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December 9, 1997

Mrs. Blanca S. Bayo
Director, Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399

RE: **Docket Nos. 960833-TP/960846-TP/960757-TP**
**960916-TP and 971140-TP**

Dear Ms. Bayo:

Enclosed is an original and fifteen copies of BellSouth Telecommunications, Inc.'s Rebuttal Testimony of Randall S. Billingsley, D. Daonne Caldwell, G. David Cunningham, Eno Landry, Dorissa C. Redmond, Walter S. Reid and Alphonso J. Varner, which we ask that you file in the captioned docket.

A copy of this letter is enclosed. Please mark it to indicate that the original was filed and return the copy to me. Copies have been served on the parties shown on the attached Certificate of Service.

Sincerely,

Bennett L. Ross (KR)

Bennett L. Ross

Enclosures

cc: All Parties of Record
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R. G. Beatty
W. J. Ellenberg

DN 12607-97
thru
DN 12613-97
12/9/97

**CERTIFICATE OF SERVICE**
**DOCKET NOS. 960833-TP/960846-TP/960757-TP/960916-TP/971140-TP**

I HEREBY CERTIFY that a true and correct copy of the foregoing was served by Federal Express this 9th day of December, 1997 to the following:

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ORIGINAL

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 960833-TP

REBUTTAL TESTIMONY OF

DR. RANDALL S. BILLINGSLEY

DECEMBER 9, 1997

## I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is Randall S. Billingsley. I am a finance Professor at Virginia Polytechnic Institute and State University. I also act as a financial consultant in the areas of cost of capital analysis, financial security analysis, and valuation. More details on my qualifications may be found in Billingsley Exhibit No. RSB-11. My business address is: Department of Finance, Pamplin College of Business, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061-0221.

This statement presents my independent professional opinions and is not presented by me as a representative of Virginia Polytechnic Institute and State University.

Q. Have you prepared exhibits to accompany this testimony?

A. Yes, my testimony and 11 exhibits were prepared by me or under my direction and supervision.

## II. PURPOSE OF TESTIMONY AND SUMMARY OF CONCLUSIONS

### A. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony in this proceeding?

A. My purpose is to provide the Florida Public Service Commission (Commission) with a rebuttal of Professor Bradford Cornell's direct testimony on behalf of AT&T Communications of the Southern States, MCI Telecommunications Company, and MCI Metro Access Transmission Services, Inc. wherein he erroneously estimates the cost of equity capital for BST to be only 10.99% to 11.05% and BST's overall average cost of capital to be only 9.43%. I also determine the reasonableness of BellSouth Telecommunications' (BST's) use of an overall cost of capital of 11.25% in its cost studies. In so doing I estimate BST's forward-looking cost of capital for providing interconnection and unbundled network services.

### B. SUMMARY OF REBUTTAL OF PROFESSOR BRADFORD CORNELL'S TESTIMONY

Q. What issues does your rebuttal focus on in Professor Cornell's direct testimony concerning BST's capital costs?

A. My rebuttal explains the errors and inconsistencies in Professor Cornell's DCF analysis of BST's cost of equity capital, his cost of debt estimation, and his misunderstanding of the nature and significance of the riskiness of investing in the telecommunications industry. His errors in estimating BST's cost of equity using the discounted cash flow (DCF) approach include: 1) use of a highly subjective three-stage model that is not representative of the investor's perspective; 2) use of growth rate forecasts that do not reflect consensus investment community expectations; 3) inappropriate reliance on BellSouth, the other regional bell holding companies (RBHCs), and selected independent telephone companies as comparable in risk to BST; 4) failure to adjust for flotation costs, and 5) failure to use the appropriate form of the DCF model that recognizes the quarterly payment of dividends.

My rebuttal shows that Professor Cornell's cost of debt analysis is flawed by its use of shorter-term rather than long-term debt costs. He also incorrectly includes debt in his analysis that was not issued to finance long-term telephone network assets. Finally, I show that Professor Cornell's views on the risks that are relevant to assessing capital costs in the telecommunications industry are confused and inconsistent. In the same vein, I show that his argument that the

business of leasing network elements is of relatively low risk is unsupported.

## C. SUMMARY OF BST COST OF CAPITAL ANALYSIS

Q. Please describe the approaches that you use to determine BST's cost of equity capital and summarize your conclusions.

A. My analysis uses objective market data to determine BST's cost of equity capital from three distinct but complementary approaches. Since BST is a subsidiary of BellSouth Corporation, it does not have equity trading in the market. Thus, there is no direct market evidence on BST's cost of equity capital. It is consequently necessary to infer BST's cost of equity using available market data.

In the first approach I apply the DCF model to a group of firms identified as comparable in risk to BST. An average cost of equity capital is calculated by applying the DCF model to this group of comparable firms in order to provide an objective, market-determined cost of equity capital for BST. In the second approach, I use the capital asset pricing model (CAPM) to estimate BST's cost of equity capital for the group of publicly traded firms that are comparable in risk to BST. Finally, I conduct a risk premium analysis.

The cost of equity for BST is in the range of 15.11% to 15.20% using the comparable firm group DCF model approach. The CAPM approach indicates that BST's cost of equity capital is in the range of 14.72% to 14.87%. The risk premium approach indicates that the expected return on the overall equity market, as measured by the Standard and Poor's Composite 500 Index (S&P 500), is currently between 14.10% and 15.09%. Billingsley Exhibit No. RSB-1 explains how my analytical approaches are consistent with well-accepted regulatory and economic standards in cost of capital analysis. From these analyses, I conclude that the current cost of equity capital for BST is within the range of 14.72% to 15.20%.

Q. Please describe how you evaluate the reasonableness of BST's use of an overall cost of capital of 11.25% in its cost studies and summarize your findings.

A. Two tests of the reasonableness of BST's use of an 11.25% overall cost of capital are performed. The first uses BST's actual capital structure of 58.84% equity and 41.16% debt and its embedded cost of debt of 6.46%. An overall cost of capital of 11.25% using these parameters implies a cost of equity of 14.60%. The second test uses an equity ratio for BST of 60%, an associated debt ratio of 40%, and a current forward-looking cost of debt of 7.25%. An overall cost of capital of 11.25% implies a cost of equity of 13.92%. Both of these tests logically imply costs of equity that are lower than my estimated range

for BST's cost of equity capital of 14.72% to 15.20%. Therefore, BST's use of an 11.25% cost of capital in its cost studies is reasonable and conservative.

## III. CURRENT STATUS OF COMPETITION IN THE TELECOMMUNICATIONS INDUSTRY

Q. What is the current status of competition in the telecommunications industry?

A. Competition in the telecommunications industry has increased dramatically in recent years. The sources of that increased competition include a greater threat of new entrants in the industry, a significant increase in the number and strength of existing competitors, a greater threat of substitute telecommunications products and services, more intense rivalry among existing competitors in the industry, and enhanced regulatory risk at both the state and the federal levels. Thus, both actual and potential competition have increased and the business risk of the industry has consequently increased. What investors believe about the future competition that the local exchange companies (LECs) will face is critical to cost of capital analysis. Investors' expectations of competition and its impact on risk is what is reflected in the Company's cost of capital.

Q. Specifically how has competition increased in recent years?

A. The interLATA, intraLATA, and local exchange markets have become much more competitive in recent years. Large businesses have been able to bypass the LECs' private line and access services using fiber optic networks, microwave transmission and very small aperture terminals (VSAT). The growth of competitive access providers (CAPs) such as Metropolitan Fiber Systems (MFS) and the Teleport Communications Group (TCG) has allowed large business customers in major cities to connect with long distance carriers (interexchange carriers or IXCs) without paying an access charge to a LEC such as BST.

It is clear that investors believe that major CAPs, IXCs, and cable television (CATV) companies are positioning themselves to compete vigorously for customers in the local exchange market. LECs like BST face heightened potential competition that poses additional risk to their operations and their ability to recoup extensive infrastructure investments. Investors see such competition coming from wired, wireless, and internet sources. Consider the representative recent observations on competition in Business Week ("Zooming Down The I-Way," Andy Reinhardt, Peter Elstrom, and Paul Judge, April 7, 1997, pp. 76-87):

[O]utside the boardrooms of telecom's giants, innovation is sweeping the wired and wireless world-bubbling up from the bottom. Hundreds of

alternative carriers and nimble startups are leaping head-first into the newly deregulated environment (p. 76).

The Internet is also giving rise to new products that could undermine traditional phone services. The one that sends shivers down the spines of telecom execs: software that lets you place phone calls over the net (p. 77);

The Internet is not the only threat to the telephone companies. A slew of startups are finding ways to eat into traditional telephone usage...PCs are becoming telephone command centers for video conferencing and unified messaging that combines e-mail, fax, and voicemail (p. 78).

The provision of wireless services such as personal communication systems by CAPs, CATV operators, and electric utilities also enhances the ability of customers to completely bypass local exchange services. Wireless services are becoming a viable consumer alternative to LEC services. These alternatives will only increase the competitiveness of that environment and thus magnify the business risk of LEC operations. This growing risk is increasing BST's cost of raising capital.

Q. Has the business risk of the telecommunications industry increased in recent years and is it expected to continue increasing in the future,

especially due to the passage of and uncertainties in implementing the Telecommunications Act of 1996?

A. Yes. The recent passage of the Telecommunications Act and responses to its passage dramatically indicate that business risk has been increasing and will increase even more in the future. The Act, which was signed into law by President Clinton on February 8, 1996, essentially allows local, long-distance, and cable companies to get into one another's businesses. Thus, the traditional barriers that separated these industry sectors are now officially being dropped. While market pressures have been eroding these limits in recent years, the various competitors are now moving forward rapidly. However, open competition brings a significant increase in risk.

The passage of the Telecommunications Act is apparently viewed as risky by investors, competing telecommunications firms, and by the Federal Communications Commission (FCC). Indeed, the FCC has recently observed:

... [I]ncumbent LECs face potential competition as a result of the act that they did not face previously. This potential competition could increase the risks facing the incumbent LECs, and thus increase their cost of capital, thus mitigating, to some extent, the factors suggesting that incumbent LECs' cost of capital has decreased since 1990 (Notice of Proposed Rule Making, Third Report and Order, And Notice of Inquiry, FCC 96-488, December 24, 1996, p. 101, paragraph 228).

The implication is that investors are requiring higher rates of return to compensate for the higher investment risk resulting from the new competitive environment fostered by the implementation of the Telecommunications Act.

## IV. REBUTTAL OF PROFESSOR CORNELL'S DIRECT TESTIMONY ON BEHALF OF AT&T, MCI TELECOMMUNICATIONS, AND MCI METRO ACCESS SERVICES

### A. ERRORS IN DCF COST OF EQUITY ANALYSIS

#### 1. FAILURE TO REFLECT INVESTORS' PERSPECTIVE

Q. Is Professor Cornell's use of a three-stage DCF model representative of investors' valuation perspective and is it a common approach in regulatory proceedings?

A. No, Professor Cornell's three-stage model is complex, subjective, and uses growth rate forecasts that reflect his own opinions rather than those of the investment community. Due to these limitations, three-stage approaches are not commonly used in regulatory proceedings.

Professor Cornell's three-stage approach only makes use of firm-specific investment community consensus growth rate forecasts, as measured by Institutional Brokerage Estimation Service (IBES), for the first stage (five years) of his analysis. After this five-year period, he

assumes a second stage of 15 years during which the growth rate falls from the initial IBES growth rate to a projected growth rate for the overall U.S. economy by the end of the 20th year. After that time, Professor Cornell assumes that the growth rate remains at that projected rate for the economy indefinitely (Direct Testimony, p. 16, line 21 - p. 22, line 16).

While his analysis is logical, it unfortunately misses the mark in the current proceeding. The goal here is to estimate BST's cost of meeting its equity investors' return requirements in market terms. Thus, the analysis should reflect the investment analysis process and expectations of investors. Professor Cornell's analysis of BST's cost of equity departs from investors' perspective by substituting his expectations for those of investors for two out of the three stages in his analysis.

Q. How relevant is Professor Cornell's criticism of the constant growth DCF model on the basis that telecommunications firms' projected growth rates are not sustainable "into perpetuity?"

A. While Professor Cornell's criticism of the constant growth version of the DCF model is theoretically correct, it is practically irrelevant and misguided in the current context. He observes:

...modern telephone companies are composed of a variety of businesses, some of which are expected to grow at rates of 30 percent

or more in the short run. Such high growth rates are clearly not sustainable into perpetuity, so that the simple constant growth model cannot be applied...(Direct Testimony, p. 16, lines 8-12).

Professor Cornell's unsupported apparent concern is that "telephone companies are composed of a variety of businesses" that cannot be captured by a single growth rate. However, investors routinely price securities for firms composed of numerous business units by evaluating the net contribution of each unit to the overall growth of the firm.

Professor Cornell's rejection of the constant growth DCF model because he assumes that telephone company growth rates are "not sustainable into perpetuity" does not adequately relate valuation theory to practice in light of realistic investor concerns. While the constant growth DCF model does theoretically assume a constant growth rate for perpetuity, there is no evidence that investors practically consider perpetuity in their valuation decisions. Simply put, the present value of the cash flows projected from an investment beyond the foreseeable future is so small that it has little practical effect on investors' decisions. While it is very difficult to forecast the distant future, it is also not practically relevant to attempt to do so in a present value sense.

Professor Cornell's theoretical criticism of the constant growth DCF model is irrelevant. His decision to replace it with a three-stage DCF model only introduces a more subjective, complicated approach that

substitutes his growth forecasts for those of the investors who are actually putting money into stocks.

Q. What support does Professor Cornell offer for limiting the long-term growth of telecommunications firms to the growth rate of the U.S. economy?

A. He offers only his opinion that "a perpetual growth rate that exceeded the growth rate of the economy would illogically imply that eventually the whole economy would be comprised of nothing but telephone companies" (Direct Testimony, p. 17, lines 9-11). Professor Cornell's observation has no practical relevance in assessing the usefulness of the constant growth DCF model in the current proceeding. Investors could easily believe that telecommunications firms' consensus growth rate projections are sustainable beyond the next five years to the foreseeable future but less than forever, which is not a realistic emphasis of investors in their valuation efforts anyway.

Q. Would you provide an example that shows how unrealistic Professor Cornell's constraint on long-term growth rate is?

A. Yes. Zacks' and IBES' current (October 1997) consensus five-year growth rate forecasts for MCI are 11.80% and 11.61%, respectively. Professor Cornell would presumably argue that these rates are

unsustainable beyond five years and that the use of this rate for a longer period of time would imply that MCI would dominate the U.S. economy. However, according to Value Line, MCI's average earnings growth rate of earnings over the past ten years has been 28%, which is more than twice either of the above consensus growth rates.

