

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

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PETITION OF THE WESTERN)	
COAL TRAFFIC LEAGUE TO)	
INSTITUTE A RULEMAKING)	
PROCEEDING TO ABOLISH THE)	EP 664 (Sub-No. 2)
USE OF THE MULTI-STAGE)	
DISCOUNTED CASH FLOW)	
MODEL IN DETERMINING THE)	
RAILROAD INDUSTRY'S COST OF)	
EQUITY CAPITAL)	

WESTERN COAL TRAFFIC LEAGUE

SUPPLEMENTAL COMMENTS

WESTERN COAL TRAFFIC LEAGUE

Of Counsel:

Slover & Loftus LLP
1224 Seventeenth Street, N.W.
Washington, D.C. 20036
(202) 347-7170

William L. Slover
Robert D. Rosenberg
Slover & Loftus LLP
1224 Seventeenth Street, N.W.
Washington, D.C. 20036
(202) 347-7170

Dated: August 6, 2015

Its Attorneys

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**WESTERN COAL TRAFFIC LEAGUE
SUPPLEMENTAL COMMENTS**

The Western Coal Traffic League (“WCTL” or the “League”) hereby submits the following supplemental comments in the above-captioned proceeding.¹

WCTL has endeavored to keep its comments relatively concise and to limit repetition of matters previously presented. Failure to address a particular contention presented by the Association of American Railroads (“AAR”) or a member railroad should not be construed as acquiescence in a railroad claim.

1. AAR Ex Post Defense of the MSDCF Model

The AAR and its expert witness devoted a significant portion of their presentation to attempting to defend the current MSDCF model. Most of the presentation covered matters previously addressed, by both the AAR and WCTL, in the written

¹ WCTL, together with Consumers Energy Company and South Mississippi Electric Power Association, is submitting a separate supplemental letter in EP 722, *Railroad Revenue Adequacy*.

materials. However, the AAR's expert presented a new claim that the MSDCF model had actually understated the cash flows achieved by the railroad industry. The AAR's analysis misses the mark in several important and related respects, some of which bear on larger issues.

First, the stated purpose of the Board's cost of capital ("COC") is to estimate the opportunity cost of capital. Investors act based on ex ante expectations. An ex post showing that the model's depiction of cashflows was conservative in a specified period does not demonstrate that the model accurately measured investor expectations or that the model is otherwise sound or conservative.

Second, and related, each of the railroad internal financial representatives highlighted the uncertainty that they confront in allocating capital for investment, *i.e.*, the fact that the outcome cannot be known in advance. Again, investors, whether purchasers seeking to assess the soundness of investing in a company or a company seeking to allocate its own capital, act based on expectations.

Third, the fact that cashflow performance exceeded the MSDCF predictions (for a specified period) shows that earnings/cashflow predictions for railroads are very prone to inaccuracy.² Dr. Levine and Professor Triantis both stressed the point in their

² The AAR has made no showing that railroad EPS projections are consistently conservative or accurate, or that the MSDCF model systematically understates cash flows. To the contrary, the AAR's expert stressed that railroad earnings are volatile. DCF approaches to estimate the COE are more plausible where there is cashflow stability and predictability. "The [DCF] model nevertheless seems to give reasonable answers, at least for the traditional public utilities in telecommunications, electric power, gas pipelines, etc. Evidently firms in these industries move slowly enough, yet at the same time have enough financial momentum, for the DCF model to work." Stewart C. Myers,

written and oral testimony. Unless one is confident in those predictions, one should not rely on them to model investor expectations. The unreliability of those predictions is a major reason why CAPM has displaced MSDCF for firms that, like the railroads, are not subject to pervasive regulation or that have variable cashflows or high EPS projections.

Fourth, the more generalized point, that expected returns can and do deviate from actual returns, presents one of the pitfalls in basing the market risk premium (“MRP”) on historical returns. Abundant scholarship confirms that actual historical returns have exceeded the returns expected at the time, giving rise to the well-known equity premium puzzle discussed by Professor Triantis. AAR’s own expert has elsewhere recognized the need not to be bound by strict adherence to historical data:

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.

Harris, Villadsen, & Lo Passo, *Calculating the Equity Risk Premium & the Risk-Free Rate* (Brattle Group Nov. 26, 2012) (prepared for NMa, OPTA), at 29 (original emphasis).

On the Use of Modern Portfolio Theory in Public Utility Cases: Comment, 7 Financial Management (Autumn 1978), at 66.

The AAR made no showing that the MSDCF model is commonly utilized outside of traditional rate-of-return regulation, and its expert conceded the opposite when questioned at the hearing. The AAR’s expert also briefly mentioned hurdle rates, but hurdle rates typically entail additional concerns beyond the firm’s COC. The railroads’ financial representatives noted some reasons why they deliberately set their hurdle rates above their COC.

