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DOCKETING DIVISION
PUBLIC UTILITIES COMMISSION OF OHIO

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Ameritech Ohio for Approval of an Alternative Form of Regulation.	)	Case No. 93-487-TP-ALT

TESTIMONY OF ROGER G. IBBOTSON
AMERITECH OHIO EXHIBIT 32.0
SUBJECT: COST OF EQUITY

Introduction

1. Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Roger G. Ibbotson. My business address is 135 Prospect Street, New Haven, Connecticut 06520.

2. Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR PRESENT POSITION?

A. I am a Professor in the Practice of Finance at the Yale School of Organization and Management, where I have taught since 1984. Prior to my current appointment, I taught finance at the University of Chicago for over ten years. In addition, I am President of Ibbotson Associates, Inc., a Chicago-based financial and economic consulting firm which I founded in 1977.

3. Q. PLEASE STATE YOUR QUALIFICATIONS AS THEY RELATE TO THIS PROCEEDING.

A. I received my Ph.D. in finance and economics in 1974 from the University of Chicago. I received my MBA in finance from Indiana University in 1967. My bachelor's degree, in mathematics, is from Purdue University.

I serve on the board of directors of a number of firms, including Ibbotson Associates, BIRR Portfolio Analysis

Inc., DFA Investment Dimensions Group, Inc., and The Institute for the Study of Security Markets. I am also the Director and Chairman of the investment committee of Hospital Fund, Inc. in New Haven. All of these organizations draw on my expertise in the area of finance.

I have published many books and articles on the topics of finance and, in particular, on estimating the cost of equity capital. A partial list of these publications includes: *Stocks, Bonds, Bills, and Inflation: The Past and the Future*; *Stocks, Bonds, and Inflation Japan*; *Investment Markets: Gaining the Performance Advantage*; *Global Investing: The Professional's Guide to the World Capital Markets*; *U.S. Treasury Yield Curves, 1926-1988*; "Price Performance of Common Stock New Issues" (*Journal of Financial Economics*, September 1975); and "The Demand for Capital Market Returns: A New Equilibrium Theory" (*Financial Analysts Journal*, January/February 1984).

In addition, I am on the editorial board of *Financial Management*, *The Journal of Applied Corporate Finance*, and *Financial Analysts Journal*.

I have also given many speeches and lectures related to these areas.

I have testified in person, submitted affidavits, and entered statements in numerous Federal and state proceedings regarding the rates of return in rate-regulated industries including the telecommunications industry. Further details of my background and qualifications are in my *curriculum vitae*, which is attached to this testimony as Attachment 32.1.

4. Q. PLEASE DESCRIBE THE WORK DONE BY YOUR FIRM, IBBOTSON ASSOCIATES, IN MORE DETAIL.

A. Ibbotson Associates is a leader in capital market data, software, and consulting in matters related to the estimation of the cost of capital, valuation, and other similar matters.

Ibbotson Associates is the premier supplier of aggregate capital market data to the investment and corporate finance communities. My book with Rex A. Sinquefield, *Stocks, Bonds, Bills, and Inflation: The Past and The Future*, is generally considered to contain the first accurate estimate of the equity risk premium for the Capital Asset Pricing Model. Subsequent editions of this book were published commercially in 1979, 1982, and 1989; and yearly updates of the book (starting with the 1983 edition), called *Stocks, Bonds, Bills, and Inflation Yearbook*, "Quarterly Market Report," and "Monthly Market Report," are distributed by Ibbotson Associates to its clients in hard-copy and computer-readable form. This client base of about 2500 subscribers represents practically all of the firms involved in investment management, as well as a large share of the corporate finance, investment banking, consulting, and academic communities.

Ibbotson Associates distributes data on dozens of asset classes worldwide (not all of which are contained in the above publications). These data are collected from various sources, carefully checked and processed, and presented in computer-readable form in a product called *EnCORR/Analyzer*. Ibbotson Associates' reputation as the industry leader in aggregate capital market return data rests substantially on the quality of *EnCORR/Analyzer* data, as well as on its publications. This information is widely used and cited in legal proceedings.

Ibbotson Associates is also widely known and used for its specialty consulting expertise. Our consulting activities span finance and economics, but are concentrated in investment research, portfolio strategy, cost of capital and rate of return analysis, and the economic support of litigation.

Purpose of Testimony

5. Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to develop an estimate of the market required rate of return on equity capital for Ameritech Ohio. To do this, I use a Discounted Cash Flow Model (DCF) and the Capital Asset Pricing Model (CAPM) or *beta model*. Both of these methods rely on market data. These methods are widely used by investors for computing required rates of return in the investment community. Investors calculate required rates of return to help analyze the value of securities so they can decide to buy, hold, or sell them.

The market required rate of return is also equal to the cost of equity (opportunity cost of investing in a particular equity). This is the return that is foregone by *not* making the next-best investment having comparable characteristics. This foregone return is the expected return on the next-best investment. In a world where there are many investment opportunities, the expected return on a particular security is the same as the expected return on the next-best alternative security having comparable risks.

