

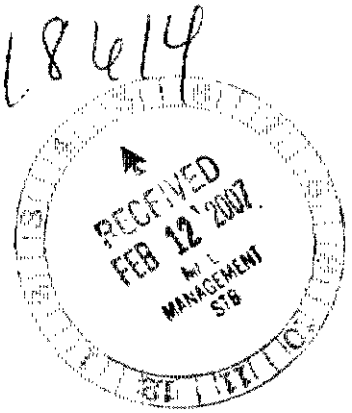
**BEFORE THE
SURFACE TRANSPORTATION BOARD**

Ex Parte No. 664

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

**SUMMARY OF PRESENTATION OF THE
ASSOCIATION OF AMERICAN RAILROADS**

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I. INTRODUCTION

- The *ANPR Order*, and the Board's Notice scheduling this hearing, ask whether there have been "any changes in underlying railroad industry economic conditions that would create the need to change the methodology currently employed by the Board" to determine the cost of capital. The short answer is "no."
- The DCF methodology remains a fundamentally sound and appropriate method for determining the cost of capital regardless of economic conditions. No principled basis has been presented that would warrant a departure from the Board's longstanding use of that methodology. As the statement of Dean Hubbard and the testimony of Dr. Stangle show, the cost of equity for the year 2005 generated by the Board's current forward-looking DCF methodology is not an indicator that there is something wrong with that methodology. Rather, the results for 2005 reflect the effects of current economic forces affecting the railroad industry,

including a strong increase in demand for rail service fueled by such disparate matters as rising Asian imports, increased demand for Western coal, demand for construction materials, and other external business factors which have, in turn, generated improvements in the railroads' financial and stock market performance and increased the expectations of equity investors. If anything, these developments confirm the desirability of using the forward-looking DCF methodology to determine the current cost of equity capital. By contrast, the backward-looking Capital Asset Pricing Model ("CAPM") advocated by WCTL fails to take changing economic conditions and investor expectations into account in a timely manner.

- Even WCTL – whose criticism of the Board's 2005 COC determination triggered this proceeding – is not advocating that the Board abandon the DCF methodology. Rather, WCTL complains that the Board currently applies the DCF methodology too "mechanically." WCTL urges the Board to make certain changes in the way it implements the DCF methodology. WCTL also urges the Board to conduct an alternative analysis based upon CAPM, and to determine which model's output is more probative "under the circumstances" if the results produced by the two models do not converge in a particular year.
- WCTL's proposal represents a reversal in the shippers' position regarding the suitability of the CAPM methodology. As AAR's written comments showed, the ICC's decision to abandon the CAPM methodology – even as

a check on the results of the DCF analysis – was influenced by the criticism of shippers that CAPM was conceptually and technically flawed. WCTL has not offered any principled basis for this change of position.

II. ABSENT COMPELLING EVIDENCE THAT THE DCF METHODOLOGY IS CONCEPTUALLY FLAWED, THE BOARD SHOULD NOT REPLACE IT.

A. As the Board observed in its recent decision in Ex Parte 558 (at 7): “There is a norm of regularity in government conduct that presumes an agency’s duties are best carried out by adhering to the settled rule.”

- The Board correctly follows a policy of adhering to its precedents unless it is confronted with persuasive reasons to depart from them.

B. The Board’s longstanding practice of using the DCF methodology to determine the cost of common equity capital is supported by more than two decades of analysis and experience:

- In *Ex Parte No. 393 (1981)*, the ICC acknowledged the Staggers Act mandate that it promote the ability of railroads to earn adequate revenues, and adopted as the standard for revenue adequacy whether a railroad is earning a rate of return equal to the current cost of capital. In doing so, the ICC explicitly rejected other measures – such as financial ratios and funds flow analysis – that it deemed inappropriate as indicators of long-term revenue adequacy.
- The ICC’s 1986 decision in *Ex Parte No. 393 (Sub-No. 1)* confirmed that the revenue adequacy analysis should “center on the long-term viability and capability of the railroads to provide essential rail service.”
- In *Ex Parte No. 436, Railroad Cost of Capital – 1982*, 367 I.C.C. 662 (1982), the ICC found that there was “unanimity of opinion” among carriers and shippers alike that the DCF methodology is appropriate for

determining the cost of equity capital. Conversely, the record in that case reflected shipper opposition to the CAPM methodology on the grounds that “*the CAPM technique was conceptually and technically flawed.*”

- By the time of its 1987 decision in *Ex Parte No. 466, Railroad Cost of Capital – 1986*, 3. I.C.C. 2d 948 (1987), the ICC ceased to use the CAPM methodology even as a “verification tool” to check the results of the DCF analysis.
- Since its inception in 1996, the STB has consistently followed the precedent established by the ICC, and has utilized the DCF approach to determine the annual cost of equity capital.

C. In light of repeated findings over more than two decades supporting use of a DCF-based methodology, the Board should not even consider replacing the DCF methodology unless it is presented with compelling reasons for doing so.

- In *Ex Parte 558*, WCTL urged the Board to replace the DCF model with an analysis based upon a form of CAPM methodology. The only reason offered by WCTL for making such a change was WCTL’s perception that the 2005 cost of capital determined by the Board was too high, a result that WCTL attributed to analysts’ current projections of future railroad earnings. WCTL did not demonstrate – indeed, it did not even argue – that the DCF model was in any way conceptually invalid.
- The Board’s September 20, 2006 Decision in *Ex Parte 558* (at 6) rejected WCTL’s proposal, concluding that “[a]t this time there is not enough evidence that our longstanding DCF model must be replaced.”