2. Significance of Operating Leases for the Capital Structure

At the hearing, WCTL juxtaposed (a) the Board's previous lack of interest in treating operating leases as debt for purposes of assessing the railroad industry's capital (debt-equity) structure so as to conform to standard financial practice with (b) the Board's possible interest in considering replacement costs, when (i) both are contrary to generally accepted accounting principles (GAAP); (ii) the cost of capital concept is foreign to GAAP, whereas valuing operating assets at depreciated net book value is standard within GAAP; (iii) lease reclassification is feasible and very common broadly done for financial and investment analysis;³ and (iv) valuing operating assets at replacement cost is infeasible and not done (not even by railroads for their own purposes, except apparently for trotting out before the Board every few years).

Railroads have substantial operating leases, and the failure to treat them as debts results in an overstated cost of capital because equity is the most expensive component of the cost of capital. The Modigliani-Miller theorem holds that the firm's overall COC is independent of its capital structure. Accordingly, increasing the percentage of equity does not increase the COC because the reduction in leverage reduces the cost of both debt and equity, such that the overall COC remains unchanged. The Board has recognized this principle, in at least general terms, in observing that "the costs of debt and equity are related to the debt-to-equity ratios. For example, if a company is

³ WCTL presented abundant evidence that standard financial practice is to treat operating leases as debt in its Reply Statement in *Railroad Cost of Capital--2011*, EP 558 (Sub-No. 15), dated May 10, 2012.

highly leveraged with debt, its costs of debt will be higher.” *Methodology to be Employed in Determining the Railroad Industry’s Cost of Capital*, EP 664 (STB served Aug. 20, 2007), at 8.⁴

Failure to treat the capital structure as perceived by the financial community results in COC overstatement. Assume a hypothetical carrier has 70% equity, 20% conventional debt, and operating leases equivalent to 10% debt. The Board perceives an entity with 77.8% equity and 22.2% debt (seven parts equity and two parts debt), but the financial community perceives an entity with 70% equity and 30% debt (seven parts equity and three parts debt). The Board determines the cost of equity (“COE”) and cost of debt (“COD”) independently of the capital structure and then weights them together to determine the overall COC. Since the COE exceeds the COD, an entity with 77.8% equity and 22.2% debt will necessarily have a higher COC than an equivalent entity with 70% equity and 30% debt.

The problem is consequential, as the railroads have substantial operating leases. UP has deemed the matter sufficiently important to have included a non-GAAP financial measure treating operating leases as debt in its financial reporting for at least the past decade. “We believe these measures [debt to capital and lease adjusted debt to

⁴ The problem manifests itself in the SAC DCF model, notwithstanding AAR’s consensus claims. The railroads argue that the SARR must retire its debt over time, leading to an all-equity capital structure. The associated reduction in leverage should reduce the COE so as to maintain the overall COC, but the Board has been reluctant to make that necessary adjustment, causing the overall COC to rise as debt is repaid. Without that adjustment, the SARR ceases to be a least-cost, most-efficient competitor, and is burdened by an entry barrier in the form of a higher COC than the incumbent’s.

capital] are important in managing our capital structure to allow efficient access to the debt market while minimizing our cost of capital.” UP 2004 Annual Report at 21. Since 2006, UP has treated operating leases as debt for purposes of calculating its non-GAAP Return on Invested Capital as Adjusted. *See, e.g.*, UP 2006 Annual Report at 31.

The Board’s approach systematically overstates the cost of capital as perceived by the financial community, even if everything else is calculated correctly.

3. Use of a Railroad Beta of 1.0

The legal and evidentiary basis for using a beta of 1.0 for purposes of applying the CAPM to the railroad industry is stronger than WCTL counsel indicated at the hearing.

The beta measures a stock’s sensitivity to changes in the market as a whole. The market, by definition, reflects the average of all securities within the market portfolio, such that an average stock has a beta of 1.0. *See, e.g.*, Brealey, Myers & Allen, *Principles of Corporate Finance* (8th ed. 2006), at 167. The beta adjustment for the CAPM is thus equivalent to making a movement-specific adjustment to system average URCS costs in that the beta adjusts the CAPM COE from the overall average of 1.0 to reflect the risk profile of the specific industry.

The Board, of course, eliminated such movement-specific adjustments to system average URCS costs. The Board justified its action on the grounds that movement-specific adjustments were, *inter alia*, complex, expensive, and time consuming and may not contribute to accuracy in *Major Issues in Rail Rate Cases*, EP 657 (Sub-No. 1) (STB served Oct. 30, 2006) (“*Major Issues*”). The D.C. Circuit

upheld the Board's decision to do so, over the objections of both WCTL and UP, in *BNSF Ry. v. S.T.B.*, 526 F.3d 770 (D.C. Cir. 2008).

There is considerable basis on which to conclude that the inclusion of the observed beta in the railroad industry CAPM is similarly a distraction and does not result in increased inaccuracy. As Dr. Levine explained, the fate of the railroad industry and the economy as a whole are closely intertwined. (The AAR made a similar point, albeit in harsher terms and for a different purpose.) The AAR has a monthly publication, *Rail Time Indicators*, that examines linkages between rail performance and the general economy. The AAR states at page 2 of that publication:⁵

Freight railroading is a “derived demand” industry: demand for rail service occurs as a result of demand elsewhere in the economy for the products railroads haul. Thus, rail traffic is a useful gauge of broader economic activity, especially of the “tangible” economy.

