

A Peer Review of:

**Prescribing the Authorized Rate of Return:
Analysis of Methods for Establishing Just and Reasonable Rates for
Local Exchange Carriers**

**Wireline Competition Bureau Staff Report (WC Docket No. 10-90)
dated May 16, 2013**

**Prepared by Professor Robert G. Bowman
September 16, 2013**

I have been asked by Julie A. Veach, Chief, Wireline Competition Bureau of the Federal Communications Commission (the “Commission”), to perform a peer review of the staff report, “Prescribing the Authorized Rate of Return: Analysis of Methods for Establishing Just and Reasonable Rates for Local Exchange Carriers” (WC Docket No. 10-90), dated May 16, 2013 (the “Report”).

The Commission initiated a proceeding to represcribe the authorized rate of return, which is used to determine interstate common line rates and special access rates for rate-of-return incumbent Local Exchange Carriers (“LECs”). The Report is a result of that directive.

The Report begins with a discussion of the WACC and identifies a group of companies to be used as a proxy group for the Rate-of-Return Carriers. It then works its way through the computation of the Weighted Average Cost of Capital (“WACC”), covering capital structure, cost of debt and cost of equity. The issues around whether to use book values or market values are covered. The Report uses two models – the Capital Asset Pricing Model (“CAPM”) and the Discounted Cash Flow (“DCF”) Model. The WACC results are summarized, a Zone of Reasonableness determined and the selection of a Unitary Rate of Return addressed.

The objective of the peer review is to establish whether the Report provides a solid foundation for estimating the WACC and a zone of reasonableness in which the authorized rate of return described above could be reasonably expected to lie.

My peer review of the Report follows.

Weighted Average Cost of Capital approach

The overarching approach to determining an authorized rate of return for LECs is the Weighted Average Cost of Capital (WACC), which the Commission’s rules specify is the sum of the cost of debt, the cost of preferred stock, and the cost of equity, each weighted by its proportion in the capital structure of the telephone companies. (Report, page i) This is the well-established and preferred approach internationally for determining the rate of return for both regulatory and non-regulatory purposes. I support this approach.

Representative proxy companies

It is standard practice in estimating the parameters for WACC to select a set of representative proxy companies¹. Selecting the companies always involves a trade-off between the comparability of the companies and having a sizable set of companies. The narrower the comparability requirement imposed, the smaller the set of companies will be. So the selection of the set of representative companies requires judgment.

The Report (page 6) applies a three-part test to choose a set of publicly traded, rate of return incumbent LECs as proxies.

1. *Threshold.* Limited consideration to companies whose incumbent LEC price-regulated interstate telecommunications services constituted at least 10% of overall operations. Although this is a low threshold, these are still fundamentally communications companies, and many of their other lines of business provide related services.

I certainly agree that this is a low threshold of representativeness. As this is likely to be a

¹ In the finance literature these are generally referred to as “comparable” companies.

concern of many readers, I suggest the Report provide details of the diverse operations of the chosen companies, including the percentage of operations that are considered representative. The riskiness of the chosen companies is very important to the estimation of WACC. Although the companies are all “fundamentally communications companies”, their operations are likely to have a considerable span of riskiness.

2. *Similarity.* The relevant service for this represcription is price-regulated interstate special access and common line service. Companies serving rural or high-cost areas that are subject to rate-of-return regulation will be the most similar.

This test is unavoidably judgmental. Similarity will run along a continuum, not a binary classification. The discussion in the Report on this test is considerable. It will no doubt meet with questioning, but in my view it does a good job of being transparent on this issue.

3. *Reliability.* The analysis of the cost of equity relies on data that is only available for publicly listed companies. The preferred companies will be financially healthy and have actively traded equity shares.

Data availability is inevitable, so that part of this test is a given. The test also puts forward financial health as a criterion. Because the riskiness of companies is so fundamental to determining WACC, this test is important and appropriate. Rate of return regulation is appropriate for companies that are financially healthy. In my view, and given that the process of estimating WACC parameters requires using historical information, this test was not applied as stringently as I expected. In particular, the inclusion of FairPoint Communications seems inappropriate. FairPoint filed for Chapter 11 bankruptcy in 2009 and only emerged in 2011.² Also, as is typical, over the period before, during and after Chapter 11, it had a range of changes in its businesses.

