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SERVICE DATE – AUGUST 14, 2007

SURFACE TRANSPORTATION BOARD

DECISION

STB Ex Parte No. 664

METHODOLOGY TO BE EMPLOYED IN DETERMINING THE RAILROAD
INDUSTRY'S COST OF CAPITAL

AGENCY: Surface Transportation Board.

ACTION: Notice.

SUMMARY: The Board proposes to revise its method for calculating the railroad industry's cost of capital by computing the cost of equity using a capital asset pricing model.

DATES: Comments on this proposal are due by September 13, 2007. Reply comments are due by October 15, 2007.

ADDRESSES: Comments may be submitted either via that Board's e-filing format or in the traditional paper format. Any person using e-filing should attach a document and otherwise comply with the instructions at the E-FILING link on the Board's website, at <http://www.stb.dot.gov>. Any person submitting a filing in the traditional paper format should send an original and 10 copies to: Surface Transportation Board, Attn: STB Ex Parte No. 664, 395 E Street, S.W., Washington, DC 20423-0001.

Copies of written comments will be available from the Board's contractor, ASAP Document Solutions (mailing address: Suite 103, 9332 Annapolis Rd., Lanham, MD 20706; e-mail address: asapdc@verizon.net; telephone number: 202-306-4004). The comments will also be available for viewing and self-copying at the Board's Public Docket Room, Room 131, and will be posted to the Board's website.

FOR FURTHER INFORMATION CONTACT: Paul A. Aguiar at (202) 245-0323.
[Assistance for the hearing impaired is available through the Federal Information Relay Service (FIRS) at 1-800-877-8339.]

SUPPLEMENTARY INFORMATION: Each year the Surface Transportation Board (the Board) determines the railroad industry's cost of capital. The Board then uses this cost of capital figure for a variety of regulatory purposes. It is used to evaluate the adequacy of

individual railroads' revenues each year.¹ It is also employed in maximum rate cases, feeder line applications, rail line abandonments, and trackage rights cases.

The Board calculates the cost of capital as the weighted average of the cost of debt and the cost of equity, with the weights determined by the capital structure (the fraction of capital from debt or equity on a market-value basis) of the railroad industry. While the cost of debt is observable and readily available, the cost of equity (the expected return that equity investors require) can only be estimated. How best to calculate the cost of equity is the subject of a vast amount of literature covering the fields of finance, economics, and regulation. In each case, however, because the cost of equity cannot be directly observed, estimating the cost of equity requires adopting a financial model and making a variety of simplifying assumptions.

After considerable public discourse, the Interstate Commerce Commission (ICC) – our predecessor agency – settled upon the simple, original form of the discounted cash flow (DCF) model to derive the cost-of-equity component. The key equation, $r = D/P + g$, calculates the average return on equity (r) desired by investors by using the current dividend to price ratio (D/P) and a forecast of future growth (g).² See Railroad Cost of Capital – 1981, 365 I.C.C. 734, 739 (1982). The computation of dividend yield is straightforward. To estimate the growth rate, the ICC and Board have used the average of leading securities analysts' 5-year forecasts for growth in earnings per share. See Railroad Cost of Capital – 1987, 4 I.C.C.2d 621 (1988).

This simple DCF method for calculating the cost of equity has been challenged. In the annual proceeding to calculate the 2005 cost of capital, the Western Coal Traffic League (WCTL) argued that there is a mismatch between the 5-year growth rate supplied to the Board by the Association of American Railroads (AAR) and the long run growth potential of the economy as a whole. WCTL cited finance texts for the proposition that an industry's sustainable growth rate cannot significantly exceed the growth rate for the economy.

WCTL recommended that the Board replace the DCF approach entirely with a Capital Asset Pricing Model (CAPM). The theory underlying the CAPM method is simple and intuitive, although the actual development of a particular model can be complex and still requires the exercise of judgment. CAPM first determines the return an investor would receive on a risk-free investment. An estimate of the risk premium associated with the particular investment is then developed. Once the risk premium is quantified, its value is added to the risk-free investment rate to obtain an estimate of the cost of equity.