One would thus not expect the railroad industry's beta to deviate substantially from the general economy, subject to the possibility of some transient events. Looking at the betas observed by the Board during 2006-2014 (assuming adoption of the AAR's calculation for 2014), a period that covers some significant swings including a major recession, only in the last two years have the beta values differed from 1.0 by more than 0.17. WCTL has previously explained that the high betas of the last two years appear linked to the railroads' increased exercise of market power (which is to

⁵ A sample issue is available at www.aar.org/Documents/Rail%20Traffic%20Sample%20Documents/Rail%20Time%20Indicators%20Sample.pdf.

be distinguished from the mere presence of market concentration).⁶ The railroads have been able to raise their rates significantly above inflation in a mild, but sustained recovery since the recession. Railroad volumes remain below the pre-recession peak, yet the railroads achieved a string of record quarterly profits. As a result, railroad stock gains have exceeded general stock market gains, which explains the higher betas. But that higher beta is not reflective of any inherently greater risk. The record shows that a beta of 1.0 is not unreasonable.

An additional factor warranting use of a beta of 1.0 is the small size of the railroad industry data sample, which is exacerbated by the exclusion of the largest member, BNSF, because it is not publicly-traded. The Board is forced to use two-thirds of the industry as a proxy for the full industry. Removing one-third of the capitalization-weighted data sample substantially increases the potential for statistical error. “The best estimates of cost of capital are still liable to measurement error.” Myers, *On the Use of Modern Portfolio Theory in Public Utility Cases: Comment, supra*, at 66.

The AAR dismissed the significance of the lower than 1.0 beta enjoyed by BNSF’s parent, Berkshire Hathaway, on the grounds that investment in BNSF and railroading is separate from investment in Berkshire itself. However, Berkshire Hathaway’s stated position is that deferred tax liabilities (of which BNSF has plenty) contribute substantially to the overall, synergistic health of the holding company by

⁶ The status of railroad volumes as a leading economic indicator creates a potential for railroads to be slightly “out of phase” with the general economy. This phasing aspect could logically result in beta fluctuations that are not reflective of greater inherent risk, especially from a long-term investment perspective.

providing a free “float” of capital.⁷ Berkshire Hathaway thus views its own COE as being something other (actually less) than the sum of its parts.

These factors provide further justification for use of a beta of 1.0, as the Board cannot, under the circumstances, conclude with confidence that the beta is or should be any greater.

The Board should also consider the Morningstar approach to beta measurement, CAPM, and COE described at pages 21-23 of *Morningstar’s Quantitative Equity and Credit Ratings*, dated May 2013 (“2013 Report”), included as Exhibit 2 to WCTL’s Reply Evidence dated November 4, 2014. Morningstar’s COE approach is further addressed in a document that WCTL referenced at the hearing, *Equity Research Methodology*, dated March 6, 2015 (“2015 Report”), attached as Exhibit A to this filing.

The 2013 Report explains at p. 21 that Morningstar has “chosen a greatly simplified COE methodology that captures the essence of the CAPM while avoiding precise estimates of inherently unknowable quantities.” The 2015 Report adds that:

Morningstar’s process for estimating COE is inspired and informed by the logic of the capital asset pricing model (CAPM) even as we take a largely qualitative and forward-looking approach. Our goal is to provide reasonable distinctions between the risk characteristics and expected returns of different companies while minimizing the effects of recency bias, false precision, and market noise.

⁷ “Besides, Berkshire has access to two low-cost, non-perilous sources of leverage that allow us to safely own far more assets than our equity capital alone would permit: deferred taxes and ‘float’ ... Better yet, this funding to date has been cost-free. Deferred tax liabilities bear no interest.” www.berkshirehathaway.com/owners.html.

Id. at 5. In other words, Morningstar relies on a prospective, qualitative analysis, rather than a retrospective, quantitative analysis dictated by observed betas.

Morningstar sorts companies “into four buckets based on their level of systematic risk.” 2013 Report at 21. The four buckets are below average, average, above average, and very high systematic risk, corresponding to COEs of 8%, 10%, 12% and 14%, respectively. *Id.* The 2015 Report presents slightly reduced values, 7.5%, 9%, 11%, and 13.5%, respectively, and identifies a MRP of 4.5%. *Id.* at 6. Morningstar states that “[m]ost companies should fall in this [average] bucket.” 2013 Report at 21.

The 2013 Report further divides systematic risk into revenue cyclicality, operating leverage, and financial leverage. The railroad industry should rank at or below average in each of these categories.

Since railroad transportation is, in the AAR’s own words, a derived demand, railroad revenues, or at least volumes, have some linkage to the general economy over time. While railroads have some cyclicality (which is not the same thing as short-term volatility), the railroads’ performance, especially in recent years, has not been inextricably tied to the general economy. Commentators such as Tony Hatch have noted the railroads’ ability to achieve secular, as opposed to merely cyclical, growth. Railroads have a diversified traffic base (coal, intermodal, and agriculture, as well as crude and frac sand, etc.), and considerable ability to shift among those sectors. The railroads have also demonstrated significant ability to increase their revenues and earnings by imposing rate increases above inflation in a weak economy. While volumes remain below the pre-recession peak, the railroads have been able to generate a string of

record quarterly revenues, earnings, and operating ratios, demonstrating significant separation from the general economy, which translates into below average, or not greater than average, revenue cyclicalities.