The Report chooses a group of 16 companies: the three Regional Bell Holding Companies (RHC), seven Mid-Size Proxy Companies and six Publicly-Traded RLECs.

Because of the distinctiveness of the RHCs and their value as a benchmark, the Report includes WACC estimates for the RHCs alone as well as an overall WACC estimate. The Report also comments that Mid-Size Proxy Companies are primarily subject to price cap regulation rather than rate-of-return regulation, are much larger than most RLECs, and tend to have higher debt levels with commensurately higher risk. Selecting only the Publicly-Traded RLEC Proxies is appealing, but their financial data is not as reliable.

The Report concludes (pages 10-11),

“Collectively, the three groups represent a wide spectrum of incumbent LEC operations, include both price cap and rate-of-return regulated operations, and include those incumbent LECs with the most widely traded equity, allowing greater confidence in the calculations that rely on the public trading of stock, especially given that it is highly uncertain where within that spectrum non-publicly-traded RLECs lie.”

Other than my objection to the inclusion of FairPoint, I believe the Report’s discussion and conclusions on the appropriate “Proxy Firms” is reasonable.

I agree with the Report’s comments regarding the proposals to use Damodaran’s Telecom Utility proxies and/or NECA’s suggested proxies

² I would not expect an operation that is subject to rate of return regulation to go bankrupt. So I assume FairPoint’s financial distress was a result of operations other than those that are the subject of this represcription.

Capital Structure

The capital structure of a firm is the percentage of debt and equity it uses to finance its operations³. An issue immediately arises as to how to measure capital structure. The choices include using the actual capital structure at a point in time or the target⁴ capital structure and then whether the measurement should be the book (accounting) values or market values. Although the Commission's rules require using book values, the Report states (page 14) that market values provide a better indication of the firms' target capital structures.

I concur that market values are more appropriate than book values. While the Report discusses book values, I will focus on market values.⁵

The Report considers the time period or point in time at which the capital structure should be measured; as of 2012 or over a five year period then ending. It chooses the former. In this case, I support the choice because of the impact that measurements that are impacted by the global financial crisis are not representative of what should be expected in the future. If the past had been more stable and the WACC was to be in place for a substantial period of time, I would likely prefer an historical average.

The Report is not clear on what is considered debt in its reported capital structure data.⁶ In practice a number of alternatives are used including

- Total liabilities (current and non-current)
- Non-current liabilities
- Long term (interest bearing) debt⁷
- All interest bearing debt

My preference is to use the last approach – all interest bearing debt. The fact that an interest bearing debt is due in less than one year does not change its characteristic of being debt. Non-interest bearing liabilities should not be classified as debt and non-interest bearing current liabilities should be considered reductions of current assets, as in the measurement of working capital.

The Report should include an explanation of how it measures debt.

In my view, the alternatives considered for measuring capital structure are too narrow. There are other approaches. The approach that I believe should be considered, although not necessarily chosen, is to estimate the capital structure that would be appropriate to encourage a new entrant in a (quasi) regulated competitive market. With this approach, the WACC would be set to be applicable to a notionally efficient provider (or new entrant). The advantage of this approach is that it avoids the possibility of perpetuating non-competitive features of the proxy firms. The disadvantage of the approach is that it is unavoidably subjective to a degree beyond that of the standard estimations developed in this Report.

³ Because of insufficient data on preferred stock, it is not included in the computation of WACC (page 13).

⁴ The actual capital structure will fluctuate through time. The target capital structure is the level the firm aims to achieve as an average over time.

⁵ Paragraph 8, Appendix C, provides a succinct statement of the inherent measurement problem with book values.

⁶ In Appendix C the Report seems to use the terms "liabilities" and "debt" interchangeably. They are not the same. Broadly, debt is a liability but all liabilities are not debt.

⁷ The calculations of Embedded Cost of Debt in Appendix E use this measure, but it is not clear if this is the definition used in the data on capital structure.

Whether the approach should be implemented depends upon the trade-off between the advantages and disadvantages. I recommend that the Report include a discussion of the approach of a notionally efficient provider (or new entrant) and an explanation/defense of why it is not appropriate for the purpose of this prescription. Alternatively, apply this approach, at least for comparison purposes.

