/TR/TR08/trTOC.html>, also indicates a long-term GDP growth rate of 4.6%. (Table VI F6 at p. 184 projects, for the intermediate case, a 2007 GDP value of \$13,841 billion and a 2085 GDP value of \$465,848 billion, 33.65 times greater. $33.65^{1/78} = 1.0461$)

D. MSDCF Results

Crowley/Fapp Exhibit No. 3 depicts the results of the MSDCF analysis for the 2002-2006 period and compares those results to those under SSDCF and CAPM approaches as follows:

Table 1 Comparison of COE Results for 2002-2006 Under SSDCF, CAPM and MSDCF				
Year	STB SSDCF COE	STB CAPM COE	MSDCF COE Modified Payout	MSDCF COE FCFE
2002	12.60%	10.05%	10.41%	11.64%
2003	12.70%	9.93%	7.84%	10.10%
2004	13.16%	10.38%	7.22%	8.87%
2005	15.18%	10.61%	8.81%	9.92%
2006	16.10%	11.08%	9.52%	9.84%
Source: Crowley/Fapp Exhibit No. 3				

Several observations are in order. First, the SSDCF values are consistently higher than the other COE values, confirming the unsuitability of the SSDCF approach. Hodder VS at 7. Second, the CAPM values are uniformly higher than the modified payout values, typically by 150 to 300 basis points. Third, the FCFE values are higher than the modified payout values, albeit sometimes by only a modest amount, and in three of the five years, the FCFE values are lower than the CAPM values (by over 100 basis points in 2004 and 2006).

Also, the MSDCF values fluctuate more than the CAPM values. The range of the CAPM values over the 2002-2006 period is 115 basis points, a relatively modest amount. In contrast, the range on the modified payout values is 319 basis points, nearly three times as much. The range on the FCFE values is 277 basis points, modestly less than that for the modified payout, but still more than double that for the CAPM.

IV. APPROPRIATE USE OF THE MSDCF METHOD

The 2002-2006 data provides considerable validation for the results of the CAPM results. Moreover, the level of validation would be increased the CAPM were calculated using a prospective MRP or, at the very least, a blend of the historic and prospective MRPs, especially as a prospective MRP would more closely align with projected future cash flows.

However, the lumpiness in the underlying cash flows and the resulting need to resort to averaging present substantial drawbacks to regular use of the MSDCF in conjunction with the CAPM at this time. In addition, the MSDCF values reveal greater fluctuation than the relatively stable CAPM values (during a period that railroad stocks have performed very favorably), indicating that inclusion of the MSDCF together with the CAPM values is unlikely to improve stability.

Under these circumstances, there is little to be gained at this time by having the Board receive and consider MSDCF evidence along with CAPM calculations as part of its regular annual determinations of the railroad industry COC. Substantial effort

would be required to perform the MSDCF calculations, particularly as there is opportunity for disagreement as to such matters as how to define the scope of the relevant cash flows, how to construct the yield, the reliability of the initial growth forecasts, the length of the transition period, and the selection of the terminal growth value.

Additionally, the lumpiness of the cash flows will likely engender disagreement over how to normalize the data, and, even after averaging or other normalization, the MSDCF values will not necessarily be particularly stable. There is no apparent basis for concluding that considering MSDCF along with CAPM values will result in greater precision or stability. Presenting MSDCF values will, however, consume time and resources of both the parties and the Board, and it will also contribute to regulatory uncertainty.

Accordingly, WCTL does not believe that it is appropriate at this time for the Board to consider MSDCF as well as CAPM evidence as part of its regular COC determinations in Ex Parte No. 558. However, it may make some sense for the Board to revisit the matter after a period of time, such as five years, when it will have accumulated more experience working with CAPM. By the same token, it may be appropriate to revisit the matter before then if the CAPM results should exhibit less stability, especially if those fluctuations appear not to be linked to changes in underlying inflation, interest rates, or risk.

**V. NO ADJUSTMENT IS WARRANTED FOR CLAIMS OF
ATYPICALLY LARGE RAILROAD CAPITAL INVESTMENT**

The Board's ANPR at 4 also expresses a willingness to consider other matters, and then notes that "parties [presumably the railroads] to STB Ex Parte No. 664 indicated that atypically large capital investment by the railroads could affect the results of a DCF analysis." The ANPR then specifically asks that parties "address this concern and show how a multi-stage DCF would account for such investments." *Id.*

The Board's statements appear rather cryptic. As best WCTL can discern, the concern seems to be that if the railroad industry were to have abnormally large capital needs, then some adjustment to the MSDCF model -- presumably one that gives an otherwise artificial increase to the COC -- might be an appropriate subject for consideration.

Based on the available evidence, WCTL sees no need for any such adjustment as the implicit premise is unfounded. Crowley/Fapp VS at 17-18. To the contrary, the available evidence -- for example, the report prepared for the AAR by Cambridge Systematics, Inc (the "Cambridge Report"), and submitted by the AAR in Ex Parte No. 664⁴ -- indicates that use of the growth rate for the general economy will

⁴WCTL's comments should not be construed as any sort of endorsement of the Cambridge Report, especially its effort to model railroad capacity using methods and assumptions developed for highways. WCTL's use of the Cambridge Report is largely confined to its growth analysis for traffic and the general economy, much of which appears to have been developed by others.

actually be quite generous for the railroad industry. Furthermore, the recent experience indicates, as WCTL demonstrated in its Ex Parte No. 664 filings, that the railroads are more inclined to use additional cash flows to reward their stockholders than to increase their capital expenditures, especially as increasing their capital expenditures could make it more difficult for them to continue the rate increases that have been at their heart of their so-called renaissance.

The Cambridge Report does not depict any massive surge in railroad traffic. Instead, it states that “[t]he anticipated rates of growth for the U S. economy and freight transportation demand are about the same as those experienced over the last 30 years ” *Id.* at 2-5 The report does project an 88% increase in railroad tonnage, apparently over the 30-year period 2005-2035. *Id.*⁵ An 88% increase is hardly trivial, but over the thirty-year period that appears to be addressed, the underlying annual compound growth rate is approximately 2.1% ($1.88^{1/30} = 1.0212653$).

In contrast, the Cambridge Report, apparently relying on a separate analysis prepared by Global Insight, Inc , “forecasts that the U S. economy will grow at a compound annual rate of about 2.8 percent over the next 30 years.” *Id.* at n.8.⁶ The AAR’s Cambridge Report thus indicates that railroad traffic is expected to grow at only about 75% of the growth rate of the general economy This relationship suggests that use

⁵This increase is less than the 98% increase projected for trucks and highways. *Id.*

⁶The 2.8% figure appears to reflect real, and not nominal, GDP growth.

of the growth rate for the general economy will actually overstate growth in the railroad industry for MSDCF purposes.

Tonnage is not an ideal measure of output. In contrast, the Board's productivity adjustment for the rail cost adjustment factor measures output according to a 189-cell matrix.⁷ The STB's most recent decision in Ex Parte No. 290 (Sub-No 4), *Railroad Cost Recovery Procedures--Productivity Adjustment* (STB served March 28, 2008), shows output index figures for the 2002-2006 period of 1.012, 1.039, 1.033, 1.021, and 1.018, respectively, which yield a compound annual growth rate (geometric average) of 2.46% (1.0246). Significantly, the growth in the output index actually trailed the rate of increase in real gross domestic product ("GDP") as measured by the Bureau of Economic Analysis, using chained 2000 dollars over that period. Specifically, <http://www.bea.gov/national/xls/gdpchg.xls> shows GDP growth for the 2002-2006 period at 1.6%, 2.5%, 3.6%, 3.1%, and 2.9%, which yields a compound annual growth rate (geometric average) of 2.74%, nearly 3 basis points (or 11%) more than the growth in Class I railroad output, during a period of high demand growth that was accompanied by significant capacity constraints in the trucking industry. Again, nothing in the available evidence suggests that use of the growth rate for the general economy will understate growth in the railroad industry.

⁷While the productivity calculation tracks the output of all Class I railroads, and not just the four that appear to qualify for inclusion in the Board's COC analysis, the four account for the vast bulk of the total Class I railroad traffic.

The growth in output has thus had a modest role in the railroads' improvement in earnings in recent years. Productivity has also grown at a modest rate (an average of 1.2% a year for the 2002-2006 period according to the Board's most recent RCAF decision). Accordingly, the most significant source of the railroads' past financial improvement, and what likely drives the current I/B/E/S projections for further growth earnings, is the railroads' imposition of higher rates on their traffic. Indeed, the 14.75% growth rate presented in the AAR's initial filing for the 2006 capital posits that railroad earnings will double in five years and quadruple in ten years. Given the moderate level of traffic growth projected and a continuation of productivity growth at current levels, only a massive increase in rates could generate earnings growth of that magnitude.

As WCTL has previously explained, the railroads have devoted more of the increase in earnings and profits to increasing their dividends and stock buybacks (and even to reduce their long-term debt), rather than to increasing capital expenditures. Indeed, in recent years, the railroads have reduced their capital expenditures expressed as a percentage of revenues. *See, e.g.,* Submission of Edward M. Wolfe, Senior Managing Director of Bear, Stearns & Co. Inc., before the House Transportation & Infrastructure Committee, Forum on Freight Rail Finance, December 12, 2007 (excerpt attached as Exhibit D), showing capital expenditures by United States railroads averaged 17.7% of revenues over 1995-2006, but only 15.9% over 2001-2006. While capital expenditures may have increased in nominal dollar terms, that nominal increase reflects the impact of

inflation, and thus the comparison of capital expenditures to revenues is particularly telling since both the capital expenditures and revenues are subject to inflation.

The fact that relative capital expenditures have decreased in the face of growth in output and especially rate increases is particularly significant in at least two respects. First, it represents a deviation from what the railroads' public representations that there is a close correlation between railroad capital spending and changes in revenues and net income. See Crowley/Fapp VS at 17-18. Second, there is the very significant possibility that railroads have been limiting capital expenditures specifically in order to drive up rates. In other words, the railroads may well have found it profitable to limit their capital expenditures, and thus their capacity, forcing shippers to pay more for the limited capacity that is available. Under such conditions, the Board should not be rewarding the railroads with the benefit of a higher cost of capital for having engaged in the equivalent of economic withholding, i.e., refusing to serve as a means of establishing higher prices.

VI CONCLUSION

For the reasons stated above, the Board should not adopt a MSDCF estimate of the COE based on a measure of cash flows broader than dividends as part of its formal COE calculation at the present time. In any event, there is no basis for any adjustment to the COE estimate to reflect atypically large railroad investment, especially

when evidence demonstrates that the railroads have actually curtailed their capital expenditures relative to their increasing revenues in recent years.

Respectfully submitted,

WESTERN COAL TRAFFIC LEAGUE

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EXHIBIT A

**Verified Statement of
Thomas D. Crowley and Daniel L. Fapp**

I. INTRODUCTION

We are Thomas D. Crowley and Daniel L. Fapp. We are economists and, respectively, the President and a Vice President of L. E. Peabody & Associates, Inc., an economic consulting firm that specializes in solving economic, transportation, marketing, financial, accounting and fuel supply problems. Mr. Crowley has spent most of his consulting career of over thirty-seven (37) years evaluating fuel supply issues and railroad operations, including railroad costs, prices, financing, capacity and equipment planning issues. His assignments in these matters were commissioned by railroads, producers, shippers of different commodities, and government departments and agencies. A copy of his credentials is included as Exhibit No. 1 to this verified statement ("VS").

Mr. Fapp has been with L. E. Peabody & Associates, Inc. since 1997. During this time, he has worked on numerous projects dealing with railroad revenue, operational, economic and financial issues. Prior to joining L. E. Peabody & Associates, Inc., Mr. Fapp was employed by BHP Copper Inc. in the role of Transportation Manager - Finance and Administration, where he also served as an officer and Treasurer of the three BHP Copper Inc. subsidiary railroads, The San Manuel Arizona Railroad, the Magma Arizona Railroad and the BHP Nevada Railroad. A copy of his credentials is included as Exhibit No. 2 to this VS.

Our consulting assignments regularly involve working with and determining various facets of railroad financial issues, including cost of capital determinations. In these assignments, we have calculated railroad capital structures, market values, cost of railroad debt, cost of preferred railroad equity and common railroad equity. We are also well acquainted with and have used the commonly accepted models for determining a firm's cost of equity, including the Discounted Cash Flow Model.

("DCF"), Capital Asset Pricing Model ("CAPM"), Fama-French Three Factor Model and Arbitrage Pricing Model

We have developed railroad industry average cost of capital and company specific cost of capital for use in litigation and for use in general business management. For several clients, we have both individually and together determined the Going Concern Value ("GCV") of privately held railroads. Developing the GCV under the Income Based Methodology requires developing company specific costs of debt and equity for use in discounting future company cash flows, as well as creating forecasts of expected cash flows to the firm and to holders of common equity from company financial statements. We have also developed cost of capital in order to capture the costs associated with shipper investment in railroad equipment and road property. Our findings regarding railroad cost of capital have been presented to U.S. District and State courts, the Interstate Commerce Commission, the Surface Transportation Board ("STB") and the Federal Railroad Administration.

We have been asked by Counsel for the Western Coal Traffic League ("WCTL") to provide comments on the use of Multi-Stage Discounted Cash Flow ("MSDCF") models to estimate the railroad industry's cost of equity in response to the Advance Notice of Proposed Rulemaking issued by the STB in *Ex Parte No. 664 (Sub-No. 1), Use Of A Multi-Stage Discounted Cash Flow Model In Determining The Railroad Industry's Cost Of Capital*, Served February 11, 2009 ("Ex Parte 664 (Sub-No. 1)"). Specifically, WCTL requested that we address the following issues noted by the STB: (1) the expansion of a dividend based MSDCF model to include broader measures of cashflow to shareholders, including stock repurchases, (2) the use of a MSDCF model that relies

upon a definition of cashflow beyond aggregate dividends and stock repurchases, and (3) the comparison of the railroad industry cost of equity from such broader MSDCF models to the railroad industry cost of equity as produced under the STB's Capital Asset Pricing Model ("CAPM") approach

We summarize our testimony below under the following topical headings

- II MSDCF With Dividends And Stock Repurchases
- III MSDCF Using Free Cash Flow To Equity
- IV Comparison of MSDCF to CAPM Costs Of Equity

II. MSDCF WITH DIVIDENDS AND STOCK REPURCHASES

In *STB Ex Parte No. 664, Methodology to be Employed in Determining the Railroad Industry's Cost of Capital*, served January 17, 2008 ("Ex Parte 664"), the STB changed the methodology it uses to calculate the railroad industry's cost of equity, concluding that the Single-Stage Discounted Cashflow Model ("SSDCF") approach it had previously relied upon to estimate railroad cost of equity had been supplanted by more modern, accurate methods.^{1/} Instead of the SSDCF model previously relied upon by the STB, Ex Parte 664 adopted the CAPM approach as the methodology to be used to estimate the railroad industry cost of equity. The STB also initiated Ex Parte 664 (Sub-No. 1) to address other cost of capital issues, including a determination of whether or not it is necessary to develop a MSDCF cost of equity to complement the CAPM in developing the railroad industry's cost of equity.