- Likewise, the current record does not provide any principled – much less compelling – reason to depart from the DCF methodology:
 - As AAR witness Dr. Stangle will discuss, the fact that the DCF methodology yielded a significantly higher cost of equity capital for a single year (2005) does not provide a principled basis for discarding that model. Rather, the 2005 cost of equity appears to be the logical result of changes in economic conditions that affected the demand for rail service. Those changes do not support a finding that the DCF model is flawed. Indeed, if the demand for rail service softens in the future, that economic circumstance will be reflected in investor expectations, future analyst projections and in the cost of equity generated by the forward-looking DCF methodology in future years.
 - One of the principal reasons why the ICC adopted the cost of capital as the benchmark for revenue adequacy was to work from a long-run perspective. Switching methodologies based upon short-term shifts in railroad traffic levels, revenues, profits or share prices would have precisely the undesirable consequences that led the ICC to reject the short-term measures for revenue adequacy. As the ICC warned in *Ex Parte 393*, reliance on short-term standards would improperly deny railroads the pricing flexibility they need to achieve long-term revenue adequacy simply because they were making progress toward achieving that goal.

- Indeed, WCTL's written comments in this proceeding (unlike its submission in *Ex Parte 558*) do not advocate abandoning the DCF methodology entirely.

III. THE BOARD'S CONSIDERATION OF MODIFICATIONS OR ALTERNATIVES TO THE DCF METHODOLOGY FOR DETERMINING THE COST OF EQUITY CAPITAL MUST BE GUIDED BY CERTAIN FUNDAMENTAL PRINCIPLES.

A. The Board's ultimate decision whether to retain, replace or modify the DCF methodology must be guided by the following principles:

- The Board's methodology for determining the cost of common equity must be consistent with the statutory goal of promoting long-term revenue adequacy. As the ICC correctly held in *Ex Parte 393* (at 808), revenue adequacy standards based upon short-term financial considerations would unlawfully penalize railroads for making progress toward long-term revenue adequacy.
- It would be inappropriate to adopt a regime under which the Board might "swing back and forth" between methodologies from year to year on the basis of short-term earnings or the results produced by a particular methodology in a given year. A results-oriented approach to determining the cost of capital would be contrary to both the Board's statutory duties and sound regulatory policy.
- The rail industry's need for a meaningful opportunity to achieve long-term revenue adequacy is especially critical in the current capacity-constrained environment. Given the challenges that carriers face to make investments in facilities that keep pace with the needs of their customers, the Board's revenue adequacy standards (including its methodology for determining

the industry's cost of capital) must be "forward looking" – that is, they must accurately reflect the returns that will be required to support ongoing investments in the rail network. The DCF model currently employed by the Board is such a forward-looking approach.

B. If the Board decides to explore possible adjustments to the DCF methodology, or the possible use of an alternate methodology as a check on the results produced by the DCF model, it must carefully evaluate both the theoretical and practical implications of any changes it may adopt.

- The Board cannot adopt the changes proposed by WCTL on the basis of the current record. Rather, the Board would have to initiate a NOPR proceeding identifying the proposed changes in the Board's methodology, and afford interested parties an adequate opportunity to comment on those proposals.
- If the Board decides to initiate such a NOPR proceeding, it should not limit its inquiry exclusively to the DCF methodology currently used by the Board or to the version of CAPM advocated by WCTL. Rather, the Board should engage in the same type of broad-ranging inquiry that the ICC conducted prior to settling on the DCF model as the methodology for estimating the cost of equity capital. In particular, the Board must consider the full range of possible alternatives, including:
 - Retaining the current DCF methodology.
 - Retaining the DCF methodology with such modifications as may be shown to be necessary to correct demonstrated "shortcomings" in the current DCF model.

- Conducting (or permitting evidence regarding) alternative analyses based upon a methodology other than DCF. If such a secondary analysis were conducted, the Board would have to decide how to reconcile differences between the results produced by multiple models in a given year. If the Board decides to conduct an alternative analysis, it should consider methodologies, such as Fama-French or Arbitrage Pricing, that may be more appropriate and reliable than CAPM.
- WCTL asks the Board to calculate the cost of equity capital based upon an alternative methodology such as CAPM, and, where the results produced by the two methodologies diverge in a given year, to “reconcile” the difference between them by choosing the more “probative” methodology for that year. AAR believes that such a purely ephemeral approach to measuring the cost of equity capital would undercut the rail industry’s ability to achieve long-term revenue adequacy.

C. In addition to evaluating the “theoretical” merits of any methodology it might adopt, the Board must take into account the practical difficulties likely to be encountered in implementing it.

- As Professor Hubbard testified, there is a significant body of research in financial economics highlighting the shortcomings of the CAPM approach to estimating the cost of capital.
- Indeed, WCTL’s written comments acknowledge that there is potential for dispute regarding the proper inputs to the CAPM.

IV. ANY CHANGE THAT THE BOARD MIGHT PROPOSE IN THE METHODOLOGY FOR CALCULATING THE COST OF COMMON EQUITY WOULD HAVE FAR-REACHING REGULATORY EFFECTS THAT WOULD HAVE TO BE CONSIDERED.

- As the *ANPR Order* recognized, the railroad cost of capital is used not only in making annual revenue adequacy determinations, but for a number of other important regulatory purposes as well.
- In particular, any change in the method used to determine the cost of equity capital will affect not only each railroad's annual revenue adequacy determination, but also its URCS costs, as the annual cost of capital is incorporated into each carrier's URCS costs for that year.
- URCS costs based upon a cost of capital determined under a backward-looking methodology such as CAPM would not reflect a carrier's current costs as accurately as the DCF methodology.
- URCS costs that do not accurately reflect each carrier's current cost of capital will impair the accuracy of the Board's rate reasonableness determinations. This is especially true under the proposed "Simplified SAC" methodology being considered in *Ex Parte No. 646*, which would base rate reasonableness on a single-year analysis that uses the defendant carrier's URCS system-average costs to estimate a Stand-Alone Railroad's operating and equipment expenses.
- WCTL's proposal, which would involve the application of multiple methodologies, introduce multiple-year averages and create a need to "reconcile" diverging results produced by alternate methodologies in a given year, would hinder the Board's ability to fulfill its regulatory

responsibilities in a timely manner. The preparation of URCS costs requires an expeditious and consistent determination of the cost of capital. Consistent application of the well-established DCF model with specified inputs allows the Board to prepare URCS costs, and to process the Carload Waybill Sample, on a timely basis. The current methodology also ensures that changes in URCS reflect changes in a carrier's current operating costs. Adoption of WCTL's proposals would delay the development of URCS and the availability of the Carload Waybill Sample. This, in turn, would result in delays in STB proceedings – including rate cases under the Board's proposed "simplified" rate procedures – that depend upon those data sources.