While railroads have some operating leverage, that leverage has been limited on both the downside and upside. Railroads have recently demonstrated considerable ability to mitigate their downside exposure by “right-sizing” their operations in response to reductions in demand (with volumes, again, remaining below the pre-recession peak). Those measures include reducing labor costs through furloughs and idling equipment. Moreover, compelling evidence of limits on the railroads’ upside operating leverage can be found in all of the available traffic that the railroads failed to transport in 2014, to the detriment of railroads, shippers, and the public at large.

The railroads also have average or below average financial leverage, as evidenced by their investment grade credit ratings and low interest rate spreads of their debt, regardless of whether operating leases are treated as debt.

Utilizing the Morningstar methodology, the railroads cannot reasonably be viewed as having an exposure to systematic risk that is any higher than average. Indeed, there is a substantial basis for finding that their exposure is below average, especially in their ability to switch traffic between sectors, to impose significant rate increases in excess of cost inflation on a recurring basis and in a weak economy, to immunize themselves from adverse consequences of oil price changes, to control their expenses, and to be unable to take advantage of some surges in demand.

Under the circumstances, the Board would have more than adequate justification, both factually and legally, for concluding that tracking the long-term beta of the industry is not worth the effort and will not result in a more accurate assessment of the industry's long-term systematic risk, just as the Board concluded in *Major Issues* that movement-specific adjustments were not worth the effort and did not result in increased accuracy.

4. Blume and Vasicek Adjustments

The issue of whether to use a Blume or Vasicek adjustment, or neither, to the beta is mooted if the Board opts for a beta of 1.0.

The AAR's expert indicated that Bloomberg provides beta calculations with and without a Blume adjustment, and concluded that Bloomberg thus provides no support for use of a Blume adjustment. That description is incomplete. Bloomberg is generally depicted as providing a Blume-adjusted beta. The AAR did not suggest that Bloomberg provides a Vasicek-adjusted beta.

At the hearing, the AAR stressed that the AFP 2013 survey showed a 50/50 split on use of an adjusted beta. The AAR, which seems to find the AFP surveys to be otherwise irrelevant, did not mention that the survey split was 57% adjusted and 43% raw among publicly traded companies, which is more telling for the Board's purposes. The AAR did not present any survey evidence showing significant use of the Vasicek adjustment.

The AAR's expert also criticized the Blume adjustment as resting on data from 1926-1960, but the AAR and its expert insist on including that data to measure the

MRP. Moreover, the point is not merely that the Blume adjustment rests on historical data, but that it continues to be commonly utilized today and is incorporated by Bloomberg, ValueLine, etc.

The AAR further claimed that the need for such an adjustment is reduced because the Board makes an annual determination of the cost of capital, and not less frequently. The Board's focus, however, is on the long-term cost of capital. Moreover, investors, who make their calculations more frequently, if not continuously, are concerned with the opportunity cost in deciding whether to buy, hold, or sell, and commonly use a Blume adjustment. While the Board's stated objective is to measure investor expectations, not those of other regulators, it is still significant that the Canada Transportation Agency decided to use a Blume adjustment (and a shorter MRP).

5. Use of Multiple Models

The AAR's expert conceded in response to questioning from the Board that CAPM is the dominant model for determining the COE for non-regulatory business purposes. The AAR and its expert nonetheless point to the continued use of MSDCF and similar models in regulation.

WCTL explained at the hearing that MSDCF and similar models may be appropriate for firms and industries where there is pervasive rate regulation, as suggested by the quote from Professor Myers at 2 n.2, *supra*. However, the railroads are not subject to pervasive regulation, and the AAR's analogy simply fails. The AAR refers to the FCC report, but that analysis was for purposes of "rate-of-return regulation" (as distinguished from price cap regulation, *etc.*) of incumbent local exchange carriers, at least in part to

determine subsidies that the regulated entities in rural areas receive from the Universal Serve Fund for High Cost Loop Support and Interstate Common Line Support. FCC Wireline Competition Staff Report, *Prescribing the Authorized Rate of Return*, WC Docket No. 10-90 (May 16, 2013). All the AAR has done is to identify an example where MSDCF is considered alongside CAPM for very traditional rate regulation.

The inconsistency is significant. Elsewhere, the AAR wants the Board to avoid acting like other regulators and rely instead on the market. When it comes to the COC, the AAR wants the Board to avoid relying on investor practices and instead adhere to the approach of other regulators that employ very different regulatory schemes for very different industries. The Board should not be confused by the AAR's contortions.

6. The AAR's Claim of WCTL's Intransigence

At the hearing, the AAR appeared to go out of its way to claim that WCTL has been intransigent on COC issues. WCTL does not wish to respond in kind, but believes that some response is in order.