From a practical perspective, I believe that most investors would relate these projections to the past performance of MCI and thereby use them to assess MCI's foreseeable future. It does not seem reasonable that such investors would be tempted to conclude that "eventually the whole economy would be comprised of nothing but telephone companies" or MCI in particular. Further, Professor Cornell offers no evidence to support his use of a second stage that is 15 years long. Why not 10, 25, or 30 years? His three-stage model is unnecessarily subjective, unrepresentative of investors' growth rate expectations, and contrary to investors' realistic concerns. While Professor Cornell's model is admittedly inventive, it is not informative concerning BST's realistic, market-based capital costs in the state of Florida.

Q. In attempting to justify his use of a three-stage rather than a constant growth version of the DCF model, Professor Cornell cites a book by Aswath Damodaran as a key reference (see pages 16-17 and footnote 4 of his testimony). Is Professor Cornell's decision to use a three-stage version of the model consistent with Damodaran's stated conditions under which the model is appropriate?

A. No, Professor Cornell's use of the three-stage model is inconsistent with the circumstances described for the best use of the model. Damodaran indicates that "...this may be the more appropriate model to use for a firm whose earnings are growing at a very high rates..." where "...growth rates over would 25% qualify as very high..." (Damodaran On Valuation, John Wiley & Sons, 1994, p. 119).

B. Cornell Exhibit BC-4 shows that none of the companies to which Professor Cornell applies his three-stage DCF model have growth rates "over 25%." Thus, his decision to use this form of the model is inconsistent with the conditions for its appropriate use described in the Damodaran reference cited in his testimony.

Q. Does this reference cited by Professor Cornell discuss any limitations in using the three-stage version of the DCF model?

A. Yes. In comparing the three-stage model to the other versions of the DCF model, Damodaran observes that:

... it requires a much larger number of inputs: year-specific payout ratios, growth rates, and betas. For firms in which there is substantial noise in the estimation process, the errors in these inputs can overwhelm any benefits that accrue from the additional flexibility in the model (Damodaran on Valuation, John Wiley & Sons, 1994, pp. 118 - 119).

Damodaran's concern over the effect of "substantial noise" is particularly relevant to Professor Cornell's analysis. He applies a three-stage DCF model to the RBHCs, GTE, and selected independent telephone holding companies. The dramatic effects of deregulation, increasing competition, and the implementation of the Telecommunications Act of 1996 certainly introduce much noise into the estimation of such firms' equity costs. Thus, Professor Cornell's DCF model is particularly inappropriate for estimating BST's cost of equity. My methodological approach is more reliable because it uses a group of firms that are demonstrably comparable in risk to BST that are not affected by such "noise" and my approach does not require the highly subjective inputs that Professor Cornell's three-stage model does.

## 2. INCORRECT RELIANCE ON BELLSOUTH, THE OTHER RBHCS, AND SELECTED INDEPENDENT TELEPHONE COMPANIES AS COMPARABLE IN RISK TO BST

Q. What justification does Professor Cornell give for applying the DCF and the CAPM approaches to BellSouth, the other RBHCs, and selected independent telephone companies as firms comparable in risk to BST?

A. Professor Cornell offers no justification for the use of these firms and only observes in passing that they are "selected as likely comparables

to BellSouth" (Direct Testimony, p. 19, lines 8-10) and that they "...were derived from the list of telephone operating companies in Standard and Poor's Industry Survey" (Direct Testimony, p. 11, lines 8-9). These supposedly comparable firms are listed in B. Cornell Exhibit BC-2. Thus, Professor Cornell assumes that BST is comparable in risk to BellSouth, the other RBHCs, and selected independent telephone companies rather than proves comparability. My analysis shows that the RBHCs are not, as a group, comparable in risk to BST and that the independent telephone companies are not as well.

### 3. FAILURE TO ADJUST FOR FLOTATION COSTS

Q. Do you agree with Professor Cornell's decision to ignore the impact of flotation costs in estimating BST's cost of equity capital?

A. No, I do not agree with his decision. Professor Cornell attempts to justify ignoring flotation costs because the price of BellSouth's stock "...has accounted for flotation costs already" (Direct Testimony, p. 49, lines 12-14). While his argument implicitly assumes that flotation costs materially affect equity costs, he presents no evidence that the market has made such an adjustment. Professor Cornell's unsupported decision not to adjust for flotation costs biases his cost of equity estimates downward.

4. FAILURE TO ADJUST FOR QUARTERLY DIVIDEND PAYMENTS

Q. Is Professor Cornell's use of the annual form of the DCF model consistent with the investor's perspective on valuing equity securities?

A. No, it is not. Professor Cornell uses the annual form of the DCF model even though all of the members of his sample of supposedly comparable firms pay dividends on a quarterly basis. The annual form of the DCF model does not accurately portray the investor's perspective, and consequently, significantly underestimates BST's cost of equity capital.

## B. ERRORS IN CAPM COST OF EQUITY ANALYSIS

Q. Is Professor Cornell's estimate of the equity market risk premium using the three-stage DCF model economically meaningful?

A. No, it is not economically meaningful. Professor Cornell uses his flawed three-stage DCF model to estimate an expected return on the overall equity market, as measured using selected members of the S&P 500 index, of 11.26% (see B. Cornell Exhibit BC-6).

Q. What effect does Professor Cornell's exclusion of all members of the S&P 500 not paying a dividend yield of at least 3% (p. 31, lines 13-15

of Cornell's testimony) have on his estimated market return of only 11.36%?

A. Professor Cornell's arbitrary screening criterion biases downward his estimated expected return on the market and thereby causes all of his CAPM calculations to underestimate equity capital costs. This partially explains why his analysis underestimates BST's capital costs.

Consider the type of firms that pay a dividend yield of less than 3%. Such firms typically pay lower dividend yields because they reinvest above-average amounts in their businesses. Thus, lower dividend yields are associated with higher growth companies that have higher equity capital costs. Professor Cornell's screening criterion consequently excludes those members of the S&P 500 with the highest capital costs and thereby underestimates the expected returns composing the market proxy. His CAPM-based equity costs that use this biased measure of equity market expectations clearly produce unrealistically low capital cost estimates.

## C. ERRORS IN COST OF DEBT ESTIMATION

Q. What mistakes does Professor Cornell make in estimating BST's cost of debt?

A. Professor Cornell fails to measure the cost of debt that is relevant to determining the forward-looking cost of BST providing unbundled network services to retail providers of local telephone service. BST's network assets that provide such services are long-lived and would traditionally be financed using long-term debt. In contrast, Professor Cornell has relied on the yields on BST debt that are maturing within the next few years rather than on appropriate long-term debt costs.

B. Cornell Exhibit BC-3 shows that the yields to maturity on selected BST debt issues generally increase with the maturity dates. Thus, it is obvious that Professor Cornell's use of shorter-term debt costs explains why his cost of debt estimates significantly underestimates BST's forward-looking cost of debt. Further, he considers debt issues that are clearly irrelevant to assessing the cost of financing long-lived network assets. My analysis of the relationship between the yields in long-term Aaa-rated public utility debt and long-term Treasury bonds indicates that a more representative, forward-looking cost of debt for BST is 7.25%.

Q. Would you elaborate on which debt issues Professor Cornell incorrectly includes in his analysis that are irrelevant to assessing BST's forward-looking cost of financing long-lived network assets?

A. Yes. B. Cornell Exhibit BC-3 incorrectly includes debt issued by BellSouth Capital Funding, which was not issued to finance BST's

network assets. Because the yields to maturity on these issues are as much as 100 basis points lower than Professor Cornell's weighted-average estimate of BST's cost of debt of only 7.06%, this mistake in part explains why his analysis underestimates BST's forward-looking debt capital costs.

## D. MISUNDERSTANDING OF THE NATURE AND SIGNIFICANCE OF THE RISKINESS OF INVESTING IN THE TELECOMMUNICATIONS INDUSTRY

Q. Do you agree with Professor Cornell's observations about the supposedly low relative risk of "leasing" local exchange telephone network elements to retail providers?

A. No, I do not. Professor Cornell only offers his unsupported opinion that:

> This leasing of network facilities... should have relatively low risk compared to many of the risky business endeavors being pursued by the telephone holding companies (Direct Testimony, p. 44, lines 3-6).

However, he acknowledges later in his testimony that "...there remains some risk that consumers, particularly business users, will bypass the network as other alternatives become available" (Direct Testimony, p. 46, lines 3-5). Professor Cornell consequently recognizes the significant risk of consumers and businesses bypassing BST's network but only offers his unsubstantiated opinion that this is a "relatively low

risk" endeavor. Once again Professor Cornell has substituted his opinion for that of investors in appraising capital costs.

Q. Why is leasing long-term telephone network assets particularly risky?

A. The leasing of long-term assets can be quite risky, especially when leasing rates are regulated. In order for BST to earn a reasonable return on its network assets, it must obtain revenues over the "leasing" period that cover its costs and an appropriate risk-adjusted profit. However, BST is partially dependent on regulators rather than solely on the market to obtain such a return. Professor Cornell obviously recognizes that regulators' decisions may well not be appealing to shareholders' when he notes:

There is still the risk of regulation itself. The rate of return a network is allowed to earn depends on the outcome proceedings such as this and remains somewhat uncertain (Direct Testimony, p. 45, lines 20-22).

Because such uncertainty implies risk to the investor, Professor Cornell acknowledges that there is substantial risk in the leasing of BST's network elements. This risk implies higher required rates of return and capital costs. However, Professor Cornell's comments on the supposedly low relative risk of network leasing are inconsistent with his recognition of high regulatory risk and the significant risk of consumer and business bypass of BST's local service network.

Q. How does technological change affect the risk of investing in long-term telephone network assets?

A. Network facilities reflect a given technology that often becomes obsolete quickly. BST must consistently invest to keep its network elements up to date and should have the flexibility to establish leasing rates accordingly. However, as noted above, it does not have this ability under current regulations. This risk of technological obsolescence makes leasing network elements risky. Thus, such obsolescence imposes costs and therefore risks. The leasing of BST's network assets poses significant risks to its investors that put upward pressure on the cost of equity.

Q. Do you agree with Professor Cornell's views on the risks that are reflected in capital costs?

A. No. Professor Cornell's views are steeped more in pristine theory than the investor's practical reality and are presented inconsistently in his testimony. For example, he emphasizes that:

> ...the risk that a company will lose customers to competition - such as a network leasing company or a local exchange company - is a diversifiable risk which does not increase the risk premium according to capital market theory" (Direct Testimony, p. 25, lines 1-3).

However, in discussing what he presumably considers to be the relevant risks associated with the business of leasing unbundled

network elements he notes that "...there remains some risk that consumers, particularly business users, will bypass the network as other alternatives become available" (Direct Testimony, p. 46, line 3 - 5).

On the one hand Professor Cornell argues that the risk of losing customers to competition should not affect capital costs and, on the other hand, he inconsistently asserts that the risk of bypass, which is just one way of losing customers, is relevant and thus affects capital costs.

Professor Cornell also inconsistently argues that:

In this case, the company in question is not a diversified telephone holding company, but a company in the more specialized (and less risky) business of providing network elements (Direct Testimony, p. 51, lines 14-16).

This observation is logically flawed and inconsistent. If we accept Professor Cornell's assumption that diversification reduces relevant or priced risk, then the fact that the " the company in question is not a diversified telephone holding company" should imply that is it riskier, not "less risky" than a diversified holding company. Professor Cornell's positions on relevant risk are confusing and inconsistent.

Professor Cornell's view that greater risk of competition is not compensated in the cost of capital is not practically relevant. While this

is strictly true in the pristine theoretical world of the CAPM, the practical realities of investing suggest otherwise. Indeed, as noted above, the FCC has recently noted that "...potential competition could increase the risks facing the incumbent LECs, and thus increase their cost of capital" (Notice of Proposed Rulemaking, Third Report and Order, and Notice of Inquiry, FCC 96-488, December 24, 1996, page 101, paragraph 228). Consequently, in contrast to Professor Cornell, the FCC views the enhanced risk posed by competition as a practical, significant influence on capital costs. While the CAPM provides useful insights into capital costs, it must be supplemented with other methods that recognize the full array of practical risks facing investors. Professor Cornell's expressed views on risk are incomplete and logically inconsistent.

## E. SUMMARY OF REBUTTAL OF PROFESSOR CORNELL'S COST OF CAPITAL ESTIMATES FOR BST

Q. Please summarize your evaluation of Professor Cornell's cost of equity estimates for BST.

A. Professor Cornell incorrectly estimates BST's cost of equity to be between 10.99% and 11.05% due to numerous errors in his applications of the DCF and CAPM approaches. His DCF model is flawed due to: 1) failure of his subjective three-stage model to reflect investors' perspective; 2) incorrect reliance on BellSouth, the other

RBHCs, and selected independent telephone companies as comparable in risk to BST; 3) failure to adjust for flotation costs; 4) failure to adjust for quarterly dividend payments, and 5) unrealistic underestimation of the risks of investing in telephone network assets in the new, highly competitive environment. Professor Cornell's CAPM cost of equity analysis for BST is also unreliable because it is based on his flawed three-stage DCF model.

Q. Please summarize your assessment of Professor Cornell's cost of debt estimate for BST.

A. Professor Cornell incorrectly estimates BST's cost of debt as only 7.06%. This underestimates BST's cost of debt because he relies on shorter-term debt issue costs that are not representative of the costs associated with financing long-term telephone network assets. Further, he incorrectly includes debt issues in his analysis that were not issued to telephone network assets. My testimony shows, however, that under current capital market conditions BST's forward-looking cost of debt is about 7.25%.

## V. DCF MODEL ESTIMATES OF BST'S COST OF EQUITY CAPITAL

### A. FORM OF THE DCF MODEL USED IN THE ANALYSIS

Q. What form of the DCF model do you use to estimate BST's cost of equity capital?

A. I use the constant growth form of the DCF model that assumes an indefinite or infinite holding period. Since most U.S. firms pay dividends quarterly, I use the quarterly form of the DCF model under the realistic assumption that such dividends are changed by firms once a year, on average in the middle of the year. Specifically, the cost of equity K is calculated as:

$$K = [D^q_0 (1 + G) / P_{mkt}] + G = [D^q_1 / P_{mkt}] + G,$$

where G is the most recent average five-year earnings per share growth rate projected by analysts, as reported by either Zacks Investment Research Inc. (Zacks) or by the IBES, and $P_{mkt}$ is the average of the three most recent months (August 1997 to October 1997) of high and low prices for the equity. $D_0^q$ and $D_1^q$ reflect the most recent annual and the anticipated next year amount of quarterly dividends, respectively. $D_1^q$ is calculated as:

$$D_1^q = d_1 (1 + K)^{.75} + d_2 (1 + K)^{.5} + d_3 (1 + K)^{.25} + d_4,$$

where $d_1$ and $d_2$ are the quarterly dividends paid prior to the assumed yearly change in dividends and $d_3$ and $d_4$ are the two quarterly dividends paid after the given change in the amount paid by a firm.