Cost of debt

The calculation of the cost of debt for the Proxy Firms uses the formula:⁸

$$\text{Embedded Cost of Debt} = \frac{\text{Previous Year's Interest Expense}}{\text{Average of Debt Outstanding at the Beginning and at the End of the Previous Year}}$$

This calculation is subject to measurement error for a number of reasons. It assumes that any change in the debt outstanding during the year was approximately at mid-year. This is unlikely to be the case, but should be a reasonable approximation over a large sample. Second, it may also be biased, depending upon how “debt outstanding” is measured. For example, if debt is measured as long term debt, omitting short term debt, the cost of debt will be over-estimated. If debt is measured as total liabilities, including amounts that are not interest bearing, the cost of debt will be under-estimated. Third, it is an historical measure of interest expense (if not also debt). What should be measured is a forward looking cost of debt. Fourth, it ignores time to maturity. Yield curves are seldom flat. Fifth, it will perpetuate any anomalies in the measurement of individual firms. Sixth, if the average of a set of firms is chosen, it provides no consideration of why some firms are over and some under that average.

An alternative approach is discussed on page 19. First make an assumption as to the credit rating that the debt of the subject companies (i.e., LEC's providing rate of return regulated interstate telecommunications services) would optimally be given. Then the average market yield can be calculated for corporate bonds with that credit rating and an appropriate time to maturity. This assumes that the credit worthiness of corporate bonds is what matters, not the operations of the companies. There are obvious criticisms of this approach, some of which are noted in the Report. However, it is the standard regulatory approach used in many countries, including Australia and New Zealand with which I am most familiar.

This is the approach taken by NECA, which adopts a credit rating of A- as appropriate for its analysis. Although I have not conducted analysis of the appropriate credit rating, my initial reaction is that this rating is too high. That is, it reflects a more favorable assessment of credit worthiness than is appropriate.

Appendix O suggests the adoption of a formula for estimating the cost of debt that is consistent with the above formula. I recommend that this issue be given more consideration before an official position is taken.

Most rate-of-return carriers can access government subsidized loans. This is discussed briefly in the Report, page 19. It is implied that a company that has a material amount of subsidized loans should have this benefit reflected in its WACC. I agree. However, there is no indication how this might be achieved.

The Report mentions the costs of issuing stocks and bonds in its footnote 93, but dismisses them as not significant for most RLECs. The flotation costs for debt or equity can be substantial, but

⁸ The Report notes that this is not consistent with the Commission's rules, but that those rules have an error. I agree that the equation given on page 18 of the Report, and identified as the Commission's rules, is wrong.

must be annualized if they are to be included in the cost of debt. In my experience, these costs, when annualized for debt are in the order of 10 to 20 basis points. The footnote argues that the costs are primarily relevant for public companies. It is generally true that economies of scale for issuance costs are very substantial, and only larger companies issue public debt. However, there is also research showing that the cost of private debt is marginally higher than for public debt, offsetting the differences in issuance costs. Because the life of equity is not specified, it is likely to be much smaller and reasonable to ignore.

Cost of Equity

The Report considers two methods of estimating the cost of equity: the Capital Asset Pricing Model (CAPM) and the Discounted Cash Flow Model (DCF). "Outside of the regulatory context, CAPM is the most widely used model for determining the cost of equity. DCF, however, is the most widely used in regulation" (page 22) This may still be true in the United States, but I have been involved in regulatory determinations of WACC in seven other countries, and in no case has DCF been used; only the CAPM approach.

Estimating the cost of equity using the CAPM requires estimating the risk free rate, the market risk premium and the company's systematic risk (commonly referred to as beta). The first two parameters are the same across all firms.

Risk free rate

The risk free rate is estimated from Government bonds at maturities consistent with the life of the assets at issue. So long term Treasury bond rates are used, commonly at ten year maturity. The Report uses ten year rates.⁹ The choice of ten years is particularly appealing as estimates of the market risk premium are typically based upon the ten year risk free rate. I agree with the Report, that the WACC, and hence the costs of debt and equity, should be a forward looking estimate. Current rates on Treasury bonds reflect future interest rates.