WCTL does not believe that it has been intransigent under the circumstances. The Board adopted CAPM in 2008 and the MSDCF (over WCTL's objections) in 2009. Just a few months before adopting the MSDCF, the Board rejected the AAR's petition to base revenue adequacy on replacement costs,⁸ yet the AAR is pursuing the issue again. In the interim, the AAR also sought, unsuccessfully, to reverse

⁸ *Assoc. of Am. RRs -- Pet. Regarding Methodology for Determining Railroad Revenue Adequacy*, EP 679 (STB served Oct. 24, 2008)

the long-standing exclusion of geographic and product competition from coal rate cases.⁹ Measured against the AAR's own actions, WCTL's conduct does not seem intransigent.

WCTL does believe that the COC is an important matter, that it is worth getting right, and that the Board has not gotten it right in several key respects that result in major overstatement, *e.g.*, over 40% even in 2014, based on the AAR's calculations.¹⁰ WCTL had tried previously to bring the problems to the Board's attention, but was told to file a petition if it wanted its concerns to be heard, and did so. Following the Board's suggestions does not seem particularly intransigent.

The AAR's claim of intransigence seems intended to block any reexamination (what the AAR dismisses as "tinkering") regarding those matters where the AAR prevailed in 2008 and 2009, particularly in the use of the 1926-based historical MRP and inclusion of the MSDCF in the simple "hybrid" COE average, over WCTL's objections. In WCTL's view, the Board actions rested on a misperception of the following fundamentals:

- (1) Investors and companies do not commonly utilize the Ibbotson MSDCF to estimate the COE; use of the MSDCF is largely confined to traditional, pervasive rate-of-return regulation, which does not apply to the railroads;

⁹ *Pet. of the Assoc. of Am. RRs to Institute a Rulemaking Proceeding to Reintroduce Indirect Competition as a Factor Considered in Market Dominance Determinations for Coal Transported to Utility Generation Facilities*, EP 717 (STB served March 19, 2013).

¹⁰ In 2006, WCTL submitted materials showing that 9.5% reasonably represented a consensus view of the financial and investment community as to the railroad COC at that time. See WCTL comments in EP 664 dated Dec. 8, 2006, at 14-16 and referenced exhibits. With the 2 percentage point decline in interest rates (relevant to, *inter alia*, the risk-free rate and the COD) following the recession, a 7.5% COC is a reasonable benchmark. The figure is also consistent with Professor Damodaran's analysis.

- (2) Investors and companies commonly do not rely on the 1926-based MRP in applying the CAPM to calculate the COE; use of the 1926-based MRP seems confined to textbooks and, perhaps, traditional, pervasive rate-of-return regulation, which again does not apply to the railroads;
- (3) The difference between the CAPM COE (with the 1926-based MRP, and more so with a more contemporary MRP) and the MSDCF COE has been substantial, contrary to what the AAR depicted when it sponsored the MSDCF for the Board's use; and
- (4) The alternative MSDCF models suggested by WCTL were not devised for litigation, but are instead effectively identical to what the Brattle Group depicts as its standard MSDCF model, even for rate-of-return regulatory purposes, contrary to the AAR's statement at the time.

The Board's current methodology thus rests on defective premises and should not be continued. In addition, the Board should address the flawed determinations made in reliance on those defective premises over the past six years.

The Board can address the past errors in several ways. Under 49 U.S.C. § 722, the Board has the authority to reopen past decisions at any time on its own initiative, or the petition of a party, because of material error, new evidence, or substantially changed circumstances, each of which is present here.¹¹ The Board has recently ordered restatement of RCAF values on that basis. The Board could publish alternate values for the past, much as it did in establishing the RCAF-5, after realizing the futility of trying to chase the business cycle and the distortions resulting from its attempts to do so.

Productivity Adjustment--Implementation, 1 S.T.B. 739 (1996), *recon. denied*, 2 S.T.B.

¹¹ No significant disruption should result. To the best of WCTL's knowledge, there is only one shipper (AEPCO) that presently ships under a common carrier rate established by the Board, and that shipper does not have a traditional prescribed rate at the present time.

158 (1997). Or, the Board could leave the matter open for determination in individual proceedings, much as the Board (belatedly) did in adopting the CAPM.¹²

Some acknowledgement of the past distortions is in order.

Respectfully submitted,

WESTERN COAL TRAFFIC LEAGUE

Of Counsel:

Slover & Loftus LLP
1224 Seventeenth Street, N.W.
Washington, D.C. 20036
(202) 347-7170

William L. Slover
/s/ Robert D. Rosenberg
Slover & Loftus LLP
1224 Seventeenth Street, N.W.
Washington, D.C. 20036
(202) 347-7170

Dated: August 6, 2015

Its Attorneys

¹² At the hearing, the AAR displayed a chart from such a follow-up proceeding, and claimed it supported the existing COE approach. *AEP Texas N. v. BNSF Ry.*, NOR 41191 (Sub-No. 1) (STB served May 15, 2009), at 10. The AAR did not note that the Board's decision was vacated and remanded in material part in *AEP Texas N. v. S.T.B.*, 609 F.3d 432, 442 (D.C. Cir. 2010), on the grounds that the chart was not sufficiently sourced, explained, or analyzed. Indeed, the AAR has not explained what MRP was used for the CAPM and Fama-French values in the chart. Nor has the AAR considered what a more standard MSDCF analysis might show.