- To similarly account for rate reasonableness and other regulatory effects, should the Board decide to initiate a formal rulemaking to consider modifications or alternatives to the DCF methodology, that proceeding should also include a review of the method used for valuation of railroads' asset bases.
 - As the Board is well aware, the railroad industry is investing in new assets at rates not seen in recent times. In such an environment, basing the industry's allowable return on book value is inappropriate and can make it more difficult to attract needed scarce capital from investors.
 - Moreover, even with the recent massive investment in new railroad assets, a very significant portion of railroads' asset bases is still

booked at historical values that do not reflect their true worth under current market conditions.

- The Board should therefore consider a method of valuation of railroads' assets that is "market-based," such as replacement cost new less depreciation ("RCNLD") or a similar current-value method that fairly recognizes value today of the significant historical investments that the railroads have made to their networks and must continue making in order to satisfy the capacity and service demands facing the industry.
- WCTL's proposal that the Board reclassify operating leases from an expense item to a debt item violates statutory principles governing railroad cost accounting. As WCTL acknowledges, such a classification would not be consistent with GAAP accounting. Nor would it be consistent with ICCTA, which requires the Board generally to conform its cost accounting rules to GAAP "to the maximum extent practicable" (49 U.S.C. § 11161), and which explicitly requires that the Board's rules governing revenue and expense accounting by carriers be "consistent with generally accepted accounting principles uniformly applied to such carriers" (49 U.S.C. § 11164).

BRUCE E. STANGLE, Ph.D.

I. INTRODUCTION AND SUMMARY

- I am a co-founder and the Chairman of Analysis Group, Inc., an economic, financial and strategy consulting firm. I hold a Ph.D. in applied economics from the Massachusetts Institute of Technology, and, for more than 25 years, I have conducted research and offered expert testimony on a variety of economic matters that arise in regulatory proceedings and litigation (see my attached CV). Together with some of my colleagues, I collaborated with Dean R. Glenn Hubbard of Columbia University's Graduate School of Business in the preparation of Dean Hubbard's verified statement, which was submitted in this matter on December 8, 2006. In addition, I consulted with Dean Hubbard in the development of my testimony.
- Based on the insights provided in Dean Hubbard's verified statement, analyses conducted since the time of that statement, and consideration of the submissions by others in this matter, I have reached the following four key conclusions relating to the estimation of the railroads' cost of equity:
 - The Discounted Cash Flow (DCF) methodology is an appropriate approach to estimating railroads' cost of equity that has served the Board and the railroad industry well for over two decades. This methodology is straightforward to implement, well-understood, and relies on relatively few inputs, all of which are readily observable by parties to the Board's proceedings.

- Economic conditions in the railroad industry have undergone changes in recent years that underscore the value of the DCF methodology's forward-looking nature. Because its implementation is backward looking in nature, the capital asset pricing model (CAPM) has only recently begun to show the effects of these changes on the railroads' cost of equity.
- The Western Coal Traffic League (WCTL) has suggested that the railroads' cost of equity should be similar to the cost of equity granted to regulated utilities. This argument lacks merit and is contradicted by sources on which the WCTL and its experts rely.
- While the Board may hear criticisms of its current DCF methodology, it is important for the Board to realize that the CAPM, the primary alternative methodology that has been proposed, is subject to substantial, well-known criticisms. In addition, in implementing the CAPM, the Board would have to make a number of subjective consequential judgments. For example, the Board would have to deal with the fact that different reasonable approaches to estimating beta — the key parameter in the application of the CAPM — can yield significant variation in the resulting cost of equity estimates, with little basis for determining which is the "right" value.

II. RECENT CHANGES IN THE ECONOMIC CONDITION OF THE RAILROAD INDUSTRY: A CONTEXT FOR COST OF CAPITAL CONSIDERATIONS

- Substantial increases in capital investments will be required to meet our economy's growing demand for freight transportation, and the railroads' recent and planned capital investments reflect that reality. As Dean Hubbard described in his verified statement, a primary concern in regulating an industry like the railroads is to ensure that regulation does not adversely affect incentives for those needed investments. Therefore, while the Board must consider numerous factors in its cost-of-capital proceedings, it is essential that it consider how these proceedings affect investment incentives.
- As the Board is aware and others will attest, changes have occurred in the economic conditions facing the railroad industry in recent years. Revenues, expenses, and capital investments have increased, and the mix of traffic and associated revenues has also changed. As I discuss below, these changes raise important questions about whether there has been a shift in the relationship between returns on railroad investments and overall market returns — a critical consideration in implementing the CAPM.

III. A KEY DIFFERENCE BETWEEN THE DCF METHODOLOGY AND THE CAPM IS PARTICULARLY RELEVANT TO THIS PROCEEDING: THE CAPM IS A BACKWARD-LOOKING APPROACH WHEREAS THE DCF IS FORWARD LOOKING

- As Dean Hubbard described in his verified statement, the DCF methodology and the CAPM are both theoretically sound approaches to estimating the cost of equity. However, the forward-looking nature of the

DCF methodology makes it a preferable method for estimating the railroads' cost of equity.