I use multiple approaches because each has unique strengths and each focuses on different attributes of the business whose cost of equity is being estimated. The results of one approach can be used to check the results using another.

I should begin by noting that in developing my DCF and CAPM cost of equity estimates, I use market data for Ameritech as a proxy for that of Ameritech Ohio. Ameritech Ohio is a wholly-owned subsidiary of Ameritech, providing mostly regulated telephone service. Its stock is not separately traded, so there are no reliable market data on Ameritech Ohio. I believe Ameritech's market data to be reasonable proxies for Ameritech Ohio's because, as seen in Attachment 32.2, Ameritech's regulated telephone sector represents an estimated 92 percent of Ameritech's assets, 84 percent of Ameritech's total revenues, and 88 percent of Ameritech's net income. Because Ameritech Ohio and the other regulated telephone operating companies are such a large part of Ameritech, any market assessment of Ameritech's stock price and future dividend growth must be largely influenced by the market's assessment of Ameritech Ohio and the four other regulated Bell operating companies subsumed in Ameritech. Thus, Ameritech's stock price and future expected dividend growth should be good proxies for those of Ameritech Ohio.

6. Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. The first section of my testimony covers my use of the DCF method. I begin this section with a discussion of DCF models both in general and theoretical terms, followed by my specific application to derive Ameritech's cost of equity. The second section of my testimony covers the CAPM. As I do in the DCF section of my testimony, I first describe the CAPM in general terms, followed by a more theoretical exposition. I follow these sections with a brief summation of my assumptions and conclusions (for both methods) as they relate specifically to Ameritech. The third section discusses the importance of including flotation costs in the cost of equity calculation and provides specific estimates for those costs. I then summarize the results and recommend a cost of equity for Ameritech Ohio. My testimony concludes with comments on the Staff Report of Investigation in this proceeding.

7. Q. BOTH THE DCF AND CAPM RELY ON FORECASTS OF KEY VARIABLES. WHAT TYPE OF DATA DO YOU USE TO FORECAST THE VALUE OF THESE VARIABLES?

A. The specific data I use and the estimation procedure for each variable depends on what the market uses for each variable, and is discussed later in my testimony. In general, current data are preferable, particularly when that data indicates what forecasts the market itself is making for particular variables. For certain variables, however, this is not possible. For these variables I rely primarily on historical data to make a forecast, because that is a common practice in the market.

8. Q. WHAT DO YOU MEAN BY THE TERM "FORECASTS THAT THE MARKET ITSELF IS MAKING"?

A. By "forecasts that the market itself is making," I mean forecasts that investors are making in estimating the value of securities for the purpose of deciding to buy, hold, and sell them.

9. Q. WHAT DO YOU MEAN BY "CURRENT DATA" WITH RESPECT TO THESE VARIABLES?

A. By "current data" I mean either the latest data point or an average of recent data points. Current data are relevant because that is what the market uses; for example, in measuring the riskless rate, bond yields other than the current yield -- or stock prices other than the current price -- contain information that the market has already discarded and replaced. However, bond yields and stock prices are volatile, making it difficult to figure out what the "current" yield or price is. To reduce variability of the estimate I therefore average the last three month-end bond yields and stock prices.

10. Q. ARE THE DCF AND THE CAPM INDEPENDENT OF EACH OTHER?

A. Yes. Each approach models the cost of equity differently. They can both apply to the same securities in the same economy, however, and if it were possible to estimate both with exact precision, would give the same answer.

11. Q. DO THE DCF AND CAPM ESTIMATES REACT IN THE SAME MANNER TO NEW INFORMATION?

A. As investors learn about changes in general economic conditions, or a company's earnings potential or risk profile, they reprice the stock, which causes a corresponding immediate change in the DCF estimate of the cost of equity. It also causes a corresponding change in the instantaneous beta and in the CAPM cost of equity based on that instantaneous beta. It is not possible, however, to calculate instantaneous betas. Most investors use 60 months of data to calculate a beta. In practice, then, any new information that impacts the stock price is incorporated into the DCF cost of equity a little more quickly than into the CAPM cost of equity.

On the other hand, changes in interest rates -- which are reflective of other types of general economic changes, such as a change in inflation -- are incorporated instantaneously into the CAPM estimate of the cost of equity, but not into the DCF, which incorporates this type of information a little more slowly.

The Discounted Cash Flow Approach

12. Q. PLEASE DESCRIBE THE DCF MODEL IN GENERAL TERMS.

A. DCF refers to an approach rather than a specific model (unlike the CAPM). The DCF approach (sometimes referred to as the "Income Method") is commonly used to determine the present value, or simply the value, of a series of future cash flows. Alternatively, given a set of future cash flows, the DCF approach can be used to determine the rate of return required to equate the cash flows with some observed value. It is the latter formulation which I use to estimate Ameritech's cost of equity.