Thus, dividend $D_1^q$ captures the quarterly payment of dividends that grow at rate G.

In order to reflect the significant effect of flotation costs on the cost of equity, I directly reduce the market price $P_{mkt}$ used in my analysis by a conservative 5 percent. Billingsley Exhibit No. RSB-2 elaborates on the nature and applicability of the DCF model in estimating the cost of capital in regulatory proceedings. It also discusses the importance of adjusting for both the payment of quarterly dividends and for flotation costs.

## B. SPECIFIC APPLICATION OF THE DCF MODEL TO ESTIMATE BST'S COST OF EQUITY

Q. Specifically how do you apply the above DCF model to BST, since it does not have equity trading in the marketplace?

A. Since BST is part of its parent holding company, BellSouth Corporation, it does not have equity trading in the market. It is consequently necessary to infer BST's cost of equity by applying the DCF model to a group of firms identified as comparable in risk to the company.

Q. What method is used to identify firms of comparable risk to BST?

A. I use a cluster analysis model to identify firms that are comparable in risk to BST. Two dimensions of risk are used to compare firms. First, the financial risk of firms is measured and used as a basis of comparison. Second, business or operating risk is compared among firms. These dimensions are, in effect, averaged in a manner that generates a comprehensive risk profile. Thus, firms are not just compared on a characteristic-by-characteristic basis, they are compared in light of those chosen characteristics and the relationship among those characteristics.

A summary measure expresses the distance between each firm and BST. A group of the 20 firms that are closest to BST in terms of this summary distance measure is chosen for analysis. A more detailed discussion of this cluster analysis is contained in Billingsley Exhibit No. RSB-4.

Q. How do the individual measures of riskiness relate to the comparability of the group of firms in the cluster in terms of overall riskiness?

A. It may be tempting to single out one company in my cluster of comparable firms and incorrectly attempt to compare its various risk measures individually to those of BST. However, none of the individual companies identified in the cluster are precisely like BST in every respect. The firms are alternative investment opportunities that, in the aggregate, have overall risk similar to that of BST.

In summary, none of the individual firms in my cluster are precisely like BST in terms of each individual measure of risk. The cluster should be viewed as a portfolio of firms that, as a group, are comparable in risk to BST.

### C. DCF MODEL COST OF EQUITY ESTIMATES FOR BST

Q. What cost of equity capital do you estimate for BST using the DCF model?

A. Billingsley Exhibit No. RSB-3 lists the portfolio of 20 firms that are comparable in risk to BST and reports the average cost of equity for the portfolio using both IBES and Zacks growth rate forecasts. The evidence indicates that the cost of equity for BST is in the range of 15.11% to 15.20%.

## VI. CAPITAL ASSET PRICING MODEL ANALYSIS OF BST'S COST OF EQUITY CAPITAL

Q. What form of the CAPM do you use to estimate BST's cost of equity capital?

A. I use the common form of the model, which calculates the risk-adjusted rate of return K as:

$K = R_f + B [R_m - R_f]$,

where $R_f$ is the expected return on a risk-free security like a U.S. Treasury bond B is the expected beta or systematic risk of the equity security, and $R_m$ is the expected return on a broad index of equity market performance like the S&P 500.

Q. How and where do you obtain the beta coefficient data needed to estimate BST's cost of equity capital using the CAPM?

A. Since BST is a subsidiary of BellSouth Corporation, it does not have its own equity trading in the market and therefore does not have the beta coefficient required by the CAPM. Thus, as discussed above in my DCF analysis, it is necessary to identify a group of firms comparable in risk to BST that do have traded equity and therefore measurable beta coefficients. Consequently, the beta coefficients for the group of firms used in my DCF analysis that are identified in Billingsley Exhibit No. RSB-3 are relied on to estimate the cost of equity for BST. Specifically, the average beta of 0.90 for the group of firms is used in the CAPM equation presented above.

The beta coefficients used in my CAPM analysis are the most recent prospective measures supplied by BARRA, a widely recognized provider of data and decision support systems for institutional investors.

Billingsley Exhibit No. RSB-5 elaborates on the nature and significance of using prospective rather than historical beta estimates.

Q. How do you estimate the risk-free rate of return needed in the CAPM equation?

A. In order to be consistent with the expectational emphasis of the CAPM, I use the 6.73% average expected yield implied by the prices of the treasury bond futures contracts quoted during October of 1997. The prices of these contracts reflect the market's consensus forecast of long-term, low-risk interest rates. Billingsley Exhibit No. RSB-6 describes the futures contracts used in the analysis in more detail and shows the calculations necessary to derive the implied expected future risk-free rate of return.

Q. How do you estimate the expected return on a broad index of equity market performance for use in the CAPM?

A. I use expectational data to estimate the return of the S&P 500 as my proxy for overall equity market performance. Billingsley Exhibit No. RSB-7 elaborates on how the DCF model is applied to estimate the expected return on the S&P 500 using both Zacks and IBES growth rate forecasts. The expected return during the most recent month (October 1997) for which data is available is used in the CAPM analysis.

Q. What cost of equity capital do you estimate for BST under the CAPM approach?

A. Summarizing the results of the above analysis, I use a risk-free rate of return of 6.73%, an average beta of 0.90 for firms comparable in risk to BST, and IBES and Zacks growth rate estimates that imply an expected return on the S&P 500 of 15.61% and 15.77%, respectively. These objective, market-determined data indicate that BST' s cost of equity capital is 14.72% using the IBES growth rate and 14.87% using the Zacks growth rate forecast.

## VII. MARKET RISK PREMIUM ANALYSIS OF THE COST OF EQUITY CAPITAL

### A. NATURE OF THE APPROACH

Q. What is the market risk premium approach?

A. The market risk premium approach quantifies the risk/return trade-off discussed in detail in Billingsley Exhibit No. RSB-1 on the economic standards used in cost of equity analysis. The equity market risk premium is defined as the difference between the return on a broad basket of equity securities (the "market") and the return on a low-risk or "riskless" benchmark security or portfolio. The return on long-term U.S.

Treasury bonds and the return on utility bonds are common benchmarks.

## B. SPECIFIC TYPE OF RISK PREMIUM ANALYSIS USED

Q. What specific form of the risk premium approach do you use?

A. Since the DCF model and the CAPM are prospective in nature, I also use a prospective approach to estimate the equity risk premium. I examine the relationship between expected returns on the S&P 500, as estimated by the DCF model using IBES growth rate forecasts, and the current market yields on public utility bonds from October of 1987 to October of 1997. Additional detail on the issues and the techniques associated with calculating the expected return on the market is presented in Billingsley Exhibit No. RSB-7.

Billingsley Exhibit No. RSB-8 shows that the average expected risk premium from 1987 to 1997 is 6.80%. The average yield on AAA-rated public utility bonds, which are used because this is the bond rating on BST's debt, over the most recent three months (August to October of 1997) is 7.30%. Thus, the average risk premium of 6.80% is added to the recent average public utility bond return of 7.30% to yield an expected cost of equity return on the S&P 500 of 14.10%.

## C. ADJUSTMENT FOR POTENTIAL INSTABILITY IN THE

RISK PREMIUM

1. EVIDENCE ON THE INSTABILITY OF RISK PREMIUMS OVER TIME

Q. Can any instability in the risk premium be adjusted for so as to increase the confidence in its representativeness?

A. Yes. As elaborated on in Billingsley Exhibit No. RSB-7, studies of the historical behavior of the equity risk premium indicate that it varies considerably over time. Importantly, there is evidence that the equity risk premium is related inversely to the returns on low-risk benchmark debt securities. Thus, when interest rates decline, the equity risk premium widens and when interest rates rise, the equity risk premium narrows.

research on this phenomenon by Professors R. S. Harris and F.C. Marston, published in Financial Management in 1992, finds that the equity risk premium moves an average of -.651 of contemporaneous changes in the return on a benchmark low-risk security (index). In other words, if interest rates decline by 100 basis points, the equity risk premium will increase by an average of about 65 basis points.

2. SPECIFIC ADJUSTMENT FOR INSTABILITY IN THE EQUITY RISK PREMIUM

Q. What specific adjustment do you make to your risk premium analysis in light of the above evidence on the inverse relationship between the risk premium and the level of interest rates?

A. During the period of Harris and Marston's study, the average risk premium was 6.47% and the average yield on long-term Treasury bonds was 9.84%. As noted above, the equity market risk premium is expected to change an average of -.651 of changes in the level of long-term Treasury bond yields. Given that the current average yield on 30-year Treasury bonds is 6.33% (October 1997), the appropriate current risk premium is 8.76%. This is calculated by multiplying the 3.51% decline in rates since the time period of Harris and Marston's study by -.651 and adding back the average risk premium of 6.47% to the indicated change of 2.29%. This alternative approach consequently provides an expected return on the S&P 500 of 15.09%, which is the current average level of 30-year Treasury yields of 6.33% added to the adjusted risk premium of 8.76%.

Q. What is your conclusion with regard to BST' s cost of equity capital?

A. Based on my cost of equity analysis, I believe BST's cost of equity is in the range of 14.72% to 15.20%.

## VIII. COST OF DEBT

Q. How do you determine BST's current cost of debt capital?

A. The cost of debt capital is estimated using current forward-looking market data.

Q. How can BST's forward-looking cost of debt be empirically estimated?

A. BST's forward-looking cost of debt can be estimated by adding the current yield to maturity on 30-year U.S. Treasury bonds to the average spread (difference) between the yields on such U.S. Treasury bonds and AAA-rated public utility bonds.

For the period from August to October of 1997, 30-year U.S. Treasury bonds yielded an average of 6.47%. As shown in Billingsley Exhibit RSB-9, the spread between AAA-rated public utility bonds and 30-year Treasury bonds averaged 0.79% from October of 1987 through October of 1997. Adding the average spread of 0.79% to the above current Treasury bond yield to maturity of 6.47% produces a yield of 7.26%, which does not reflect the material effect of flotation costs.

Q. What is your estimate of BST's forward-looking cost of debt?

A. Based on my analysis, I believe that BST's forward-looking cost of debt is 7.25%.

## IX. OVERALL COST OF CAPITAL

Q. How did you test the reasonableness of BST's overall cost of capital of 11.25% in its cost studies?

A. I used two different sets of assumptions, one using BST's reported capital structure and embedded cost of debt of only 6.46% and the other using an equity ratio of 60% and a current forward-looking cost of debt of 7.25%.

Q. Please describe the first test of the reasonableness of BST's use of an 11.25% overall cost of capital.

A. As shown in Billingsley Exhibit RSB-10, as of September 30, 1997, BST's reported capital structure was 58.84% equity and 41.16% debt and the embedded cost of debt was 6.46%. An overall cost of capital of 11.25% implies a cost of equity of 14.60%.

Q. Please describe the second test of the reasonableness of BST's use of an 11.25% overall cost of capital.

A. Assuming the 60% equity and 40% debt capital structure that is used in BST's cost studies and a current forward-looking cost of debt of 7.25%, an 11.25% overall cost of capital implies a cost of equity of 13.92%.

Q. What conclusions do you draw concerning the reasonableness of BST's use of an 11.25% overall cost of capital in its cost studies?

A. Based on my cost of equity estimate for BST of 14.72% to 15.20% and the above tests, the use of an 11.25% overall cost of capital by BST is reasonable and conservative.

## X. SUMMARY OF DETERMINATION OF REASONABLENESS OF BST'S 11.25% COST OF CAPITAL IN COST STUDIES

Q. Is it your opinion that it is reasonable for BST to use an overall cost of capital of 11.25% in its cost studies?

A. Yes. My analysis shows that BST's cost of equity is in the range of 14.72% and 15.20% and that its forward-looking cost of debt is at least 7.25%. Two tests are used to determine the reasonableness of BST's use of an overall cost of capital of 11.25% in its cost studies.

The first test uses BST's actual capital structure of 58.84% equity and 41.16% debt and a conservative embedded cost of debt of 6.46%. This set of assumptions implies that a 14.60% cost of equity is consistent with an overall cost of capital of 11.25%. The second test uses a capital structure of 60.00% equity and 40.00% debt and a current cost of debt of 7.25%. This set of assumptions implies that a

13.92% cost of equity is consistent with an overall cost of capital of 11.25%. Thus, the above tests and my estimated range for BST's cost of equity capital of 14.72% to 15.20% show that BST's use of an 11.25% cost of capital in its cost studies is reasonable and conservative.

Q. Are you aware that the Commission has not previously recognized the need to adjust cost of equity estimates for flotation costs or the quarterly payment of dividends?

A. Yes, I am aware of this. I have estimated BST's cost of equity with adjustments for both flotation costs and the quarterly payment of dividends because I believe that these factors affect equity costs. The economic rationales for these adjustments are elaborated in Billingsley Exhibit RSB-2.

Q. What are your revised estimates of BST's cost of equity assuming annual dividend payments and no flotation costs?

A. An annual DCF model that ignores flotation costs produces a cost of equity for BST of 15.02% using IBES growth rate forecasts and 15.16% using Zacks growth forecasts. The revised CAPM approach indicates that BST's cost of equity is in the range of 14.74% to 14.88%. Thus, under the assumption of annual compounding and no flotation costs

the revised estimate of BST's cost of equity is within the range of 14.74% to 15.16%.

Q. Do you believe that it would be reasonable for BST to use an overall cost of capital of 11.25% in its cost studies if flotation costs and quarterly compounding adjustments are omitted from your estimates?

A. Yes. The revised cost of equity capital estimates are in the range of 14.74% to 15.16%. The same two tests of reasonableness used above imply costs of equity that are lower than these revised cost of equity estimates. Thus, BST's use of an 11.25% cost of capital in its cost studies is conservative even in the absence of adjustments for flotation costs and the quarterly payment of dividends.

Q. Does this conclude your testimony?

A. Yes, it does.

# REGULATORY AND ECONOMIC STANDARDS USED IN COST OF CAPITAL ANALYSIS

## I. Regulatory Standards

Two important Supreme Court decisions, commonly referred to as **Bluefield** and **Hope**, provide the essential standards that are applied in the regulation of a public utility's allowed rate of return. The first standard is that a public utility should be allowed earnings opportunities sufficient to enable it to attract capital on reasonable terms. The second standard is that a public utility should be allowed the opportunity of earning at a level comparable to other firms of corresponding risk.