In Ex Parte 664 (Sub-No. 1), the STB asked parties to propose forms of MSDCF models that would compliment the CAPM approach for developing the cost of equity for the railroad industry. The STB directed that proposed MSDCF models meet two specific requirements.^{2/} First, proposed models must be able to accommodate different growth rates in railroad expected cashflows by using a MSDCF format. Second, the DCF models should not focus solely on dividend payment only, but should also factor in other methods used by companies to return cash to their shareholders, including stock repurchase programs.

^{1/} See Ex Parte 664 at 1.

^{2/} See Ex Parte 664 (Sub-No. 1) at 3. The STB also listed two additional criteria in its Ex Parte 664 (Sub-No. 1) decision. First, that the proposed model only be used on firms that pass the STB's current screening criteria for inclusion in railroad cost of capital determinations, and second, that the use of the MSDCF in conjunction with the CAPM approach, reduces variability in cost of equity calculations.

We have developed two MSDCF models which meet the STB's modeling criteria. One relies upon discounting expected cash payments to common equity holders based upon current dividend and common stock repurchases. The second uses expected future cash flows available for common equity holders. Each MSDCF model is discussed below.

A. INCORPORATION OF DIVIDENDS AND STOCK REPURCHASES

Companies attempt to maintain stability in their payment of dividends, as stigma often attaches to a publicly traded company that reduces or eliminates its dividends. This stability is useful when constructing a MSDCF model. However, many financial researchers have noted the decline in dividends paid by publicly traded companies over the last 20 years. Fama and French reported that only 20.8 percent of firms paid dividends in 1999, compared with 66.5 percent that paid dividends in 1978.^{3/} The decline in dividends has been attributed to many different factors, including an increasing number of investors who do not want dividends, an increase in idiosyncratic risks, and/or a larger number of smaller firms that are uninterested in paying dividends.^{4/} Not only have dividends declined but the difference between dividends paid and potential dividends has widened. This difference creates a challenge for estimating a company's cost of equity using a dividend discount approach.

^{3/} See Fama, E. F. and French, K. R. "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?", *Journal of Financial Economics*, 60, pp. 2-44, 60, 2001.

^{4/} See, Damodaran, A. "Valuation Approaches and Metrics: A Survey of the Theory and Evidence," Stern School of Business, 2001 ("Damodaran").

To address this issue, financial researchers have expanded straight dividend discount models to include other forms of payment to stockholders, including stock repurchases, while also considering the inflow of cash to the firm related to common equity. The most straight forward adjustment to the standard dividend discount model is to incorporate stock repurchases to the dividends paid by a firm to develop aggregate cash distributed to shareholders, and to net against this the cash received from exercising of stock options and from shares issued. The netting of cash received from the exercising of stock options is a logical extension of the dividend discount model because it makes little sense to consider cash flows to stockholders without also considering the inflow of cash flows from stockholders.

Because a firm stock's price is equal to the discounted value of future cashflows, it is necessary to create a mechanism to forecast the future cashflow stream. One way to develop a forecast of future dividends and stock repurchases is to link these cashflows to forecasts of net income. Net income, or earnings forecasts, are produced continuously by financial and investment analysts and can be readily adopted to estimate cost of equity.

To develop a stream of expected future dividends and stock repurchases, annual aggregate net cashflow can be divided by the firm's net income (earnings) for the year to develop a modified payout ratio.⁵ The modified payout ratio can then be applied to forecasts of expected company earnings to develop a forecast of aggregate disbursements to shareholders for using a cost of equity MSDCI model.

⁵ A firm's payout ratio is usually defined as the ratio of dividends to earnings per share. See Richard A. Brealey, Stewart C. Myers and Franklin Allen *Principles of Corporate Finance*, 8th Edition 2006 ('Brealey, Myers & Allen') at 66. Also see Damodaran at 20.

While this approach is relatively direct, the resulting modified payout ratio for any particular year may be skewed. This is because stock repurchases, unlike dividends, are not levelized over time, which can lead to dramatically uneven cash flows. For example, CSX repurchased \$103 million in common stock in 1998 and \$42 million in 2000, but did not repurchase stock again until 2006 when it bought back \$465 million in common equity.²⁶ To mitigate against these uneven cash disbursements, a better estimate of the modified payout ratio can be obtained by using an average payout ratio based upon several years of payout data.²⁷

B. MULTIPLE GROWTH RATES

The major failing of the SSDCF model is its reliance upon a single growth rate to estimate cashflows into perpetuity.²⁸ Application of a growth rate that is too high will ultimately lead to a high cost of equity, while an unreasonably low growth rate will understate equity capital costs. The STB proposes to address the SSDCF model's failings through the use of a MSDCF, which can incorporate multiple rates of growth.

An inherent issue with the MSDCF approach is choosing which are the appropriate growth rates to include in the model. As we indicated in our Reply VS in the Ex Parte 664, there is no single

²⁶ See CSX 1998, 2000 and 2006 SEC Form 10-K.

²⁷ See Damodaran at 20 discussing the use of averages to smooth cashflows to shareholders when developing modified payout ratios.

²⁸ See Ex Parte 664 at 4.

correct MSDCF model formation.² This same sentiment was expressed by Dr. Stewart C. Myers in his writings on the application of MSDCF models:

Anyone who has reviewed and tried to absorb [the DCF model results] will be frustrated at the inexplicable scatter of the DCF cost of equity estimates. It is tempting to look for some simple rule or message in these results. Unfortunately, the scatter is the rule and is the message. DCF is not one method but many, it is difficult (probably impossible) to say which growth rate measure or variable growth method is correct.¹⁰

Without a single preferred approach for applying the variable growth factors, the challenge is developing a method which is open and transparent, uses generally reliable data inputs and provides a mechanism for applying reasonable future growth patterns. We believe the approach we advocated in our Reply VS in the Ex Parte 664 proceedings for applying different growth rates meets these objectives. We discuss each component of our approach below.

1 Initial Growth Stage

The initial stage should reflect growth over a relatively short initial term, i.e., one to five years. A relatively short initial term consistent with this approach is used by Myers/Borucki¹¹ and Brealey, Myers & Allen.¹² A key aspect though is matching the length of the initial term to the length of the

² See Reply Verified Statement of Thomas D. Crowley and Daniel L. Fapp submitted on behalf of the WCTL in Ex Parte 664, October 29, 2007 ("Crowley/Fapp Reply VS").

¹⁰ See "Discounted Cash Flow Estimates of the Cost of Equity Capital - A Case Study," Myers, Stewart C. and Borucki, Lynda S. *Financial Markets, Institutions & Instruments*, Volume 3, Number 3, 1994, 9-45, 27 ("Myers/Borucki").

¹¹ See Myers/Borucki at 21.

¹² See Brealey, Myers & Allen at 70-71.

forecast. Using a three year forecast of earnings growth with a five year initial stage could lead to an misstatement in the cost of equity.

There are several methods for estimating earnings growth during the initial phase. Some analysts have relied upon historical average growth in net earnings as a proxy for future growth. However, empirical studies have shown historical averages to be poor forecasters of future growth rates.^{13/} A better approach is to utilize earnings forecasts produced by financial analysts. Analysts' forecasts of future earnings growth have been more reliable than using historic averages.^{14/} However, forecasts are apt to be based in large part on recent past performance, and there is no certainty that forecasts will prove accurate.

We propose to utilize the truncated consensus I/B/E/S earnings forecasts previously used by the STB to estimate railroad earnings growth under the SSDCF procedures. The use of truncated consensus forecasts provides an open and transparent means for forecasting future earnings growth, and are produced by at least somewhat independent third parties.^{15/}

2. Transition Growth Stage

As indicated above, there is no one strict formulation for a MSDCF, nor limit on the number of transition growth rates that may be applied.^{16/} Logic dictates though that, at some point, growth will diverge towards the average rate of growth in the overall economy. A growth rate that is significantly above that of the overall economy will cause the firm(s) or sector to overtake the entire

^{13/} See Patterson, C. S., "The Cost of Capital: Theory and Estimation," Quorum Books, 1995 at 87 to 90 ("Patterson").

^{14/} See Patterson at 94.

^{15/} As we have noted previously, there is significant evidence that financial analysts are subject to some pressures that can result in overstated forecasts. See Mr. Crowley's April 28, 2006 Reply VS at 6 to 7 in STB *Ex Parte No. 558* (Sub-No. 9), *Railroad Cost of Capital – 2005*.

^{16/} See Brealey, Myers & Allen at 71.

economy, and if the growth rate is substantially below the general growth rate, the firm(s) or sector will disappear altogether. Neither outcome is at all plausible for the railroad industry.

We propose that the transition stage of growth would begin in year 6 of the MSDCF model, with growth moving from its short-term levels in the initial stage towards the estimated growth in the GDP in straight-line manner. In other words, the difference in each railroad's short-term earnings growth rate and the expected growth rate in the GDP would be calculated, and the difference divided by the 10 years in the transition growth range to develop an annual growth adjustment factor. Application of the growth adjustment factor to the prior year's growth estimate will lead to a linear change in transition period growth rates until the long-term growth rate is reached in year 15.

Others have advocated or used similar approaches for developing transition phase growth rates. Brealey, Myers & Allen suggested using such an approach, and provide an example in their book.^{17/} Fuller and Hsia proposed a similar approach where, after an initial growth phase, growth is assumed to change linearly over a user specified number of years before leveling at a steady mean rate of growth.^{18/}

3 Terminal Growth Stage

The final, or terminal, stage should reflect the long-term expected growth rate in the GDP. As indicated by Morningstar, "even in a rapidly growing industry there will come a time when growth slows to be more in line with the overall economy."^{19/} This approach has also received support from Brealey, Myers & Allen.^{20/}

^{17/} See Brealey, Myers & Allen at 71.

^{18/} See Fuller, R. J., and C. C. Hsia, "A Simplified Common Stock Valuation Model," *Financial Analysts Journal*, 40(5), 1984 at 49 to 56, and Damodaran at 12.

^{19/} See SBBI at 68.

^{20/} See Brealey, Myers & Allen at 71.

As for an estimate of the expected long-term GDP growth rate, we propose using the consensus forecast of the long-term nominal growth in the GDP as calculated by Blue Chip Economic Indicators ("Blue Chip"). The March 10, 2008 issue of Blue Chip places long-term GDP growth at 5.0 percent.

C. APPLICATION OF THE MODIFIED PAYOUT MODEL

Based upon the approaches and methodologies described above, we developed a MSDCF cost of equity for the railroad industry for the years 2002 to 2006 utilizing the modified payout method. Our approach utilized the following procedures:^{21/}

1. For each railroad company meeting the STB's cost of capital selection criteria^{22/}, we extracted total cash outflows for dividends on common stock and stock repurchases, cash inflows from stock options exercised and issuance of new equity and annual net income from each company's consolidated statement of cashflows as reported in the company's SEC Form 10-K.
2. We calculated the modified payout ratio for each company by year by netting cash outflows from dividends and buybacks against cash inflows from the exercising of stock options and issuance of new equity and dividing the difference by the year's net income.
3. We normalized each company's modified payout ratios by calculating the simple average of the ratios over the three most recent years. For example, the normalized modified payout ratio applicable for 2006 was developed by averaging the ratios for 2004 to 2006.
4. We developed an estimate of next year's cash disbursements per share for each company by applying the normalized modified payout ratio to the most current year's reported net income. We then multiplied this product by one plus the truncated 1/13/1 /S forecast of

^{21/} Consistent with the STB's request in its Ex Parte 664 (Sub-No. 1) decision, we have included with this VS the workpapers associated with our calculations.

^{22/} This includes the Burlington Northern Santa Fe Corporation ("BNSF"), CSX Corporation ("CSX"), Norfolk Southern Corporation ("NS") and Union Pacific Corporation ("UP").

earnings growth and divided the resultant product by the average number of common shares outstanding to develop an estimated cash to shareholder per share.

- 5 We developed a 15 year forecast of expected cash disbursements per share by utilizing the expected growth factors discussed above. Specifically, for the initial 5 year growth stage, we applied truncated consensus I/B/L/S forecast applicable for each railroad. For the 10 year transition phase, we adjusted the growth in a linear manner between the railroad's truncated I/B/E/S forecast and the long-term forecast of growth in the GDP. The terminal growth stage was calculated using the long-term GDP forecast of 5.0 percent,
- 6 We developed the cost of equity for each railroad through an iterative process which equated discounted future cashflows to the railroad's average weekly closing stock price for the subject year, and
- 7 We developed a weighted cost of equity for the railroad industry by weighting each railroad's cost of equity based upon its equity market capitalization for the year.

The results of our analysis are shown in Table 1 below.

Table 1	
Estimates of the Railroad Industry Cost of Equity Using A Modified Payout Ratio MSDCF	
<u>Year</u>	<u>Modified Payout MSDCF Railroad Industry Cost of Equity</u>
(1)	(2)
1 2002	10.41%
2 2003	7.84%
3 2004	7.22%
4 2005	8.81%
5 2006	9.52%
Sources: Exhibit No. 3	

As Table 1 above indicates, the railroad industry cost of equity under the modified payout MSDCF approach ranges from 7.22 to 10.41 percent over the 2002 through 2006 time period.

III. MSDCF USING FREE CASH FLOW TO EQUITY

Dividend discount models, and their progeny like the modified payout model we discussed above, rest on the premise that a stock's value is equal to the discounted value of future cash disbursements to shareholders. Implicit in such models is the assumption that companies are paying out all cash available after taking into consideration cash required for current and future operations and repayment of debt. In the long-run this maybe an accurate assumption. However, in the short run, the amount of cash returned to shareholders maybe significantly different than the cash actually available after considering other cash requirements.

Because of this difference between actual cash disbursements made to shareholders, and what are essentially potential cash disbursements to shareholders, analysts have developed valuation models using Free Cashflow To Equity ("FCFE") as a replacement for estimated cash distributed to shareholders in the form of dividends and stock repurchases. We discuss the calculation of FCFE and our use of it in the calculation of railroad cost of equity below.