Two relevant issues are not mentioned in the discussion of the risk free rate. As to the calculation, should the rate on a specific date be used or should the rate be an average over some period? Given that the WACC is not referenced to a specific date, I recommend averaging over a reasonably long period of time, perhaps three to six months. The other issue is whether consideration should be given to the fact that current interest rates are near historic lows. I will return to this issue when I comment on the estimation of the market risk premium.

Market risk premium

The market risk premium (MRP) is the premium in the average expected return on the equity market over the risk free rate. Of all the parameters required to estimate WACC, the MRP is generally considered the most contentious. Quite literally, a book could be written on the topic, but that is neither appropriate nor necessary. The Report discusses some of the issues and clearly states its conclusions. However, I believe there are a few issues that warrant further discussion

I agree with the choice of the S&P 500 as the market index. It is very broad based and widely

⁹ The life of regulated infrastructure assets is typically considerably longer than ten years, however, ten years is justified for at least three reasons. Ten year Treasury bonds are actively traded, indicating that the yield is an accurate reflection of the market yield at that point in time. Although the life of the regulated assets is generally longer than ten years, the assets are consumed (used) over the life, so that the average life is roughly half of the total life. Third, the yield curve beyond ten years is typically approximately flat, indicating little difference between maturities of 10 years and beyond.

used. It is also the case that the correlation between the S&P 500 and other major indices such as the Dow Jones Industrial Average is very high. I also agree that the historical estimates are almost all based upon a ten year maturity for the risk free rate.

In addition to historical data on the MRP provided by Ibbotson and Damodaran, another widely cited source is the Global Investment Returns Yearbook.¹⁰ This data begins in 1900, includes standard deviations, further analysis, and covers most countries in the world with well-developed securities markets. However, the difference in the reported data across the three sources is small, given the estimation error, although perhaps economically significant.

The Report relies upon the historical estimates of MRP for its cost of equity calculations. This requires an implicit assumption that the future will look like the past. This is conventional but warrants some discussion, if not some adjustment. There are two issues that should be considered. First, is the riskiness of the market over the future period of the WACC estimate (in this case being 10 years) the same as the average riskiness over the past 87 years? This can be debated. My view is that the riskiness is somewhat higher now. Second, has the riskiness of investing in equity markets has changed over the past 7 years. There have been many structural and institutional changes that reduce the risk and cost of investing in equities. Transaction costs are lower, the availability of information has exploded (particularly with the development of the internet), risk management tools have greatly increased, and diversification is far simpler with the advent of index funds. We do not have any method of estimating the aggregate impact of these changes. My judgment is that the changes would reduce the MRP, relative to a historical average, by a half to a full percent.

I recommend that these issues are discussed in the Report. Although a specific adjustment is perhaps not warranted, a direction of change could be indicated.

The Report cites a number of surveys of MRP. I believe inclusion of surveys is appropriate, but personally I have little regard for the results. They are too fraught with biases.

The Report also mentions a small firm effect that is much documented and discussed in the literature. Referring to recent results that call to question whether this upward bias in the returns of small firms is still in existence, the Report chooses to not make any adjustment. In my view, the evidence against the continued existence of a small firm effect is not yet persuasive. I favor making an adjustment when appropriate. However, it is not clear to me that the firms subject to the cost of equity resulting from this repricing are as small as the firms that have been shown to manifest the small firm effect. It may be that they would not warrant an adjustment in any event.

An important issue in calculating historical measures of MRP is whether to use arithmetic or geometric returns. The Report makes it clear that it is using arithmetic returns, and I agree with that choice. However, there is no discussion of the choice between the two measures. Given the importance of the choice and the substantial difference between the two methods, I recommend a brief explanation.

A final issue that I regard as important is the relevance of the current very low interest rates for estimating the MRP. The procedure followed in the Report to estimate the cost of equity creates a downward bias. The reason is simple. The estimate of the risk free rate is based upon current interest rates, which are near historic lows. The estimate of the MRP is based upon a long period of historical data (nearly 90 years). Over this long period, interest rates have been high and low; that is the MRP reflects average interest rates. It is also empirically documented

¹⁰ The most recent edition is "Global Investment Returns Yearbook 2012," E. Dimson, P. Marsh and M. Staunton, published by Credit Suisse.

that there is a strong negative correlation between the risk free rate and the MRP.¹¹

In my opinion, in the current interest rate environment it is necessary and appropriate to adjust the long run average MRP for the low interest rate environment. In a separate paper, I estimate that the adjustment is currently about one percent.¹²

In summary, I suggest additional discussion of the issues mentioned above. As to the estimate of the MRP, I believe the estimate in the Report is reasonable except for the lack of recognition of the low interest rate environment.