In using the DCF approach to estimate the cost of equity for a firm, one assumes that investors set the price of the stock of company *s* based on the amount of cash they expect to receive from holding the stock (that is, dividends), and a company-specific cost of equity, r_s, which accounts for both the time value of money (as represented by the riskless rate) and the specific risk of investing in company *s*. Thus, by knowing the value of the stock and the expected future dividends, one can estimate the cost of equity which investors have implicitly used in setting the stock's price. This cost of equity incorporates investors' perception of the risk inherent in the future cash flows, making the estimates obtained from the DCF method, if used correctly, an appropriate measure of the market required rate of return on equity capital.

13. Q. WHY DO YOU USE THE DCF APPROACH AS WELL AS THE CAPM TO ESTIMATE AMERITECH'S COST OF EQUITY?

A. I use a DCF model in conjunction with the CAPM for several reasons:

1. The DCF approach is easy to understand, widely used, and well-accepted by investors trying to ascertain the value of securities for the purpose of deciding whether to buy, hold, or sell them, and for corporate planning;

2. A DCF model incorporates the market's *current* assessment of the company as captured in the current price of the company's stock; and

3. No matter how good any one approach is in estimating the cost of equity, it is usually advisable to corroborate results by using a different, and independent, approach. In this

respect, the CAPM is a good complement to the DCF approach.

14. Q. PLEASE DESCRIBE THE THEORETICAL BASIS FOR THE DCF APPROACH.

A. The DCF approach is based on the basic economic principle of present value. Investors will not pay a dollar today to receive a dollar tomorrow; rather, they require a positive return on their investment. In particular, investors expect to receive $\$1.00 \times (1 + r_s)^t$ in the future, where r_s is the expected rate of return on investment s, and t is the number of time periods until they receive their money. As discussed earlier, this rate of return accounts for both the time value of money and the risk of the investment. The higher the value of r_s, the greater the amount of money the investor expects to receive.

This very simple example can be expanded to a more generalized formula for computing the present value of cash flows generated by a company into perpetuity:

$$PV = \sum_{t=1}^{\infty} \frac{CF_t}{(1+r_s)^t} \qquad \textbf{(1)}$$

where:

PV = the present value of all future cash flows,

CF_t = the cash flow (or dividend) expected to be received at the end of time period t, and

r_s = the cost of equity for company s.

This more complex formula, however, makes it more difficult to estimate the cost of equity, r_s.

In its application to estimating the cost of equity, the PV is assumed to be the current stock price and the CF_t is the dividend paid at the end of time period t. Presuming that markets are efficient, that is, they embody all relevant information known about any particular asset at each point in time, then the asset's price is an accurate measure of its value. Furthermore, in setting this price, market participants (investors) forecast that they will receive certain cash flows from their investment and they have imputed a rate of return so that the market price equals the present value of these cash flows. This rate of return must be sufficient for investors to be willing to invest in the asset at its current price.

If it were possible to know all the forecasts of all cash flows into perpetuity that the price-setting market participants actually used to arrive at the current price of Ameritech stock, the rate of return equating those forecasted cash flows with the present price would be an exact measurement of Ameritech's cost of equity. Of course, it is not possible to observe the behavior of market participants in such detail and, because of this, any DCF model requires several assumptions.

15. Q. IS THERE A SIMPLIFIED VERSION OF THE DCF THAT IS FREQUENTLY USED TO ESTIMATE THE COST OF EQUITY?

A. One type of DCF model which is widely used in many situations is the Constant Growth Model, or Gordon growth model (named after Professor Myron J. Gordon). The Gordon growth model is often used because it is a simple model of the cost of equity. Its applicability does not depend on the industry being considered, and it is employed in the utility and telecommunications industry as well as every other industry that I know of.

When I say that the Gordon growth model is employed, I mean two things: (1) it is used by corporate financial executives for forecasting, strategic planning, investment decisions, and so forth; and (2) it is used by investors and investment analysts for the purpose of ascertaining security value.

The model can be stated as:

$$PV = \frac{D_1}{r_s - g} \tag{2}$$

where:

PV = the price of the stock,

r_s = cost of equity,

D_1 = the dividend payment expected to be received by investors at the end of the next time period (period 1), and

g = the expected annual growth rate of dividends.

Equation (2) is a simple annual constant growth equation that does not take into account different growth rates or the quarterly payment of dividends. In this context, D_0, the "current" dividend, means the dividend that would be paid at time 0 if dividends were paid annually. ("Time 0" represents the present time.) In contrast, D_1 is the expected dividend twelve months after time 0.

Besides the assumptions inherent in the generalized formulation of the DCF model, the results derived using the Gordon growth model are based on the assumption that the dividend growth rate will remain constant into perpetuity. Because of this simplifying assumption, computing the cost of equity using the Gordon growth model is relatively straightforward:

$$r_s = \frac{D_1}{PV} + g \tag{3}$$

This model is appropriate for a hypothetical company that is expected to remain in a roughly steady state of growth forever into the future. That is, there are no anticipated structural changes to the company, its industry, or the economy that would cause future growth to be something other than constant.