¹ See 49 U.S.C. 10704(a)(2),(3); Standards for Railroad Revenue Adequacy, 364 I.C.C. 803 (1981), modified, 3 I.C.C.2d 261 (1986), aff'd sub nom. Consolidated Rail Corp. v. United States, 855 F.2d 78 (3d Cir. 1988).

² In order to account for annualized growth in the dividend yield, the agency modified the equation to: $r = [D(1+0.5g)/P] + g$. See Railroad Cost of Capital – 1982, 367 I.C.C. 662, 670 (1983).

The Board concluded that the record in the annual proceeding was too bare to support a departure from established agency precedent, and that the concerns raised by WCTL should be explored in more depth with broader public input. Railroad Cost of Capital - 2005, STB Ex Parte No. 558 (Sub-No. 9) (STB served Sept. 15, 2006), pet. for review docketed, No. 07-1064 (D.C. Cir. Mar. 13, 2007). Accordingly, on September 20, 2006, the Board issued an advance notice of proposed rulemaking (ANPRM) in this proceeding to explore the most suitable methodology for calculating the cost of capital.

In response to the ANPRM, the Board has received comments from Arkansas Electric Cooperative Corporation; AAR; National Industrial Transportation League; Snively, King, Majoros, O'Connor & Lee, Inc. (Snively King); United Transportation Union-General Committee of Adjustment; and WCTL. Several of the comments included verified statements from reputable financial experts, who presented conflicting views on the existing approach and offered possible refinements or alternatives. The Board also held a public hearing on February 15, 2007.

AAR and Snively King suggested that, if the Board were to refine or modify the existing approach, it should use a multi-stage DCF method to address the weakness in the current formulation of the DCF model.³ A multi-stage DCF approach would replace the current implicit assumption that the short-term growth rate will remain constant forever with an assumption that railroad growth will moderate and trend downward towards the rate of growth of the economy as a whole. WCTL suggested the Board use both a multi-stage DCF and CAPM method to derive the cost-of-equity component of the cost of capital.⁴ At the public hearing, the Board also received written and oral testimony from the Federal Reserve Board (FRB) on its experience with DCF and CAPM, written testimony from the Canadian Transportation Agency (CTA) on its use of CAPM and DCF methods, and written testimony from the United States Department of Agriculture in support of a multi-stage DCF approach. After the hearing, Board staff met with technical staff of Federal Energy Regulatory Commission (FERC) to discuss how that agency applies its DCF approach to derive the cost of equity for gas pipelines. Board staff also met with staff of CTA to explore further how that agency derives the cost of capital for the Canadian railroads.⁵ Finally, Board staff conducted an independent review

³ See AAR Comments, V.S. Hubbard at 7-8; Snively King Comments at 12-13. AAR's principal position, however, is that, absent compelling evidence that the existing approach is conceptually flawed, the Board should not discard it or modify it. See AAR Comments at 5; Hearing Tr. at 64.

⁴ Hearing Tr. at 95-97.

⁵ Notes from these meetings are included in the correspondence section of the public docket and are publicly available in the Board's Public Docket Room, 395 E Street, S.W., Room 131, Washington, DC 20423.

of the economic and financial literature on best practices in the calculation of cost of capital.⁶

PROPOSED RULE

Cost of capital plays a significant role in the regulation of railroads, and it is therefore important that the cost of capital be measured as accurately and practically as possible. Towards that end, the record presents compelling evidence that our current DCF approach can be improved upon using more modern techniques to estimate the cost-of-equity component of the cost of capital. The DCF method adopted in the 1980s was at the time the most common method used by regulatory agencies to estimate the cost of equity. This simple DCF method required few inputs and few judgment calls, permitting the agency to promptly develop an estimate of the cost-of-equity component of the cost of capital.