EXHIBIT A

Morningstar,

Equity Research Methodology

March 6, 2015



Equity Research Methodology

March 6, 2015

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We believe that a company’s intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk-adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth. Four key components drive the Morningstar rating: our assessment of the firm’s economic moat, our estimate of the stock’s fair value, our uncertainty around that fair value estimate and the current market price. This process ultimately culminates in our single-point star rating. Underlying this rating is a fundamentally focused methodology and a robust, standardized set of procedures and core valuation tools used by Morningstar’s equity analysts. In this document, we provide a detailed overview of how the Morningstar Rating for stocks is derived, and also outline the analytical work that feeds into our coverage of stocks.

Morningstar Research Methodology



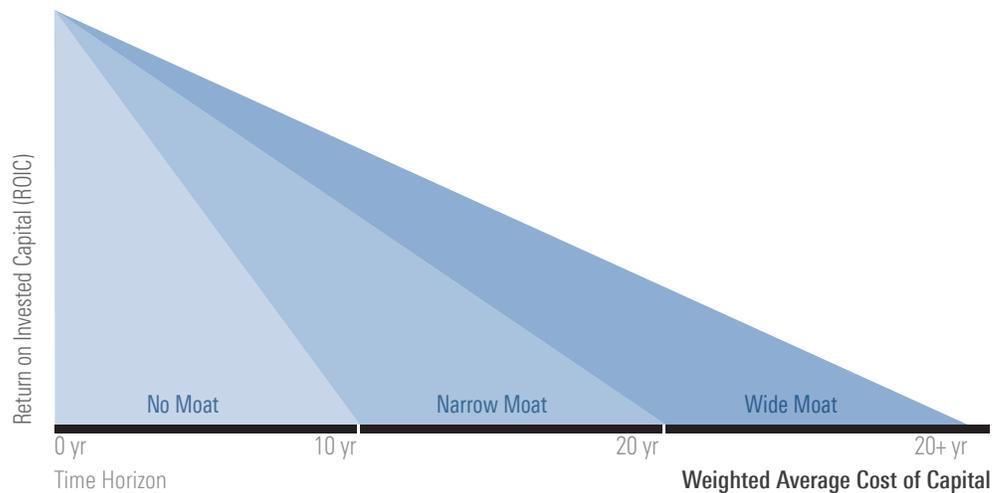
Morningstar’s Economic Moat™ Rating

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm’s long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital, or ROICs, over and above our estimate of a firm’s cost of capital, or WACC (weighted average cost of capital). Without a moat, profits are more susceptible to competition. Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm’s cost of capital more quickly than companies with moats. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

To assess the sustainability of excess profits, analysts perform ongoing assessments of what we call the moat trend. A firm’s moat trend is positive in cases where we think its sources of competitive advantage are growing stronger; stable where we don’t anticipate changes to competitive advantages over the next several years; or negative when we see signs of deterioration. The assumptions that we make about a firm’s economic moat play a vital role in determining the length of “economic outperformance” that we assume in the terminal sections of our valuation model—a topic we will explore in the next section.

Because of the global nature of the equities market and business competition, and its importance to our valuation process and its use in many of the products and services that Morningstar provides, analysts must vet proposed changes to the economic moat ratings with senior managers in Morningstar’s equity research department.

Measuring a Moat



Determining Fair Value

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' independent primary research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, in-depth competitive advantage analysis, and a variety of other analytical tools to augment this process.

We believe this bottom-up, long-term, fundamentally based approach offers several advantages over other valuation techniques. The granularity in a multiyear, cash-flow forecast with many key inputs allows for more-detailed scenario analysis. It also helps us to identify potential future trends, and presents an opportunity to closely analyze returns on invested capital—all critical tenets to our economic moat framework and uncertainty ratings. Furthermore, it focuses analyst efforts on long-term business drivers, which have the greatest valuation impact, rather than short-term market noise that has little impact on intrinsic value.

Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (such as mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss short-term market-price movements), but we believe these negatives are mitigated by deep analysis and our long-term approach.

By applying the same valuation framework across our entire global coverage universe in a consistent manner, we are able to compare investment opportunities across industries and around the globe on an apples-to-apples basis. Combining our analysts' financial forecasts with the moat rating helps us determine how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

As a result of this methodology, our model is divided into three distinct stages. Here is how the system works in practice for operating companies:

Stage I: Explicit Forecast

In the first stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in working-capital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes

(EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

We define the second stage of our model as the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I.

The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline in revenue is an NPV=0 proposition. Stated differently, in the perpetuity period, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Discount Rates

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total present value of expected future cash flows.

Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

Cost of Equity

A company's cost of equity (COE) represents the average, annualized, nominal total return expected by shareholders. For most companies, COE is the dominant factor in the company's WACC and therefore holds sizable influence in the valuation process. However, in contrast to fixed-rate forms of capital, the COE is not a contractual return. It cannot be observed directly, and considerable controversy persists in theoretical finance as to how the COE is best estimated.

Morningstar's process for estimating COE is inspired and informed by the logic of the capital asset pricing model (CAPM) even as we take a largely qualitative and forward-looking approach. Our goal is to provide reasonable distinctions between the risk characteristics and expected returns of different companies while minimizing the effects of recency bias, false precision, and market noise.

We use a building block approach to derive COE estimates for individual companies:

Cost of Equity = Market Average Real Return Expectation
(6.5%–7.0% based on what we observe as a mean-reverting real return of the S&P 500 over long rolling time horizons—this is not a forecast, but rather what we believe shapes investor expectations)

+ Inflation Expectation (2.0%–2.5% based principally on stable 10- to 30-year inflation expectations derived from TIPS spreads as well as actual CPI over the last decade)

+/- Country Risk Premium (for non-USD reporting firms; this will reflect differentials in inflation and real risk-free rate expectations outside the U.S. as well as political risks)

+/- Systematic Risk Premium (four categories; ranges from -1.5% to +4.5%)

Systematic Risk Premium Categories

Category	Equity Risk Premium (%)	X Implied Beta	Risk-Free + Rate (%)	= Total COE (%)	- Average COE	= Systematic Risk Premium (%)
Below Average	4.50	0.67	4.50	7.50	9.00	-1.50
Average	4.50	1.00	4.50	9.00	9.00	—
Above Average	4.50	1.44	4.50	11.00	9.00	2.00
Very High	4.50	2.00	4.50	13.50	9.00	4.50

Importantly, because the fair value estimate reflects the present value of expected future cash flows, it should rise by the company's estimated cost of equity (net of the shareholder return allocated to dividends) over time, all else equal.

Cost of Debt

In estimating the cost of debt, we use a similar building-block approach as our cost of equity. We use the same assumed risk-free rate and level of inflation, while layering on a corporate credit spread, which varies according to the company's credit risk. We also adjust for the tax benefit of the deductibility of interest expenses.

Once we have these inputs, we weight them in terms of the implied value of each as a proportion of total estimated enterprise value to come up with our overall WACC estimate.

A significant percentage of our coverage includes firms domiciled outside the United States, and there are those that call the U.S. home but have considerable non-U.S. operations. Depending on the systematic risk of a country relative to the U.S., we may incorporate a country risk premium into our discount rate. Some characteristics that we consider are differences in local real risk-free rate, expected inflation, financial disclosure, and other specific operating-market differences that could cause equivalent businesses to be more or less risky in one national economy versus another. In assigning country risk premia, we have developed a set of country-specific standardized scores that are reviewed at least once annually.

Hidden Assets/Liabilities

Once we have an estimated present value of expected future cash flows, we must also consider any other items that affect value not specifically included within our cash-flow projections. We refer to these special items as hidden assets and hidden liabilities, and they might include items that occur frequently across our coverage universe, such as the estimated value of outstanding option grants or underfunded/overfunded pensions, or items that tend to be very company-specific in nature, such as minority ownership positions in other companies, underutilized land or other balance sheet assets that could be sold without changing the cash-flow prospects of the business, or an expected future litigation settlement. It is impractical to list all the possible hidden assets and liabilities we find across our coverage, but we think about these hidden assets and liabilities as anything that affects value that is handled outside of our cash-flow forecasts.

PV of Stage I Estimated Cash Flows
+ PV of Stage II Estimated Cash Flows
+ PV of Stage III Estimated Cash Flows (i.e., Residual Value)
+ Estimated Value of Excess Balance Sheet Cash Average
<hr/>
Enterprise Value
– Estimated Value of Debt, Preferred, and Any Other Funding Sources
+ / – Estimated Value of Hidden Assets/Liabilities
<hr/>
Estimated Value of Equity
Divided by # of shares
<hr/>
Estimated Equity Value per Share or Fair Value Estimate