A. CALCULATION OF FCFE

As described above, FCFE generally reflects the cash left over in the firm after reinvestment needs are met and debt repaid. This is specifically defined as

Net Income

+ Noncash charges (e.g. depreciation,
amortization, deferred revenue and deferred
taxes)

- Capital Expenditures

± Change in Working Capital

- Dividends on Preferred Stock (if any)

± Change in Long Term Debt

= FCFE²³

When FCFE replaces dividends in an equity valuation, it is implicitly assumed that the FCFE will be paid out to stockholders. There are two consequences to this assumption. First, there will be no cash building-up in the firm, since the cash available after debt repayments and reinvestment is paid to shareholders each year. Second, the expected growth in FCFE will come from growth in operating assets and not growth in income from increases in marketable securities.²⁴

B. INCORPORATION OF FCFE INTO THE MSDCF

To develop the cost of railroad equity using I C I L and a MSDCF model, we used the following methodology

²³ See Pratt, Shannon P., *Cost of Capital: Estimation and Applications*, 2002 at 16 (‘Pratt’). Also see Damodaran at 21.

²⁴ See Damodaran at 21.

- 1 For each railroad in the study group, we identified annual net income, non-cash charges, capital expenditures, new debt issuances and debt repayments from each company's consolidated statement of cashflows contained in their SEC Form 10-K.
- 2 For each railroad in the study group, we calculated the annual net change in non-cash working capital, net of debt from current asset and current liability information contained each company's consolidated balance sheet.
- 3 Using the data from the railroad's statement of cashflows and our calculation of net changes in working capital, we developed each railroad's FCFE.
- 4 We calculated the annual ratio of FCFE to net income for each railroad, and averaged these ratios over a three year period to develop a normalized FCFE to net income ratio.
- 5 We developed an estimate of next year's FCFE per share for each company by applying the normalized FCFE to net income ratio to the most current year's reported net income, multiplying this product by one plus the truncated I/B/E/S forecast of earnings growth and dividing the resultant product by the average number of common shares outstanding.
- 6 We developed a 15 year forecast of FCFE per share by utilizing the expected growth factors discussed above. Specifically, for the initial 5-year growth stage, we applied truncated consensus I/B/E/S forecast applicable for each railroad. For the 10-year transition phase, we adjusted the growth in a linear manner between the railroad's truncated I/B/E/S forecast and the long-term forecast of growth in the GDP. The terminal growth stage was calculated using the long-term GDP forecast of 5.0 percent.
- 7 The cost of equity for each railroad was developed through an iterative process which equated discounted future FCFE to the railroad's average weekly closing stock price for the subject year, and
- 8 We developed a weighted cost of equity for the railroad industry by weighting each railroad's cost of equity based upon its equity market capitalization for the year.

Table 2 below displays the results of our analysis

Table 2	
Estimates of the Railroad Industry Cost of Equity Using A FCFE MSDCF	
<u>Year</u>	<u>FCFE MSDCF Railroad Industry Cost of Equity</u>
(1)	(2)
1 2002	11.64%
2 2003	10.10%
3 2004	8.87%
4 2005	9.92%
5 2006	9.84%
Source: Exhibit No. 3	

The Table 2 results show that the railroad industry cost of equity ranged from 8.87 percent to 11.64 percent over the 2002 through 2006 time period.

If the STB chooses to utilize a FCFE approach in developing its MSDCF model calculations, it should rely upon the model described above. All of the inputs to the model are readily available from public sources. Additionally, the model does not rely upon proprietary information regarding future growth rates or expected future cash requirements for capital expansions and uses reasonable assumptions about future growth in expected FCFE.

Some may argue that the above model does not take into consideration future railroad capital needs. This argument is a red herring. As the railroads have previously stated, changes in railroad capital spending closely track changes in revenues, net income, and returns.²⁵ In other words, as

²⁵ See, for example, the written testimony submitted by UP on November 27, 2007 preceeding the Oral Hearing in *Ex Parte 664* at 3. "As our earnings have improved, Union Pacific has responded to the challenges of providing adequate infrastructure and has been investing for long-term growth." See also slide 34 to BNSF's November 14, 2006 presentation at the Citigroup Annual Transportation Conference, and slide 30 to BNSF's February 14, 2008

revenues and net income have increased, so have the railroads' willingness to expend funds on capital projects. By calculating a FCFE to net income ratio, and using that ratio to calculate future FCFE based on increases in net income, the MSDCF model implicitly accounts for increases in capital investment.

IV. COMPARISON OF MSDCF TO CAPM COSTS OF EQUITY

The two models we discuss above are reasonable examples of methodologies used to develop cost of equity using MSDCF approaches. To compare the results of these two models to the results of the CAPM cost of equity, we developed the cost of equity as outlined under the STB's *Ex Parte 664* procedures for the years 2002 to 2006.²⁶ Table 3 below compares the results of our analyses

Table 3			
<u>Estimates of the Railroad Industry Cost of Equity</u>			
<u>Year</u>	<u>STB CAPM</u>	<u>Modified Payout MSDCF</u>	<u>FCI1 MSDCF</u>
<u>(1)</u>	<u>Railroad Industry</u>	<u>Railroad Industry</u>	<u>Railroad Industry</u>
	<u>Cost of Equity</u>	<u>Cost of Equity</u>	<u>Cost of Equity</u>
	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>
1 2002	10.05%	10.41%	11.64%
2 2003	9.93%	7.84%	10.10%
3 2004	10.38%	7.22%	8.87%
4 2005	10.61%	8.81%	9.92%
5 2006	11.08%	9.52%	9.84%
Sources: Exhibit No. 3			

As shown in Table 3 above, the two MSDCF models produce similar but not identical results to that of the CAPM cost of equity.

²⁶ The calculations for our 2002 to 2006 CAPM costs of equity are included in our workpapers accompanying this VS. In developing the CAPM cost of equity, we used the approach specified in our February 15, 2008 Reply VS in *Ex Parte No. 558 (Sub-No. 10) Railroad Cost of Capital - 2006*.

VERIFICATION

COMMONWEALTH OF VIRGINIA)
)
CITY OF ALEXANDRIA)

I, THOMAS D CROWLEY, verify under penalty of perjury that I have read the foregoing
Verified Statement of Thomas D Crowley, that I know the contents thereof, and that the same are
true and correct. Further, I certify that I am qualified and authorized to file this statement




Thomas D. Crowley

Sworn to and subscribed
before me this 14th day of April, 2008

Diane R. Kavounis
Diane R. Kavounis
Notary Public for the State of Virginia

My Commission expires November 30, 2012

VERIFICATION

COMMONWEALTH OF VIRGINIA)
)
CITY OF ALEXANDRIA)

I, DANIEL L. FAPP, verify under penalty of perjury that I have read the foregoing Verified Statement of Daniel L. Fapp, that I know the contents thereof, and that the same are true and correct. Further, I certify that I am qualified and authorized to file this statement.


Daniel L. Fapp

**Sworn to and subscribed
before me this day of April 14, 2008.**

Alton B. Krauss

Notary Public for the State of Virginia

My Commission expires. *November 30, 2012*

LIST OF EXHIBITS

<u>Exhibit No.</u>	<u>Description</u>
(1)	(2)
1	Thomas D. Crowley Statement Of Qualifications
2	Daniel L. Fapp Statement of Qualifications
3	Comparison of Railroad Costs of Equity

STATEMENT OF QUALIFICATIONS

My name is Thomas D Crowley I am an economist and President of the economic consulting firm of L E Peabody & Associates, Inc The firm's offices are located at 1501 Duke Street, Suite 200, Alexandria, Virginia 22314,, and 10445 N Oracle Road, Suite 151, Tucson, Arizona 85737

I am a graduate of the University of Maine from which I obtained a Bachelor of Science degree in Economics I have also taken graduate courses in transportation at George Washington University in Washington, D C I spent three years in the United States Army and since February 1971 have been employed by L E Peabody & Associates, Inc

I am a member of the American Economic Association, the Transportation Research Forum, and the American Railway Engineering and Maintenance-of-Way Association

The firm of L E Peabody & Associates, Inc specializes in analyzing matters related to the rail transportation of coal As a result of my extensive economic consulting practice since 1971 and my participating in maximum-rate, rail merger, service disputes and rule-making proceedings before various government and private governing bodies, I have become thoroughly familiar with the rail carriers that move coal over the major coal routes in the United States This familiarity extends to subjects of railroad service, costs and profitability, railroad capacity, railroad traffic prioritization and the structure and operation of the various contracts and tariffs that historically have governed the movement of coal by rail

STATEMENT OF QUALIFICATIONS

As an economic consultant, I have organized and directed economic studies and prepared reports for railroads, freight forwarders and other carriers, for shippers, for associations and for state governments and other public bodies dealing with transportation and related economic problems. Examples of studies I have participated in include organizing and directing traffic, operational and cost analyses in connection with multiple car movements, unit train operations for coal and other commodities, freight forwarder facilities, TOFC/COFC rail facilities, divisions of through rail rates, operating commuter passenger service, and other studies dealing with markets and the transportation by different modes of various commodities from both eastern and western origins to various destinations in the United States. The nature of these studies enabled me to become familiar with the operating practices and accounting procedures utilized by railroads in the normal course of business.

Additionally, I have inspected and studied both railroad terminal and line-haul facilities used in handling various commodities, and in particular unit train coal movements from coal mine origins in the Powder River Basin and in Colorado to various utility destinations in the eastern, mid-western and western portions of the United States and from the Eastern coal fields to various destinations in the Mid-Atlantic, northeastern, southeastern and mid-western portions of the United States. These operational reviews and studies were used as a basis for the determination of the traffic and operating characteristics for specific movements of coal and numerous other commodities handled by rail.

STATEMENT OF QUALIFICATIONS

I have frequently been called upon to develop and coordinate economic and operational studies relative to the acquisition of coal and the rail transportation of coal on behalf of electric utility companies. My responsibilities in these undertakings included the analyses of rail routes, rail operations and an assessment of the relative efficiency and costs of railroad operations over those routes. I have also analyzed and made recommendations regarding the acquisition of railcars according to the specific needs of various coal shippers. The results of these analyses have been employed in order to assist shippers in the development and negotiation of rail transportation contracts which optimize operational efficiency and cost effectiveness.

Moreover, I have developed numerous variable cost calculations utilizing the various formulas employed by the Interstate Commerce Commission ("ICC") and the Surface Transportation Board ("STB") for the development of variable costs for common carriers, with particular emphasis on the basis and use of the Uniform Railroad Costing System ("URCS") and its predecessor, Rail Form A. I have utilized URCS/Rail form A costing principles since the beginning of my career with L. E. Peabody & Associates Inc. in 1971.

I have frequently presented both oral and written testimony before the ICC, STB, Federal Energy Regulatory Commission, Railroad Accounting Principles Board, Postal Rate Commission and numerous state regulatory commissions, federal courts and state courts. This testimony was generally related to the development of variable cost of service calculations, rail traffic and operating patterns, fuel supply economics, contract interpretations, economic principles

STATEMENT OF QUALIFICATIONS

concerning the maximum level of rates, implementation of maximum rate principles, and calculation of reparations or damages, including interest. I presented testimony before the Congress of the United States, Committee on Transportation and Infrastructure on the status of rail competition in the western United States. I have also presented expert testimony in a number of court and arbitration proceedings concerning the level of rates, rate adjustment procedures, service, capacity, costing, rail operating procedures and other economic components of specific contracts.

Since the implementation of the Staggers Rail Act of 1980, which clarified that rail carriers could enter into transportation contracts with shippers, I have been actively involved in negotiating transportation contracts on behalf of coal shippers. Specifically, I have advised utilities concerning coal transportation rates based on market conditions and carrier competition, movement specific service commitments, specific cost-based rate adjustment provisions, contract reopeners that recognize changes in productivity and cost-based ancillary charges. I have also reviewed, analyzed and evaluated both UP's Circular 111 and BNSF 90068 rate levels and other terms and conditions on behalf of coal shippers.

I have been actively engaged in negotiating coal supply contracts for various users throughout the United States. In addition, I have analyzed the economic impact of buying out, brokering, and modifying existing coal supply agreements. My coal supply assignments have encompassed

STATEMENT OF QUALIFICATIONS

analyzing alternative coals to determine the impact on the delivered price of operating and maintenance costs, unloading costs, shrinkage factor and by-product savings

I have developed different economic analyses regarding rail transportation matters for over sixty (60) electric utility companies located in all parts of the United States, and for major associations, including American Paper Institute, American Petroleum Institute, Chemical Manufacturers Association, Coal Exporters Association, Edison Electric Institute, Mail Order Association of America, National Coal Association, National Industrial Transportation League, North America Freight Car Association, the Fertilizer Institute and Western Coal Traffic League. In addition, I have assisted numerous government agencies, major industries and major railroad companies in solving various transportation-related problems.

In the two Western rail mergers that resulted in the creation of the present BNSF Railway Company and Union Pacific Railroad Company and in the acquisition of Conrail by Norfolk Southern Railway Company and CSX Transportation, Inc., I reviewed the railroads' applications including their supporting traffic, cost and operating data and provided detailed evidence supporting requests for conditions designed to maintain the competitive rail environment that existed before the proposed mergers and acquisition. In these proceedings, I represented shipper interests, including plastic, chemical, coal, paper and steel shippers.

STATEMENT OF QUALIFICATIONS

I have participated in various proceedings involved with the division of through rail rates. For example, I participated in ICC Docket No. 35585, Akron, Canton & Youngstown Railroad Company, et al v Aberdeen and Rockfish Railroad Company, et al which was a complaint filed by the northern and mid-western rail lines to change the primary north-south divisions. I was personally involved in all traffic, operating and cost aspects of this proceeding on behalf of the northern and mid-western rail lines. I was the lead witness on behalf of the Long Island Rail Road in ICC Docket No. 36874, Notice of Intent to File Division Complaint by the Long Island Rail Road Company.

STATEMENT OF QUALIFICATIONS

My name is Daniel L. Fapp. I am Vice President of the economic consulting firm of L. E. Peabody & Associates, Inc. The firm's offices are located at 1501 Duke Street, Suite 200, Alexandria, VA 22314, and 10445 N. Oracle Road, Suite 151, Tucson, AZ 85737.

I received a Bachelor of Science degree in Business Administration with an option in Marketing (cum laude) from the California State University, Northridge in 1987, and a Master of Business Administration degree from the University of Arizona's Eller College of Management in 1993, specializing in finance and operations management. I am also a member of Beta Gamma Sigma, the national honor society for collegiate schools of business.

I have been employed by L. E. Peabody & Associates, Inc. since December 1997. Prior to joining L. E. Peabody & Associates, Inc., I was employed by BHP Copper Inc. in the role of Transportation Manager - Finance and Administration, and where I also served as an officer of the three BHP Copper Inc. subsidiary railroads: The San Manuel Arizona Railroad, the Magma Arizona Railroad (also known as the BHP Arizona Railroad) and the BHP Nevada Railroad. I have also held operations management positions with Arizona Lithographers in Tucson, AZ and MCA-Universal Studios in Universal City, CA.