The simplicity of this DCF model, however, is the result of an assumption that the 5-year growth rate provided by the AAR will remain constant forever. But the growth rate of a particular industry can not substantially exceed the long-term growth rate of the economy indefinitely. Indeed, at the oral hearing, AAR's expert acknowledged that the current high projected 5-year growth rates cannot be sustained.⁷ Thus, when the 5-year growth rate is high, this model will overstate the cost of equity because it assumes that the growth rate will continue forever. Similarly, if the railroads experience a downturn and the predicted 5-year growth rate is very low, the model will understate the cost of equity, as the model assumes the growth rate of the railroads will forever remain below the growth rate for the national economy.

The record reveals that modern finance practices have changed since the last time the agency reviewed its cost of capital methodology and that this simple DCF approach has been displaced by more sophisticated and precise techniques to estimate the cost of equity.⁸ Indeed, support for this DCF approach in academia, private industry, and the public sector has eroded over time. AAR nonetheless advocates that we continue to use

⁶ On July 25, 2007, WCTL filed reply comments in STB Ex Parte No. 558 (Sub-No. 10), Railroad Cost of Capital – 2006. That same day WCTL also tendered the same reply comments for filing and consideration in STB Ex Parte No. 664. Those reply comments will be accepted for filing in STB Ex Parte No. 664, but, because they were submitted well after the due date for comments in this proceeding, the comments have not been considered by the Board in issuing today's notice. They can be considered by the Board along with comments filed in response to today's notice.

⁷ Hearing Tr. at 175-76.

⁸ See Graham & Harvey, The Theory and Practice of Corporate Finance: Evidence from the Field, 60 J. FIN. ECON. 187 (2001); Bruner, Eades, Harris, and Higgins, Best Practices in Estimating the Cost of Capital: Survey and Synthesis, FIN. PRACTICE & EDUC. at 13-29 (Spring/Summer 1998) (Best Practices) (survey found that CAPM has become the prevalent financial model used to estimate the cost of equity).

this simple DCF approach because it was carefully developed and should not be changed absent compelling evidence that it is conceptually flawed. Given the central role this calculation plays in our economic regulation of the rail industry, however, we believe the time has come to modernize our approach to address the valid concern over the use of a single 5-year growth rate in the DCF model.

One way we could update our approach would be to replace our existing method with a “2-Stage DCF” method. A 2-stage DCF would permit an industry’s growth rate to exceed the long-term growth rate of the economy initially, but would use the long-term growth forecast for the economy as a better predictor of long-term growth. The 2-Stage DCF is itself merely a variant of a more general class of models known as multi-stage DCF. For example, a 3-Stage DCF might use different growth rates in the years 1-5, years 6-10, and years 11 and beyond.⁹ A multi-stage DCF can be adapted in any number of ways: stages can be made longer or shorter; more stages can be added; and growth rates could be phased down from the initial rate to the long-term rate over any number of years.

The very flexibility of this multi-stage DCF method gives us pause, however. If we move to a multi-stage DCF, parties could advocate a variety of outcomes by manipulating the stage lengths and phase down. Because there is no sound theoretical basis to prefer one multi-stage DCF over another and there is no literature to support such a choice, it would be difficult to select a particular approach in a non-arbitrary fashion.

Several parties have suggested that we use a “2-Stage” DCF similar to that employed by FERC. FERC’s “2-Stage” DCF operates in a slightly different way than the approach described above in footnote 8. Rather than attributing different growth rates to different periods, FERC blends the separate growth rates into a single weighted average. In calculating its growth rate, FERC places two-thirds of the weight on the short-run growth forecast and the remaining one-third on the long-run growth forecast. This approach greatly mitigates the problem that arises when short-run growth forecasts exceed the long-term growth rate of the economy as a whole. Indeed, using our 2005 figures, it is possible to show that FERC’s approach and “true” 2-stage DCF would yield equivalent results if the first-stage was assumed to last 49 years. Yet, we are reluctant to