The **Bluefield** case establishes the regulatory standard that a public utility's allowed rate of return should be sufficient to permit it to attract the capital that it needs to meet its responsibilities. In order to maintain the ability to attract capital, a public utility must assure that its financial integrity is not compromised.

The **Hope** case establishes the standard that a public utility's allowed rate of return will not be appropriate unless it is comparable to the returns on investments of comparable risk. In terms of the current proceedings, this standard requires that the target regulated firm's allowed rate of return be commensurate with the expected rate of return associated with the risk faced by equity holders in firms of comparable risk.

## II. Economic Standards

### A. Overview

Several fundamental economic standards are used to determine the cost of equity capital. These standards are implied by the concepts of opportunity cost, the risk/return trade-off, and market efficiency. If the process used to establish the cost of equity is inconsistent with those standards, then the resulting estimate will be biased. Such a cost of equity would not treat ratepayers fairly and could damage the ability of the regulated firm to raise funds. This could compromise the firm's capacity to continue providing appropriate telecommunications services.

**B. Opportunity Cost**

Investors have the opportunity to put their money to work in a variety of different investments. The decision to put money in one investment implies that another investment opportunity must be given up. Thus, the opportunity cost of making an investment is the opportunity (expected return) foregone on the next best alternative.

The opportunity afforded by an investment must be measured in light of the time value of money. This acknowledges that the value of a dollar to be received in a year is not worth a dollar today. This is because investors have the opportunity to invest less than a dollar today at some positive expected return in order to generate a dollar a year from today. Money has a time value that reflects the benefits of an investor's other competing investment alternatives.

The cost of equity capital is an opportunity cost from the equity investor's viewpoint. When an investor considers investing money in a stock, care is taken to evaluate the expected return on the next best alternative investment that must be foregone if that stock is bought. An investor has a target required rate of return that is influenced by that opportunity cost. If an investor does not expect a stock to meet the target or minimally acceptable return, then the stock will not be purchased by that investor. In order to meet investors' return expectations, the firm must reinvest the funds supplied by those investors at an expected rate of return no less than that expected by investors.

The standard that emerges for cost of equity capital analysis is that any estimate should consider the opportunity costs faced by equity investors. The cost of equity capital cannot be determined in isolation. It must reflect equity investors' other investment alternatives. In the case of a regulated public utility, the company's authorized rate of return must meet investors' return requirements, as reflected in the cost of equity capital, or investors will not supply the firm with their capital. This would effectively deny the utility access to the capital market on reasonable terms. Thus, the standards established by **Hope** and **Bluefield** would be violated.

**C. Risk/Return Trade-Off**

The risk/return trade-off is a description of how investors behave given what they like and what they dislike about investments. Investors generally prefer higher to lower returns and prefer less to more risk. Investors will not take on additional risk unless they

expect to earn higher returns. This is because investors must trade-off what they like (higher expected returns) against what they dislike (higher risks) in making investment decisions. In everyday terms, investors cannot get more of what they like unless they are willing to take on more or what they dislike.

In competitive capital markets, the risk/return trade-off will generally prevail. If an investment's expected return is not commensurate with its risk, investors will look elsewhere for investment opportunities. Investors seeking to measure opportunity costs must develop some criterion for judging what makes investments comparable so that they can identify the "next best alternative foregone," as discussed above. The primary criterion is risk. Investors will evaluate investments of comparable risk and seek the investment yielding the highest expected return for a given level of risk. Thus, opportunity costs can only be measured accurately when the riskiness of competing investments is taken into consideration.

The standard for cost of capital analysis implied by the risk/return trade-off is that a firm must meet the return requirements that equity holders impose after having evaluated other investments of comparable risk. If a firm does not meet investors' risk-adjusted expected returns, investors will move their money to alternative investments of similar risk that offer expected higher returns. This standard asserts that a regulated firm should have the opportunity to earn a return that is commensurate with its risk and, by implication, comparable to the expected returns of other firms of comparable risk.

**D. Implications of Opportunity Costs and the Risk/Return Trade-Off**

The joint presence of opportunity costs and the risk/return trade-off implies the standard that investments of comparable risk are expected to generate comparable returns. If they do not, investors will purchase the stocks of firms yielding higher expected returns and will sell the stocks of firms yielding lower expected returns until the returns reflected by the prices are the same. This standard is the result of many investors measuring their opportunity costs by comparing investments with full knowledge that relevant alternatives are defined largely on the basis of comparable riskiness.

This standard implies that groups of firms comparable in risk to a target firm should have average costs of equity capital that are comparable to that target firm's cost of equity capital. This is the basis for the common practice of applying the discounted cash flow (DCF) model to a group of comparable firms.

**E. Market Efficiency**

In its most general form, an efficient market is one in which all information that is relevant to security price (expected return) formation is reflected quickly in prices (expected returns). Market efficiency is not an all or nothing proposition, but rather is a matter of degree. Financial research finds evidence of a high degree of efficiency in contemporary U.S. financial markets. Thus, security prices are on average unbiased, objective estimates of what the investment community expects to happen to a security. Indeed, prices reflect the market's assessment of what a security is expected to yield given its riskiness relative to comparable investments. The implication of a high degree of market efficiency for cost of equity capital analysis is that the equity prices for firms of comparable risk are reliable sources of objective information about capital costs.

# NATURE AND APPLICABILITY OF THE DISCOUNTED CASH FLOW MODEL IN COST OF EQUITY CAPITAL ANALYSIS FOR REGULATORY PROCEEDINGS

## I. Nature of the Discounted Cash Flow(DCF) Model

The DCF model is a formal statement of common sense and basic financial theory. The model asks an investor's most basic question: How much is this stock worth? Common sense dictates that the answer depends on what investors expect to get out of the stock and when they expect to get it. The "what" is the expected cash flow stream generated by the stock and the "when" is the projected timing of those expected cash flows.

Determining how much a stock is worth depends on one more critical consideration: the riskiness or probability that investors associate with their forecast of what they will receive from the stock. In this context, risk is the possibility that investors' expectations will be frustrated. Thus, risk is reflected by the probability that investors' actual returns will differ from their expected returns. The DCF model assumes that the average investor dislikes risk and consequently will accept higher risk only if there is a higher expected return.

The DCF model recognizes two types of expected cash flows: The periodic payment of cash dividends and the (possible) future sale of the stock. If an investor facing an opportunity cost of K percent expects to get dividends $D_t$ annually for the next N years and then sells the stock at the end of year N for a price of $P_N$, then the appropriate current price $P_0$ is:

$$P_0 = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} + \ldots + \frac{D_N + P_N}{(1+K)^N}$$

In summary, the appropriate price of a stock is the present value of all of the cash benefits that an investor expects to get from owning it.

## II. Applicable Form of the DCF Model

### A. Issues

The above form of the DCF model is typically modified in at least two ways. First, a regulatory commission is presumably not concerned with determining how much a stock should sell for. Its goal is to determine what rate of return a regulated firm's equity investors should reasonably expect to receive for bearing the firm's risk. Thus, a regulator is concerned with what the price is rather than with what it should be. The actual price $P_{mkt}$ should consequently be used to infer investors' required rate of return.

Second, the form of the DCF presented above makes no explicit assumption concerning the expected rate of growth in dividends and the stock's price over time, nor any assumption concerning the length of an investor's expected holding period. The so-called constant growth form of the DCF model assumes that dividends and price grow at a constant rate G over time, that the growth rate is less than the required rate of return, and that investors have an infinite or indefinite holding period.

It is important to remember that the fundamental source of a stock's value to investors in the DCF model is its expected dividend stream. Why would investors be willing to trade a stock among themselves if the stock was nothing more than a piece of paper that would never pay any money? If the current price of a stock is the present value of all expected future cash flows, then the price at any point in time should be the present value of the expected cash flows beyond that point in time.

While an infinite holding period may not seem to apply to any one investor, this assumption is an accurate way of portraying the behavior of investors collectively. This is because investors must determine all prices, present and future, by projecting a seemingly endless series of future dividends. They must make such dividend projections since any expected future price is dependent on the dividends that are expected to be paid on that stock after it is purchased.

The constant growth form of the DCF model makes these two adjustments and can be expressed as:

$$K = \frac{D_0 (1 + G)}{P_{mkt}} + G = \frac{D_1}{P_{mkt}} + G,$$

where $D_0$ is the most recent dividend paid, G is the expected growth rate, $D_1$ is the next anticipated dividend, and the rest of the variables are defined as above.

Two additional modifications to the DCF model are necessary. First, it should be recognized that dividends are paid by most companies on a quarterly, not an annual, basis. The second adjustment to the general DCF model presented above considers the flotation costs borne by the firm in raising equity funds.

**B. Adjustment for Quarterly Dividends**

**1. Rationale**

The annual form of the DCF model assumes that investors receive dividends only once a year and that they have the opportunity to reinvest those cash flows in alternative investments of the same risk. The required rate of return implied by the annual form of the DCF model will be biased downward if investors actually receive their dividend payments in quarterly rather than in annual installments. This bias results because equity investors have the opportunity to start earning a return on their reinvested dividends sooner when these dividends are received quarterly than when the dividends are received only annually.

Investors determine prices that are consistent with the returns that they expect to earn. Thus, investors pay prices that reflect that they expect dividends quarterly rather than annually. Failure to make this adjustment to the DCF model will understate the cost of equity capital. This adjustment should be made in order to determine an economically correct cost of equity for a regulated firm.

**2. Specific Adjustment**

There are two basic ways in which quarterly dividends can be handled. The first approach makes the simplifying assumption that dividends are paid quarterly and grow quarterly as well. While this approach has the virtue of simplicity, it is not realistic because most firms adjust their dividend payments only once a year, not quarterly.

The second approach assumes that firms pay dividends quarterly but that those dividends are only changed by a firm annually. Thus, quarterly reinvestment opportunities are recognized and the more realistic pattern of annual dividend growth is accounted for as well. This is the approach that I use in my analysis of a regulated

firm's cost of equity. Further, I assume that firms on average adjust the level of their dividends in the middle of the year.

The adjusted DCF model calculates a revised dividend, $D_1^q$ :

$$D_1^q = d_1 (1+K)^{.75} + d_2 (1+K)^{.5} + d_3 (1+K)^{.25} + d_4,$$

where $d_1$ and $d_2$ are the two quarterly dividends paid prior to the assumed yearly change in dividends and $d_3$ and $d_4$ are the two quarterly dividends paid after the given change in the amount paid by a firm. This dividend, $D_1^q$, revised to recognize the quarterly payment of dividends that grow at rate G once a year (on average for all firms in the middle of the next 12 months), is substituted in the place of $D_1$ in the basic form of the DCF model as follows:

$$K = \frac{D_1^q}{P_{mkt}} + G.$$

In my analysis, the market price is the average of the monthly high and low stock prices for the most recent three months for which data are available.

## C. Adjustment for Flotation Costs

### 1. Rationale and Specific Adjustment

The cost of equity capital must reflect what a firm needs to earn on its funds in order to meet the return requirements of its investors. Flotation costs reduce the amount of funds that a firm has to invest and thereby increase the return that a firm must earn on those remaining funds if it is to continue attracting investors. If a utility was allowed to recover all of its flotation costs at the time of issuance, there would be no need for this adjustment. Otherwise, it is important to subtract the flotation costs from the price used in the DCF model in order to capture the fact that a utility does not receive the full proceeds of an equity issue.

Two empirical studies indicate that a 5% flotation cost is realistic. Research by C. W. Smith, Jr. (*Journal of Financial Economics*, 1977, pp. 273-307) finds that explicit flotation costs amount to between 4% and 5% of the amount of an equity issue. Focusing on the utility industry, research by R. H. Pettway (*Public Utilities*

*Fortnightly*, May 10, 1984, pp. 35-39) finds that the sale of equity securities generally also involves implicit flotation costs in the form of a 2% to 3% decline in the price of the stock that results from market pressure.

While the above studies deal with both utilities and industrial firms, they are also relevant to the estimation of telecommunications companies' flotation costs. As the telecommunications industry becomes more competitive, such firms are increasingly being viewed more like industrials than as "pure" public utilities. Equity investors taking a long-term view in their valuations recognize this. Thus, the firm's cost of equity should reflect this expected transition. Therefore, given actual costs of approximately 4-5% and market pressure of 2-3%, I include a conservative 5% flotation cost adjustment that is implemented as a 5% reduction to the stock prices used in my DCF analysis.

**2. Relevance of Flotation Costs Despite the Absence of Actual Equity Sales**

The fact that a regulated firm does not actually sell equity by virtue of an affiliation with a parent company does not invalidate the need to adjust for flotation costs. Taken to its logical extreme, it could be argued that such a regulated subsidiary firm has no cost of equity capital at all since it does not sell shares of stock on the open market. Yet such regulated firms bear such equity costs and should be compensated accordingly.

The omission of a flotation cost adjustment is incorrect and is equivalent to comparing mortgage rates without adjusting for "points". A regulated firm will not get fair treatment if it is only permitted to earn a return that does not cover all of its reasonable costs, which include flotation costs.

**3. Estimation of Growth for Use in the DCF Model**

Investors are forward-looking. Investment decisions are made on the basis of how investors expect a stock to perform in the future. While how a stock has performed in the past may well influence an investor's expectations concerning future performance, there is no guarantee that the future will be a simple extension of the past. Thus, it is important that the estimated growth rate used in the DCF model be a prospective or expected, not a historical rate.

Financial research indicates that the consensus growth rate forecasts of financial analysts are the most unbiased, objective, and accurate measure of investors' growth expectations for a stock. Thus, I use the growth rate estimates published by the

Institutional Brokers Estimate System (IBES) and Zacks Investment Research, Inc. (Zacks). Both IBES and Zacks are used widely within the investment profession and are revised frequently enough to remain relevant to investors evaluating the growth prospects of stocks. Further, the use of both sources provides broad-based measures of long-term growth rate expectations.