Beta

The estimation of beta is complex and therefore provides many opportunities for debate. Broadly speaking, I believe the Report does a very competent job of discussing and estimating betas for the Proxy Firms and then aggregating that data into an estimate to use in its estimate of WACC. For purposes of determining a point estimate, it chooses weekly return intervals and an adjustment for the tendency of the regression estimate to revert to the aggregate mean of one. These are judgments based on the analysis of alternatives reported in Appendices F and G. I support the choices reflected in the Report.

There is an econometric problem when estimating betas using regression. As the explanatory power (i.e., the R^2) approaches zero, the regression coefficient (beta) must also approach zero. In my opinion, betas measured with explanatory power less than five percent, if not higher, are biased downward, for purposes of estimating beta, and I would exclude them from the analysis. From Appendices F and G, the most concern is with the beta estimate for NULM. Its beta for the Report is given as 0.50, but the R^2 on that estimate is only 0.0137, and its beta fluctuates dramatically when measured as daily, weekly or monthly. Excluding this observation increases the average beta for the RLECs to 0.905 and the overall average to 0.92.

CAPM Cost of Equity Results

The components of the CAPM estimate of the cost of equity are brought together, with the analysis reported in Appendix H. The Report notes (page 30), concerning the data in Appendix I1, "CAPM estimates are low compared to the cost of debt. This is anomalous; because equity is subordinate to debt with regard to a company's profits and assets, equity should command a higher return." This certainly is anomalous. Something is wrong but potentially it could be that the cost of debt is too high, the cost of equity is too low, or they both have measurement error.

The average for each of the sub-samples and for all 16 observations has cost of equity higher than cost of debt, but five of the 16 companies have cost of debt higher than cost of equity. The Report discusses the frequency of this anomaly on an individual company basis. In only one case, the RLEC SHEN, is the cost of equity higher than the cost of debt by even three percent, and in that case the spread is only 4.97%. The Report also references to the comparison of the cost of debt and cost of equity from its 1990 WACC, when the spread was 4.39%, and for the data from 1926 through 2010, i.e., the long run average, when the spread was 5.7%.

Although for the 16 companies, the average spread between the cost of debt and the cost of equity is 0.99%, this cannot disguise a serious measurement error issue. The Report passes a

¹¹ For example, see Harris, R., and F. Marston (1992), "Estimating Shareholder Risk Premia using Analysts' Growth Forecasts," *Financial Management*, 63-70, Marston, F., and R. Harris (1993), "Risk and Return: A Revisit using Expected Returns," *Financial Review*, 117-137, and Maddox, F., D. Pippert and R. Sullivan (1995), "An Empirical Study of ex ante Risk Premiums for the Electric Utility Industry," *Financial Management*, 89-95.

¹² The report is available on request.

resolution of the issue to its following section where a WACC estimate range is developed.

CAPM WACC Range

The Report discusses some adjustments to the data and some alternative estimations for the cost of equity, noting the difficulties with each. It concludes (page 33),

“In summary, we prefer the two standard deviation spread around the historical mean market premium observed in the S&P 500 index, but we place a lower bound on the market premium range that ensures a cost of equity that is no less than the cost of debt for all 16 companies examined. The result is a CAPM WACC range of 7.39-8.58 percent.”

In my opinion, this discussion and conclusion is very unsatisfactory. I believe that both the cost of debt and the cost of equity have substantial measurement error.

The report notes that the cost of debt may be high because it is measured as the embedded cost of debt reported by the companies. The variation in cost of debt across the 16 companies is very high¹³ and not readily explained by the differences in risk. In my opinion this highlights the need to measure the cost of debt with current market rates, not historical rates. Given the downward trending of interest rates over the past few years, I have no doubt the embedded rates overstate the true cost of debt. An alternative approach or a new dataset is required.