⁹ See, e.g., Pratt, *COST OF CAPITAL: ESTIMATION & APPLICATIONS* at 114 (2002). As is the case with the Board’s current DCF approach, a multi-stage DCF cost of equity is set so as to make the present value (PV) of expected dividends equal to the current stock price. The PV formula for a 3-stage DCF approach is as follows:

$$PV = \sum_{n=1}^5 [NCF_0(1+g_1)^n]/(1+k)^n + \sum_{n=6}^{10} [NCF_5(1+g_2)^{n-5}]/(1+k)^n + [NCF_{10}(1+g_3)]/(k-g_3)/(1+k)^{10}$$

where NCF_i is the net cash flow in the i th year; g_1 , g_2 , and g_3 are the expected growth rates in net cash flow in each of the three stages; and k is the cost of equity. Because there is no formula to calculate k directly, different possible values are plugged into the PV formula iteratively until the difference between PV and the actual stock price is minimal.

adopt FERC's approach. The weights FERC places on the short- and long-run forecasts are essentially arbitrary; two-thirds weight on the short-run is not unreasonable, but why not three-fifths or one-half? There is no reason to prefer one number over another. This is equivalent to arguing over whether the first period growth rate should last 5, 10, 20, or 49 years. In a 2-Stage DCF, the Board's choice of weights or period lengths would be enormously important, but would lack any theoretical justification.

Fortunately, CAPM provides an alternative to DCF that commands greater respect in the regulatory and academic community and dominates the private sector. As a result, there is a more robust literature to guide us in its implementation. Between 2000 and 2005, the FRB conducted an extensive review of existing finance methods for estimating the cost of equity, exploring both the DCF and CAPM models. It worked with an external consulting firm that specialized in capital allocation and risk management. It also consulted with four finance professors from U.S. academic institutions to obtain information about current private sector practices. In addition, it received public comments on the options available. Based on this review, FRB moved to CAPM, in part because it found that this model was a "well known, widely used and theoretically sound, model that was simple and transparent compared to other approaches."¹⁰ Similarly, our Canadian counterpart – which calculates the cost of equity for the Canadian railroads each year after examining both the DCF and CAPM methods – has concluded that "CAPM produces an estimate that best reflects the state of relevant capital markets and is a better indicator of changes in financial markets through the risk-free rates."¹¹

We acknowledge that moving from a DCF method to a CAPM method would be a departure from agency precedent, but such a change appears to be appropriate now. The ICC rejected the use of CAPM because "it requires the use of many assumptions ... [and each] can have a significant effect on the result obtained and each necessitates judgments on how best to define and measure it." Railroad Cost of Capital – 1981, 365 I.C.C. 734, 741 (1982). Yet once we move away from the current, simplistic DCF model – a change the record compels – we must make judgment calls whether we use a multi-stage DCF or CAPM model. The fact that CAPM is widely considered to be the superior financial model and is now the dominant model used by companies and investors in the marketplace, has persuaded us to propose using a CAPM method over a multi-stage DCF approach, thereby shifting the agency's approach into the mainstream.

We recognize that, while CAPM has become the industry norm, there are disputes over how to apply the model and whether newer methods are superior. For example, AAR cited literature on alternative models – such as the Fama-French and Arbitrage Pricing Theory – that its proponents claim are superior to CAPM. We anticipate that best finance practices will continue to evolve, as new approaches are developed and tested by

¹⁰ See id. at 21; see also Green, Lopez, & Wang, Formulating the Imputed Cost of Equity Capital for Priced Services at Federal Reserve Banks, FRBYU ECON. POLICY REV. at 59 (Sept. 2003) ("CAPM is still the most widely used model in classrooms and the financial industry for calculating the cost of capital.").

¹¹ CTA Comments at 7.

the marketplace. We are not foreclosing the use of a superior approach in the future, if such an approach should replace CAPM as the industry norm, just as the DCF model has been displaced by CAPM. Furthermore, we are aware that more complex CAPM models exist than the simple version described in the **Appendix**. However, the literature we reviewed suggests that the added complexity of those CAPM models may offer limited increased precision.¹²

To illustrate the potential impact of our proposal, we have re-calculated the cost-of-equity for the railroad industry from 1997 through 2005 under both the proposed CAPM approach described in the **Appendix**, and a 2-stage DCF approach.¹³ **Table 1** provides a comparison of the cost-of-equity estimates under these two alternatives and the existing DCF approach.