16. Q. HOW IS THE GROWTH RATE IN THIS DCF MODEL DETERMINED?

A. The most accurate way of estimating the cost of equity using this simple DCF model is to use estimates of growth that are representative of what participants in the market are themselves using. The consensus forecasts of the Institutional Brokers Estimate System ("I/B/E/S") service are an excellent source of these data. This service provides averages of financial analysts' forecasts from more than 100 leading investment firms. It is the preferred data source because it does not rely on any one analyst's estimates and therefore represents a consensus of market forecasts of future earnings growth. The earnings per share growth forecast from I/B/E/S is used as a proxy for dividend growth. This is reasonable if there is no reason to believe the dividend payout ratio will change dramatically in the future. Thus, the I/B/E/S growth estimates are good proxies for investors' expectations of future dividend growth (as embodied in the stock price).

Unfortunately, the forecasts provided by I/B/E/S only cover the next five years. Using these relatively short-term forecasts to estimate both the short-term and long-term growth rates embodied in the current stock price can result in a misstatement of the implied cost of equity for a firm whose long-term prospects may be different from its near-term prospects.

By these comments, however, I am not implying that a DCF approach is inappropriate for estimating the cost of equity; rather, the simple constant growth DCF approach must be modified to incorporate more realistic estimates.

17. Q. HOW MIGHT THE SIMPLE CONSTANT GROWTH DCF BE MODIFIED TO BE A MORE APPROPRIATE DCF MODEL FOR AMERITECH?

A. A DCF model having two or more stages of growth should be used. This more accurately models the cash flows, or dividends, for firms that are in changing markets, such as Ameritech. I have used a two-stage DCF model to estimate Ameritech's cost of equity.

18. Q. ARE TWO-STAGE DCF MODELS OF THE COST OF EQUITY USED BY MARKET PARTICIPANTS?

A. Yes.

19. Q. HOW DO YOU KNOW?

A. I know this by virtue of my personal experience in advising investors, investment management firms, securities dealers, corporate planners, and others over a period of more than 25 years.

20. Q. WHY HAVE YOU CHOSEN TWO STAGES?

A. I have chosen two stages because of the types of forecast information available. The first stage (the next five years) is a period for which there is a large amount of forecast information. The second stage reflects the growth of Ameritech beyond five years.

21. Q. PLEASE DESCRIBE THE TWO-STAGE MODEL IN MORE DETAIL.

A. As stated earlier, the DCF approach equates a stock's price with the present value of the future dividend stream discounted at the firm's cost of equity. In using a two-stage DCF model, there is one simplifying assumption: dividends grow at constant rates within each stage. This approach is not as restrictive as, and hence is more realistic than, the single stage growth rate assumption used when applying the Gordon model. The resulting two-stage model can be stated as:

$$PV = \sum_{t=1}^{5} \frac{D_0 (1+g_1)^t}{(1+r_s)^t} + \sum_{t=6}^{\infty} \frac{D_5 (1+g_2)^{t-5}}{(1+r_s)^t} \qquad \textbf{(4)}$$

where:

PV = the current stock price,

D_0 = the current dividend,

D_5 = the expected dividend at the end of year 5, which is equal to $D_0 \times (1 + g_1)^5$,

r_s = the cost of equity,

g_1 = the expected dividend growth rate during the first stage (the first five years), and

g_2 = the expected dividend growth rate during the second or perpetual stage (years six to infinity).

Note that the current dividend, D_0, in equation (4) is different from the D_1 term in equations (2) and (3). D_0 and D_1 are related according to:

$$D_1 = D_0 \times (1 + g) \qquad \textbf{(5)}$$

That is, D_1 is larger than D_0 by the amount of one year's dividend growth at rate g.

Solving equation (4) for the cost of equity, r_s, is considerably more complicated than in the case of a single growth rate. It involves an iterative procedure which is best done using a computer.

22. Q. HOW OFTEN ARE DIVIDENDS ASSUMED TO BE PAID IN THIS FORM OF THE DCF?

A. In the form of the DCF model given above, the dividends are assumed to be paid to investors at the end of each year.

In actuality, Ameritech pays dividends quarterly. After I have presented my annual DCF estimate of the cost of equity, I will adjust it for the quarterly payment of dividends.

23. Q. HOW DO YOU ESTIMATE AMERITECH'S GROWTH RATE FOR THE FIRST STAGE?

A. The growth rate in the first stage, g_1, is the median earnings per share growth forecast for Ameritech as given in the April 14, 1994 issue of I/B/E/S. As I discussed earlier, this is one of the most widely used sources for five-year earnings forecasts. This estimate is 6.0 percent and is shown in Attachment 32.3.

24. Q. ARE COMPANY-SPECIFIC FORECASTS OF EARNINGS, DIVIDENDS, ETC. AVAILABLE BEYOND FIVE YEARS?

A. They are generally not available -- market analysts usually do not make such forecasts. I/B/E/S provides no information on any company beyond the first five year period.

25. Q. HOW DO YOU ESTIMATE AMERITECH'S GROWTH RATE FOR THE SECOND STAGE?

A. For the second stage, I have used the historical long-term real growth in the economy as an estimate of the real growth in Ameritech's businesses and then added investors' expectations of long-term inflation to arrive at a nominal growth forecast.