# DCF AND CAPM DATA FOR COMPARABLE FIRM GROUP

## DCF RESULTS

| Portfolio of Comparable Firms | ZACKS | IBES | BARRA Beta Coefficients |
|---|---|---|---|
| Coca Cola | 18.31% | 18.69% | 1.00 |
| Campbell Soup | 14.44% | 14.57% | 0.78 |
| Anheuser Busch | 13.31% | 12.58% | 0.76 |
| DuPont & Co. | 13.51% | 14.39% | 1.05 |
| Kellogg | 12.94% | 12.77% | 0.79 |
| McDonalds | 14.39% | 14.21% | 0.95 |
| Hershey Foods | 13.37% | 13.09% | 0.76 |
| Clorox | 14.68% | 14.73% | 0.82 |
| Warner-Lambert | 21.13% | 21.47% | 1.09 |
| Kimberly Clark | 15.09% | 15.84% | 0.89 |
| Eli Lilly | 17.10% | 17.35% | 1.10 |
| Wal-Mart Stores | 14.11% | 14.01% | 1.14 |
| Chevron | 11.23% | 11.52% | 0.58 |
| Proctor & Gamble | 14.54% | 14.46% | 1.01 |
| Alltel | 14.01% | 13.71% | 0.64 |
| Pfizer | 17.14% | 17.40% | 1.08 |
| Frontier | 16.15% | 16.23% | 0.85 |
| Motorola | 20.09% | 19.84% | 1.31 |
| Texaco | 11.81% | 12.95% | 0.50 |
| Becton Dickinson | 14.94% | 14.52% | 0.91 |
| **AVERAGE** | **15.11%** | **15.20%** | **0.90** |

# COMPARABLE FIRM IDENTIFICATION CRITERIA AND METHODOLOGY

## I. Introduction

Since BellSouth Telecommunications (BST) does not have equity trading independently of BellSouth Corporation, no direct market price of equity can be used to infer its cost of equity. Thus, it is necessary to identify a portfolio of firms that are comparable in equity investment risk to BST's operations. The discounted cash flow (DCF) model is applied to each of the portfolio's members and an average cost of equity capital is determined. Given that the portfolio of firms is of comparable risk to BST, this average cost of equity is an objective, reasonable estimate of BST's cost of equity. The next section identifies the sources of investment risk and the specific proxies used to identify comparable firms.

## II. Risk Criteria

The following sources of investment risk are measured and used to identify a group firms comparable in risk to BST:

A. Financial Risk

1. Relative Amount of Debt

Financial risk is dependent, in part, on the amount of total debt employed by a firm relative to its equity base. Other things being equal, higher debt per dollar of equity implies higher risk. This source of risk is measured by a firm's equity-to-total capital ratio. The most recent annual value (1996) of this ratio is used.

2. Ability to Service Debt

Apart from the above descriptive measure of a firm's relative indebtedness, it is important to evaluate the ability of a firm to service its total debt. This is assessed by examining the amount of interest (I) that a firm owes relative to the resources (net cash flow (NCF), or net income plus non-cash expenses plus interest expense) it has available to meet that commitment. This is measured by the cash flow-based interest coverage ratio, NCF/I. Other things being equal, an increase in this ratio reflects greater ability to service debt and

consequently implies lower riskiness. The most recent annual value (1996) of this variable is used.

3. Bond Rating

Bond ratings reflect a rating agency's evaluation of the relative probability of default on a firm's given debt security. Ratings are readily accessible to investors and are commonly used to appraise the risk of a firm. Bond ratings are assigned numerical (i.e., dummy variable) values for the purposes of the present analysis.

B. Business Risk

1. Variability of Cash Flows

The variability of a firm's cash flows characterize the riskiness of a firm's chosen line of business. Cash flows represent a firm's command over goods and services. The risk implications of a given level of cash flows are easiest to interpret when related to an economically meaningful base such as total assets. This source of risk is measured by the standard deviation of the ratio of a firm's operating cash flows-to-total average assets. Higher values of the measure are associated with greater risk. The variable is calculated using the most recent five years of annual data (1992-1996).

2. Operating Return on Assets

The operating return on assets, as measured by the ratio of a firm's operating cash flow-to-total average assets, reflects the business risk associated with generating income in a given line of business. Operating cash flow is used because it does not include the risk effects captured in measures that include financing and investing choices. This variable is calculated using the most recent annual data (1996).

## III. Methodology Used in the Comparable Firms Identification Process

A portfolio of comparable firms is identified using a modified cluster analysis model. Classical cluster analysis techniques develop natural groupings of objects based on the relationships among a given set of descriptive variables. The goal is to determine how the object should be assigned to groups so that there will be as much similarity within groups and as much difference among groups as possible. No predetermined reference object is offered to organize the grouping effort. The

modified cluster analysis used in this analysis differs from the classical techniques by identifying a target object (firm) characterized by several descriptive (financial) measures. The goal of this application is to find a group of firms that are as similar as possible to the target firm in terms of the identified measures of investment risk. Unlike classical cluster analysis, the goal of maximizing the differences among groups is irrelevant since all dissimilar groups are discarded. Specifically, in this context, only those firms that are identified as comparable to BST are retained for use in inferring its cost of equity capital.

As in classical cluster models, similarity is determined by measuring the Euclidian distance between the descriptive variables in a manner that considers the multivariate nature of the problem. The distance $D_i$ of each firm i in the sample from the target firm T, assuming the five descriptive variables $V_{ij}$ discussed above, is calculated as:

$$D_i = \sqrt{\sum_{j=1}^{5} (V_{ij} - V_{Tj})^2}.$$

The distance measure uses the squared differences of a given firm's descriptive variable from that of the target firm T in order to measure distance irrespective of whether it is above (positive) or below (negative) the respective value for the target firm. The portfolio of firms considered to be similar to the target, BST, is identified by balancing the goals of minimizing the distance $D_i$ of a firm from the target with the desire to have a sample of sufficient size to assure confidence in its representativeness.

## IV. Issues in Applying Cluster Analysis

Only firms available on the COMPUSTAT data source also having an IBES and Zacks consensus growth rate forecast based on at least two analysts' estimates are retained for analysis. Foreign, financial, and limited partnership firms are eliminated. Outliers are identified on a variable-by-variable basis. Those firms with variable values greater than two standard deviations above or below the mean value of the population for each variable are deleted. All outliers are eliminated before standardizing the variables to prevent biasing the means and standard deviations. The final population consists of 391 firms.

Since the proxies of investment risk discussed above are denominated in different units of measurement, they consequently need to be standardized. A Z-statistic is calculated using the mean of $V_j$ and the standard deviation $\sigma_j$ of each variable across all of the firms as:

$$Z_{ij} = \frac{V_{ij} - \overline{V_j}}{\sigma_j}$$

The squared difference between the Z-value for each firm's given variable and the value of the Z-statistic for the target firm for the same given variable across all descriptive variables is then calculated. After generating Z-values for every variable for each firm, squared differences for each firm are summed. The distance measure $D_i$ is determined by taking the square root of the sum of the squared differences.

The final step in the analysis is the identification of the portfolio of the 20 firms that are the least distance from BST. Billingsley Exhibit No. RSB-3 lists the final group of comparable firms. A correlation coefficient matrix for the variables used to identify firms is provided on the following page.

# CLUSTER ANALYSIS CORRELATION MATRIX

| | Common Equity to Total Capital | Operating Cash Flow to Assets Standard Deviation | Operating Cash Flow to Assets | Cash Flow Interest Coverage |
|---|---|---|---|---|
| **Bond Rating** | -0.377 | 0.214 | -0.307 | -0.424 |
| **Common Equity to Total Capital** | | 0.191 | 0.365 | 0.659 |
| **Operating Cash Flow to Assets Standard Deviation** | | | 0.014 | 0.038 |
| **Operating Cash Flow to Assets** | | | | 0.429 |

# CAPITAL ASSET PRICING MODEL ANALYSIS OF THE COST OF EQUITY CAPITAL

## I. Description of the Approach

The capital asset pricing model (CAPM) is a theory of the relationship between the risk of a security or a portfolio of securities and the expected rate of return that is commensurate with that risk. The theory is based on the assumption that security markets are efficient and dominated by risk averse investors. In other words, the CAPM argues that investors are willing to take on more risk only if they can reasonably expect a higher return.

As discussed in Billingsley Exhibit No. RSB-1, the CAPM accepts the so-called risk/return trade-off economic principle and quantifies that trade-off. Further, the model assumes that most investors diversify their investment holdings so as to not put "all of their eggs in one basket." Indeed, the tendency for investors to diversify their investment portfolios implies that, in a CAPM context, the only type of risk that is rewarded or relevant in the risk/return trade-off is systematic or market-related risk. Thus, the additional risk created by not diversifying among investments is not rewarded by the securities markets under the CAPM.

The measurable relationship between risk and expected return in the CAPM is summarized by the following expression:

$$R_i = R_f + B_i [ R_m - R_f ],$$

where $R_i$ is the expected return on security or portfolio I, $R_f$ is the return on a risk-free security like a U.S. Treasury bond, $B_i$ is the beta of security or portfolio i, and Rm is the expected return on a broad index of equity market performance like the Standard & Poor's Composite 500 Index (S&P 500).

## II. Economic Rationale for the Approach

The rationale for the CAPM equation is the common sense observation that investors must be coaxed to move their money from riskless assets like U.S. Treasury bonds into risky assets. Consider an everyday example wherein investors can obtain about a 7% return on a Treasury security. Investors will not invest in a broad market portfolio of risky securities unless they can expect a significant return premium for accepting the risk in excess of the riskless security. In terms of the above example, investors would want an expected return that is greater than 7% if material risk is present. The usefulness of the CAPM is in measuring how much of an expected return premium is appropriate for investments in light of their riskiness relative to the risk of a benchmark broad market index.

The economic interpretation of the CAPM equation is as the base risk-free rate of return Rf plus the market-wide risk premium of $[R_m - R_f]$ that is required to coax investors away from exclusive investment in risk-free securities. The beta coefficient measures the riskiness of a given security or portfolio relative to the overall market benchmark. It expresses how much the given investment's returns tend to vary as the returns on the benchmark market index vary over the business cycle. Beta therefore may be viewed as the appropriate weight to apply to the market-wide risk premium $[R_m - R_f]$. The beta of the market portfolio must, by definition, be equal to 1.

Consider an example of how the CAPM estimates the appropriate risk-adjusted expected return on an investment. Assume that the risk-free rate of return on a U.S. Treasury bond is 7%, the expected return on the market is 15%, and that an investor wants to determine the appropriate expected rate of return on a stock with a beta of 1.5. The market-wide risk premium is [15% - 7%] or 8%. This implies that investors will not allocate money to investments with market-like riskiness unless they can expect to get at least an 8% premium over the risk-free rate of 7%. However, a 8% premium will be insufficient if an investment is more variable (i.e., riskier) than the overall market. The returns on a stock with a beta of 1.5 tend to vary 1.5 times more than the return on the overall market. The market-wide risk premium of 8% must therefore be increased 1.5 times to 12% in order to attract investors. Thus, a stock with a beta of 1.5 should generate an expected return of 19% in order to adequately compensate investors for the above-market risk of the investment.

## III. Consistency of the Approach with Regulatory and Economic Standards

The CAPM is consistent with the appropriate public utility regulatory and economic standards. Specifically, the CAPM is consistent with the regulatory principle set forth in the **Hope** case that the allowed return of a public utility should be "...commensurate with the returns on investments in other enterprises having corresponding risk." The CAPM is also consistent with the regulatory standard that emerged from the **Bluefield** decision, which states that the "...return should be reasonably sufficient to assure confidence in the financial soundness of the utility and ...enable it to raise the money necessary for the proper discharge of its public duties."

In terms of the appropriate economic standards, the CAPM produces return estimates that should meet investors opportunity costs, satisfy the demands of the risk/return trade-off, and is consistent with the empirical evidence that supports a high degree of efficiency in U.S. financial markets.

## IV. Usefulness of the CAPM in Estimating the Cost of Equity Capital

The primary usefulness of the CAPM is as a conceptual tool for systematically relating expected returns to risk. The model requires market-based data inputs that are largely objective and relatively easy to obtain. The shortcoming of the CAPM is that available empirical evidence indicates that the beta coefficient may not fully capture all of the sources of market risk. This implies that CAPM-based estimates of the cost of equity should be supplemented with alternative approaches that use other measures of risk. For this reason, my cost of equity analysis does not rely solely on the CAPM but also uses the DCF model and the risk premium approach to corroborate the reasonableness of my cost of equity estimates for the target regulated firm.

## V. Data for CAPM Analysis

### A. Beta Coefficients

Since the target firm, BST, is a wholly-owned subsidiary of their BellSouth Corporation, it does not have its own equity trading in the market and therefore do not have the beta coefficients required by the CAPM. Thus, as discussed above in the DCF analysis section of my statement, it is necessary to identify a group of firms comparable in risk to BST that do have traded equity. Consequently, the beta coefficients for the group of firms used in my DCF analysis that are identified in Billingsley Exhibit No. RSB-3 are relied on to estimate the cost of equity for the BST.

Importantly, the beta coefficients presented in Billingsley Exhibit No. RSB-3 are not historical betas like those commonly quoted by Value Line, Standard & Poor's, or Merrill Lynch. While frequently used, such historical estimates of beta are inconsistent with the CAPM's reliance on prospective beta coefficients. Historical estimates only reflect the past riskiness of an equity security that need not be representative of the future riskiness that is relevant to equity investors. The CAPM is formulated in terms of investor expectations, which clearly transcend exclusive reliance on historical measures of riskiness like betas based solely on the past return performance of stocks. The beta coefficients used in my CAPM analysis are prospective measures supplied by BARRA, a widely recognized provider of data and decision support systems for institutional investors.

BARRA describes its predicted beta as follows:

> In the BARRA E2 multiple-factor model, factors are estimated for 13 risk indices and for 55 industry groups...each risk index is built from a number of underlying fundamental data items that capture elements of risk. By combining them, we produce a multifaceted measure of risk that best characterizes the single concept we are trying to measure. The individual data items are called descriptors. The combined descriptors make up the risk index (*BARRA U.S. Equity Beta Book*, January 1997).

**B. Risk-Free Rate of Return**

In order to be consistent with the expectational emphasis of the CAPM, I use the average expected yield implied by the prices of the U.S. Treasury bond futures contracts quoted during the most recent month for which data are available. These future contracts are obligations to either take or make delivery of 8% coupon, 20-year Treasury bonds for a fixed price (yield) at a specified future date. The prices of these contracts reflect the market's objective consensus forecast of long-term, low-risk interest rates. The rate on long-term Treasury securities is chosen to be consistent with the long-time horizon of equities. A more detailed explanation of the data and calculations is provided in Billingsley Exhibit No. RSB-6.