- The DCF methodology estimates the rate of return that investors demand of a firm (i.e., the firm's cost of equity) by reconciling a firm's stock price with investors' expectations of future dividends and price appreciation. Importantly, by incorporating investors' expectations, the DCF methodology is a forward-looking approach to estimating the cost of equity.
- The CAPM also estimates the cost of equity that investors demand of a firm. Specifically, it suggests that, along with demanding a "risk-free rate of return", investors require an additional return, called a risk premium, when making investments with uncertain returns. While investors require a "market risk premium" for a diversified investment portfolio, they may require a relatively greater or lesser risk premium for an investment in a specific firm. The CAPM's key insight is that, because investors can diversify their investments, they do not care about the absolute volatility of returns on a particular firm's stock. Rather, they care about how an investment in that firm affects the volatility of returns on their entire investment portfolio. This depends on how sensitive the returns on that firm's stock are to the variation in returns on a diversified portfolio. This sensitivity is measured in the CAPM by a coefficient called beta, which measures the portion of an

investment's risk that cannot be diversified away (also called the market risk of that investment).¹ The more sensitive a firm's stock returns are to variation in overall market returns, the higher is the stock's beta. For example, whereas a beta of 1.0 implies that, on average, a stock's value will increase (decrease) by 1 percent for every 1 percent increase (decrease) in the overall market, a beta of 1.3 implies that, on average, a stock's value will increase (decrease) by 1.3 percent for every 1 percent increase (decrease) in the overall market. The higher the beta, the more an investment in that stock contributes to (rather than dampens) the volatility of returns on a portfolio of investments, and therefore the higher the risk premium investors demand.

- While both the CAPM and the DCF methodology are sound in theory, practical limitations related to the implementation of the CAPM can lead to a significant difference between cost of equity estimates derived from it and those obtained from the DCF methodology: as implemented, the CAPM is a backward-looking approach, whereas the DCF methodology is forward-looking. A forward-looking methodology is particularly important in cases where a firm or an industry is undergoing changes in its economic condition, such that the past may not be a good predictor of the future. Of course, this is the case for the railroads today.

¹ Richard Brealey, Stewart Myers, and Franklin Allen, *Principles of Corporate Finance* (8th edition), New York: McGraw-Hill, Inc., 2006, p. 167.

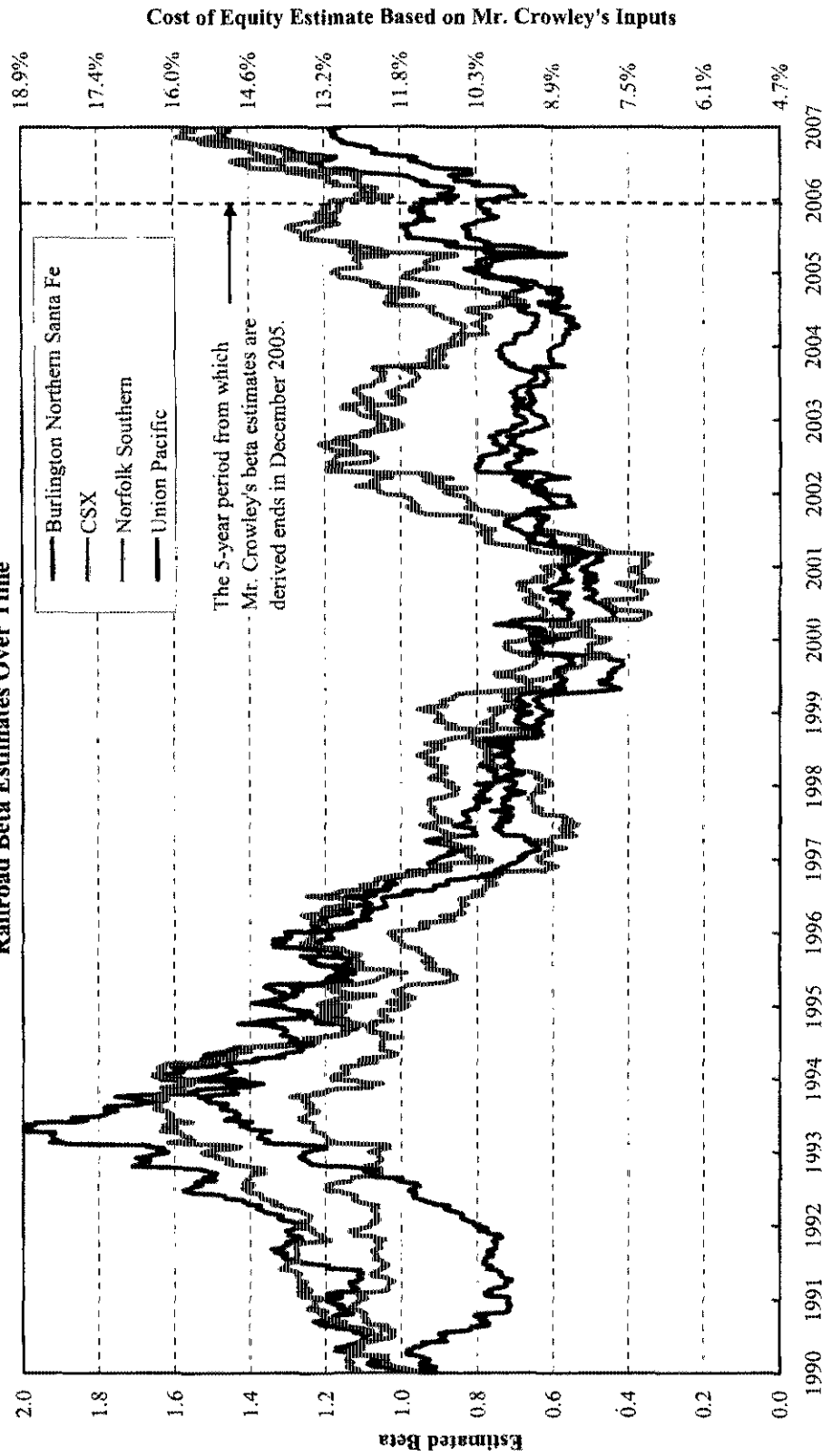
- While theory calls for the CAPM beta to be a forward-looking measure of the expected sensitivity of a stock's returns to market returns, beta can only be calculated in a backward-looking manner — based on historical relationships between a stock's returns and market returns.
- Estimates of beta are therefore a lagging indicator of the appropriate cost of equity, and economic research shows that betas are not necessarily stable over time.² When an industry is undergoing economic changes, as the railroad industry is now, use of historical data to estimate betas is particularly problematic.
- Railroad betas and the costs of equity that these betas imply have increased substantially since the time period from which the WCTL's witness, Mr. Crowley, drew betas for his analysis (See Figure 1). These recent changes in railroad betas demonstrate the value of a forward-looking approach to estimating the cost of equity.
- Figure 1 presents estimates of railroad betas based on one of many possible estimation methods. As I discuss below, the fact that there is no common agreement on the precise method of estimating beta presents a significant challenge in implementing the CAPM. However, a variety of