Another reasonableness test of the cost of debt is to compare it to the risk free rate, which is relatively free of estimation error. The average cost of debt from Appendix I1, across the sample is 6.19%. The current market yield on 10 year Treasury bonds is about 2%. That implies a debt risk premium of over 4%, which is very high relative to long term averages.

The primary source of measurement error in the cost of equity is likely to be the failure to reflect the impact of the very low interest rates on the MRP. In the section on MRP above, I stated that I estimate the MRP requires an adjustment of at least one percent. The anomalous relationship between the cost of debt and cost of equity would support the view that the MRP adjustment should be substantially more.

With respect to the estimated WACC, the measurement errors in the two costs are somewhat offsetting. Further work will be required to evaluate the degree of offset. My rough estimate, given the capital structure possibilities, is that the offset will be substantial such that the net effect will be small, but probably result in a slight increase in estimates of WACC.

As quoted above, the Report arrives at a CAPM WACC range of 7.39-8.58 percent. The development of this WACC range, the central purpose of this section, is *ad hoc*.¹⁴ Furthermore, it seems excessively narrow for a range of reasonable estimates of WACC. Every variable involved in the CAPM estimate of WACC, with the exception of the risk free rate, has very substantial estimation error. In my opinion, a reasonable range for an estimate of WACC would span at least three percent, if not higher.

I recommend the following with respect to the ranges in this Report.

- the intention of what the ranges are to represent be stated,
- the setting of the ranges be given more consideration,
- statistical information on estimation error be referred to when available, and

¹³ The lowest cost of debt is 3.80% for LMOS, an RLEC, and the highest is 8.42% for CBB, a mid-sized company.

¹⁴ However, this is not surprising and the only regulator that I am aware of that has used a statistical approach to estimating a range is the New Zealand Commerce Commission.

- the preferred point estimate within the range be stated.

Discounted Cash Flow

The Report moves on to an alternative approach to the CAPM for estimating the cost of equity – a Discounted Cash Flow (DCF) method. This method¹⁵ calculates the cost of equity as:

$$\text{Cost of Equity} = (\text{Dividends per Share}_1 / \text{Price per Share}_0) + g$$

This is a perpetuity model that assumes the company's dividends grow perpetually at a constant rate (g). For the sample companies, the most recent dividend is observable, and projecting that forward for the coming year will generally be quite precise. For publicly listed companies that are actively traded, the current market value price per share is also observable. However, for companies that are not publicly and actively traded, estimating the value of equity is very difficult and creates a circularity problem. Since the standard economic value of a company is the present value of its future cash flows, the valuation requires an estimate of the cost of equity. The comparison companies used in the Report are publicly listed, so this should not be a significant problem. So the estimate of cost of equity for the sample companies comes down to an estimate of future growth.

Because the model assumes perpetual growth in dividends, conventional wisdom is that it only provides reasonable estimates of the cost of equity for companies that are mature (i.e., past any rapid growth stage) and financially stable. It is arguable how many of the sample companies would fit that description; certainly not all of them.

The Report makes the observation that in the long run, growth in dividends will approximate growth in earnings for a company. It then relies upon four sources of long run estimates of growth in earnings. The use of growth in earnings as a proxy for growth in dividends is fairly common, and in my opinion, not likely to be the main source of estimation error for companies that are mature and financially stable.

Four estimates of growth in earnings are obtained from highly reputable sources. The Report notes that these are five year estimates, not perpetual growth. Although short term growth, certainly up to five years, can be quite high, reasonable estimates of perpetual growth cannot differ more than marginally from estimates of the long run growth in GDP. Unfortunately, the Report does not disclose the growth estimates. This information should be provided.

The RHCs are the most likely to meet the test of being mature and financially stable, so a comparison between the CAPM estimates of WACC and the DCF estimates is interesting. There are four DCF estimate from the growth estimates and three RHCs. All twelve WACC estimates using DCF are higher than the corresponding CAPM WACC estimates. One interpretation of this fact is that it provides support for the position that the measurement error in the CAPM cause a downward bias in the WACC estimate.