**C. Expected Return on the Equity Market**

In order to focus on the prospective nature of the CAPM, I use expectational data to estimate the return on the S&P 500 as my proxy for overall equity market performance. Billingsley Exhibit No. RSB-7 elaborates on how the DCF model is applied to estimate the expected return on the S&P 500 using both IBES and Zacks growth rate forecasts. The returns on the S&P 500 used in the CAPM analysis are for the most recent month for which data are available (October of 1997).

# CALCULATION OF U. S. TREASURY BOND FUTURES' IMPLIED INTEREST RATE

The interest rate implied by the price of a U.S. Treasury Bond futures contract cannot be directly taken from **The Wall Street Journal**. Rather, it must be calculated as follows:

$$(\textit{Price of Contract}) \times 10 = \frac{\$40}{(1+i)^1} + \frac{\$40}{(1+i)^2} + \ldots + \frac{\$40}{(1+i)^{40}} + \frac{\$1{,}000}{(1+i)^{40}},$$

where i = the semi-annual rate of return.

The implied annual rate of return on U.S. Treasury bond futures is calculated as:
Annual Rate of Return = $(1 + i)^2 - 1$.

The U.S. Treasury Bond futures contract prices shown below are averaged, by contract maturity, using the Friday settlement prices for October of 1997.

## U.S. TREASURY BOND FUTURES CONTRACT DATA

| Contract Maturity | 10/3/97 | 10/10/97 | 10/17/97 | 10/24/97 | 10/31/97 | Average Price | Implied Yield |
|---|---|---|---|---|---|---|---|
| 12/97 | 116.6563 | 115.0313 | 114.8438 | 116.7813 | 118.4688 | 114.3203 | 6.67% |
| 03/98 | 116.3750 | 114.7188 | 114.5313 | 116.4688 | 118.1875 | 113.5859 | 6.70% |
| 06/98 | 116.0000 | 114.3438 | 114.1875 | 116.0625 | 117.7813 | 113.4531 | 6.73% |
| 09/98 | 115.6875 | 114.0313 | 113.8750 | 115.8125 | 117.8125 | 113.1250 | 6.76% |
| 12/98 | 115.3750 | 113.7188 | 113.3438 | 115.5313 | 117.2188 | 112.8125 | 6.79% |
| **AVERAGE IMPLIED YIELD** | | | | | | | **6.73%** |

# MARKET RISK PREMIUM APPROACH TO ESTIMATING THE COST OF EQUITY CAPITAL

## I. Nature and Economic Justification for the Market Risk Premium Approach

The market risk premium approach is a systematic way of quantifying the risk/return trade-off that is discussed in Billingsley Exhibit No. RSB-1 concerning the economic standards used in cost of equity analysis. The market risk premium is defined as the difference between the return on a broad basket of equity securities (the "Market") and the return on a far less risky benchmark security or portfolio. The return on long-term U.S. Treasury bonds and the return on utility bonds are common benchmarks. The economic justification for examining the difference between the return on the market and a benchmark security's return is to measure the premium that is necessary to coax investors to move from investing in a "risk-free" or lower risk security into a higher risk equity investment. This premium is often referred to as the equity risk premium.

My analysis identifies a market risk premium on public utility bonds and then adds that premium to the current expected return on such bonds. This determines a reasonable expected rate of return on the equity market.

## II. Estimation of the Equity Market Risk Premium

### A. Overview of Approaches

There are two fundamental approaches to estimating the equity risk premium. The first approach is prospective and the second approach is historical. The equity risk premium can be estimated by surveying investors' expectations concerning the premium's magnitude. Similarly, a prospective approach like the DCF model can be used to estimate the equity risk premium that is implied by the relationship among analysts' consensus growth forecasts for the market, the general level of the market, and the expected return on a low-risk benchmark security. Alternatively, the historical relationship between earned returns on the equity market and earned returns on a low-risk benchmark security can be measured, thereby revealing an average historical (earned) equity risk premium.

While it is clear that investors trade on the basis of expectations (i.e., prospective factors), these expectations are not directly observable. However, there cannot be any confidence that historical return patterns will be repeated in the future.

**B. Specific Estimation Approach**

**1. General Description**

Since the DCF model is prospective in nature, I also use a prospective approach to estimate the equity risk premium. I examine the relationship between expected returns on the Standard & Poor's Composite 500 Index (S&P 500), as estimated by the DCFmodel using Institutional Brokers Estimate Service (IBES) growth rate projectionsand the current market yield on public utility bonds over a recent period. This average expected risk premium is added to the average yield that has prevailed on appropriately-rated public utility bonds over the most recent three months for which data are available (August - October 1997).

**2. Estimation of the Expected Market Return**

In recognition of the fact that most firms pay dividends on a quarterly basis, the quarterly form of the DCF model is used to estimate the expected market return on the S&P 500. As in the discussion of the DCF analysis in Billingsley Exhibit No. RSB-2, it is assumed that dividends grow at a given rate over a year with the yearly change in the amount paid by a firm occurring on average after the second quarter each year.

**3. *Source of the* Expected Growth Rate**

The expected growth rate used in the quarterly version of DCF model is the consensus mean market value-weighted five-year earnings per share estimate published by IBES for the S&P 500. Dividend yield data as obtained from Standard & Poor's **Outlook**, restated on a quarterly basis.

**4. Interest Rate Reference Point**

An index of Aaa public utility bond is used as the relevant security benchmark in the analysis. A three month average (August - October 1997) of the interest rate benchmark is used in the calculation of the expected market risk premium.

**5. Computational Procedure**

The expected risk premium E(RP) as of point t in time is calculated as the simple arithmetic difference between the expected return on the S&P 500 at time t [$E(S\&P500_t)$], produced by applying the DCF model to the S&P 500, and the average monthly Aaa public utility bond yield at time t [$R(UBOND_t$]. Thus risk premiums are calculated as:

$$E(RP_t) = E(SP500_t) - R(UBOND_t)$$

The average expected risk premium E(RP) for the time period spanning N months is calculated as:

$$E(RP) = \sum_{t=1}^{n} \frac{E(RP_t)}{N}$$

The current expected return on the S&P 500 is estimated by adding the average expected risk premium E(RP) to the average yield prevailing on Aaa-rated public utility bonds over the three month period from August to October of 1997.

It is important to note that the resulting cost of equity estimates for the overall equity market are not adjusted for flotation costs. They are consequently a conservative reference point for estimating the cost of equity in the overall market.

**6. Time Period of the Analysis**

The statistical analysis uses data on expected market risk premiums and Aaa public utility bond yields over the period from October of 1987 through October of 1997. This time period is dictated by the availability of consistent IBES expected growth rate forecast data.

## III. Nature and Implications of Instability of the Risk Premium

### A. Evidence of Instability

Studies of the historical behavior of the equity risk premium find that it varies considerably over time. Of particular interest is that the equity risk premium is related inversely to returns on the traditionally used benchmark securities. These benchmarks often include, U.S. government or corporate debt securities. Thus, when interest rates decline, the equity risk premium widens and when interest rates rise, the equity risk premium narrows.

The most plausible explanation for this inverse relationship is that investors' attitudes towards risk change over time. As hypothesized by the Nobel prize-winning financial economist, Professor William F. Sharpe, when investors are doing well financially, they are optimistic and require relatively low risk premiums and when investors are doing poorly, they are pessimistic and require relatively high risk premiums. Since the general level of interest rates is an indicator of where the economy is in a cycle, it is reasonable to expect an inverse relationship between interest rates and equity risk premiums.

### B. Adjustments for Instability

The above observation suggests another way of using the risk premium approach to evaluate the cost of equity capital for a target firm. Research by Professors R. S. Harris and F. C. Marston, published in **Financial Management** in 1992, finds evidence that the equity risk premium tends to move an average of -.651 of contemporaneous changes in the return on a benchmark low-risk security (index). That is, if interest rates decline by 100 basis points, the equity risk premium required increases by approximately 65 basis points.

In Professor Harris and Marston's work, the benchmark low-risk security index is composed of long-term U.S. Treasury Bonds and the equity market proxy is the S&P500. Therefore, adjusting for the difference between the level of the rates on the benchmark

low-risk security during the sampled time period and the current level of such rates generates an equity risk premium estimate that is modified explicitly for a prominent source of its instability over time. This estimated risk premium is added to the current level (i.e., the most recent month, October of 1997) of the benchmark low-risk security's rate.

## EXPECTED MARKET RISK PREMIUM

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 10/87 | 14.82% | 10.92% | 3.92% |
| 11/87 | 15.06 | 10.43 | 4.63 |
| 12/87 | 15.46 | 10.64 | 4.82 |
| 01/88 | 15.65 | 10.39 | 5.26 |
| 02/88 | 15.52 | 9.77 | 5.75 |
| 03/88 | 15.42 | 9.72 | 5.70 |
| 04/88 | 15.45 | 10.07 | 5.38 |
| 05/88 | 15.42 | 10.29 | 5.13 |
| 06/88 | 15.65 | 10.27 | 5.38 |
| 07/88 | 15.63 | 10.50 | 5.13 |
| 08/88 | 15.72 | 10.66 | 5.06 |
| 09/88 | 15.66 | 10.15 | 5.51 |
| 10/88 | 15.63 | 9.62 | 6.01 |
| 11/88 | 15.64 | 9.52 | 6.12 |
| 12/88 | 15.58 | 9.67 | 5.91 |
| 01/89 | 15.54 | 9.72 | 5.82 |
| 02/89 | 15.34 | 9.71 | 5.68 |

## EXPECTED MARKET RISK PREMIUM

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 03/89 | 15.34 | 9.87 | 5.47 |
| 04/89 | 15.35 | 9.88 | 5.47 |
| 05/89 | 15.40 | 9.60 | 5.80 |
| 06/89 | 15.22 | 9.13 | 6.09 |
| 07/89 | 15.36 | 8.98 | 6.38 |
| 08/89 | 15.14 | 9.02 | 6.12 |
| 09/89 | 14.94 | 9.10 | 5.84 |
| 10/89 | 15.02 | 9.01 | 6.01 |
| 11/89 | 15.17 | 8.92 | 6.25 |
| 12/89 | 15.12 | 8.92 | 6.20 |
| 01/90 | 15.18 | 9.08 | 6.10 |
| 02/90 | 15.29 | 9.35 | 5.94 |
| 03/90 | 15.47 | 9.48 | 5.99 |
| 04/90 | 15.62 | 9.60 | 6.02 |
| 05/90 | 15.70 | 9.58 | 6.12 |
| 06/90 | 15.71 | 9.38 | 6.33 |
| 07/90 | 15.81 | 9.36 | 6.45 |

## EXPECTED MARKET RISK PREMIUM

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 08/90 | 15.69 | 9.54 | 6.15 |
| 09/90 | 15.91 | 9.73 | 6.18 |
| 10/90 | 16.04 | 9.66 | 6.38 |
| 11/90 | 16.23 | 9.43 | 6.80 |
| 12/90 | 16.16 | 9.18 | 6.98 |
| 01/91 | 16.17 | 9.17 | 7.00 |
| 02/91 | 16.01 | 8.92 | 7.09 |
| 03/91 | 15.85 | 9.04 | 6.81 |
| 04/91 | 15.61 | 8.95 | 6.66 |
| 05/91 | 15.55 | 8.93 | 6.62 |
| 06/91 | 15.59 | 9.10 | 6.49 |
| 07/91 | 15.59 | 9.10 | 6.49 |
| 08/91 | 15.62 | 8.81 | 6.81 |
| 09/91 | 15.59 | 8.65 | 6.94 |
| 10/91 | 15.52 | 8.57 | 6.95 |
| 11/91 | 15.58 | 8.52 | 7.06 |

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 12/91 | 15.65 | 8.38 | 7.27 |
| 01/92 | 15.60 | 8.22 | 7.38 |
| 02/92 | 15.71 | 8.30 | 7.41 |
| 03/92 | 15.57 | 8.39 | 7.18 |
| 04/92 | 15.53 | 8.36 | 7.17 |
| 05/92 | 15.54 | 8.32 | 7.22 |
| 06/92 | 15.45 | 8.26 | 7.19 |
| 07/92 | 15.44 | 8.12 | 7.32 |
| 08/92 | 15.46 | 8.04 | 7.42 |
| 09/92 | 15.57 | 8.04 | 7.53 |
| 10/92 | 15.53 | 8.06 | 7.47 |
| 11/92 | 15.56 | 8.11 | 7.45 |
| 12/92 | 15.57 | 8.01 | 7.56 |
| 01/93 | 15.29 | 7.94 | 7.35 |
| 02/93 | 15.07 | 7.75 | 7.32 |
| 03/93 | 15.00 | 7.64 | 7.36 |
| 04/93 | 14.71 | 7.50 | 7.21 |
| 05/93 | 14.81 | 7.44 | 7.37 |
| 06/93 | 14.73 | 7.37 | 7.36 |

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 07/93 | 14.61 | 7.25 | 7.36 |
| 08/93 | 14.59 | 6.94 | 7.65 |
| 09/93 | 14.43 | 6.76 | 7.67 |
| 10/93 | 14.50 | 6.75 | 7.75 |
| 11/93 | 14.52 | 7.06 | 7.46 |
| 12/93 | 14.50 | 7.06 | 7.44 |
| 01/94 | 14.55 | 7.05 | 7.50 |
| 02/94 | 14.59 | 7.19 | 7.40 |
| 03/94 | 14.66 | 7.60 | 7.06 |
| 04/94 | 14.69 | 8.00 | 6.69 |
| 05/94 | 14.77 | 8.11 | 6.66 |
| 06/94 | 14.89 | 8.07 | 6.82 |
| 07/94 | 14.95 | 8.21 | 6.74 |
| 08/94 | 14.78 | 8.15 | 6.63 |
| 09/94 | 14.82 | 8.41 | 6.41 |
| 10/94 | 14.80 | 8.65 | 6.15 |
| 11/94 | 14.95 | 8.77 | 6.18 |
| 12/94 | 14.96 | 8.55 | 6.41 |
| 1/95 | 15.01 | 8.53 | 6.48 |

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 2/95 | 14.95 | 8.33 | 6.02 |
| 3/95 | 14.95 | 8.18 | 6.71 |
| 4/95 | 14.89 | 8.08 | 6.81 |
| 5/95 | 14.93 | 7.71 | 7.22 |
| 6/95 | 14.89 | 7.39 | 7.50 |
| 7/95 | 14.92 | 7.51 | 7.42 |
| 8/95 | 14.95 | 7.71 | 7.24 |
| 9/95 | 14.95 | 7.48 | 7.47 |
| 10/95 | 14.89 | 7.30 | 7.59 |
| 11/95 | 14.90 | 7.22 | 7.68 |
| 12/95 | 14.82 | 7.03 | 7.79 |
| 1/96 | 14.68 | 7.02 | 7.66 |
| 2/96 | 14.79 | 7.20 | 7.59 |
| 3/96 | 14.79 | 7.45 | 7.34 |
| 4/96 | 14.80 | 7.60 | 7.20 |
| 5/96 | 15.01 | 7.73 | 7.28 |
| 6/96 | 14.99 | 7.83 | 7.16 |
| 7/96 | 14.97 | 7.78 | 7.19 |
| 8/96 | 15.10 | 7.59 | 7.51 |

| Time Period | Standard & Poor's 500 DCF Cost of Equity* | Moody's Aaa Public Utility Bonds | Market Risk Premium |
|---|---|---|---|
| 9/96 | 15.22 | 7.76 | 7.46 |
| 10/96 | 15.21 | 7.50 | 7.71 |
| 11/96 | 15.24 | 7.21 | 8.03 |
| 12/96 | 15.31 | 7.33 | 7.98 |
| 1/97 | 15.22 | 7.53 | 7.69 |
| 2/97 | 15.16 | 7.47 | 7.69 |
| 3/97 | 15.11 | 7.70 | 7.41 |
| 4/97 | 15.36 | 7.88 | 7.48 |
| 5/97 | 15.49 | 7.72 | 7.77 |
| 6/97 | 15.56 | 7.55 | 8.01 |
| 7/97 | 15.62 | 7.29 | 8.33 |
| 8/97 | 15.62 | 7.39 | 8.23 |
| 9/97 | 15.66 | 7.33 | 8.33 |
| 10/97 | 15.61 | 7.18 | 8.43 |
| **AVERAGE** | **15.26%** | **8.46%** | **6.80%** |

* Standard & Poor's DCF cost of equity, calculated as described in Billingsley Exhibit No. RSB-7.