² For example, a 1972 study by William Sharpe and Guy Cooper divided stocks into deciles, ranked by their betas during one five-year period. Their analysis indicates that only half of the stocks remained within one decile of their original ranking in the subsequent five-year period. William Sharpe and Guy Cooper, "Risk-Return Classes of New York Stock Exchange Common Stocks, 1931-1967," *Financial Analysts Journal*, March/April 1972, p. 53.

possible methods show the same upward trend in railroad betas in recent years.

- The changes in CAPM cost of equity estimates lag the changes that were already identified using the DCF methodology, and therefore demonstrate the importance of using a forward-looking approach like DCF.
- The WCTL's expert Mr. Crowley submitted CAPM estimates of the cost of equity based on data through December 2005 in which he assumed a market risk premium of 7.1 percent and a risk-free rate of 4.65 percent. Given these assumptions, the changes in beta estimates for individual railroads from the end of December 2005 to the end of December 2006 that are depicted in Figure 1 imply increases in the costs of equity for these railroads that range from 2.4 to 4.0 percentage points.
- Given recent changes in the railroads' betas, much of the difference between the CAPM and DCF cost of equity estimates highlighted by the WCTL's experts may simply reflect the backward-looking CAPM that they applied.

Figure 1
Railroad Beta Estimates Over Time



Notes: Beta estimates presented here are based on weekly data over a two-year period, and use the S&P 500 Index as a proxy for measuring market returns. This is similar to the methodology used by Bloomberg to estimate betas. Although Bloomberg is a well-recognized source of beta estimates, I do not endorse it or any other particular method of estimating beta. Cost of equity estimates are based on the estimated betas and Mr. Crowley's estimates of the risk-free rate (4.65%) and market risk premium (7.1%). Data are from Bloomberg.

IV. COMPARISON OF RAILROADS TO UTILITIES IS INAPPROPRIATE

- The WCTL has suggested that the Board's recent cost of equity estimate is too high by comparing the railroads to regulated utilities. The WCTL first claims that the CAPM betas of the two sectors are similar, and that this implies that the risks of investments in railroads are similar to the risks of investments in regulated utilities. The WCTL then argues that the Board's cost of equity estimate for the railroads is too high because it is greater than the costs of equity granted to utilities by state utility commissions.³
- The WCTL makes these claims based on a single set of estimates of railroad and utility betas. However, other estimates of these betas — including estimates from a source on which the WCTL and its experts rely — indicate that railroads have higher betas than regulated utilities, and therefore should have a higher cost of equity. For example, Ibbotson Associates — a source on which the WCTL's expert, Mr. Crowley, relies — indicates that the median railroad beta as of March 2006 was 0.99.⁴ This beta is significantly greater than Ibbotson's contemporaneous estimate of the median beta of firms in the electric sector (0.47), and in the

³ Comments of the Western Coal Traffic League in Ex Parte No. 664, December 8, 2006, pp. 12-13. Charles King makes a similar argument in the verified statement that he submitted to the Board.

⁴ Ibbotson Associates, *Cost of Capital 2006 Yearbook*. Ibbotson Associates reports the median beta of firms in each industry, as defined by the Standard Industrial Classification (SIC) code. The betas reported here are for SIC code 4011 (Railroads, Line-Haul Operating), 4911 (electric services), and 4924 (natural gas distribution). The betas reported here and elsewhere in this testimony are all standard equity betas, which are also called "levered" betas. These betas represent the risk associated with a firm's equity. At some points in his verified statement, Mr. Crowley reports both levered and "unlevered betas", where the latter represent the risk associated with a firm's entire cash flow, assuming there is no debt in its capital structure.

natural gas distribution sector (0.24). Using Mr. Crowley's estimate of the market risk premium (7.1 percent), these differences between railroad and utility betas suggest that the cost of equity for railroads should be 3.7 to 5.3 percentage points higher than that for utilities.

V. ADOPTION OF THE CAPM WILL INTRODUCE A NEW SET OF SIGNIFICANT CHALLENGES AND CRITICISMS

- Given the criticism of the Board's current methodology, it is important to recognize that potential methodological alternatives would introduce significant challenges and will also be subjected to substantial criticism. Because the WCTL focuses on the CAPM as an alternative, I focus my remarks on well-known criticisms of that methodology. The Board would need to evaluate carefully all of the following criticisms of the CAPM before deciding whether a CAPM approach deserves consideration as a possible methodology for determining the railroad industry's cost of equity.
- While CAPM has been described as a "theoretical tour de force" (emphasis added), it is also widely recognized to suffer from serious shortcomings in estimating the cost of equity.⁵ These shortcomings are described in standard finance textbooks and are summarized in a recent

⁵ Eugene Fama and Kenneth French, "The Capital Asset Pricing Model: Theory and Evidence," *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer 2004, p. 44.

article by Eugene Fama and Kenneth French, two pioneering researchers in the field of finance.⁶