The Report discusses a wide range of ways to analyze the data and arrives at upper and lower bounds on the DCF cost of equity and then the WACC. It then does a reasonableness test, such as discussed with the CAPM estimates, by comparing the spread between the cost of debt and the cost of equity with the spreads from the 1990 prescription and the average spread over the 1926 to 2010 data. As the DCF WACC estimates are higher than the CAPM WACC estimates, it is no surprise that the DCF estimates appear more reasonable. On page 36 the Report states, "we

¹⁵ This method goes by many names including the dividend growth model, the Gordon model and the dividend discount model.

believe the constant-growth DCF model provides reasonable estimates of the DCF-based cost of equity.” Although the DCF estimates may be reasonable, this statement is substantively a tautology.

The conclusion of the DCF analysis is (page 41), “When the lower and the upper bound DCF cost of equity estimates are used to determine the WACC, the DCF WACC Range is 8.45 percent to 8.72 percent.”

This is an extremely narrow range for any estimate of WACC, and in my opinion totally unrealistic. In part, it reflects a lack of clear definition of how the Report interprets its ranges. In reading the Report, they are clearly *ad hoc* and not consistent across the different estimations. My comments concerning the ranges for the CAPM WACC applies here. In my view, this is a serious deficiency in the Report.

Establishing the Zone of Reasonableness

The purpose of this section of the Report is most easily captured in the following two quotes from page 42.

“To determine a zone of reasonableness, we compare the range of WACCs produced when the cost of equity is determined using CAPM with varying market premiums, and the range produced when the cost of equity is determined using DCF with varying analysts’ forecasts.”

“After identifying this “zone of reasonableness,” the Commission should determine, based on policy considerations, where to prescribe the unitary rate of return.”

The Report expresses no strong reasons to prefer one estimation source over another, and I concur. It concludes with a recommendation that the zone of reasonableness be set as a lower bound of 7.39% and an upper bound of 8.72%.

As I have stated above with respect to the CAPM and DCF ranges, this is a narrow “zone” given the very substantial estimation error involved.

I also note that the Report makes a very erroneous statement with respect to statistical interpretations of its estimates. On page 43, it identifies the lower bound of its CAPM WACC estimate as being from a 95% confidence interval. This is wrong. The lower limit is from using a cost of capital estimated using the lower of a two standard deviation range on one specific set of historical MRP data. The cost of capital range has no statistical characterizations as it does not consider any other estimation errors involved in the estimate. This representation should be expunged.

Selecting the Unitary Rate of Return

The report sets a unitary rate of return by applying a “times interest earned” (TIE) analysis. The TIE ratio is intended to measure the ability of a firm to cover its interest payments, and thus its credit worthiness.

The Report spends five pages doing its TIE analysis. The analysis conducted seems sound, but I question the appropriateness of it.

The TIE ratio is intended to capture credit worthiness, but that is not the same as WACC. It is also measured with accounting data, and the shortcomings of accounting measures of earnings and interest are well known and have been discussed in the Report as well as this review. Further, it is not at all clear to me why the unitary rate of return within a zone of reasonableness

should be determined by credit worthiness. Credit worthiness is related to the risk of debt, but its relation to the risk of equity is tenuous at best.

In my opinion, this entire analysis should be deleted. It adds nothing substantive to the Report.

I suggest determining the unitary rate of return as either the mid-point of the zone of reasonableness or subjectively by considering the various sources of measurement error encountered in developing the zone of reasonableness. The former is appropriate if there is no confidence in evaluating the sources of measurement error. However, in my opinion, such an evaluation is possible and would add considerably to the quality of this Report.

Two candidates as starting points for such an evaluation are expressed in the Conclusion. There is concern about the importance of arriving at a WACC that is appropriate for the smaller rate-of-return regulated incumbent LECs. The Conclusion also justifies its position on WACC, in part, as reflecting the current historically low interest rates.

Although the stated purpose of this section of the Report is to arrive at a unitary rate of return, it does not do that. Its recommendation to the Commission (page 43) is to “select a unitary rate of return near the upper end of the zone of reasonableness.”¹⁶

Grants

I agree with the position taken in this section on the treatment of grants and exclusion of them from calculation of appropriate returns to the companies subject to the Report.