** Calculated as the average of the monthly risk premiums, not as differences of averages for the entire time

# Aaa vs. Treasury Bond Yields

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 10/87 | 10.92% | 9.62% | 1.30% |
| 11/87 | 10.43% | 8.91% | 1.52% |
| 12/87 | 10.64% | 9.09% | 1.55% |
| 1/88 | 10.39% | 8.81% | 1.58% |
| 2/88 | 9.77% | 8.42% | 1.35% |
| 3/88 | 9.72% | 8.59% | 1.13% |
| 4/88 | 10.07% | 8.98% | 1.09% |
| 5/88 | 10.29% | 9.26% | 1.03% |
| 6/88 | 10.27% | 9.06% | 1.21% |
| 7/88 | 10.50% | 9.22% | 1.28% |
| 8/88 | 10.66% | 9.37% | 1.29% |
| 9/88 | 10.15% | 9.11% | 1.04% |
| 10/88 | 9.62% | 8.92% | 0.70% |
| 11/88 | 9.52% | 9.02% | 0.50% |
| 12/88 | 9.67% | 9.01% | 0.66% |
| 1/89 | 9.72% | 8.94% | 0.78% |
| 2/89 | 9.71% | 9.00% | 0.71% |
| 3/89 | 9.87% | 9.14% | 0.73% |

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 4/89 | 9.88% | 9.06% | 0.82% |
| 5/89 | 9.60% | 8.90% | 0.70% |
| 6/89 | 9.13% | 8.35% | 0.78% |
| 7/89 | 8.98% | 8.10% | 0.88% |
| 8/89 | 9.02% | 8.11% | 0.91% |
| 9/89 | 9.10% | 8.17% | 0.93% |
| 10/89 | 9.01% | 8.00% | 1.01% |
| 11/89 | 8.92% | 7..89% | 1.03% |
| 12/89 | 8.92% | 7.90% | 1.02% |
| 1/90 | 9.08% | 8.24% | 0.84% |
| 2/90 | 9.35% | 8.48% | 0.87% |
| 3/90 | 9.48% | 8.57% | 0.91% |
| 4/90 | 9.60% | 8.75% | 0.85% |
| 5/90 | 9.58% | 8.73% | 0.85% |
| 6/90 | 9.38% | 8.43% | 0.95% |
| 7/90 | 9.36% | 8.50% | 0.86% |
| 8/90 | 9.54% | 8.85% | 0.69% |
| 9/90 | 9.73% | 8.99% | 0.74% |
| 10/90 | 9.66% | 8.86% | 0.80% |
| 11/90 | 9.43% | 8.58% | 0.85% |
| 12/90 | 9.18% | 8.23% | 0.95% |

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 1/91 | 9.17% | 8.20% | 0.97% |
| 2/91 | 8.92% | 8.08% | 0.84% |
| 3/91 | 9.04% | 8.21% | 0.83% |
| 4/91 | 8.95% | 8.22% | 0.73% |
| 5/91 | 8.93% | 8.24% | 0.69% |
| 6/91 | 9.10% | 8.48% | 0.62% |
| 7/91 | 9.10% | 8.44% | 0.66% |
| 8/91 | 8.81% | 8.15% | 0.66% |
| 9/91 | 8.65% | 7.96% | 0.69% |
| 10/91 | 8.57% | 7.95% | 0.62% |
| 11/91 | 8.52% | 7.91% | 0.61% |
| 12/91 | 8.38% | 7.69% | 0.69% |
| 1/92 | 8.22% | 7.61% | 0.61% |
| 2/92 | 8.30% | 7.86% | 0.44% |
| 3/92 | 8.39% | 8.00% | 0.39% |
| 4/92 | 8.36% | 7.95% | 0.41% |
| 5/92 | 8.32% | 7.89% | 0.43% |
| 6/92 | 8.26% | 7.83% | 0.43% |
| 7/92 | 8.12% | 7.59% | 0.53% |
| 8/92 | 8.04% | 7.39% | 0.65% |
| 9/92 | 8.04% | 7.34% | 0.70% |

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 10/92 | 8.06% | 7.50% | 0.56% |
| 11/92 | 8.11% | 7.56% | 0.55% |
| 12/92 | 8.01% | 7.46% | 0.55% |
| 1/93 | 7.94% | 7.34% | 0.50% |
| 2/93 | 7.75% | 7.06% | 0.69% |
| 3/93 | 7.64% | 6.78% | 0.86% |
| 4/93 | 7.50% | 6.85% | 0.65% |
| 5/93 | 7.44% | 6.92% | 0.20% |
| 6/93 | 7.37% | 6.82% | 0.17% |
| 7/93 | 7.25% | 6.63% | 0.62% |
| 8/93 | 6.94% | 6.30% | 0.64% |
| 9/93 | 6.76% | 6.03% | 0.73% |
| 10/93 | 6.75% | 5.93% | 0.82% |
| 11/93 | 7.06% | 6.24% | 0.82% |
| 12/93 | 7.06% | 6.26% | 0.80% |
| 1/94 | 7.05% | 6.29% | 0.76% |
| 2/94 | 7.19% | 6.51% | 0.68% |
| 3/94 | 7.60% | 6.94% | 0.66% |
| 4/94 | 8.00% | 7.25% | 0.75% |
| 5/94 | 8.11% | 7.32% | 0.79% |
| 6/94 | 8.07% | 7.38% | 0.69% |

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 7/94 | 8.21% | 7.60% | 0.61% |
| 8/94 | 8.15% | 7.61% | 0.54 |
| 9/94 | 8.41% | 7.84% | 0.57% |
| 10/94 | 8.65% | 8.02% | 0.63% |
| 11/94 | 8.77% | 8.17% | 0.60% |
| 12/94 | 8.55% | 7.91% | 0.64% |
| 1/95 | 8.53% | 7.86% | 0.67% |
| 2/95 | 8.33% | 7.66% | 0.67% |
| 3/95 | 8.18% | 7.52% | 0.66% |
| 4/95 | 8.08% | 7.43% | 0.65% |
| 5/95 | 7.71% | 7.04% | 0.67% |
| 6/95 | 7.39% | 6.68% | 0.71% |
| 7/95 | 7.51% | 6.75% | 0.76% |
| 8/95 | 7.66% | 6.92% | 0.74% |
| 9/95 | 7.42% | 6.44% | 0.98% |
| 10/95 | 7.23% | 6.35% | 0.88% |
| 11/95 | 7.13% | 6.29% | 0.84% |
| 12/95 | 6.94% | 6.05% | 0.89% |
| 1/96 | 6.92% | 6.05% | 0.87% |
| 2/96 | 7.11% | 6.25% | 0.86% |
| 3/96 | 7.45% | 6.62% | 0.83% |

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 4/96 | 7.60% | 6.76% | 0.84% |
| 5/96 | 7.73% | 6.94% | 0.79% |
| 6/96 | 7.83% | 6.94% | 0.89% |
| 7/96 | 7.78% | 7.05% | 0.73% |
| 8/96 | 7.59% | 6.88% | 0.71% |
| 9/96 | 7.76% | 7.00% | 0.76% |
| 10/96 | 7.50% | 6.78% | 0.72% |
| 11/96 | 7.21% | 6.55% | 0.66% |
| 12/96 | 7.33% | 6.56% | 0.77% |
| 1/97 | 7.53% | 6.82% | 0.71% |
| 2/97 | 7.47% | 6.70% | 0.77% |
| 3/97 | 7.70% | 6.96% | 0.74% |
| 4/97 | 7.88% | 7.13% | 0.75% |
| 5/97 | 7.72% | 6.93% | 0.79% |
| 6/97 | 7.55% | 6.73% | 0.83% |
| 7/97 | 7.29% | 6.53% | 0.76% |
| 8/97 | 7.39% | 6.58% | 0.81% |
| 9/97 | 7.33% | 6.49% | 0.84% |
| 10/97 | 7.18% | 6.33% | 0.85% |
| **AVERAGE** | **8.47%** | **7.68%** | **0.79%** |

Source: Moody's Bond Record
The Wall Street Journal

| Date | Moody's Aaa Public Utility Bond | 30-Year U.S. Treasury Bond | Aaa/U.S. Treasury Bond Spread |
|---|---|---|---|
| 4/96 | 7.60% | 6.76% | 0.84% |
| 5/96 | 7.73% | 6.94% | 0.79% |
| 6/96 | 7.83% | 6.94% | 0.89% |
| 7/96 | 7.78% | 7.05% | 0.73% |
| 8/96 | 7.59% | 6.88% | 0.71% |
| 9/96 | 7.76% | 7.00% | 0.76% |
| 10/96 | 7.50% | 6.78% | 0.72% |
| 11/96 | 7.21% | 6.55% | 0.66% |
| 12/96 | 7.33% | 6.56% | 0.77% |
| 1/97 | 7.53% | 6.82% | 0.71% |
| 2/97 | 7.47% | 6.70% | 0.77% |
| 3/97 | 7.70% | 6.96% | 0.74% |
| 4/97 | 7.88% | 7.13% | 0.75% |
| 5/97 | 7.72% | 6.93% | 0.79% |
| 6/97 | 7.55% | 6.73% | 0.83% |
| 7/97 | 7.29% | 6.53% | 0.76% |
| 8/97 | 7.39% | 6.58% | 0.81% |
| 9/97 | 7.33% | 6.49% | 0.84% |
| 10/97 | 7.18% | 6.33% | 0.85% |
| **AVERAGE** | **8.47%** | **7.68%** | **0.79%** |

Source: Moody's Bond Record
The Wall Street Journal

# RANDALL S. BILLINGSLEY

**December 1997**

## BUSINESS ADDRESSES

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Department of Finance
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## APPOINTMENTS

**1994 - Current:** Associate Professor of Finance
Virginia Polytechnic Institute & State University

**1993:** Vice President
Association for Investment Management and Research
Education and Programs Department

Duties: Project director, responsible for the development and design of education technology products. Projects included videos on options and futures analysis, ethical issues in the investment profession, and financial statement analysis for investment valuation and management.

Responsible for the design and offering of continuing education programs to meet the needs of AIMR's members in particular and the investment industry in general.

Associate Professor, On Leave of Absence
Virginia Polytechnic Institute & State University

**1987-1992:** Associate Professor of Finance
Virginia Polytechnic Institute and State University

**1981-1987:** Assistant Professor of Finance
Virginia Polytechnic Institute and State University

**1978-1981:** Lecturer of Finance
Texas A&M University

**1977-1978:** Lecturer of Economics
Research Assistant in Economics
Texas A&M University

**Summers 1978, 1980:** Research Associate
Texas Transportation Institute
Texas A&M University

Duties: (1978) Principal researcher and author of a study concerning design of optimal subsidy techniques for public transit projects. (1980) Co-author of research proposal for study of the projected economic impact of user charges on the Texas Gulf Intra-Coastal Waterway (proposal accepted and fully funded). Performed research concerning various policy issues in transportation economics.

## PROFESSIONAL DESIGNATIONS

**1986:** Chartered Financial Analyst (CFA)
The Institute of Chartered Financial Analysts
(Association for Investment Management and Research)

**1992:** Certified Rate of Return Analyst (CRRA)
National Society of Rate of Return Analysts

## EDUCATION

**1982:** Doctor of Philosophy in Finance, supporting field in Economics
Dissertation Title: "A Multivariate Analysis of Bank Holding Company Capital Note and Debenture Ratings"
Chairman: Dr. Donald R. Fraser

Texas A&M University

**1978:** Master of Science in Economics, supporting field in Statistics
Texas A&M University

**1976:** Bachelor of Arts in Economics
Texas Tech University

## PRIMARY TEACHING AND RESEARCH INTERESTS

**Teaching:** Investments, Corporate Finance, Financial Institution Management.

**Research:** General interests include investments, valuation methods, cost of capital analysis, primary market pricing of debt instruments, and banking and public utility regulatory issues.

## TEACHING HONORS

Teaching Excellence Award, The R. B. Pamplin College of Business, Virginia Polytechnic Institute and State University, 1986-1987.

Excellence In Teaching Award, MBA Association, Virginia Polytechnic Institute and State University, 1985-1986.

## PUBLICATIONS

### Journal Articles - Refereed

"The Benefits and Limits of Diversification Among Commodity Trading Advisors," *Journal of Portfolio Management*, Vol. 23, No. 1, Fall 1996, pp 65-80 (Author listing: R. S. Billingsley and D. M. Chance).

"Why Do Firms Issue Convertible Debt?," *Financial Management*, Vol. 25, No. 2, Summer 1996, pp. 93-99, (Author listing: R.S. Billingsley and O.M. Smith).

"Simultaneous Debt and Equity Offerings and Capital Structure Targets," *Journal of Financial Research*, Vol. 17, No. 4, Winter 1994, (Author listing: R. S. Billingsley, D. M. Smith, and R. E. Lamy).