While at BHP Copper Inc., I was responsible for all financial and administrative functions of the company's transportation group. I also directed the BHP Copper Inc. subsidiary railroads' cost and revenue accounting staff, and managed the San Manuel Arizona Railroad's and BHP Arizona Railroad's dispatchers and the railroad dispatching functions. I served on the company's Commercial and Transportation Management Team and the company's Railroad Acquisition Team where I was responsible for evaluating the acquisition of new railroads, including developing financial and economic assessment models. While with MCA-Universal Studios, I

STATEMENT OF QUALIFICATIONS

held several operations management positions, including Tour Operations Manager, where my duties included vehicle routing and scheduling, personnel scheduling, forecasting facilities utilization, and designing and performing queuing analyses

As part of my work for L E Peabody & Associates, Inc , I have performed and directed numerous projects and analyses undertaken on behalf of utility companies, short line railroads, bulk shippers, and industry and trade associations Examples of studies which I have participated in organizing and directing include, traffic, operational and cost analyses in connection with the rail movement of coal, metallic ores, pulp and paper products, and other commodities I have also analyzed multiple car movements, unit train operations, divisions of through rail rates and switching operations throughout the United States The nature of these studies enabled me to become familiar with the operating procedures utilized by railroads in the normal course of business

Since 1997, I have participated in the development of cost of service analyses for the movement of coal over the major eastern and western coal-hauling railroads I have conducted on-site studies of switching, detention and line-haul activities relating to the handling of coal I have also participated in and managed several projects assisting short-line railroads In these engagements, I assisted short-line railroads in their negotiations with connecting Class I carriers, performed railroad property and business evaluations, and worked on rail line abandonment projects

I have been frequently called upon to perform financial analyses and assessments of Class I, Class II and Class III railroad companies In addition, I have developed various financial models exploring alternative methods of transportation contracting and cost assessment.

STATEMENT OF QUALIFICATIONS

developed corporate profitability and cost studies, and evaluated capital expenditure requirements. I have determined the Going Concern Value of privately held freight and passenger railroads, including developing company specific costs of debt and equity for use in discounting future company cash flows. My consulting assignments regularly involve working with and determining various facets of railroad financial issues, including cost of capital determinations. In these assignments, I have calculated railroad capital structures, market values, cost of railroad debt, cost of preferred railroad equity and common railroad equity. I am also well acquainted with and have used the commonly accepted models for determining a firm's cost of equity, including the Discounted Cash Flow Model ("DCF"), Capital Asset Pricing Model ("CAPM"), Fama-French Three Factor Model and Arbitrage Pricing Model.

In my tenure with L. E. Peabody & Associates, Inc., I have assisted in the development and presentation of traffic and revenue forecasts, operating expense forecasts, and discounted cash-flow models which were presented in numerous proceedings before the STB. I presented evidence applying the STB's stand-alone cost procedures in Docket Number 42057, *Public Service Company of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Railway Company*, and in Docket Number 42071, *Otter Tail Power Company v. BNSF Railway Company*. I have also presented evidence before the STB in Ex Parte No. 661, *Rail Fuel Surcharges*, in Ex Parte No. 558 (Sub-No. 10), *Railroad Cost of Capital – 2006*, and Ex Parte No. 664, *Methodology To Be Employed In Determining The Railroad Industry Cost Of Capital*. In addition, my reports have been used as evidence before the Nevada State Tax Commission.

Comparison of Railroad Costs of Equity - 2002 to 2006

		STB Single- Stage DCF	STB CAPM	Modified Payout Method	Free Cash Flow To Equity Method Cost
<u>Year</u>		<u>Cost of Equity 1/</u>	<u>Cost of Equity 2/</u>	<u>Cost of Equity 3/</u>	<u>of Equity 4/</u>
(1)		(2)	(3)	(4)	(5)
1	2002	12.60%	10.05%	10.41%	11.64%
2	2003	12.70%	9.93%	7.84%	10.10%
3	2004	13.16%	10.38%	7.22%	8.87%
4	2005	15.18%	10.61%	8.81%	9.92%
5	2006	16.10%	11.08%	9.52%	9.84%

1/ 2002 to 2005 from STB Ex Parte No. 558 decisions; 2006 from the AAR's evidence in STB Ex Parte No. 558 (Sub-No. 10)

2/ Using the STB's CAPM method as outlined in our February 15, 2008 testimony in Ex Parte No. 558 (Sub-No. 10)

3/ Based on multi-stage DCF approach using dividends and stock repurchases, net of cash received from options exercised

4/ Based on multi-stage DCF approach using free cash flow to equity

EXHIBIT B

Verified Statement of Dr. James E. Hodder

VERIFIED STATEMENT

OF

JAMES E. HODDER

My name is James E. Hodder. I am the Charles and Laura Albright Professor of Finance at the University of Wisconsin-Madison and am currently also Chairman of the Finance Department. My address is 3441 Crestwood Drive, Madison, Wisconsin 53705.

I have served on the faculty of the University of Wisconsin Business School since 1992. From 1978 to 1992, I served on the faculty of Stanford University, where I received my Ph.D. in Economics in 1979. At Wisconsin, I have taught a masters-level Corporate Finance course as well as corporate-oriented courses on Financial Policy and on Multinational Business Finance. In addition, I have taught several courses on options and other derivative securities, at both introductory and advanced levels. At Stanford, most of my teaching was in corporate finance with a particular focus on valuing manufacturing and technology investments. Hence, I have been teaching corporate finance courses since 1978 – almost 30 years.

A substantial portion of my research and publications has addressed the subjects of investment evaluation and discounting. A key aspect of those subjects is the firm or project cost of capital, including appropriate risk and inflation adjustments. Another substantial portion of my research has addressed corporate capital structure. I have previously submitted testimony to the Surface Transportation Board (Board) in two coal rate cases – on behalf of Wisconsin Power & Light in its case against Union Pacific Railroad Company and on behalf of PPL Montana in its case against the Burlington Northern and Santa Fe Railway Company. In connection with Ex

Parte No. 664, Methodology to be Employed in Determining the Railroad Industry's Cost of Capital, I have provided testimony on several occasions to the Board on behalf of the Western Coal Traffic League (WCTL). Those occasions include a Verified Statement (December 2006), a Public Hearing (February 2007), a Verified Statement (September 2007), a Reply Verified Statement (October 2007), and a Public Hearing (December 2007). A copy of my detailed curriculum vitae is included herewith as Appendix A.

In the current instance, I have been asked by Counsel for WCTL to provide comments in response to the Board's Advance Notice of Proposed Rulemaking (ANPR) in STB Ex Parte No 664 (Sub-No. 1) regarding Use of a Multi-stage Discounted Cash Flow Model in Determining the Railroad Industry's Cost of Capital. I have also been asked to review and comment on the Verified Statement (VS) regarding that ANPR being submitted by Thomas D. Crowley and Daniel L. Fapp on behalf of WCTL.

I view the analysis and comments contained in the Crowley and Fapp VS as appropriate and illuminating. Indeed, I had several discussions with them as the models and calculations reported in that Verified Statement were being developed. There are, however, some underlying issues and modeling choices that are important but may not be obvious from looking at their summary results. In what follows, I attempt to highlight those issues.

The Board is in the position of trying to determine a cost of equity (more generally, a cost of capital) in a situation where the various parties to the proceeding have differing and sometimes opposing perspectives regarding desirable outcomes. This suggests that it is very important for the Board to use a procedure that is transparent and not easily manipulated by any of the parties. This suggests using publically available information and argues for relatively

simple models. Since we are talking about an input for valuing long-term investments, it is also desirable that the estimated cost of equity be relatively stable through time

The basic approach in the Crowley and Fapp VS is a modification of the procedure used in their Reply VS from October 2007 in connection with Ex Parte No. 664. This is a three-stage model with a short-run growth rate for the first five years using the IBES truncated consensus earnings forecast. The long-run growth rate begins in year 15 and continues indefinitely. The long-run growth rate for each of the railroads is assumed to match the long-run nominal GDP growth forecast for the U S economy obtained from Blue Chip Economic Indicators (Blue Chip). In between the first and third (long-run) stages, they use a simple adjustment mechanism for the annual growth rate such that it converges over a ten year period to the long-run rate. In the current situation with a relatively high short-run rate, the growth rate during stage two declines annually by 10% of the difference between the short-run and long-run growth rates.

Two additional inputs are needed to implement this model, an initial share price and an initial cash flow estimate. In prior years when the Board was using a single-stage DCF procedure, the standard approach was to calculate a monthly average of the firm's dividend yield for the year in question. In the ANPR, the Board requested a procedure which uses a broader measure of cash flow to shareholders. The Board mentioned in particular share buybacks (also called repurchases) in addition to dividends. This suggests decoupling the cash flow estimate from the initial price. The input for initial price used in the Crowley and Fapp VS is the weekly average of the firm's closing stock price for the year in question.

Obtaining an input for the initial cash flow to shareholders raises some issues. Logically, such a cash flow estimate should reflect not only share buybacks but also share issuance by the

firm As pointed out in Professor Stewart Myers Reply VS (October 2007) in connection with Ex Parte No. 664.

Corporations issue shares through various channels, for example to finance acquisitions, from exercise of stock options or from conversion of convertible debt Absence of formal public offerings does not mean that stock issues are zero

Hence, we need to also consider cash received by the firm from selling new shares or from the exercise of employee stock options The amounts of such cash inflows to the four major railroads have been very substantial in recent years – in several cases exceeding the firm's dividends during that year This suggests that we define the Net Payout to shareholders during a year as the amount paid out in dividends plus the cash used for share buybacks less the cash received from share sales or option exercises during that same year

When making such a calculation, one immediately notices that Net Payout has been quite volatile at all four of the large U S railroads over the last several years This is illustrated in Table 1 with data for CSX Corporation (CSX) ¹

Table 1
CSX Corporation
(Amounts are \$ millions)

Year	2007	2006	2005	2004	2003
Net Income	1336	1310	1145	339	246
Dividends Paid	231	145	93	86	86
Stock Repurchases	2174	465	0	0	0
Option Exercises	153	319	98	12	0
Net Payout	2252	291	(5)	74	86

Data from CSX 10-K reports

¹ The other three railroads also have very volatile Net Payouts in recent years

In large part, the volatility of Net Payouts for all four railroads is due to the lumpiness of share buybacks, however, simply netting the cash inflows from option exercise etc against dividends paid creates considerable unevenness and even negative Net Payouts. Using a negative number for the initial cash flow to shareholders is going to lead to a nonsensical cost of equity estimate. So some sort of smoothing mechanism is needed, and the Crowley-Fapp VS uses a three-year moving average procedure based on the ratio of Net Payout to Net Income.

Smoothing helps, but it is clear that decisions to repurchase shares can substantially affect the initial cash flow estimate and hence the firm's estimated cost of equity. Unless it represents a major recapitalization, the decision to repurchase shares (or pay dividends) should theoretically have only a very modest impact on a firm's cost of equity. Consider the CAPM perspective, where a share buyback will not alter the risk-free rate or the market risk premium. A share buyback can alter beta via either decreasing the cash position of the firm or increasing its leverage. However, if the buyback is a modest proportion of the total shares outstanding, the effect on beta will be quite small.

So smoothing doesn't fully eliminate the problem of buybacks substantially altering the estimated cost of equity in the sort of relatively simple DCF model being contemplated. The underlying issue is that DCF models (simple or complicated) are based conceptually on forecasts of future cash flows. What is happening in the three-stage model employed in the Crowley-Fapp VS is that a historic average is used as a starting point to predict the future. If the Net Payout declines substantially next year (for example), that is not consistent with this relatively simple model. One could make forecasts of future payouts that were not based on historic averages, but that sort of approach takes us into the realm of subjectivity and potential manipulation.

In Table 1, it is clear that the Net Payout for CSX jumped massively upward in 2007.² So when that year replaces 2004 in the three-year average, it will tend to push up the cost of equity estimate. We can note further that CSX had a Net Payout in 2007 that dramatically exceeded Net Income. Clearly, that situation is not sustainable in the long run, however, forecasting how the Net Payout rate will return to more sustainable levels would again take us away from the relatively simple three-stage model and from using the publically-available IBES forecasts.

Given the above issues, Crowley and Fapp also explored using the same three-stage model but with the Initial Cash Flow to Shareholders estimate based on Free Cash Flow to Equity (FCFE) rather than Net Payout. Again there was substantial volatility over time, and they opted to use a three-year averaging mechanism analogous to that used with Net Payout. Smoothing helped, but the FCFE based estimates can also move up or down for reasons which have very little to do with a firm's cost of equity³

In summary, the relative simplicity of the three-stage model plus the use of historic information and publically available forecasts can lead to cost of equity estimates which are not accurate upon closer inspection. Nevertheless, relative simplicity and avoiding proprietary forecasts appear critical for the Board's cost of capital estimation procedure. Consequently, it seems we will need to make do with a model which can sometimes generate estimates that we can identify as too high or too low for reasons which are visible in the data. To a substantial extent, averaging across firms will tend to mitigate inaccuracies that are attributable to firm-

² Similar statements can also be made about the other major railroads

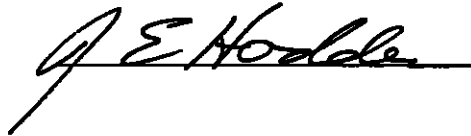
³ For example, the CSX cost of equity estimated using the FCFE approach was 12.73% for 2005 but dropped to 5.39% for 2006. That precipitous drop was primarily due to the three-year average of FCFE to Net Income ratio dropping from 29.8% in 2005 to only 1.5% in 2006. The very low ratio for 2006 is due to a large negative ratio in 2005, which is in turn primarily due to a relatively large debt payment. Theoretically, a leverage reduction should reduce beta and the cost of equity, but not this much. The underlying difficulty in this situation is that a negative

specific anomalies. Consequently, we will need to focus on identifying situations where the industry average is pushed up or down by some systematic effect that is not truly related to the industry's cost of equity. When using a multi-stage DCF approach as a cross-check on the CAPM estimate, an obvious warning flag that suggests closer analysis is when the two estimates are dramatically different. Looking at Exhibit 3 in the Crowley-Fapp VS, the model which appears dramatically inconsistent with the others is the old single-stage DCF procedure. That suggests we have made considerable progress in identifying procedures which are more robust and reasonable, even if not completely perfect.

FCTE, even with averaging, can lead to unreasonably small estimates in some years for the initial Cash Flow to Shareholders. In turn, this leads to an unreasonable cost of equity estimate.

VERIFICATION

I, James E Hodder, verify under penalty of perjury that the foregoing is true and correct
Further, I certify that I am qualified and authorized to file this Verified Statement Executed on
April 14, 2008

A handwritten signature in black ink, reading "J E Hodder", written over a horizontal line.