This section tangentially raises an issue that is not directly addressed in the Report – the method of measuring the Regulatory Asset Base (RAB). The measurements of the RAB and the WACC need to be consistent. I appreciate that this might be dealt with effectively elsewhere in regulations and that a fulsome discussion of it would be a substantial undertaking. I have approached my review without reference to the RAB measurement. Thus, I have tacitly assumed that the approaches taken in the Report are consistent with the RAB.

I recommend that this issue of the correspondence between the WACC and RAB at least be briefly discussed in the Report.

Conclusion

I agree with the discussion that begins on page 49 concerning setting a WACC for the rate-of-return regulated companies that are mainly smaller incumbent LECs.

I believe the Report needs additional work in a number of areas, as outlined above, before a conclusion can be reached.

Additional Issues

The Report states (page 4), “The WACC is the minimum rate of return required to attract capital to an investment”. That is not correct. An investment that earns precisely the WACC has a Net Present Value (NPV) equal to zero. A company would not rationally invest in a NPV=0 project.

The minimum rate of return required to attract investment capital must be greater than the WACC so that it is a positive NPV project.

¹⁶ On page 48 this is stated as being “in the top half of the zone of reasonableness.”

This Report does not address a few issues that I believe are important to the determination of WACC. My treatment of these issues is only intended to briefly introduce the issues. If they are judged worth further consideration, they will need to be studied in some detail.

Companies subject to regulation face regulatory risk. This is mentioned on page 6 of the Report but not discussed elsewhere. The importance of regulatory risk will vary across businesses and regulators. It is reasonable to expect regulatory risk to increase the cost of capital. To the extent the development of the WACC estimate is based upon proxy firms, the regulatory risk should be reflected in the analysis, at least in part. For example, the impact of regulatory risk on the cost of debt would be considered in the borrowing costs of the proxy firms. It is possible, but not clear, that this risk would also have some impact on beta.

I doubt that regulatory risk would impact the estimate of WACC for the companies subject to this Report, but a careful discussion should be included.

It is also worth noting that as companies make investment decisions, regulatory risk can be very important and even decisive in decisions, in spite of traditional NPV evaluations using WACC.

An important issue for regulators to consider in setting WACC is the asymmetry of social costs and benefits. All estimates of WACC involve substantial estimation error. As a result, the estimate may differ from the "true" cost of capital. If a long run perspective is applied there will not be a symmetric relationship between setting the WACC too high or too low. To present the problem, I will briefly consider the impact of this on consumers and on providers.

For consumers, if WACC is set too high, they will pay too high a price and/or consume sub-optimally. If WACC is set too low, they will pay too low a price and/or over consume. To a large extent the consumer effects do not affect social welfare as they merely involve a transfer payment between the consumer and the provider. Therefore, of particular importance is the impact that setting the WACC too high or too low will have on investment and consumption decisions, which are deadweight losses.

For providers of the product or service, an asymmetry exists in investment. Setting the WACC too low necessarily results in a reduction in investment and with it the loss of all social surplus associated with that investment. However, if the WACC is set too high there is only a possibility of too much investment.

Further, it is likely that the impact on consumers of the consequences of under investment are widely agreed to exceed the impact of over investment.

The consequence of this asymmetry of social costs and benefits is that, given uncertainties in estimates of the true cost of capital, regulated returns should err on the high side of the zone of reasonableness to minimise expected losses in social welfare through investment effects.

One final comment. I was very surprised to learn that the WACC had not been adjusted since 1990. As shown in Appendix B, this has been very favorable to the regulated companies. I have been advised that there is provision for triggering a re-set of the WACC (47 CFR 65.101(a))

"Whenever the Commission determines that the monthly average yields on ten (10) year United States Treasury securities remain, for a consecutive six (6) month period, at least 150 basis points above or below the average yields in effect for the consecutive six (6) month period immediately prior to the effective date of the current prescription."

In my opinion this is a very reasonable provision. If anything, the 150 basis point allowance could be lower. Also, and relevant to my comments above on regulatory risk, I recommend that this provision be rigorously and consistently applied.

Statements

I have been supplied with a list of parties who have participated in the proceeding. I do not have any current or potential conflicts of interest that might be relevant to the Report. I have not participated in this rulemaking proceeding in any capacity, and I do not you have financial ties to regulated entities, other stakeholders or regulatory agencies.

I understand that this peer review will not be anonymous. The review will be placed in the public record.

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