- In response to these shortcomings, several years ago Fama and French proposed an alternative model that they claim is superior to the standard CAPM. If the Board were to adopt a new methodology as an alternative to or a check on the DCF approach, the Fama-French three-factor model should be considered.
- Use of the CAPM would require the Board to make many judgments that have substantial consequences for the cost of equity estimate, and for which there is no generally accepted (i.e., “right”) answer. In this respect, I disagree with Professor Hodder’s contention that “[t]he CAPM approach is also not difficult to implement.”⁷
- The key input in the implementation of the CAPM is beta, and the determination of this value will unquestionably be subject to significant controversy. There is no single correct estimation approach and the results of alternative approaches can lead to substantial variation in cost of equity estimates.
- There is no consensus about precisely how beta should be estimated, including, among other factors:
 - The period over which beta is estimated

⁶ See Richard Brealey, Stewart Myers, and Franklin Allen, *Principles of Corporate Finance* (8th edition), New York: McGraw-Hill, Inc., 2006, Sections 8.3 and 8.4; and Fama and French (2004).

⁷ Verified Statement of Dr. James E. Hodder in Ex Parte No. 664, December 8, 2006, p. 3.

- The frequency of data that is used to estimate beta (e.g., daily, weekly, or monthly)
- The proxy that is used to measure overall market performance
- The implications of alternative approaches to estimating beta are apparent in the wide range of railroad beta estimates offered by reputable third party sources. The following table shows recent beta estimates from four financial information providers. Two of these sources, Value Line and Ibbotson Associates, were relied on by Messrs. King and Crowley in their respective testimonies.⁸ The range of possible beta values for an individual railroad is as great as 0.89: Ibbotson Associates estimates Norfolk Southern's beta to be 0.91, whereas Thomson/Worldscope estimates its beta to be 1.80, nearly double Ibbotson's estimate. Given the assumed market risk premium adopted by Mr. Crowley of 7.1 percent, this 0.89 range of possible betas implies that the resulting cost of equity estimate for a given railroad could differ by as much as 6.3 percentage points depending on which source one relies on for beta estimates.

⁸ The Ibbotson Associates beta estimates presented in this table differ from those presented in Mr. Crowley's verified statement for two reasons. First, they are more recent than those used by Mr. Crowley. Second, they are levered betas, not the unlevered betas that Mr. Crowley presents in his statement.

Table 1
Most Recent Beta Values of Select Railroads from
Four Different Financial Information Providers

Company	Bloomberg	Ibbotson Associates	Thomson / WorldScope	Value Line	Difference Between Maximum and Minimum Beta Value
Burlington Northern Santa Fe Corp.	1.45	0.78	1.28	0.95	0.67
CSX Corp.	1.52	1.05	1.39	0.95	0.57
Norfolk Southern Corp.	1.51	0.91	1.80	1.00	0.89
Union Pacific Corp.	1.11	0.74	1.57	0.90	0.83

Note: Ibbotson Associates betas are from June 2006, all other betas are from January 2007.

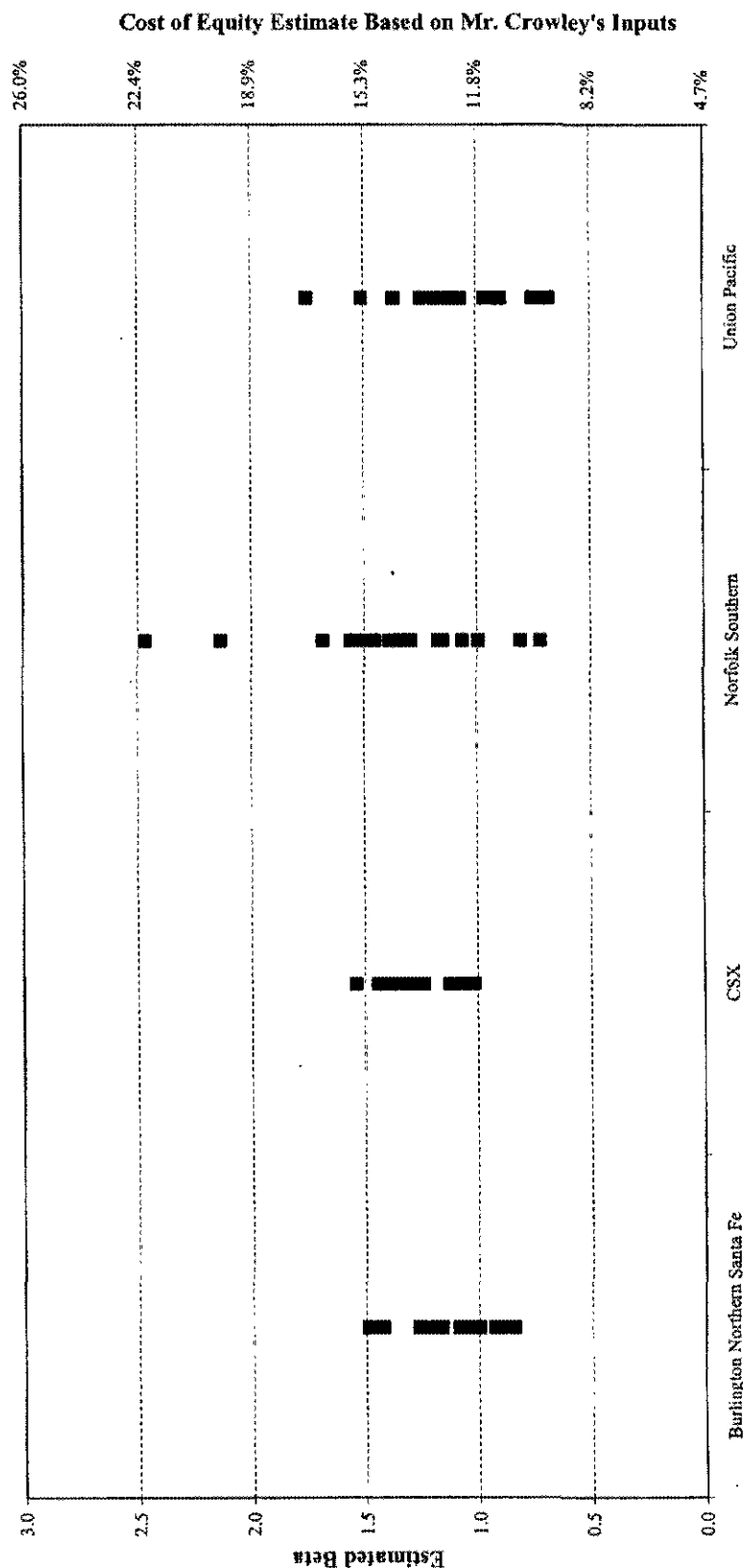
- Moreover, these four sources understate the full extent of variation in alternative beta estimates that can be produced by different reasonable estimation methodologies. Based on data through January 2007, Figure 2 presents 16 different beta estimates for each of the four major railroads. These 16 different beta estimates result from different permutations of the time horizon examined, frequency of data, and proxy for market performance. Importantly, economic theory provides no guidance on which of these 16 permutations (or any other plausible method for estimating beta) is more appropriate than any others. The implications of these different beta estimates for resulting cost of equity estimates are indicated by using Mr. Crowley's assumptions regarding the market risk premium (7.1 percent), and the risk-free rate (4.65 percent). As this figure makes clear, differences in beta estimates lead to tremendous variation in resulting cost of equity estimates.
- Even Figure 2 understates potential variation in CAPM cost of equity estimates because there is also disagreement about other decisions that must be made when implementing the CAPM, such as deciding upon the