Appendix A: Curriculum Vitae

JAMES E. HODDER

Charles and Laura Albright Professor of Finance

School of Business
University of Wisconsin - Madison
975 University Ave
Madison, WI 53706-1323

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Areas of Specialization. Corporate Finance, Derivative Securities, International Finance, and Risk Management

Education

1967	B.S	Industrial Engineering, Stanford University
1968	M.B.A	Business Administration, University of Michigan
1976	M.A	Economics, University of California (Berkeley)
1979	Ph.D	Economics, Stanford University

Dissertation The Hedging of Exposure to Exchange-Rate Movements

Employment

1968-69	Sylvania Electronic Systems	Project Administrative Engineer
1969-73	U.S. Navy	Engineering Duty Officer
1974-76	Department of Economics, University of California (Berkeley)	Research and Teaching Assistant
1976-78	Department of Economics, Stanford University	Teaching Assistant and Instructor
1978-92	Department of Industrial Engineering and Engineering Management, Stanford University	Assistant Professor and Associate Professor, Associate Chairman 1987-1988, Ph.D. Program Director 1987-1992
1992-	School of Business, University of Wisconsin - Madison	Professor of Finance, Director of Quantitative Masters in Finance (QMF) Program 1995-2004, Department Chairman since 2004.

Visiting Appointments

- 1986 Visiting Scholar, Department of Economics, Osaka University -- funded by a fellowship from the Japan Society for the Promotion of Science
- 1990-91 Visiting Associate Professor, School of Business, University of Wisconsin - Madison

Teaching.

Advanced Derivatives
Corporate Finance
Fixed Income and Derivative Securities
Options and Financial Futures
Ph D. Seminar Interest Rate and Credit Risk Models
Ph D Seminar Risk Management in Financial Institutions
Multinational Business Finance
Financial Policy
Doctoral Seminar in Financial Decisions
Engineering Economy
International Economics

Awards:

Outstanding Teacher, Department of Industrial Engineering and Engineering Management, Stanford University, 1981-82 and 1986-87

Lawrence J. Larson Award for Excellence in Teaching, School of Business, University of Wisconsin-Madison, 1999

Wisconsin Idea Fellow, In recognition of extraordinary public service on behalf of the University of Wisconsin, 2004-2005

Publications

"Foreign Investment from the Firm's Perspective," in D. Bonham-Yeaman, ed., Developing Global Corporate Strategies, Academy of International Business and European International Business Association Joint Conference, Barcelona, Spain, December, 1981

"Exposure to Exchange Rate Movements," Journal of International Economics, November, 1982

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American Finance Association
Financial Management Association
Global Association of Risk Professionals
Professional Risk Managers' International Association
Society for Financial Studies
Western Finance Association

House Transportation & Infrastructure Committee: Forum on Freight Rail Finance

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December 12, 2007

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EXHIBIT C

**Submission of Edward M. Wolfe, Senior Managing Director of Bear, Stearns & Co. Inc.,
before the House Transportation & Infrastructure Committee, Forum on Freight Rail
Finance, December 12, 2007 (excerpt)**

House Transportation & Infrastructure Committee: Forum on Freight Rail Finance

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December 12, 2007

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Capex Trends by Company



Total Capital Spending (\$'n Millions)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007E	2008E	5-Yr Avg	12-Yr Avg
BNI	\$1,935	\$2,714	\$2,598	\$2,767	\$2,526	\$1,762	\$1,608	\$1,505	\$1,726	\$1,990	\$2,179	\$2,614	\$2,550	\$2,550	\$2,003	\$2,160
CNI (US\$)	404	400	\$663	724	738	743	684	598	749	825	975	1,141	1,495	1,550	858	720
CP (US\$)	511	395	620	738	567	385	359	357	493	519	731	698	831	890	559	531
CSX	972	1,220	943	1,115	1,256	859	879	1,036	1,059	1,030	1,136	1,639	1,700	1,600	1,180	1,095
NSC	939	957	960	956	912	731	746	695	720	1,041	1,025	1,178	1,405	1,455	932	905
UNP	1,903	2,076	2,101	2,110	2,158	2,315	2,196	2,359	2,071	2,402	2,869	2,742	3,100	3,100	2,489	2,275
Total (US\$)	\$6,664	\$7,761	\$7,885	\$8,410	\$8,157	\$6,795	\$6,472	\$6,550	\$6,818	\$7,807	\$8,914	\$10,012	\$11,081	\$11,145	\$8,020	\$7,687
Canadian Rails	915	794	1,283	1,462	1,305	1,128	1,043	955	1,242	1,344	1,705	1,839	2,326	2,440	1,417	1,251
US Rails	5,749	6,967	6,602	6,948	6,852	5,667	5,429	5,595	5,576	6,463	7,209	8,173	8,755	8,705	6,603	6,436

% Change (Y-o-Y)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007E	2008E	5-Yr Avg	12-Yr Avg
BNI	-	40.3%	-4.3%	6.5%	-8.7%	-30.2%	-8.7%	-6.4%	14.7%	15.3%	9.5%	20.0%	-2.4%	0.0%	10.6%	4.3%
CNI	-	-1.1%	65.9%	9.2%	1.9%	0.7%	-8.0%	-12.6%	25.2%	10.2%	18.1%	17.1%	31.0%	3.7%	11.6%	11.5%
CP	-	-22.8%	57.1%	19.1%	-23.2%	-32.2%	-6.7%	-0.7%	38.4%	5.1%	40.9%	-4.5%	19.1%	7.1%	15.8%	6.4%
CSX	9.3%	25.4%	-22.7%	18.2%	12.6%	-31.6%	2.3%	17.9%	2.2%	-2.7%	10.3%	44.3%	3.7%	-5.9%	14.4%	7.1%
NSC	-6.9%	2.0%	0.3%	-0.4%	-4.6%	-19.8%	2.1%	-6.8%	3.6%	44.6%	-1.5%	14.9%	19.3%	3.6%	10.9%	2.3%
UNP	29.0%	9.1%	1.2%	0.4%	2.3%	7.3%	-5.1%	7.4%	-12.2%	16.0%	19.4%	-4.4%	13.1%	0.0%	5.2%	5.9%
Total (US\$)	13.1%	16.5%	1.6%	6.7%	-3.0%	-16.7%	-4.8%	1.2%	4.1%	14.5%	14.2%	12.3%	10.7%	0.6%	9.3%	5.0%
Canadian Rails	-	-11.9%	61.5%	14.2%	-10.6%	-15.7%	-7.3%	-6.6%	31.8%	7.6%	29.5%	6.3%	25.1%	5.4%	13.7%	8.2%
US Rails	13.1%	21.2%	-5.2%	5.2%	-1.4%	-17.3%	-4.2%	3.1%	-0.3%	15.9%	11.5%	13.4%	7.1%	-0.6%	8.7%	4.6%

% of Revenue

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007E	2008E	5-Yr Avg	12-Yr Avg
BNI	23.7%	33.1%	30.9%	30.9%	27.5%	19.1%	17.5%	16.8%	18.3%	18.2%	16.8%	17.4%	16.3%	15.5%	17.5%	22.5%
CNI	10.7%	10.5%	17.5%	20.9%	20.9%	20.3%	18.7%	15.4%	17.7%	15.9%	15.8%	16.4%	20.0%	18.5%	16.2%	16.7%
CP	18.7%	14.5%	24.5%	31.5%	24.1%	15.6%	15.0%	15.3%	18.8%	17.3%	20.1%	17.3%	18.8%	18.2%	17.7%	19.4%
CSX	13.7%	17.1%	13.1%	15.6%	19.1%	11.9%	12.2%	14.4%	14.2%	12.8%	13.2%	17.1%	17.1%	15.2%	14.4%	14.5%
NSC	15.2%	15.3%	15.1%	15.3%	14.8%	11.9%	12.1%	11.1%	11.1%	14.2%	12.1%	12.5%	15.1%	14.9%	12.2%	13.4%
UNP	20.1%	20.5%	21.0%	22.3%	21.2%	21.4%	20.3%	21.1%	17.9%	19.7%	21.1%	17.6%	19.0%	18.0%	19.5%	20.4%
Total Class I's	17.0%	18.5%	20.4%	22.7%	21.2%	16.7%	16.0%	15.7%	16.4%	16.3%	16.5%	16.4%	17.7%	16.7%	16.3%	17.8%
Canadian Rails	14.7%	12.5%	21.0%	26.2%	22.5%	18.0%	16.9%	15.3%	18.2%	16.6%	18.0%	16.8%	19.4%	18.4%	17.0%	18.1%
US Rails	18.2%	21.5%	20.0%	21.0%	20.6%	16.1%	15.5%	15.9%	15.4%	16.2%	15.8%	16.2%	16.9%	15.9%	15.9%	17.7%

Note: Includes off-balance sheet leases, 5 and 12 year averages through 2006

Source: Company reports, Bear Stearns & Co. estimates



Morningstar's Quantitative Equity & Credit Ratings

Warren Miller, CFA
Morningstar Methodology Paper
May 2013

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The Philosophy of Morningstar's Quantitative Ratings

Morningstar has been producing differentiated investment research since 1984. Although our roots are in the world of mutual funds, Morningstar research has expanded to Equity, Corporate Credit, Structured Credit, ETFs and more. Traditionally, our approach has been to provide analyst-driven, forward-looking, long-term insights alongside quantitative metrics for further understanding of the investment landscape. However, we have now developed a new way of combining our quantitative and analyst-driven output while expanding the coverage of our analysis beyond the capabilities of our analyst staff.

In general, there are two broad approaches that we could have chosen to expand our analyst-driven rating coverage in a quantitative way: either automate the analyst thought process without regard for output similarity, or, alternatively, replicate the analyst output as faithfully as possible without regard for the analyst thought process.

We find that attempting to mechanically automate a thought process introduces needless complexity without marginal benefit, so we have opted to build a model that replicates the output of an analyst as faithfully as possible.

To this end, our quantitative equity and credit ratings are empirically driven and based on the proprietary ratings our analysts are already assigning to stocks.

Utilizing the analyst-driven ratings in our quantitative rating system strengthens both systems. The quality of our quantitative recommendations is intertwined with the quality of our analyst-driven ratings. Accordingly, improvements to our analyst-driven research will immediately flow through our quantitative rating system and leaves the analyst-driven research as the internal focal point of our rating improvement efforts.

But perhaps the most obvious benefit of developing a quantitative set of ratings is the gains to breadth of coverage. Our quantitative coverage universe is many times the size of our analyst covered universe, and growing. It is limited only by our access to the necessary input data. Morningstar, and indeed the investment sector continue to grow their data collection efforts at a rapid pace.

Of course no rating system, quantitative or otherwise, is valuable without empirical evidence of its predictive ability. Just as we regularly test and diagnose problem areas in our analyst-driven research, we have rigorously tested the performance of our quantitative ratings. We have peppered some of these studies throughout this document and will continue to enhance our methodologies over time to improve performance.

Quantitative Valuation for Stocks

To an investor that thinks about stocks as a claim on the cash flows of a business, the true intrinsic value of those cash flows is a must-have piece of information for any investment decision. As part of our continuing effort to provide investors with better estimates of intrinsic values for stocks, we have developed a quantitative valuation algorithm.

In essence, the quantitative valuation algorithm attempts to divine the characteristics of stocks that most differentiate the overvalued stocks from the undervalued stocks as originally valued by our team of human equity analysts. Once these characteristics have been found, and their impact on our analyst-driven valuations has been estimated, we can apply our model beyond the universe of analyst-covered stocks.

To be more precise, we use a machine learning algorithm known as a random forest to fit a relationship between the variable we are trying to predict (an analyst's estimate of the over- or under-valuation of the stock) and our fundamental and market-based input variables. A sample representation of our data is shown in Figure 1.

Figure 1: Sample Data Representation for Random Forest Model

Identifiers		Input Variables											Variable to predict
UNIQUE COMPANY ID	EP	BP	SP	MV	EV	EVMV	REV	VOLUME	VOLATILITY	DRAWDOWN	ROA	SECTORID	FVP
0P000000OE	0.0347	0.081	0.0743	39199114198	36681008676	0.935761	18369517000	5674537	0.31351	-0.263773	0.400154	IG0008A008	0.086801732
0P000000OG	0.0923	0.8306	1.0667	19942746460	24182746460	1.212608	21246000000	6026459	0.277207	-0.241388	0.073901	IG0008A009	0.106692919
0P000000OM	0.0637	0.1796	1.256	6545107721	9884307721	1.510182	8649000000	1090576	0.146817	-0.220973	0.057214	IG0008A003	-0.013511769
0P0000ASRZ	0.0688	1.2264	0.7631	33389928000	1.23468E+11	3.697759	24110000000	66307334	0.349422	-0.336826	0.003652	IG0008A010	-0.052260517
0P000000OY	0.0853	0.514	0.4299	61122484587	36129282001	0.591096	55928324000	9071117	0.235078	-0.252752	0.014602	IG0008A010	0.096673345
0P000000OZ	0.0925	0.5383	0.5677	71107636254	1.1671E+11	1.641309	82538000000	13562853	0.277794	-0.254558	0.016547	IG0008A010	0.145448765
0P0000ASJA	0.0651	1.3175	0.7017	55893574928	2.86867E+11	5.132371	53736722000	97791713	0.340433	-0.358028	0.003851	IG0008A010	-0.032205931

Variable we're trying to predict (FVP) = $\log(.0001 + \text{Analyst-Driven Fair Value Estimate} / \text{Most Recent Closing Price})$

Input Variables:

- ▶ Trailing 12 Month (TTM) Return on Assets (ROA)
- ▶ TTM Earnings Yield (EP)
- ▶ TTM Sales Yield (SP)
- ▶ Most Recent (MR) Book Value Yield (BP)
- ▶ TTM Equity Volatility (VOLATILITY)
- ▶ TTM Maximum Drawdown (DRAWDOWN)
- ▶ TTM Total Revenue (REV)
- ▶ MR Market Capitalization (MV)
- ▶ MR Enterprise Value (EV)
- ▶ TTM Average Daily Volume (VOLUME)
- ▶ MR EV/MV (EVMV)

► Sector (SECTORID)

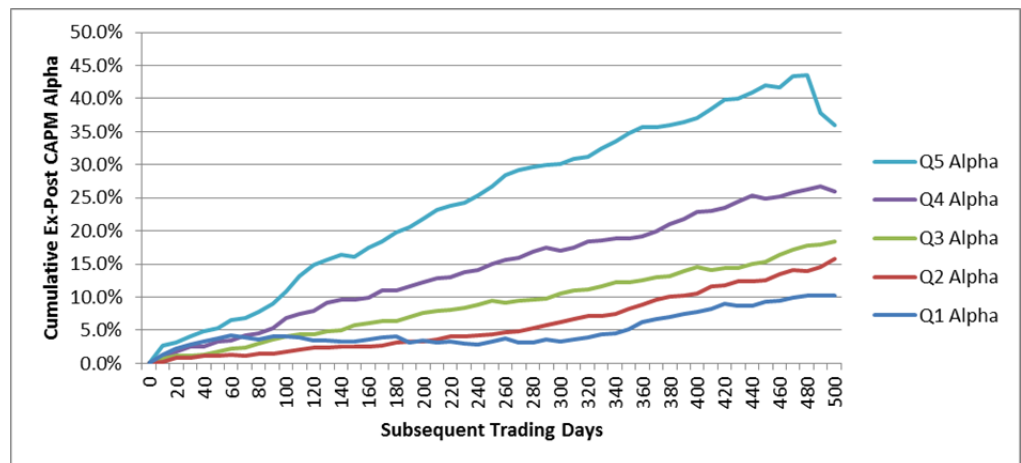
Our random forest model uses 500 individual regression trees to generate its predictions for the quantitative fair value estimates for stocks. See Appendix A for a description of a random forest model.