I measured the historical long-term growth in the economy by computing the compound annual growth in real (adjusted for inflation) Gross Domestic Product ("GDP"). The growth rate in real GDP for the period 1926 to 1993 was approximately 3.1 percent, as shown in Attachment 32.4. With only a few exceptions, growth in real GDP has been reasonably stable over time. Therefore, I consider its historical performance to be a good estimate of expected long-term (future) performance. As mentioned earlier, I use historical data only in the absence of a relevant, market-based forecast that uses current information.

In the case of long-term inflation, I do have an estimate of what the capital markets expect long-term inflation to be. This expectation is 4.7 percent. An explanation of how I ascertained this forecast of inflation is given in Attachment 32.5.

Adding the 3.1 percent real GDP growth estimate and the expected 4.7 percent inflation rate, I obtain an expected long-term growth rate for the economy of 7.8 percent.

26. Q. WHY IS THE LONG-TERM GROWTH RATE IN THE ECONOMY A REASONABLE PROXY FOR THE GROWTH OF AMERITECH?

A. The most comprehensive measure of growth for all sectors of the U.S. economy is GDP growth. To the extent that Ameritech's client mix mirrors the mix of participants in the entire U.S. economy, the growth in the U.S. economy is a good proxy for Ameritech's.

27. Q. HOW DOES GENERAL ECONOMIC GROWTH TRANSLATE INTO GROWTH FOR AMERITECH?

A. The demand for Ameritech's services is a function of the economic fortunes of its clients; as these customers grow, their demand for Ameritech's services should grow. These customers, which include large numbers of both businesses and households, span most of the sectors of the U.S. economy. The Great Lakes region of the United States, which Ameritech serves, has enjoyed economic growth mirroring that of the country overall.

28. Q. WHY HAVE YOU INCLUDED AN INFLATION FORECAST?

A. The cost of equity I am trying to estimate is a nominal rate. That is, investors expect to receive a (nominal) rate of return which consists of a real rate of return plus expected inflation. The real rate of return is a function of various factors, such as investment risk. The expected long-term inflation rate must be added to the real rate of return because, in order to forego consumption, investors require a rate of return that is no less than expected inflation. Thus, to ensure that this expected inflation rate is captured in the cost of equity, I have to include it in the earnings growth rate.

29. Q. RECENT INFLATION RATES HAVE BEEN AROUND 3 PERCENT. WHAT IS THE BASIS FOR YOUR FORECAST OF A LONG-RUN EXPECTED INFLATION RATE OF 4.7 PERCENT?

A. Long-term U.S. Treasury bonds currently have yields in excess of 7 percent. If investors expected inflation to remain at 3 percent, the inflation-adjusted yield on long-term bonds would be above 4 percent. Bonds would be unusually attractive, because it would be possible to "lock in" a real return of 4 percent per year in default-free Treasury securities. This has almost never been the case over any extended period --

historically, real returns on long-term bonds have averaged 2.31 percent.

I use this information to ascertain what the market expects long term inflation to be. Subtracting 2.31 percent real returns from the recent average long-term Treasury bond yield of 7.02 percent, I arrive at a long-run inflation forecast of 4.71 or (rounding) 4.7 percent. I describe the derivation of the recent average bond yield later, in my testimony on the CAPM.

30. Q. WHAT WERE THE RESULTS OF YOUR DCF ANALYSES FOR AMERITECH?

A. My results are based on using an average of Ameritech's closing stock prices on February 28, 1994 ($40⅛), March 31, 1994 ($38⅛), and April 29, 1994 ($39⅜). The average of these three prices, which I input into the two-stage DCF model, is $39.21. The dividend amount used in this model is Ameritech's current quarterly dividend of 48¢. As stated earlier, I have used a 6.0 percent dividend growth rate for each year of the next five years, and a 7.8 percent annual dividend growth rate thereafter. Using the two-stage annual DCF model, the cost of equity for Ameritech is 12.7 percent. The results of this analysis are shown in Attachment 32.3.

Adjustment for Quarterly Payment of Dividends in the DCF Model

31. Q. DOES THIS RESULT REFLECT THE FACT THAT DIVIDENDS ARE PAID QUARTERLY?

A. No. In the form of the DCF model shown in equation (4), dividends are assumed to be paid to investors at the end of each year. Of course, Ameritech's dividends are paid quarterly. Because of this fact, any result using an annual model must be adjusted to take into account quarterly dividend payments.

32. Q. WHY MUST THE ANNUAL MODEL BE ADJUSTED?

A. Investors who receive quarterly dividend payments have the opportunity to reinvest their dividends. This implies that the total cash flow these investors receive over the course of the year is the sum of the quarterly dividends *plus* any cash flow they receive from reinvesting those dividends. Therefore, the annual DCF model must be adjusted to reflect the impact of the quarterly cash flows.