Table 1
Cost-Of-Equity Comparison

Year	Current DCF	2-Stage DCF	CAPM
1997	13.8	7.6	10.5
1998	13.1	7.1	8.8
1999	12.9	7.0	9.3
2000	13.9	8.5	9.3
2001	12.8	6.9	8.2
2002	12.6	6.6	7.3
2003	12.7	6.8	6.7
2004	13.2	6.9	7.1
2005	15.2	7.2	7.5

Table 2 compares the cost-of-capital under these two alternatives and the existing DCF approach.

¹² See Barnes & Lopez, Alternative Measures of the Federal Reserve Banks' Cost of Equity Capital, Working Paper 2005-06 (Oct. 2005) (forthcoming in Journal of Banking and Finance).

¹³ To illustrate a 2-stage DCF approach, we assumed the short-term growth forecasts would remain constant for 20 years, but then revert to the Social Security Administration's long-term forecast for the economy thereafter. The work papers used to derive all these figures, including the CAPM calculations, are available from the Board upon request.

Table 2
Cost-Of-Capital Comparison

Year	Current DCF	2-Stage DCF	CAPM
1997	9.7	7.4	9.5
1998	11.6	6.8	7.9
1999	10.7	7.0	8.5
2000	10.8	8.1	8.4
2001	10.1	6.8	7.4
2002	9.6	6.2	6.5
2003	9.4	6.0	6.0
2004	10.1	6.2	6.4
2005	12.2	6.7	6.8

We have reviewed and reject other suggested changes to our existing procedures. First, we reject WCTL’s suggestion that parties should be permitted to argue for an alternate approach to be used in a particular year. One of our objectives is to adopt a fixed and transparent methodology upon which railroads and the public can rely. Using a consistent method every year will accomplish that goal.

Second, we will not adjust the debt portion of capital to reflect the capitalization of operating leases, as requested by WCTL. A central accounting issue associated with leases is the identification of those leases that transfer substantially all the benefits and risks inherent in the ownership of property, called capital leases. Those leases that are not identified as capital leases are called operating leases and are not treated as sales by lessors and as purchases by lessees. They are treated on a prospective basis as a series of cash flows from the lessee to the lessor. WCTL urges us to treat operating leases as debt for purposes of the cost-of-capital calculation. This would require a change to our procedures for determining revenue adequacy, which in turn would require that we modify our annual reporting requirements for carriers. We rely on Generally Accepted Accounting Principles (GAAP) to distinguish between the capital leases and operating leases. See 49 U.S.C. 11161 (instructing the Board to conform its accounting principles to GAAP, to the maximum extent practicable). It is not proper to treat all operating leases as debt, particularly very short-term leases, and WCTL has offered no persuasive evidence to justify a departure from GAAP.

Third, we reject WCTL’s suggestion to replace the current-year debt-to-equity ratio with a multi-year average to avoid alleged “artificial” fluctuations in the capital structure used to calculate the weighted average. Market values are not artificial. Moreover, the costs of debt and equity are related to the debt-to-equity ratios. For example, if a company is highly leveraged with debt, its costs of debt will be higher. Thus, it would be improper to first calculate the costs of debt and equity using the real debt-to-equity ratios and then attempt to weight those costs with a multi-year average.

Finally, we will not expand the scope of this rulemaking to reexamine how this cost-of-capital determination is used in the Board's annual revenue adequacy determinations and consider using a replacement-cost analysis, as suggested by the AAR. As the ICC explained, "[w]hile current cost accounting is theoretically preferable to original cost valuation, it cannot be practically implemented in a manner that we can be confident would produce accurate and reliable results." Standards for Railroad Revenue Adequacy, 3 I.C.C.2d at 277. AAR has not attempted to demonstrate here how we could perform this complex analysis; therefore we will not reconsider that conclusion at this time. If AAR or another interested party believes that they can offer a practical means to implement a replacement-cost approach, they should file a petition for a separate rulemaking proceeding describing the proposal in detail. We note, however, that switching to a replacement-cost analysis would also require use of a real cost of capital (the cost of capital with inflation excluded), which would be lower than the nominal cost of capital currently used. Thus, any petition to switch to a replacement cost approach would also need to explain how the real cost of capital would be estimated.