Of course this quantitative model is meaningless to an investor that does not understand the methodology used by a Morningstar equity analyst to value stocks in the first place. The methodology for our discounted cash flow approach to equity valuation can be found in Appendix B.

In production mode, we re-fit the random forest model each night using all of the most recent input data we can gather from Morningstar's Equity XML Output Interface (XOI) database. We refit each night because we believe the input variables have a dynamic impact on the valuations, which can change on a daily (if not more frequent) basis. Therefore a static model would not be appropriate. At the time of this update, we generate predictions for roughly 75,000 equities globally. Breakdowns of our coverage by country of domicile and exchange are available in Appendices D and E, respectively.

Naturally, all of the theoretical rigor in the world will not validate our quantitative model if it does not work in practice. Equity valuations are meant to predict future excess returns, and so we would hope that the stocks which appear undervalued in our quantitative system would generate positive excess returns and the stocks we designate as overvalued would generate negative excess returns. We have tested our quantitative valuations historically to examine how they would have performed. Figure 2 shows that the results of this test confirm the value of our quantitative valuations.

Figure 2: Out-of-Sample Quantitative Valuation Quintile Event Study
[Q5 is most undervalued quintile, Q1 is most overvalued quintile.]



Quantitative Valuation Uncertainty Ratings for Stocks

No valuation is a point estimate. There is always uncertainty embedded in any estimate of value. This uncertainty arises from two sources: model uncertainty and input uncertainty. Our quantitative valuation uncertainty rating is meant to be a proxy for the standard error in our valuation estimate or, if you will, the range of possible valuation outcomes for a particular company.

Unlike our quantitative valuations and quantitative moat ratings, we do not need to fit a separate model for valuation uncertainty. Our quantitative valuation model supplies all the data needed to calculate our quantitative uncertainty ratings.

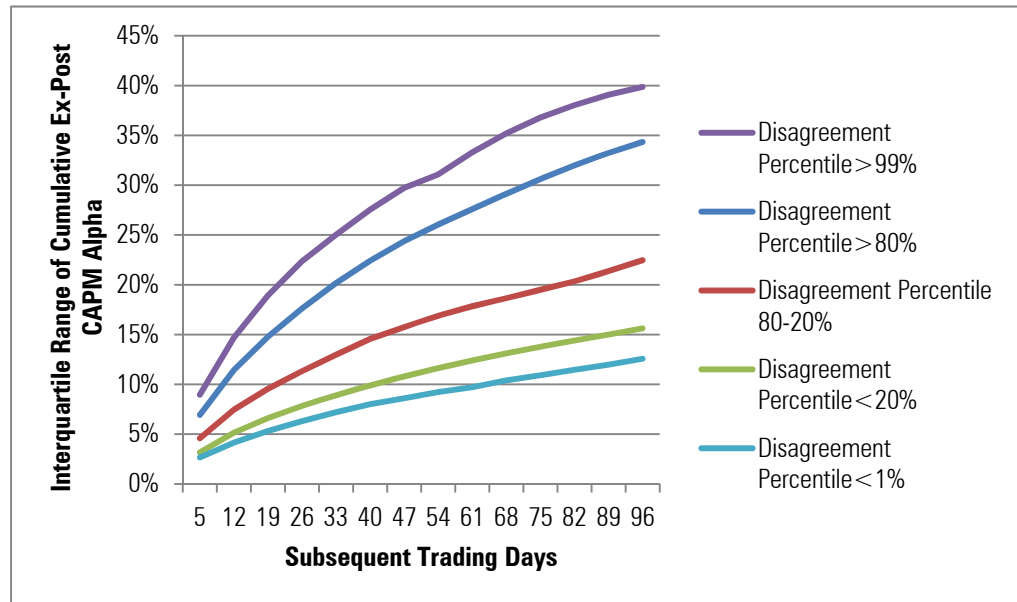
As described in the *Quantitative Valuation for Stocks* section of this document, we use a random forest model to assign intrinsic valuations, in the form of Quantitative Fair Value-to-Price ratios to stocks. However, our random forest model generates 500 intermediate tree predictions before averaging them to arrive at the final prediction. The dispersion (or more specifically, the interquartile range) of these 500 tree predictions is our raw Valuation Uncertainty Score. The higher the score, the higher the disagreement among the 500 tree models, and the more uncertainty is embedded in our quantitative valuation estimate. This is analogous to how an analyst-driven uncertainty estimate is derived. The 10 companies with the lowest quantitative uncertainty and the 10 companies with the highest quantitative uncertainty as of the most recent update of this document are listed in Figure 3.

Figure 3: Ten Highest and Lowest Quantitative Uncertainty Rating Companies - 10/17/2012

10 Lowest Quantitative Uncertainty Companies	10 Highest Quantitative Uncertainty Companies
SCANA Corp (SCG)	Stem Cell Therapeutics Corp. (SSS)
CMS Energy Corp (CMS)	Loon Energy Inc. (LNE)
AGL Resources, Inc. (GAS)	Ventrus Biosciences, Inc. (VTUS)
OGE Energy Corp (OGE)	Geovic Mining Corporation (GMC)
Travelers Companies, Inc. (TRV)	Vanda Pharmaceuticals, Inc. (VNDA)
Alliant Energy Corporation (LNT)	SVC Group Ltd (SVC)
Chubb Corp (CB)	Vector Resources, Inc. (VCR.P)
DTE Energy Holding Company (DTE)	Syngas Limited (SYS)
Commerce Bancshares, Inc. (CBSH)	War Eagle Mining Company Inc. (WAR)
Fortis, Inc. (FTS)	St. Elias Mines Ltd. (SLI)

We tested our Quantitative Uncertainty metric to see if it were predictive of the future dispersion of excess returns. That is, stocks with low valuation uncertainty scores should have a relatively tight ex-post alpha distribution while stocks with very high uncertainty scores should have a very wide distribution of ex-post alpha. We see that empirically, these scores perform exactly as we would hope (Figure 4).

Figure 4: Quantitative Valuation Uncertainty Event Study



Quantitative Moat Ratings for Companies

A company that has an economic moat can be expected to earn economic profits for a non-trivial period of time into the future. Many investors look for the presence of an economic moat when considering investing in a company as a quality litmus test. The stability of a firm's expected economic profits yields some insight into the safety net that an investor has if they choose to invest. Companies with economic moats tend to experience smaller drawdowns, fewer dividend cuts, smaller dividend cuts, and fewer periods of financial distress. This information can be very valuable when controlling the risk exposure of a portfolio.

In developing our quantitative moat algorithm, we took the same approach as we did with our quantitative valuation algorithm with a few small tweaks. We built two random forest models – one to predict whether a company has a wide moat or not, and one to predict whether a company has no moat or not. At first glance, these models may appear to be redundant, but they are not. The characteristics that separate a wide moat company from the rest of the universe are not identical to the characteristics that separate a no moat company from the rest of the universe. For example, while Wide Moat stocks tend to have larger market caps than the rest of the universe, market cap is much less significant in differentiating no moat companies. We use the same input variables for these two models as we do in our Quantitative Valuation.

Once we have fit the two models, we need to aggregate their two predictions into one single metric describing the moatiness of the company in question. To do so, we use the following equation:

Raw Quantitative Moat Score = Wide Moat Model Prediction + (1-No Moat Model Prediction)

$$\text{Raw Quantitative Moat Score} = \frac{\text{Wide Moat Model Prediction} + (1 - \text{No Moat Model Prediction})}{2}$$

Since both the wide moat model and no moat model predictions range from 0 to 1, they can be interpreted as probability estimates. So in essence, our raw quantitative moat score is equivalent to the average of the probabilities that our company does have a wide moat and the probability that it is not a no moat. Figure 5 shows the 10 highest and lowest Quantitative Moat rating companies globally.

Figure 5: Ten Highest and Lowest Quantitative Moat Rating Companies - Data as of 10/17/2012

10 Lowest Quantitative Moat Companies	10 Highest Quantitative Moat Companies
Trina Solar Limited (TSL)	Altria Group Inc. (MO)
JA Solar Holdings Co., ADR (JASO)	Abbott Laboratories (ABT)
Yingli Green Energy Holding Company, Ltd. (YGE)	Coca-Cola Co (KO)
Energy Solutions, Inc. (ES)	Roche Holding AG (ROG)
SunPower Corporation (SPWR)	British American Tobacco PLC (BATS)
Finmeccanica SpA (FNC)	Colgate-Palmolive Company (CL)
Century Aluminum Company (CENX)	Merck & Co Inc (MRK)
Barnes & Noble, Inc. (BKS)	GlaxoSmithKline PLC (GSK)
MEMC Electronic Materials Inc (WFR)	Oracle Corporation (ORCL)
Suntech Power Holdings Co., Ltd. (STP)	Philip Morris International, Inc. (PM)

Since Moat ratings are not meant to predict excess returns, a cumulative alpha event study would not be appropriate to measure the performance of our Quantitative Moat model. Instead, we decided to see how closely it replicated our analyst ratings. Figure 6 shows that there is significant agreement between the analyst ratings and the Quantitative Moat ratings.

Figure 6: Agreement Table Comparing Analyst Moat Ratings with Quantitative Moat Ratings – Data as of 9/28/2012

	Quant Moat Score Percentile Rank			Total
	[1,.9)	[.9,.5)	[.5,0)	
Wide	152	2	0	154
Narrow	3	738	0	741
None	0	20	505	525
Null	100	11,634	12,241	23,976
Total	255	12,394	12,746	25,396

Market Implied Financial Health for Companies

Morningstar's Market Implied Financial Health measure ranks companies on the likelihood that they will tumble into financial distress. The measure is a linear model of the percentile of a firm's leverage (ratio of Enterprise Value to Market Value), the percentile of a firm's equity volatility relative to the rest of the universe, and the interaction of these two percentiles. This is a proxy methodology for the common definition of Distance to Default which relies on an option-based pricing model. The proxy has the benefit of increased breadth of coverage, greater simplicity of calculation, and more predictive power while maintaining the timeliness of a market-driven metric.

Step 1: Calculate annualized trailing 300 day equity total return volatility (EQVOL)

Step 2: Calculate current enterprise value / market cap ratio (EVMV)

Step 3: Transform EQVOL into a percentile [0, 1] by ranking it relative to all other stocks in the calculable universe (EQVOLP). 1 represents high equity volatility, 0 represents low equity volatility.

Step 4: Transform EVMV into a percentile [0, 1] by ranking it relative to all other stocks in the calculable universe (EVMVP). 1 represents high leverage companies, 0 represents low leverage companies.

Step 5: Calculate new raw DTD = $1 - (EQVOLP + EVMVP + EQVOLP * EVMVP) / 3$

Step 6: Transform new raw DTD into a decile [1, 10] by ranking it relative to all calculable US-domiciled stocks. 10 represents poor financial health while 1 represents strong financial health.

For more information about the performance of Morningstar's Market Implied Financial Health metric, please refer to the following white paper:

<http://corporate.morningstar.com/us/documents/MethodologyDocuments/MethodologyPapers/CompareModelsCorpBankruptcyPrediction.pdf>

Solvency Score for Companies

We consider several ratios to assess a firm's financial strength, including the size of a company's obligations relative to its assets, and comparing the firm's debt load with its cash flow. In addition to examining these ratios in past years, our analysts explicitly forecast the cash flows we think a company is likely to earn in the future, as well as consider how these balance sheet ratios will change over time. In addition to industry-standard measures of profitability (such as profit margins and returns on equity), we focus on return on invested capital as a key metric in determining whether a company's profits will benefit debt and equity holders. At Morningstar, we have been focusing on returns on invested capital to evaluate companies for more than a decade, and we think it is particularly important to understand a firm's ability to generate adequate returns on capital in order to accurately assess its prospects for meeting debt obligations.

Any credit scoring system would be remiss to ignore a company's current financial health as described by key financial ratios. In our effort to create a ratio-based metric, we used binary logistic regression analysis to evaluate the predictive ability of several financial ratios commonly believed to be indicative of a company's financial health. This extensive testing yielded a calculation that has shown to be more predictive of corporate bankruptcy. We refer to it as the Morningstar Solvency Score™.

Financial ratios can describe four main facets of a company's financial health: liquidity (a company's ability to meet short-term cash outflows), profitability (a company's ability to generate profit per unit of input), capital structure (how does the company finance its operations), and interest coverage (how much of profit is used up by interest payments). The Morningstar Solvency Score includes one ratio from each of these four categories.

Although our extensive testing was based on previously reported accounting values, Morningstar's equity analysts continually forecast the very same accounting values for future time periods. No testing of our analysts' forecasts has been possible due to data limitations, but it is reasonable to assume that using analyst estimates of future accounting values will yield more predictive results than previously reported ratios. As a result, the Morningstar Solvency Score uses some analyst estimates of future ratios.

Morningstar Solvency Score

$$5 \times \sqrt{\frac{TL_0 + CLO_0}{TA_0 + CLO_0} \times \frac{IE_1 + RE_1}{EBITDAR_1}} - (4 \times ROIC_1) - (1.5 \times QR_0)$$

Where:

TL_0 = Total Liabilities

CLO_0 = Capital Lease Obligations

TA_0 = Total Assets

IE_1 = Interest Expense

RE_1 = Rent Expense

$EBITDAR_1$ = Earnings before Interest, Taxes, Depreciation, Amortization and Rent

$ROIC_1$ = Return on Invested Capital

QR_0 = Quick Ratio

$$ROIC_1 = \frac{EBITDAR_1}{IC_0}$$

IC_0 =

$CA + NetPPE + NetGW + IA + LTOA + CLO - ExcessCash - AP - OtherCL - LTOL$

Where:

CA = Current Assets

$NetPPE$ = Net Property, Plant and Equipment

$NetGW$ = Net Goodwill

IA = Intangible Assets

$LTOA$ = Long Term Operating Assets

CLO = Capital Lease Obligations

$ExcessCash$ = Excess Cash

AP = Accounts Payable

$OtherCL$ = Other Current Liabilities

$LTOL$ = Long Term Operating Liabilities

Part of the attractiveness of the Solvency Score is in its appeal to intuition. A practitioner of financial analysis will recognize that each of the ratios included has its own ability to explain default risk. In addition, the weighting scheme and ratio interaction appeal to common sense. For instance, it is logical to assume that an interest coverage ratio would be highly predictive of default.