33. Q. HOW DOES THE TWO-STAGE MODEL ALLOWING FOR QUARTERLY DIVIDEND PAYMENTS DIFFER FROM THE ANNUAL TWO-STAGE MODEL?

A. The two-stage model, incorporating the quarterly dividend payments and reinvestment, is similar to the two-stage model I gave earlier. This model can be stated as:

$$PV = \sum_{t=1}^{\infty} \frac{Dadj_t}{(1+r_s)^t} \tag{6}$$

where $Dadj_t$ is the annual dividend rate adjusted for quarterly payment and reinvestment of dividends and is given by:

$$Dadj_t = \sum_{i=1}^{4} \left[D_0 (1+r_s)^{1-0.25i}\right] \left[(1+g_1)^{0.25i+t-1}\right] \tag{7}$$

when t ranges from 1 to 5 years and

$$Dadj_t = \sum_{i=1}^{4} \left[D_5 (1+r_s)^{1-0.25i}\right] \left[(1+g_2)^{0.25i+t-6}\right] \tag{8}$$

when t is greater than 5 years; and the other variables are as I described them before.

34. Q. WHAT IS THE COST OF EQUITY OF AMERITECH USING THE QUARTERLY FORM OF THE TWO-STAGE DCF MODEL?

A. It is 12.8 percent.

35. Q. STATED IN THE FORM OF AN ADJUSTMENT TO THE COST OF EQUITY FROM THE ANNUAL MODEL, WHAT IS THE EFFECT OF QUARTERLY PAYMENT AND REINVESTMENT OF DIVIDENDS?

A. The cost of equity is 12.7 percent using the annual model; hence, the adjustment for the quarterly payment and reinvestment of dividends is 0.1 percent.

The Capital Asset Pricing Model

36. Q. PLEASE DESCRIBE THE CAPM IN GENERAL TERMS.

A. In general, the return an investor would expect to receive on an asset increases as the riskiness of that asset increases. The CAPM is a simple and elegant model that directly captures this essential premise and describes the expected return on any security or portfolio of securities in terms of the expected return on the overall market for securities (stocks, bonds, etc.).

37. Q. WHY HAVE YOU CHOSEN THE CAPM AS ONE OF THE WAYS TO ESTIMATE AMERITECH'S COST OF EQUITY?

A. My reasons for using the CAPM to estimate Ameritech's cost of equity are:

1. The CAPM describes the most basic principle in finance -- the relationship between risk and return. While not all investors frame their expectations in the formal way implied by the CAPM, all investors expect to be compensated for taking risk. Thus the CAPM expresses the expectations of investors, and simplifies them in a way that enables the analyst to calculate those expectations based on a few easily observable data points.

2. The CAPM has been thoroughly researched and empirically tested over the past 25 years, and shown to be effective in estimating the cost of equity.

3. The CAPM uses only publicly available data from the market, and a single formula so that the resulting cost of equity estimate is objective, reproducible, and less susceptible to miscalculation than other methods.

4. The CAPM is intuitively appealing in that (1) it says investors demand and receive a risk premium for holding stocks instead of riskless bills or bonds, and (2) it relates the return and risk of any stock to that of the market as a whole -- that is, it says that every

security is priced in the context of all of the opportunities investors have available to them.

38. Q. IS THE CAPM WIDELY USED?

A. Yes. The CAPM is widely used to estimate the cost of equity in a number of different contexts. It has been used for decades by practitioners in the area of finance, including portfolio managers, investment advisors, security analysts, and appraisers. It is also used in corporate finance departments for capital budgeting purposes. It is used by regulatory commissions in a number of different jurisdictions.

39. Q. WHAT DOES THE CAPM SAY ABOUT THE COST OF EQUITY?

A. The CAPM represents that the cost of equity for any company's stock is equal to the riskless rate plus an amount proportional to the amount of systematic risk in that stock. Systematic risk is the risk that comes from the co-movement of a stock with the overall market, and is considered, in the CAPM, to be the only risk for which investors can expect to be compensated by a higher expected return.

40. Q. WHAT IS THE MATHEMATICAL FORM OF THE CAPM?

A. It is:

$$r_s = r_f + [\beta_s \times RP] \tag{9}$$

where:

r_s = cost of equity for company s;

r_f = expected total return of the riskless asset;

β_s = the beta factor of the stock of company s; and

RP = the expected equity risk premium.

41. Q. WHAT IS THE BETA FACTOR?

A. The beta factor, or simply the *beta* of a stock, measures the systematic risk of a security. Its mathematical form is:

$$\beta = \frac{cov(r_s, r_m)}{var(r_m)} \tag{10}$$

where:

$cov(r_s, r_m)$ = expected covariance between the return on portfolio or security *s* and the return on the market *(m)*, and

$var(r_m)$ = expected variance of the market return.

42. Q. WHAT IS RP?

A. RP is the equity risk premium. In general terms, the equity risk premium is the return on the overall stock market minus the return on the riskless asset. Before I continue discussing some of the important aspects of this variable, however, I would like to first define some terms that I plan to use throughout this portion of my testimony. There are actually three separate concepts that are commonly referred to as the equity risk premium:

- *Realized Equity Risk Premium* -- This is the difference between the return on the overall stock market and the income return on the riskless asset in any particular year. It is a measurement of what happened in the past on a year by year basis.

- *Historical Equity Risk Premium* -- This is an average of a number of realized risk premia.