appropriate market risk premium — the value that beta is multiplied by to determine the firm-specific risk premium.

- In light of the above, I find at best questionable the WCTL's conclusion that Professor Hodder's CAPM analysis "confirm[s] the conservatism of the analysis [by Mr. Crowley] previously submitted by the League", and that "the minor differences between the Crowley and Hodder CAPM analyses pale in comparison to the major disparities in the analysts' projections used in the DCF analysis."⁹ For his calculations, Mr. Crowley used betas from one source (Ibbotson Associates) out of many possible alternatives, and Professor Hodder simply adopted Mr. Crowley's betas without providing any basis for why he believes that these beta estimates are more appropriate than other, significantly different estimates. The adjustments that Professor Hodder made to Mr. Crowley's work do not address the critical question that would face the Board: how to choose among the wide range of alternative plausible beta values.
- To estimate beta, the Board either would have to choose among alternative third party sources or develop its own estimation method. Given the significance that different beta estimates have for the issue at hand — estimating the railroads' cost of equity — the choice of the method used to estimate beta would be controversial and subject to ongoing scrutiny and potential challenge by interested parties.

⁹ Comments of the Western Coal Traffic League in Ex Parte No. 664, December 8, 2006, p. 10.

Figure 2
Railroad Beta Estimates in January 2007
Using Different Beta Estimation Methodologies



Notes: Betas presented here are estimated by regressing historical excess firm returns on historical excess market returns according to different permutations of the time horizon examined (the preceding 2, 3, 4, or 5 years), the data frequency (weekly or monthly), and the market proxy (S&P 500 index or NYSE composite index). These different permutations alone lead to 16 different beta estimation methodologies, though many more methodologies are employed in practice. Excess returns are calculated with respect to the yield on 30-day treasuries. To allow comparison with prior submissions by the WCTL, the corresponding cost of equity is estimated using a market risk premium of 7.10% and a risk-free rate of 4.65%. Data are from Bloomberg.

VI. CRITICISMS OF THE DCF METHODOLOGY DO NOT WARRANT DISCARDING IT

- Criticisms of the Board's DCF methodology should be viewed in the context of all of the preceding points and to the challenges that the Board would face if it were to seek to adopt the CAPM approach. In particular, the WCTL has offered two criticisms of the DCF methodology. Neither suggests that the Board should abandon the use of the DCF methodology.
 - Mr. Crowley expressed concern that analyst forecasts of earnings growth may be biased upward. However, as Dean Hubbard described in his verified statement, financial economics research suggests that this claim is overstated.
 - Professor Hodder suggested that it is inappropriate to use a single-stage DCF approach because it assumes perpetual growth in earnings. However, all methods require certain simplifying assumptions, and extreme examples can always be constructed to demonstrate seemingly fundamental flaws. For instance, Professor Hodder offers the example that extending the railroads' projected growth in perpetuity would suggest that the railroad industry should take over the entire economy in a century. This extreme example offers little insight as to whether, as a practical matter, the constant growth assumption is a reasonable simplifying assumption. Furthermore, Professor Hodder ignores the fact that the Board recalculates the cost of equity every year, thereby including new information about future growth expectations.

- The Board has employed the DCF methodology for many years and absent compelling evidence, the methodology should not change. I have seen no such compelling evidence.
- Others have proposed certain modifications to the Board's existing methodology, such as employing a multi-stage DCF methodology. However, there are numerous possible multi-stage approaches that could be employed, as was made evident by the different approaches proposed by Mr. King and Professor Hodder. Consideration would need to be given to the implications of the numerous alternative multi-stage approaches before considering any single multi-stage approach as an alternative to the existing methodology employed by the Board.
- Two factors suggest that it may be undesirable to rush to adjust the current methodology based only on the dissatisfaction of some with the results that it has produced in just one year.
 - First, results from the CAPM methodology remain the primary underlying bases for some parties' claims that the Board's current methodology needs to be adjusted. As noted above, implementation of the CAPM to estimate the cost of equity has resulted in increasing estimates since the time of the WCTL's initial comments because of its inherent lag in reflecting changes. The Board would therefore benefit from more time to determine whether any significant differential between the CAPM and DCF approaches actually persists. Much of the perceived differential in

the context of the 2005 proceeding appears simply to reflect the fact that the CAPM is a backward-looking approach.