Even healthy companies, however, can have odd years in which profits may suffer and interest coverage is poor. For this reason, a multiplicative combination of the interest coverage ratio with a capital structure ratio is more explanatory than either ratio individually, or even a linear combination of the two. This is because interest coverage is not highly important for companies with healthy balance sheets (perhaps they have cash on hand to weather even the most severe of downturns), but interest coverage becomes more important as liabilities increase as a percentage of a company's total capital structure.

For more information about the performance of the Morningstar Solvency Score, please refer to the following white paper:

<http://corporate.morningstar.com/us/documents/MethodologyDocuments/MethodologyPapers/IntroMorningstarSolvencyScore.pdf>

Concluding Remarks

Morningstar's Quantitative ratings are intended to be predictive of future return distributions, and extensive performance studies (beyond those described in this document) have affirmed that they are, in fact, performing as intended. For additional details on these performance studies, please feel free to contact us.

We expect that, over time, we will develop enhancements to our Quantitative models to improve their performance. We will document methodological changes in this document as they are made.

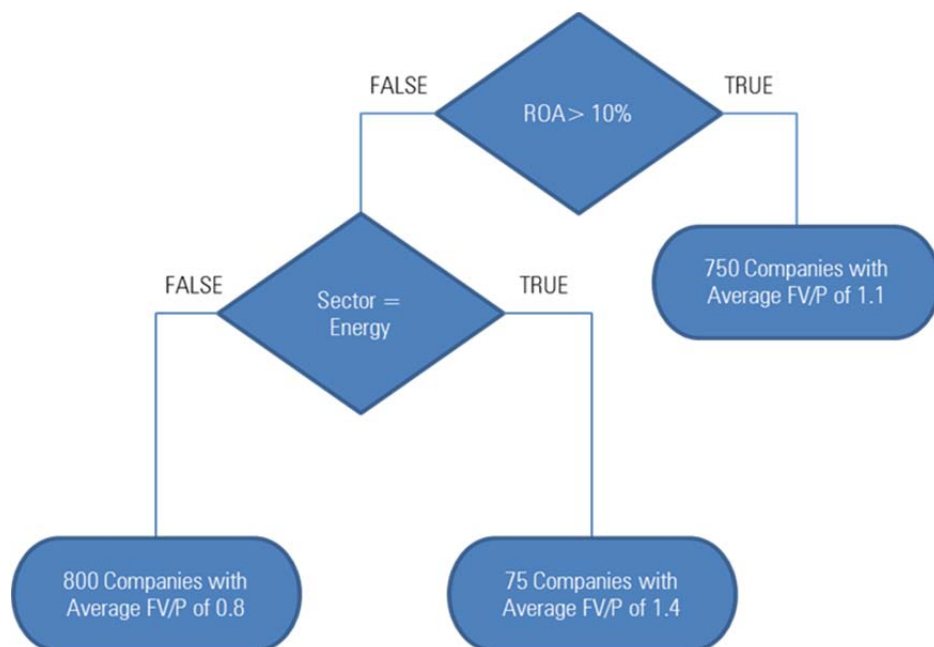
Appendix A: How Does a Random Forest Work?

A random forest is an ensemble model, meaning its end prediction is formed based on the combination of the predictions of several sub-models. In the case of a random forest, these sub-models are typically regression or classification trees (hence the 'forest' part of the name 'random forest'). To understand the random forest model, we must first understand how these trees are fit.

Regression Trees

A regression tree is a model based on the idea of splitting data into separate buckets based on your input variables. A visualization of a typical regression tree is shown in Figure 7. The tree is fit from the top down, splitting the data further, into a more complex structure as you go. The end nodes contain groupings of records from your input data. Each grouping contains records that are similar to each other based on the splits that have been made in the tree.

Figure 7: Sample Representation of a Regression Tree with Dummy Data



How are splits determined?

As you can see, the tree is comprised of nodes which then are split until they reach terminal nodes that no longer split. Each split represents a division of our data based on a particular input variable, such as ROA or Sector in Figure 7. The algorithm determines where to make these splits by attempting to split our data using all possible splitpoints for all of the input variables and chooses the split variable and split point to maximize the difference between the variance of the unsplit data and the sum of the variances of the two groups of split data as shown in the following function.

$$VarDiff = \frac{\sum(y - \bar{y}_{presplit})^2}{N_{presplit}} - \left[\frac{\sum(y - \bar{y}_{left})^2}{N_{left}} + \frac{\sum(y - \bar{y}_{right})^2}{N_{right}} \right]$$

Intuitively, we want the split that maximizes the function because the maximizing split is the split which reduces the heterogeneity of our output variable the most. That is, the companies that are grouped on each side of the split are more similar to each other than the pre-split grouping.

A regression or classification tree will generally continue splitting until a set of user-defined conditions have been met. One of these conditions is the significance of the split. That is, if the split does not reduce heterogeneity beyond a user-defined threshold, then it will not be made. Another condition commonly used is to place a floor on the number of records in each end node. These conditions can be made more or less constrictive in order to tailor the bias-variance tradeoff of the model.

How are end-node values assigned?

Each tree, once fully split, can be used to generate predictions on new data. If a new record is run through the tree, it will inevitably fall into one of the terminal nodes. The prediction for this record then becomes the arithmetic mean of the output variable for all of the training set records that fell into that terminal node.

Aggregating the Trees

Now that we understand how trees are fit and how they can generate predictions, we can move further in our understanding of random forests. To arrive at an end prediction from a random forest, we first fit N trees (where N can be whatever number desired – in practice, 100 to 500 are common values) and we run our input variables through each of the N trees to arrive at N individual predictions. From there, we take the simple arithmetic mean of the N predictions to arrive at the random forest's prediction.

A logical question at this point is: why would the N trees we fit generate different predictions if we give them the same data? The answer is: they wouldn't! That's why we give each tree a different and random subset of our data for fitting purposes (this is the 'random' part of the name 'random forest'). Think of your data as represented in Figure 6.

Figure 6: Sample Random Forest Data Representation

	InputVar1	InputVar2	InputVar3	InputVar4	InputVar5	InputVar6	InputVar7	InputVar8	InputVar9	InputVar10	Variable To Predict
Record1	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record2	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record3	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record4	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record5	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record6	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record7	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record8	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record9	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record10	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record11	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record12	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record13	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record14	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record15	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record16	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record17	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record18	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record19	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record20	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record21	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record22	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record23	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record24	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record25	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record26	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record27	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record28	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record29	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record30	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record31	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record32	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX
Record33	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX	X.XX

Random Subset1
Random Subset2
Random Subset3

A random forest will choose random chunks of your data including random cross-sectional records as well as random input variables as represented by the highlighted sections in Figure 6 each time it attempts to make a new split. While Figure 6 shows 3 random subsets, the actual random forest model would choose N random subsets of your data, which may overlap and variables selected may not be adjacent. The purpose of this is to provide each of your trees with a differentiated data set, and thus a differentiated view of the world.

Ensemble models are a 'wisdom of crowds' type of approach to prediction. The theory behind this approach is that many 'weak learners' which are only slightly better than random at predicting your output variable can be aggregated to form a 'strong learner' so long as the 'weak learners' are not perfectly correlated. Mathematically, combining differentiated, better-than-random, 'weak learners' will always result in a 'strong learner' or a better overall prediction than any of your weak learners individually.

The archetypal example of this technique is when a group of individuals are asked to estimate the number of jelly beans in a large jar. Typically the average of a large group of guesses is more accurate than a large percentage of the individual guesses.

Random forests can also be used for classification tasks. They are largely the same as described in this appendix except for the following changes: slightly different rules are used for the splitting of nodes in the individual tree models (gini coefficient or information gain), and the predictor variable is a binary 0 or 1 rather than a continuous variable. This means that the end predictions of a random forest for classification purposes can be interpreted as a probability of being a member of the class designated as '1' in your data.

Appendix B: The Morningstar Analyst-Driven Valuation Methodology

Discounted Cash Flow Valuation—Stage I

We value companies using a three-stage discounted cash flow (DCF) model. The first stage includes our explicit forecasts. Analysts make specific predictions about a company's future financial performance to arrive at annual estimates of free cash flow to the firm (FCFF). Our Stage I forecasts can be seen on the Inputs tab in the section entitled "Discounted Cash Flows" starting on row 254. Free cash flow to the firm has two components: earnings before interest (EBI) and net new investment (NNI). EBI is calculated as follows:

	Operating Income (excluding charges)
+	Amortization
+	Other Non-Cash Charges ¹
–	Restructuring & Other Cash Charges
+	After-tax Operating Adjustments ²
–	Cash Taxes ³
+	Pension Adjustment ⁴
=	Earnings Before Interest

Net new investment is added to EBI to arrive at free cash flow to the firm. NNI is calculated as follows:

	Depreciation
–	Capital Expenditures
–	Net Investment in Working Capital ⁵
–	Net Change in Other Operating Assets / Liabilities
–	Net Acquisitions / Asset Sales
=	Net New Investment

¹ Impairment of goodwill and other intangibles, and other noncash charges, included in SG&A or other operating expense accounts.

² Minority interest and other after-tax operating gains.

³ Cash taxes are calculated as taxes from the income statement, plus the net interest tax shield, plus net changes in deferred taxes.

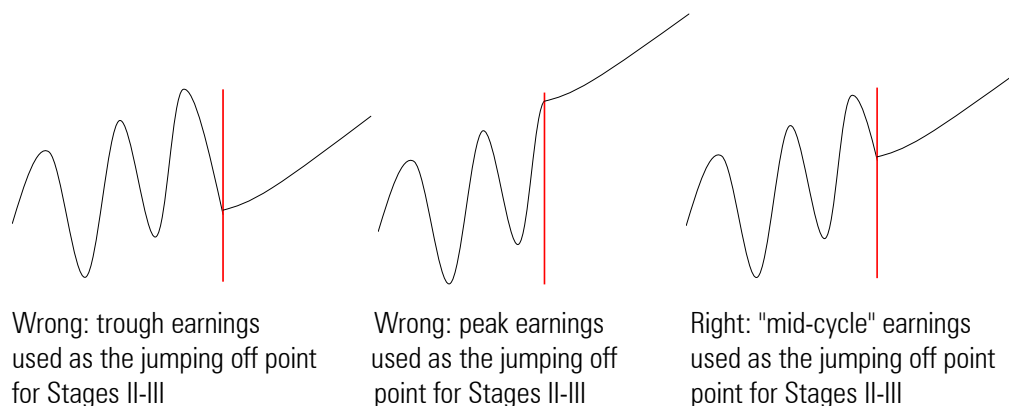
⁴ This adjustment is needed to prevent double-counting of non-service components of pension cost (i.e. components of pension cost related to existing assets and liabilities).

⁵ Excludes changes in cash.

The most important element of Stage I is earnings before interest in the last year of the explicit forecast horizon, since this is used as the jumping-off point for Stages II and III. *It is critical that the last year's EBI be representative of a normalized, sustainable, midcycle level of earnings.* Analysts have the ability to choose either five or 10 years as the length of Stage I. For most companies, five years is appropriate, as estimates become increasingly unreliable as the forecast horizon is extended. However, if a normalized level of EBI cannot be attained within five years, a 10-year Stage I should be used.

Figure 1 shows the importance of the EBI forecast in the last year of Stage I. Stage II and III assume a steady growth rate off of this base. If Stage I ends with a company's trough earnings, the fair value estimate will likely be too low. If Stage I ends with a peak level of earnings, the fair value estimate will likely be too high. The appropriate estimate incorporates a midcycle level of both revenue and margins.

Figure 1: Choosing an EBI Forecast in the Last Year of Stage I



Discounted Cash Flow Valuation—Stage II (Standard Methodology)

Our standard Stage II methodology uses a formula to simplify the summation of discounted cash flows.⁶ The formula relies on an assumption that EBI growth, return on new invested capital (RONIC), and return on existing invested capital will be constant during Stage II. Analysts are responsible for choosing the growth rate, RONIC, and the length of Stage II, but do not make specific assumptions about revenue, operating costs, and so on.

Stable EBI growth and RONIC also imply stable FCFF growth. Let $FCFF_1$ represent a company's free cash flow in the upcoming year (recall that $FCFF_1 = EBI_1 + NNI_1$), G represent the growth rate, and $WACC$ represent the discount rate. In this case, the company's fair value (FV) today is given by:

$$FV = \frac{FCFF_1}{WACC - G} = \frac{EBI_1 + NNI_1}{WACC - G}$$

⁶ Our Stage II and III formulas were derived independently, but are substantially similar to those found in McKinsey's Valuation (Fifth Edition) by Tim Koller, Marc Goedhart, and David Wessels.

Let us also define the investment rate (IR) as the percentage of EBI that is reinvested in the business and return on new invested capital as the incremental EBI generated from increases in invested capital. That is:

$$IR = - \frac{NNI}{EBI} \quad \text{and} \quad RONIC = \frac{EBI_{t+1} - EBI_t}{- NNI_t}$$

Dividing both the numerator and denominator of the RONIC definition by EBI_t yields:

$$RONIC = \frac{(EBI_{t+1} - EBI_t) / EBI_t}{- NNI_t / EBI_t} = \frac{G}{IR}$$

This can be rearranged as $IR = G / RONIC$. Finally, note that we can factor out EBI from the numerator of the fair value equation above and re-write the equation as follows:

$$FV = \frac{EBI_1(1 + NNI_1/EBI_1)}{WACC - G} = \frac{EBI_1(1 - IR)}{WACC - G} = \frac{EBI_1(1 - G/RONIC)}{WACC - G}$$

We use the right-most version of this formula to value Stage II cash flows. However, because Stage II is assumed to have a finite length, we must subtract the value of cash flows from years beyond the end of Stage II. The final formula becomes:

$$\text{Stage II Value} = \frac{EBI_{T+1}(1 - IR)}{WACC - G} - \frac{EBI_{T+L+1}(1 - IR)}{(WACC - G)(1 + WACC)^L}$$

Where T represents the last year of the Stage I forecast (either five or 10 years from now) and L represents the length of Stage II.