- *Expected Equity Risk Premium* -- This is what investors in stocks *expect* to be compensated over and above the rate on the riskless asset in the future. Unlike the other two concepts referenced above, it is a forward-looking concept.

Henceforth in this testimony, the symbol RP will be used only to represent the *expected* equity risk premium.

43. Q. WHY IS RP MULTIPLIED BY THE COMPANY BETA?

A. The product of the beta and the expected risk premium is the additional return that investors demand for accepting the risk of the stock of company *s* rather than investing in a riskless security. Because the expected risk premium used in the CAPM is an expectation, it is not directly observable. I therefore estimate it by examining the historical risk premium. The manner in which this is done is discussed later in my testimony.

44. Q. WHAT IS MEANT BY THE RISKLESS ASSET?

A. The CAPM implicitly assumes the presence of a single riskless asset, that is, an asset perceived by all investors as having no risk. I use the yield (or *income* return) on long-term U.S. Treasury obligations as the proxy for the nominal riskless rate of return. These obligations are practically default-free because of the ability of the U.S. government to create money to fulfill its debt obligations under virtually any scenario. While interest rate changes cause government obligations to fluctuate in price, investors face essentially no default risk as to either coupon payment or return of principal.

45. Q. WHY DO YOU USE THE INCOME RETURN ON LONG-TERM TREASURY BONDS RATHER THAN THE TOTAL RETURN?

A. When calculating the equity risk premium some persons subtract a long-term Treasury bond's total return, rather than its income return, from the total return on the overall stock market. (Income return is the return from a security solely due to its yield, and ignores capital gains or losses, which form the remainder of the total return.) The income return on Treasury issues is the correct measure of return to be subtracted from the stock market total return because it is the completely riskless portion of the issues' returns. (Treasury securities are subject to price risk -- that is, the capital gain component of the total return on a Treasury security is not riskless.)

Since the market provides a clear measure of what investors in Treasury obligations expected -- the bonds' yields or income returns -- this information should be used to estimate the riskless rate for the purpose of determining the equity risk premium (the realized, historical, and expected risk premia).

46. Q. WHY DO YOU USE DATA FROM THE PAST TO ESTIMATE THE EXPECTED RISK PREMIUM?

A. Unlike bonds, for which the expected total return is directly observable (as a yield), stocks have no *current* market-observable expected return. Therefore I examine what returns investors have received. I believe it is appropriate to do so because, over the long run, the historical risk premium has been relatively stable; and because investors also examine historical risk premia to estimate the expected risk premium.

47. Q. WHAT TIME PERIOD DO YOU USE TO COMPUTE YOUR ESTIMATE OF THE EXPECTED RISK PREMIUM?

A. I use the period 1926 to 1993 to derive my estimate of the expected risk premium. This data is obtained from Ibbotson Associates' *Stocks, Bonds, Bills, and Inflation 1994 Yearbook*. This widely-used and widely-cited publication contains a detailed statistical study of 68 years of market returns, from which investors obtain a numerical estimate of the expected risk premium for the overall stock market.

48. Q. WHY DO YOU USE SUCH A LONG TIME PERIOD AS THE BASIS FOR YOUR ESTIMATE?

A. The calculation of the historical risk premium is dependent on the length of the period studied. A valid estimate of the expected risk premium requires examination of realized risk premia over a long time period, long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated for long time periods, the historical risk premium is relatively stable. Furthermore, because an average of the realized risk premia is quite volatile when calculated over relatively short periods, a long period does not afford the increased opportunity to come up with any number desired by the observer.

49. Q. WHAT IS THE CORRECT WAY TO COMPUTE AN AVERAGE WHEN CALCULATING THE HISTORICAL RISK PREMIUM?

A. The correct way is to compute an arithmetic average. Upon first glance, the use of the arithmetic average seems counter-intuitive, so that the issue of the arithmetic versus the geometric average needs to be explained.

The arithmetic average (or mean) is the total of the year-by-year rates of return, divided by the number of years, and gives the performance in a typical single year. The geometric average is used by investors to construct a summary statistic of historical performance because it measures the constant single rate, which if compounded over a multiple-year holding period of variable returns, would have achieved the same total return as what was actually achieved. It works well as a performance summary because it requires only the beginning and end points of a wealth index, and takes no account of what happened between these points in time. This trait, which makes the geometric average a good summary statistic of past investment results, makes it a bad forecaster of future returns.

The realized equity risk premium is a random variable. (A random variable is a variable for which one can forecast the average, but not the deviations from the average.) It is statistically correct to say that the best forecast of the future value of a random variable is its past arithmetic average -- and the expected equity risk premium is the future, or expected, value of the realized equity risk premium. Thus the arithmetic average of realized equity risk premia is the best forecast of the expected equity risk premium.

The geometric average of the historical data, in contrast, has no forecasting applications because it is not a predictor of the future value of the data. The geometric average or the achieved compound annual rate of return will always be less than the arithmetic average. Only when returns are constant, in other words with no variability, will the geometric and arithmetic averages be the same. This is an algebraic result and is not dependent upon circumstances.