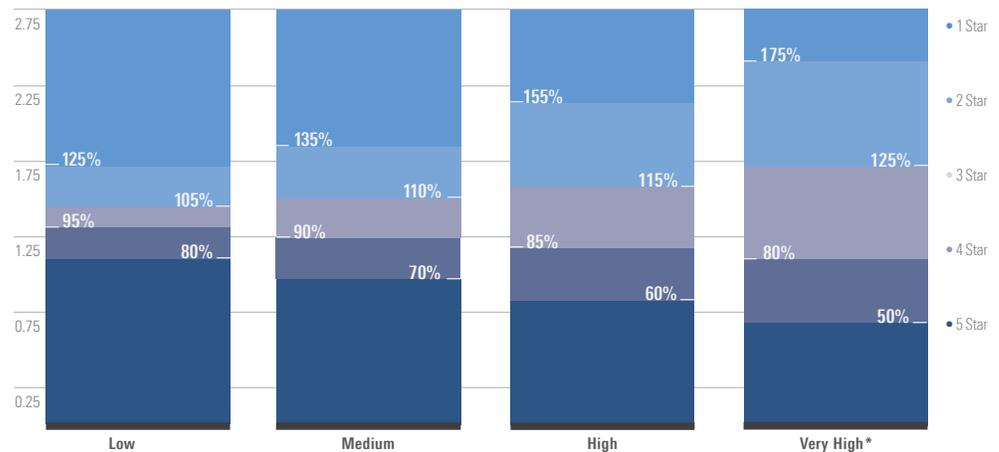
The Uncertainty Rating

Morningstar’s Uncertainty Rating captures a range of likely potential intrinsic values for a company and uses it to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating represents the analysts’ ability to bound the estimated value of the shares in a company around the Fair Value Estimate, based on the characteristics of the business underlying the stock, including operating and financial leverage, sales sensitivity to the overall economy, product concentration, pricing power, and other company-specific factors.

Analysts consider at least two scenarios in addition to their base case: a bull case and a bear case. Assumptions are chosen such that the analyst believes there is a 25% probability that the company will perform better than the bull case, and a 25% probability that the company will perform worse than the bear case. The distance between the bull and bear cases is an important indicator of the uncertainty underlying the fair value estimate. Our recommended margin of safety—the discount to fair value demanded before we’d recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the estimated value of the equity, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the uncertainty rating provides guidance in portfolio construction based on risk tolerance.

Morningstar Rating

Price/Fair Value



* Occasionally a stock’s uncertainty will be too high for us to estimate, in which case we label it Extreme.

Our uncertainty ratings are low, medium, high, very high, and extreme. With each uncertainty rating is a corresponding set of price/fair value ratios that we use to assign star ratings, as shown in the graph.

The actual price/fair value cutoffs are determined using a combination of a) empirical data from the historical performance of our uncertainty rating, and b) option pricing theory based on the implied volatility of stocks with commonly agreed-upon uncertainty characteristics. Our empirical data show that appropriate 1-star and 5-star prices fall approximately at the midpoint between a log-normal relationship and a symmetrical relationship. A log-normal relationship would mean that a stock would post the same return between the 5-star price and the fair value as it would between the fair value and the 1-star price, while a symmetrical relationship would mean that the same percentage discount to a stock price for a 5-star rating would be assigned as a premium to the stock price for a 1-star rating. We formally assign our 1-star prices as the midpoint between the symmetrical and the log-normal relationship. We then round these prices to fair value relationships to the nearest 5 percentage points for simplicity.

Extreme Uncertainty

In very rare cases, the potential outcomes for a firm's intrinsic value become so disparate and volatile that a proper margin of safety cannot be properly estimated. For these speculative situations, we assign companies an uncertainty rating of extreme. Using our best estimates, we publish fair values on these firms, but because of the extreme uncertainty surrounding these companies, we fix the stock rating at 3 stars regardless of stock price movements. Significant financial distress is the most common reason for assigning an extreme uncertainty rating to a firm, although not the only one.

Generating the Star Rating

Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market is open.

Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted. Furthermore, as mentioned earlier, we would expect our fair value estimates to generally rise over time, due to the time value of money. Specifically, over the course of a year, barring major changes to analyst assumptions, we would expect our fair value estimates to increase at the level of our estimate of a firm's cost of equity (net of shareholder returns attributed to dividends). So, for a stock that pays no dividends with a \$100 fair value estimate today and an estimated 10% cost of equity, we would expect our fair value estimate to rise to \$110 in 12 months, all else equal.

It is also worth noting that there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time, generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust). If you bought a company's stock at exactly our fair value estimate today, we would expect that you should achieve total returns in line with our assumed cost of equity for the next three years, absent a change in business prospects relative to our base-case expectations. A stock price lower than our fair value estimate suggests that there is a higher probability than not that investors should expect returns at a greater rate than COE over a three-year period (i.e., we would expect the investment to produce abnormal returns or alpha). Conversely, a price above our fair value estimate implies lower-than-COE expected returns (or negative alpha). In some cases, we believe investors should expect negative absolute returns, if the price/fair value estimate ratio is sufficiently high.

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

★★★★★ We believe appreciation beyond a fair risk-adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential. This rating encourages investors to consider an overweight position in the security relative to the appropriate benchmark.

★★★★ Appreciation beyond a fair risk-adjusted return is likely, in our opinion. This rating encourages investors to own the firm's shares, possibly overweight relative to the appropriate benchmark after fully considering more attractively priced alternatives, such as our 5-star recommendations.

★★★ Indicates that investors we believe are likely to receive a fair risk-adjusted return (approximately cost of equity). Concentrated portfolios might consider exiting these positions if more attractively priced alternatives are available.

★★ We believe investors are likely to receive a less than fair risk-adjusted return and should consider directing their capital elsewhere. Securities with this recommendation should generally be underweight, assuming less expensive alternatives are available for the portfolio strategy being employed.

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss. This rating encourages investors to strongly consider exiting portfolio positions in the security in nearly all strategies. ■■■