Pursuant to 5 U.S.C. 605(b), the Board certifies that the proposed action should not have a significant economic effect on a substantial number of small entities within the meaning of the Regulatory Flexibility Act.

This action will not significantly affect either the quality of the human environment or the conservation of energy resources.

Authority: 49 U.S.C. 721; 49 U.S.C. 10704.

Decided: August 8, 2007.

By the Board, Chairman Nottingham, Vice Chairman Buttrey, and Commissioner Mulvey.

Vernon A. Williams
Secretary

Appendix

To calculate the cost of equity, we propose to use the following simple single-Beta version of the CAPM model: $\text{cost of equity} = \text{RF} + \beta \cdot \text{RP}$. In this equation, RF is the annual economy-wide risk-free rate, RP is the annual market-wide risk premium, and β (or Beta) is the measure of systematic, non-diversifiable risk of a particular carrier. The industry-wide cost of capital will be determined as a weighted average of individual railroad costs, using the same methodology as is used now.

To calculate the annual risk-free rate, we propose to use the 10-year Treasury Bond rate. The FRB uses a short-term Treasury Bill rate and the CTA uses both short-term and long-term rates. We believe a longer rate is superior and the 10-year is the longest Treasury Bond that has been continuously issued. A comprehensive study found that 70% of corporate and financial advisors use Treasury bond yields of maturities of 10 years or greater. See Best Practices at 13-28. Moreover, the risk-free rate used by investors should be risk free over the time period of the investment, and railroad assets are often long-lived. Finally, an advantage of using long-term rates is that they contain long-term inflation expectations. Using a 10-year risk-free rate therefore makes the proposed CAPM calculation more forward looking.

To calculate the annual market-wide risk premium, we propose to use monthly New York Stock Exchange (NYSE) data over a 50-year time period. Because this calculation is essentially an average return, a longer time period is usually chosen. We invite comments on the appropriate time period. While we propose to calculate the market risk premium each year, we also seek comments on the use of a fixed number instead.

To calculate the Beta for each carrier, we propose to use that carrier's monthly, merger-adjusted¹⁴ stock return data for the prior 10 years in the following standard equation:

$$R - \text{RF} = \beta (\text{RM} - \text{RF}) + \varepsilon$$

R	=	merger-adjusted monthly stock return for the railroad;
RF	=	monthly 10-year U. S. Treasury bond rate;
RM	=	monthly return on the NYSE; and
ε	=	random error term

Using a simple, ordinary least squares (OLS) regression technique, the Board would estimate β , the coefficient of systematic, non-diversifiable risk. OLS regression technique is a simple but accepted statistical tool one can use to develop an unbiased estimate of the true Beta. There would always be 120 months of data. Each year, 12

¹⁴ "Merger-adjusted" means that, in instances where a carrier has been formed by merger of several predecessor railroads, data for the shares of predecessor railroads are included in such a way as to show total performance as if the merger had already occurred.

months of new data would be added to the data set and the oldest 12 months of observations would be removed.

In selecting a 10-year time period to estimate Beta, we seek to balance the desire to eliminate statistical noise and achieve stability in the estimate, while allowing for the fact that Beta may change over time. Using earlier data might cause results to be skewed by events that are no longer important. On the other hand using a shorter timeframe – while capturing changes in industry risk profiles more rapidly – would introduce more variability and noise in the estimate. We also invite comment on the use of 25-year or 5-year time periods. Anything less than five years appears to add too much noise. Green, Lopez, & Wang, Formulating the Imputed Cost of Equity Capital for Priced Services at Federal Reserve Banks, FRBYU ECON. POLICY REV. at 70 (Sept. 2003).

We invite comments on whether it would be reasonable to assume that Beta equals 1, thereby eliminating the need to estimate Beta. Finance theory predicts that Beta will move towards 1 over time, and this has proved true for banks and other firms that provide payment processing services. See Hearing Tr. at 25. We also invite comments on the inclusion of an intercept term in the regression.