- Second, given that the cost-of-capital proceeding is repeated annually, if earnings growth forecasts are lower in the future, then the cost of equity will decline from its current level.
- As noted above there are sound reasons for continuing to use the current DCF methodology that the Board should keep in mind in deciding how to proceed. In particular, it is a straightforward approach that is well understood and is, importantly, forward-looking.

VII. THE VALUE OF REGULATORY CONSISTENCY

- While the current DCF methodology has many merits in its own right, another reason to favor its continued use is the regulatory consistency that this would maintain. Assume, for purposes of argument, that the CAPM would currently produce a lower cost of equity than the DCF. However, over time it is likely that the relative positions of the two models will again shift. At that point, the shippers may argue that the DCF should once again be the preferred approach. In the early 1980s, the shippers were opposed to the use of the CAPM, presumably because it then produced a higher cost of equity than the DCF approach. Changing back and forth among models depending on the results that each produces in a particular year is not a sound approach to regulation.

VIII. CONCLUSIONS

- The DCF methodology is an appropriate and straightforward approach to estimating railroads' cost of equity that has served the Board and the railroad industry well for over two decades.
- Economic conditions in the railroad industry have undergone changes in recent years, underscoring the value of the DCF methodology's forward-looking nature. Backward-looking CAPM estimates have only recently begun to reflect the change in the cost of equity presaged by the DCF approach.
- The WCTL's claim that the railroads' cost of equity should be similar to the cost of equity granted to regulated utilities is contradicted by the sources on which the WCTL and its experts rely.
- The CAPM, the primary alternative methodology that has been proposed by others, is subject to substantial well-known criticism, and its implementation requires a number of subjective consequential judgments.
- In addition to its merits in its own right, use of the current DCF methodology has the benefit of maintaining consistency in the methods that have been employed by the Board over the past two decades.

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A co-founder of Analysis Group, Inc., Dr. Stangle specializes in the fields of industrial organization, economics and finance. He has over 25 years experience directing large research projects in numerous industries on issues relating to antitrust, regulation, intellectual property and securities matters, and has consulted with Fortune 500 companies on various management, strategy and policy issues. Dr. Stangle has provided testimony on market definition, entry conditions, competitive effects, securities valuation, and damages. He is a member of the American Economics Association, the Board of Trustees of Bates College, the Visiting Committee for the Economics Department at MIT, and the Board of Directors of Wellington Trust Company, a subsidiary of the private money management firm, Wellington Management Company. He was formerly a director of a venture capital firm.

EDUCATION

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| 1978 | Ph.D. in Applied Economics, Sloan School of Management, Massachusetts Institute of Technology |
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| 1981 - present | Chairman and Co-founder, Analysis Group, Inc. |
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DISSERTATION

"Price Determination in the Markets for Beef"

Committee: M.A. Adelman (Chair), Paul L. Joskow, Lester C. Thurow

PUBLICATIONS AND PRESENTATIONS

"An Assessment of Competition in California Title Insurance and Escrow Markets," with Bruce A. Strombom, report prepared for First American Title Insurance Company, August 30, 2006.

"Evaluation of Proposed Regulations for the California Title Insurance and Escrow Industry," with Bruce A. Strombom, report prepared for First American Title Insurance Company, August 30, 2006.

"Competition and Title Insurance Rates in California," with Bruce A. Strombom, report prepared for First American Title Insurance Company, January 23, 2006.

"Market Efficiency Versus Behavioral Finance," with Burton Malkiel and Sendhil Mullainathan, *Journal of Applied Corporate Finance* Summer 2005;17(3):74-84.

"Is Competitive Entry Free? Bypass and Partial Deregulation in Natural Gas Markets," with Paul W. MacAvoy and Daniel F. Spulber, *Yale Journal on Regulation*, 1989.

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"How Much Is Your Bank Worth?" with Michael F. Koehn and Laura Stiglin, *1988 Bank Performance Annual*, Edwin B. Cox, ed., Boston, MA: Warren, Gorham & Lamont, 1988.

"Market Share and Profitability," with M.A. Adelman, *Antitrust and Regulation: Essays in Memory of John J. McGowan*, Franklin M. Fisher, ed., Cambridge, MA: M.I.T. Press, 1985.

"New Antitrust Chief and Herfindahl Index," with William C. Pelster, *New York Law Journal*, 1981.

"The Effect of Deposit Rate Ceilings on Bank Risk: A Comment," with Michael F. Koehn, *Journal of Banking and Finance*, 1980.

"Federal Regulation of Energy, 1972-1974," with Paul W. MacAvoy, presented at the American Association for the Advancement of Science Annual Meeting, Session on Regulation, chaired by Professor George J. Stigler, New York, January 1975. Also published in *Technology Review*.

TESTIMONY OVER PAST FIVE YEARS

▪ CIGNA Securities Litigation

United States District Court, Eastern District of Pennsylvania
Deposition testimony regarding loss causation and damages.

- **CIGNA Securities Litigation**
United States District Court, Eastern District of Pennsylvania
Deposition testimony regarding measurement of economic loss.
- **Remeron Direct Purchaser Antitrust Litigation**
United States District Court, New Jersey
Deposition testimony regarding damages from delayed generic entry.
- **Stop & Shop, et al. v. Blue Cross of Rhode Island, et al.**
United States District Court, Rhode Island
Deposition and trial testimony regarding effects on competition of a closed pharmacy network.
- **Whetman v. IKON Office Solutions**
United States District Court, Pennsylvania
Deposition testimony regarding damages in an ERISA matter.
- **Visa Check/Master Money Antitrust Litigation**
United States District Court, Eastern District of New York
Deposition testimony regarding damages from alleged tying of credit cards and debit cards.