"Regional Reciprocal Interstate Banking: The Supreme Court and the Resolution of Uncertainty," *Journal of Banking and Finance*, Vol. 16, No. 1, 1992, pp. 665-686, (Author listing: R. S. Billingsley and R. E. Lamy).

"Integration of the Mortgage Market," *Journal of Financial Services Research*, Vol. 6, 1992, 137-155, (Author listing: R. S. Billingsley, V. A. Bonomo, and S. P. Ferris).

"Units of Debt with Warrants: Evidence of the 'Penalty-Free' Issuance of an Equity-Like Security," *The Journal of Financial Research*, Vol. 13, No. 3, Fall 1990, pp. 187-199, (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith).

"Shareholder Wealth and Stock Repurchases By Bank Holding Companies," *Quarterly Journal of Business and Economics*, Vol. 28, No. 1, Winter 1989, pp. 3-25, (Author listing: R. S. Billingsley, D. R. Fraser and G. R. Thompson).

Abstract: *Journal of Economic Literature*, Vol. 27, No. 3, September 1989, p. 1503.

"The Regulation of International Lending: IMF Support, the Debt Crisis, and Bank Shareholders," *Journal of Banking and Finance*, Vol. 12, No. 2, 1988, pp. 255-274, (Author listing: R. S. Billingsley and R. E. Lamy).

"Put-Call Ratios and Market Timing Effectiveness," *Journal of Portfolio Management*, Vol. 15, No. 1, Fall 1988, pp. 25-28, (Author listing: R. S. Billingsley and D. M. Chance).

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"Bankruptcy Avoidance As A Merger Incentive," *Managerial Finance*, Vol. 14, No. 1, November 1988, pp. 25-33, (Author listing: R. S. Billingsley, D. J. Johnson, and R. P. Marquette).

"The Pricing and Performance of Stock Index Futures Spreads," *Journal of Futures Markets*, Vol. 8, No. 3, June 1988, pp. 303-318, (Author listing: R. S. Billingsley and D. M. Chance).

"The Choice Among Debt, Equity, and Convertible Bonds," The *Journal of Financial Research*, Vol. 11, No. 1, Spring 1988, pp. 43-55, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

"Valuation of Primary Issue Convertible Bonds," *The Journal of Financial Research*, Vol. 9, No. 3, Fall 1986, pp. 251-259, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

Abridged Reprint: *The CFA Digest*, Vol. 17, No. 2, Spring 1987, pp. 18-19.

"The Reaction of Defense Industry Stocks to World Events," *Akron Business and Economic Review*, Vol. 18, No. 2, Summer 1987, pp. 40-47, (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson).

"Listed Stock Options and Managerial Strategy," *Strategy and Executive Action,* No. 4, Fall 1986, pp. 17-20, 28, (Author listing: R. S. Billingsley and D. M. Chance).

"Reevaluating Mortgage Refinancing "Rules of Thumb," *Journal of the Institute of Certified Financial Planners*, Vol. 7, No. 1, Spring 1986, pp. 37-45, (Author listing: R. S. Billingsley and D. M. Chance).

"Explaining Yield Savings on New Convertible Bond Issues," *Quarterly Journal of Business and Economics*, Vol. 24, No. 3, Summer 1985, pp. 92-104, (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson).

Abstract: *Journal of Economic Literature*, Vol. 24, No. 2, June 1986, p. 1083.

"Options Market Efficiency and the Box Spread Strategy," *The Financial Review,* Vol. 20, No. 4, November 1985, pp. 287-301, (Author listing: R. S. Billingsley and D. M. Chance).

Reprint: *CFA Readings in Derivative Securities*, pp. 217-231, Charlottesville, VA: The Institute of Chartered Financial Analysts, 1988.

"Determinants of Stock Repurchases by Bank Holding Companies," *Journal of Bank Research*, Vol. 16, No. 3, Autumn 1985, pp. 128-35, (Author listing: R. S. Billingsley and G. R. Thompson).

"The Informational Content of Unrated Industrial Bonds," *Akron Business and Economic Review*, Vol. 16, No. 2, Summer 1985, pp. 53-58, (Author listing: R. S. Billingsley and R. E. Lamy).

"Split Ratings and Bond Reoffering Yields," *Financial Management*, Vol. 14, No. 2, Summer 1985, pp. 59-65, (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson).

"Determinants of Bank Holding Company Bond Ratings," *The Financial Review*, Vol. 19, No. 1, March 1984, pp. 55-66, (Author listing: R. S. Billingsley and D. R. Fraser).

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"Market Reaction to the Formation of One-Bank Holding Companies and the 1970 Bank Holding Company Act Amendment," *Journal of Banking and Finance*, Vol. 8, No. 2, 1984, pp. 21-33, (Author listing: R. S. Billingsley and R. E. Lamy).

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"Preliminary Study Indicates Optimal Number of Advisors May Be 40 +," *Managed Account Reports*, Issue No. 185, July 1994, p. 13.

"Managing Portfolios Using Index Options," *Futures*, Vol. 14, No. 9, September 1985, pp. 70-74, (Author listing: D. M. Chance and R. S. Billingsley).

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"The Evolution of Depository Institution Regulation In The United States," in *Banking and Monetary Reform: A Conservative Agenda*, Catherine England, pp. 47-56, Washington, D. C.: The Heritage Foundation, 1985, (Author listing: R. S. Billingsley).

*Fare Box and Public Revenue: How to Finance Public Transportation.* State Department of Highways and Public Transportation, Texas Transportation Institute, February 1980, (Author listing: R. S. Billingsley, P. K. Guseman and W. F. McFarland).

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"A Multivariate Analysis of the Ratings of Bank Holding Company Debt Issues," *The Financial Review*, Vol. 17, No. 2, July 1982, p. 57, (Author listing: R. S. Billingsley and D. R. Fraser).

**Editor**

"Corporate Decision Making and Equity Analysis," Seminar Proceedings, Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley, Editor), 1995.

"Industry Analysis: The Telecommunications Industry," Seminar Proceedings, Charlottesville, VA: The Association for Investment Management and Research, (Author listing: R. S. Billingsley, Editor), 1994.

## PAPERS PRESENTED AT PROFESSIONAL MEETINGS

"Further Evidence on the Gains from Diversification in Multi-Manager Programs," (Author listing: R. S. Billingsley and D. M. Chance). Presented at Managed Account Reports' conference, *Alternative Investment Strategies*, Chicago, Illinois, June 1995.

"The Gains from Diversification in a Multi-Manager Program: Some Preliminary Results," (Author listing: R. S. Billingsley and D. M. Chance). Presented at Managed Account Reports' conference, *Derivatives Investment Management*, Chicago, Illinois, July 1994.

"Estimation Bias in the Application of the Quarterly Discounted Cash Flow Model to Public Utility Cost of Capital Analysis," (Author listing: R. S. Billingsley and V. A. Bonomo). Presented at the Financial Management Association Meetings, San Francisco, California, October 1992.

"Firm Value and Convertible Debt Issues: Signalling vs. Agency Effects," (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith). Presented at the Eastern Finance Association Meetings, Hot Springs, Virginia, April 1991.

"The Valuation of Simultaneous Debt and Equity Offerings," (Author listing: R. S. Billingsley, R. E. Lamy, and D. M. Smith). Presented at the Financial Management Association Meetings, Orlando, Florida, October 1990.

"The Choice Between Issuing Convertible Bonds and Units of Debt with Warrants," (Author listing: R. S. Billingsley, R. E. Lamy and D. M. Smith). Presented at the Financial Management Association Meetings, New Orleans, Louisiana, October 1988. (Subsequently published in *The Journal of Financial Research*, see article citation.)

"The Choice Among Debt, Equity, and Convertible Bonds," (Author listing: R. S. Billingsley, R. E. Lamy, and G. R. Thompson). Presented at the Financial Management Association Meetings,

Las Vegas, Nevada, October 1987. (Subsequently published in *The Journal of Financial Research,* see article citation.)

"The Regulation of International Lending: IMF Support, the Debt Crisis, and Bank Shareholders," (Author listing: R. S. Billingsley and R. E. Lamy). Presented at the Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, Chicago, Illinois, May 1986. (Subsequently published in the *Journal of Banking and Finance*, see article citation.)

"Valuation of Primary Issue Convertible Bonds," (Author listing: R. S. Billingsley, R. E. Lamy and G. R. Thompson). Presented at the Financial Management Association Meetings, Denver, Colorado, October 1985. (Subsequently published in *The Journal of Financial Research*, see article citation.)

"The Economic Impact of Split Ratings on Bond Reoffering Yields," (Author listing: R. S. Billingsley, R. E. Lamy, M. W. Marr, and G. R. Thompson). Presented at the Financial Management Association Meetings, Toronto, Canada, October 1984. (Subsequently published in *Financial Management*, see article citation.)

"The Informational Content of Unrated Industrial Bonds," (Author listing: R. S. Billingsley and R. E. Lamy). Presented at the Financial Management Association Meetings, Atlanta, Georgia, October 1983. (Subsequently published in *Akron Business and Economic Review*, see article citation.)

"Bankruptcy Avoidance As A Merger Incentive: An Empirical Study of Failing Firms," (Author listing: R. S. Billingsley, R. P. Marquette, and D. J. Johnson). Presented at the Eastern Finance Association Meetings, New York, New York, April 1983. (Subsequently published in *Managerial Finance*, see article citation.)

"A Multivariate Analysis of the Ratings of Bank Holding Company Debt Issues," (Author listing: R. S. Billingsley and D. R. Fraser). Presented at the Eastern Finance Association Meetings, Jacksonville, Florida, April 1982. (Subsequently published in *The Financial Review*, see article citation.)

## PAPERS DISCUSSED AT PROFESSIONAL MEETINGS

"Behavioral Aspects of the Intra-Industry Capital Structure Decision," M. G. Filbeck, R. F. Gorman, and D. Preece. Presented at the Financial Management Association Meetings, San Francisco, California, October 1992.

"The Relationship Between the Argentinean Debt Rescheduling Announcement and Bank Equity Returns," Igbal Mansur, Steven J. Cochran, and David K. Seagers. Presented at the Financial Management Association Meetings, Boston, Massachusetts, October 1989.

"Model Specification In the Statistical Analysis of Bond Ratings," John J. Jackson and James W. Boyd. Presented at the Southern Finance Association Meeting, Washington, D. C., November 1983.

"The Effects of Inflation on Leverage, Risk, and Return," I. Keong Chew. Presented at the Financial Management Association Meeting, San Francisco, California, October 1982.

## PROFESSIONAL EDUCATIONAL SEMINARS PLANNED AND ORGANIZED FOR THE ASSOCIATION FOR INVESTMENT MANAGEMENT AND RESEARCH

"Effective Risk Management in the Investment Firm," Boston MA, October 1995. Conference Moderator: G. L. Gastineau.

"Equity Analysis: The Role of Corporate Financial Decision Making," Washington, D.C., January 1995. Conference Moderator: R. S. Billingsley.

"Blending Quantitative and Traditional Equity Analysis," Boston, MA, March 1994. Conference Moderator: H. R. Fogler.

"Industry Analysis: The Telecommunications Industries," New York, NY, November 1993. Conference Moderator: R. S. Billingsley.

## PROFESSIONAL SERVICE

**Board of Directors**
Society of Utility and Regulatory Financial Analysts, Vice-President

**Association for Investment Management and Research Activities**
(Formally the Institute for Chartered Financial Analysts).
Professional service beyond duties performed as Vice President at AIMR.

Grading Staff, Institute of Chartered Financial Analysts, June 1987.

Candidate Curriculum Committee, Institute of Chartered Financial Analysts, Quantitative Analysis Sub-Committee, 1987-1989.

CFA Examination Analysis Team, Levels I-III, March 1988.

CFA Examination Grading Review Team, July 1988.

Faculty, CFA Refresher Course, Valuation: Equity, Charlottesville, VA, June 1992, June 1993, June 1994, UCLA, November 1994.

Faculty, Basics of Equity Analysis, Montreal, Quebec, Canada, November 1994.

**Consulting Clients**

Association for Investment Management and Research

Bell Atlantic

BellSouth Telecommunications

The Financial Analysts' Review of the United States

Institut Penembangan Analisis Finansial, Jakarta, Indonesia

Securities Analysts' Association, Bangkok, Thailand

Union Bank of Switzerland, Zürich

United States Telephone Association

**Expert Witness Regulatory Testifying**

| Company | Docket No. | Year |
|---|---|---|
| BellSouth Telecommunications (Alabama) | ALPSC 26029 | 1997 |
| BellSouth Telecommunications (Georgia) | GAPSC 7061-U | 1997 |
| United States Telephone Association | FCC 96-262 | 1997 |
| United States Telephone Association | FCC: AA096-28 | 1996 |
| Southern Bell (South Carolina) | SCPSC 95-862-C | 1995 |
| United States Telephone Association | FCC 94-1 | 1994 |
| Southern Bell (South Carolina) | SCPSC 93-503-C | 1994 |
| Southern Bell (Georgia) | GPSC 3905-4 | 1994 |
| Southern Bell (Florida)* | FPSC 920260-TL | 1993 |

*Testimony filed, case settled.

**Manuscript Referee**

*Journal of Banking and Finance*

*Journal of Financial Research*

*Journal of Futures Markets*

*Financial Review*

*Quarterly Journal of Business and Economics*

*Quarterly Review of Business and Economics*

*International Review of Economics and Finance*

*Japan and the World Economy*

*Journal of Business Research*

*Journal of Economics and Business*

*Engineering Economist*

Program Committee, 1995,1994, 1993, 1992, 1991, Financial Management Association Annual Meeting.

Reviewer for 1992 Eastern Finance Association meeting papers.

Reviewer for 1985 Eastern Finance Association paper competition.

**SELECTED INVITED SPEECHES/WORKSHOPS**

Maryland - District of Columbia Utilities Association, "Telecommunications: Increasing Risk on the Horizon? An Investment Community Perspective, "71st Annual Fall Conference, Ocean City, MD, September, 1995.

Bell Atlantic, "Do the 'Traditional' Cost of Equity Estimation Methods Work in the Current Environment?" National Accounting Witness Conference, Landsdowne Conference Resort, VA, April 1994.

Southeastern Electric Exchange, "Trends in Estimating the Cost of Equity for Public Utilities," St. Petersburg, FL, October 1993.

Securities Analysts' Association, "Common Problems in Valuing Equity Securities," Bangkok, Thailand, April 1992.

Virginia Bankers Association, Group Five (Credit Policy Committee), "Want to Sell Your Bank?" Interstate Banking in 1987 and Beyond," Credit Policy Conference, Radford, VA, April 1987.