Analysts input their assumptions for Stage II growth and RONIC, and the length of Stage II, in the Stage II-III Methodology box at the top of the Inputs tab. This box also includes the five-year historical average and Stage I projected average values for RONIC and EBI growth to help inform the analyst's choices.

Stage II assumptions are the main way in which our equity valuation models incorporate our analysis of economic moats. In general, companies with wide or narrow economic moats should have $RONIC > WACC$ and a relatively long Stage II. The wider the moat, the longer the company can be expected to outearn its cost of capital. As a rule of thumb, we think of wide-moat companies as being able to earn excess returns on capital for at least 20 years, while narrow-moat companies should be able to earn excess returns on capital for at least 15 years. For no-moat companies, Stage II RONIC normally should be close to or below WACC. If a company's RONIC is below its WACC, it may be appropriate to assume a negative EBI growth rate (that is, the company may rationally choose to disinvest in its business).

Cost of Capital

Because the output of our general model assumptions is free cash flow to the firm--representing cash available to provide a return to both equity and credit investors--we must discount future cash flows using the weighted average cost of capital (WACC), which is a weighted average of the costs of equity, debt, and preferred stock. In most cases, we determine the weights using the book value of debt and preferred stock, and the fair value of equity (using an iterative process). These weights may be adjusted if the company's current capital structure differs from its long-run target capital structure. The cost of debt and preferred stock should be based on observed market rates of return. Because we use a book rather than market value of debt, it may be appropriate to base the cost of debt on a mix of the incremental and historical cost of debt.

The cost of equity (COE) presents the greatest challenge in calculating the WACC because it is unobservable. The most common methodology for estimating the COE is the Capital Asset Pricing Model (CAPM). However, we find that the CAPM raises more questions than it answers, by replacing one unobservable input with three (the risk-free rate, the equity risk premium, and beta). While interest rates on U.S. Treasury bonds can serve as a reasonable proxy for the risk-free rate, there is significant disagreement about appropriate values for the equity risk premium and beta. For this reason, we have chosen a greatly simplified COE methodology that captures the essence of the CAPM while avoiding precise estimates of inherently unknowable quantities.

The central insight of the Capital Asset Pricing Model is that investors will only be rewarded, on average, for taking on systematic or non-diversifiable risk. We sort the companies in our coverage universe into four buckets based on their level of systematic risk. The buckets correspond to cost of equity values as follows:

Systematic Risk	COE
Below Average	8%
Average	10%
Above Average	12%
Very High	14%

The choice of a systematic risk bucket must be approved by the analyst's director or associate director. When deciding on a systematic risk bucket, the analyst should consider the question: "If aggregate global economic output unexpectedly and permanently increased (decreased) by 5%, what would happen to this company's sustainable operating earnings?"

If the answer is that the company's operating earnings would increase (decrease) by about as much as the average firm in the S&P 500, the company has average systematic risk. Most companies should fall in this bucket. If the answer is that the company's operating earnings would change by significantly less than most other firms, the company has below-average systematic risk. For example, most regulated utilities and soft-drink manufacturers would fall in this bucket. Finally, if the company's operating earnings would be expected to change by significantly more than most other firms, it has above-average or very high systematic risk. These buckets include economically sensitive businesses such as metal fabrication, hotels, oil and gas drilling, and asset management.

Viewed in another way, systematic risk to equity has three components: revenue cyclicality, operating leverage, and financial leverage. Table 1 provides a rough guide for assigning companies to systematic risk buckets based on an assessment of these underlying drivers. Importantly, company-specific, diversifiable (that is, nonsystematic) risks *do not* contribute to the systematic risk rating. For example, companies with a high degree of product or customer concentration, pending legal or regulatory issues, concerns about management execution, and so on would not be allocated to a higher systematic risk bucket. In contrast, the uncertainty rating should incorporate both systematic and company-specific risks. For this reason, the uncertainty rating should be at least as high as the systematic risk rating (where below-average systematic risk corresponds to low uncertainty, and so on). Additionally, company-specific risks should be incorporated in fair value estimates through base-case cash flow forecasts, which represent the expected value of future cash flows, or by explicitly probability-weighting scenario-based fair value estimates.

Table 1: Assigning Companies to Systematic Risk Buckets

Revenue Cyclicality	Operating Leverage	Financial Leverage	Systematic Risk to Equity	Cost of Equity
Low	Low	Low	Below Average	8%
Low	Low	Medium	Below Average	8%
Low	Low	High	Average	10%
Low	Medium	Low	Below Average	8%
Low	Medium	Medium	Average	10%
Low	Medium	High	Average	10%
Low	High	Low	Average	10%
Low	High	Medium	Average	10%
Low	High	High	Above Average	12%
Medium	Low	Low	Below Average	8%
Medium	Low	Medium	Average	10%
Medium	Low	High	Average	10%
Medium	Medium	Low	Average	10%
Medium	Medium	Medium	Average	10%
Medium	Medium	High	Above Average	12%
Medium	High	Low	Average	10%
Medium	High	Medium	Above Average	12%
Medium	High	High	Very High	14%
High	Low	Low	Average	10%
High	Low	Medium	Average	10%
High	Low	High	Above Average	12%
High	Medium	Low	Average	10%
High	Medium	Medium	Above Average	12%
High	Medium	High	Very High	14%
High	High	Low	Above Average	12%
High	High	Medium	Very High	14%
High	High	High	Very High	14%

The 8%,10%,12%, and14%, COE values refer to companies whose primary business is in the U.S. For international companies, we may add a premium to the baseline COE to account for differences in country risk and inflation. The analyst should be sure that the impact of inflation on future cash flow forecasts is consistent with the inflation rate implied by the cost of equity.

The country premium should be based on the location of the company's operations. This may be different from the company's headquarters. For companies with operations in multiple countries with different risk premiums, a blended rate may be appropriate.

The following table provides a guideline for country premiums as of January 2012. We revise this table approximately every six months.⁷ Please consult Allan Nichols (allan.nichols@morningstar.com) for up-to-date values or for any countries not shown.

Table 2: International Cost of Equity Premiums

Argentina	9%	Greece	11%	Peru	3%
Australia	1%	Hong Kong	none	Philippines	4%
Austria	none	Iceland	3%	Portugal	4%
Bahamas	2%	India	3%	Russia	3%
Belgium	1%	Indonesia	4%	Singapore	none
Bermuda	1%	Ireland	4%	South Africa	2%
Brazil	3%	Israel	1%	South Korea	1%
Canada	none	Italy	2%	Spain	1%
Chile	1%	Japan	-1%	Sweden	none
China	1%	Lithuania	2%	Switzerland	none
Colombia	3%	Mexico	2%	Taiwan	1%
Denmark	none	Netherlands	none	Thailand	2%
Finland	none	New Zealand	none	Turkey	4%
France	none	Norway	none	United Kingdom	none
Germany	none	Panama	3%		

⁷ Country risk premiums are adapted from research by Aswath Damodaran and are based on differences in nominal sovereign debt rates. See <http://pages.stern.nyu.edu/~adamodar/>.

Appendix C: The Morningstar Analyst-Driven Moat Methodology

Sustainable competitive advantages can take many forms, and some companies are better at developing them than others. But more than anything, the principle of sustainability is central to an evaluation of a company's economic moat. A company with a wide economic moat is one best suited to prevent a competitor from taking market share or eroding its margins.

Here is how Morningstar defines the five main types of economic moats.

Low-Cost Producer: Firms that can figure out ways to provide goods or services at a lower cost than anyone else have an advantage because they can undercut their rivals on price. **Wal-Mart** WMT is a textbook example of a low-cost producer because it can use its size to acquire merchandise on the cheap, passing part of the savings to its customers.

Switching Costs: Switching costs are those one-time inconveniences or expenses a customer incurs to change from one product to another. Customers facing high switching costs often won't switch unless they are offered a large improvement in either price or performance. Otherwise, the switch isn't worth it. As they say time is money. Companies whose customers have switching costs can charge higher prices (and reap more profits) without the threat of losing business.

Many financial-services companies enjoy the benefits of customer switching costs. Just ask anyone who has contemplated moving a checking account from one institution to another. Is it worth the hassle to open a new account, order new checks, switch direct deposit, and transfer automatic billing just to save \$1 on ATM transactions?

The Network Effect: The Network Effect occurs when the value of a particular good or service increases for both new and existing users as more people use that good or service. For example, the fact that there are literally millions of people buying and selling things on **eBay** EBAY makes its service incredibly valuable to existing users—and makes it all but impossible for another company to duplicate its service. Imagine if you started a competing auction site tomorrow—there would be nothing for sale, so no buyers would be interested in your site. And without any buyers, there would be no sellers, either. It's a virtuous circle for eBay, but a vicious one for competitors.

Intangible Assets: Intangible assets generally refer to the intellectual property that firms use to prevent other companies from duplicating a good or service. Of course, patents are the most common economic moat in this category, critical for drugmakers, such as **Pfizer** PFE and **Johnson & Johnson** JNJ. A strong brand name can also be an economic moat—just consider consumer-product companies such as **Coca-Cola** KO and **Procter & Gamble** PG.

Efficient Scale

This dynamic primarily occurs when a limited market size is effectively served by one or a small handful of companies. In many of these situations, the incumbents have economic profits, but a potential competitor has less incentive to enter because the limited opportunity would cause returns in the market to fall well below the cost of capital, not just down to the cost of capital itself. The companies that benefit from this phenomenon are efficiently scaled to fit a market that only supports one or a few competitors, limiting rivalry. **International Speedway ISCA** is a great example; there is simply not enough demand for more than a single NASCAR racetrack in any given city. Airport companies like **Grupo Aero del Sureste ASR** (a Mexican airport operator) also benefit from efficient scale because, for most cities, it makes sense to have just a single commercial airport.

Companies can sometimes fall into just one of these buckets, while others may have two or more sources of advantage. Take Grupo Aero del Sureste: Even though efficient scale alone would keep competitors at bay, the company also sources its moat from intangible assets in the form of government concessions that limit new airports from being built in geographies where it operates. Or consider Coca-Cola: The company obviously benefits from the intangible assets represented by its brands. But even if these brands were to lose their value and the company were to produce generic cola, Coke would still have a major cost advantage because of its distribution network.

Measuring Moats

At Morningstar, we classify moats as either wide, narrow, or none. To determine which bucket a company fits into, we spend a lot of time getting to know the industries we cover, combing through financial statements, and talking to management. Before we assign a company a narrow or wide economic moat, we want to be confident that sustainable competitive advantages will allow it to generate returns on capital in excess of its cost of capital for at least one decade. To attain a wide moat rating, we must expect a company's competitive advantage period to last at least two decades.

It is not easy for a company to meet our wide-moat criteria. Of the approximately 2,000 securities to which we assign moat ratings, only about 10% are classified as wide-moat. This is all the more impressive when you consider Morningstar's coverage universe skews toward large and successful firms; most companies in the overall economy don't have any sort of moat whatsoever. By focusing on this select group of wide-moat firms, we are focusing on the at least the top decile in terms of company quality.

Appendix D: Breakdown of Quantitative Coverage by Country of Domicile

Country of Domicile	Equities Covered	Country of Domicile	Equities Covered	Country of Domicile	Equities Covered
USA	18012	GRC	302	COL	12
CAN	10116	IRL	284	HRV	11
JPN	6544	TUR	254	PER	11
DEU	4390	LUX	249	MCO	10
CHN	3400	POL	240	MUS	10
AUS	3259	PRT	235	CZE	8
GBR	2726	VGB	215	FRO	7
CYM	2371	JEY	212	KAZ	7
THA	2007	NZL	189	LIE	7
BMU	1877	RUS	186	ATG	6
FRA	1863	KOR	145	ISL	6
TWN	1584	LVA	134	BGD	5
ITA	1345	LTU	129	BHS	5
SGP	1297	MHL	118	MLT	5
CHE	1146	ARG	108	PAK	4
SWE	1103	IMN	79	PNG	4
HKG	927	CHL	78	QAT	3
IND	892	CYP	67	UKR	3
NLD	856	EST	52	GRL	2
ZAF	687	GGY	45	MWI	2
NOR	678	EGY	26	NAM	2
ESP	672	CUW	21	ZWE	2
FIN	594	MYS	21	AIA	1
DNK	545	PAN	21	BHR	1
BEL	516	PRI	20	KEN	1
AUT	501	PHL	18	NGA	1
MEX	449	HUN	17	ROU	1
BRA	361	LBR	17	COL	12
IDN	338	GIB	16	HRV	
ISR	325	ARE	12	PER	

Appendix E: Breakdown of Quantitative Coverage by Exchange

Exchange	Equities Covered	Exchange	Equities Covered
EX\$\$\$XFRA	9226	EX\$\$\$XHAN	335
EX\$\$\$XBER	9002	EX\$\$\$XASE	317
EX\$\$\$XETR	8339	EX\$\$\$XNGO	317
EX\$\$\$XSTU	5159	EX\$\$\$XMIL	312
EX\$\$\$PINX	4316	EX\$\$\$XNSE	307
EX\$\$\$XMUN	4168	EX\$\$\$XJSE	304
EX\$\$\$XLON	4015	EX\$\$\$XOSL	217
EX\$\$\$XNAS	2480	EX\$\$\$XBUE	205
EX\$\$\$XTKS	2254	EX\$\$\$XBRU	203
EX\$\$\$XTSX	2177	EX\$\$\$XCSE	177
EX\$\$\$XDUS	2108	EX\$\$\$XAMS	163
EX\$\$\$XNYS	2027	EX\$\$\$XMCE	150
EX\$\$\$XSHE	1474	EX\$\$\$XHEL	146
EX\$\$\$XHKG	1439	EX\$\$\$XLUX	146
EX\$\$\$XBKK	1429	EX\$\$\$XBSP	140
EX\$\$\$XASX	1303	EX\$\$\$XWAR	117
EX\$\$\$XTSE	1142	EX\$\$\$XIST	112
EX\$\$\$XHAM	1010	EX\$\$\$XNZE	112
EX\$\$\$XSHG	976	EX\$\$\$XCNQ	111
EX\$\$\$XJAS	843	EX\$\$\$XWBO	85
EX\$\$\$XTAI	824	EX\$\$\$XATH	65
EX\$\$\$XOTC	805	EX\$\$\$XLIS	61
EX\$\$\$XSES	776	EX\$\$\$XDUB	42
EX\$\$\$XOSE	743	EX\$\$\$XRIS	31
EX\$\$\$ROCO	651	EX\$\$\$XLIT	29
EX\$\$\$XPAR	521	EX\$\$\$XTAL	12
EX\$\$\$XMEX	489	EX\$\$\$XICE	6
EX\$\$\$XBOM	392	EX\$\$\$ARCX	1
EX\$\$\$XSTO	377	EX\$\$\$XHAN	
EX\$\$\$XSWX	340	EX\$\$\$XASE	