Attachment 32.6 illustrates this relation for historical returns. For each series (common stocks, corporate bonds, etc.), the geometric mean is lower than the arithmetic mean. Thus, to earn (for example) a compound rate of return of 10.3 percent in common stocks over the period 1926 to 1993, one had to have a single-year expectancy, or arithmetic mean return, of 12.3 percent every year over that period. In other words, because the total returns of these investments were *uncertain* from year to year, an investor would have had to expect the higher arithmetic mean in each year in order to achieve the lower geometric rate when compounded over time.

50. Q. CAN YOU GIVE A SIMPLE EXAMPLE WHICH DEMONSTRATES THE VALIDITY OF USING THE ARITHMETIC MEAN AS OPPOSED TO THE GEOMETRIC MEAN?

A. Yes. Suppose that one held a security with an arithmetic mean (or expected) return of 10 percent, with a standard deviation of 20 percent. (The standard deviation, which is a measure of the variability of returns around the average, reflects the uncertainty referred to earlier.) Suppose further that the returns alternate as follows:

+30%, -10%, +30%, -10%, ...

Any given pair of up and down years would have the compound (or geometric average) annual return of

$$[(1 + 0.30) / (1 - 0.10)]^{1/2} - 1 = 8.17 \text{ percent.}$$

Thus, one must have an expected return of 10% in each year (the arithmetic mean of +30 percent and -10 percent) in order to achieve an *ex post* compound return of 8.17 percent (the geometric mean of +30 percent and

-10 percent), given this particular return distribution.

Because I am trying to determine the expected risk premium, the historical arithmetic mean of the realized risk premia must be used to estimate the expected risk premium each year in order to compound to the geometric mean risk premium over multiple years. This principle is not new, and there is agreement on its appropriate application to this problem by the principal economic researchers of today.

51. Q. IN APPLYING THE CAPM TO AMERITECH, WHAT RISKLESS RATE DID YOU USE?

A. U.S. Treasury securities are regarded by market participants as a riskless (default-free) asset, but within this class of securities are instruments as diverse as 91-day Treasury bills and 30-year Treasury bonds. The proper selection of which security to use as the riskless asset is crucial to the proper implementation of the CAPM. The most significant difference between Treasury securities is their term to maturity. The instrument selected for the CAPM should have a maturity that matches the long time horizon. I believe that the 20-year bond is the Treasury security which best meets the criterion for a riskless security in this context.

For an investor who has a long time horizon, the price fluctuation risk of a long-term Treasury securities is not directly pertinent. Since the relevant investors in this case have long time horizons, a long-term Treasury bond is the most nearly riskless of the assets that could be used to represent the riskless rate.

Consequently, I use a three-month average (using the month-end values) of the yield to maturity on the 7-1/4% issue of May 2016 (which is the shortest, current-coupon issue that has a term of at least twenty years) as the rate on the riskless asset (r_f). The yield on this bond at the end of February 1994 was 6.37 percent; for March 1994 it was 7.25 percent; and in April 1994 it was 7.45 percent. The average yield for these three dates is 7.02 percent which is the value that I use for r_f.

52. Q. WHAT EXPECTED EQUITY RISK PREMIUM DID YOU USE FOR AMERITECH?

A. I estimated the expected risk premium as the difference between the historical arithmetic means (rounded to one decimal place) of:

- the annual returns on the overall stock market, as measured by the total annual return on the Standard and Poor's 500 Index ("S&P 500") -- of 12.3 percent; and
- the annual income returns on 20-year U.S. Treasury bonds -- of 5.1 percent.

These averages are measured over the period of 1926 to 1993. The difference, of 7.2 percent, is what I use as my estimate of the expected risk premium.

53. Q. WHAT IS YOUR SOURCE FOR BETA?

A. The betas I use were computed by Value Line and published in the *Value Line Investment Survey.* The betas for Ameritech and the other regional Bell operating companies (RBOCs) are shown in Attachment 32.7. The *Value Line Investment Survey* is a widely used source of statistical financial information about publicly-traded companies. These betas are calculated by using the last five years' weekly NYSE composite total returns and the subject company's weekly total returns. As I discussed earlier, the CAPM is a prospective model; thus the beta that is used in it for these purposes should also be prospective. Theoretically, beta is the ratio of an *expected* covariance to an *expected* variance. In practice it is difficult to ascertain these expectations, other than by assuming that the historical covariances and variances are expected to continue in the future. My approach, which is widely used by market participants and thus relevant to this proceeding, is to use historical covariances and variances.

I believe that the five-year past beta, which is relied upon by many practitioners, is a reasonable estimate of a company's future beta. If, however, the subject company's stock returns are expected to demonstrate more volatility than the overall stock market in the future (*e.g.*, due to an increasing level of competition within the industry in which the company operates), then its beta, as computed in this fashion, might understate its prospective beta. Thus, if the risk of Ameritech is expected to increase, this historical measure of beta does not fully capture that expectation, and the resulting cost of equity estimate is conservative.

54. Q. WHAT VALUE OF BETA DO YOU USE FOR AMERITECH?

A. The most recent beta for Ameritech's stock is 0.75.

55. Q. HOW DOES THE BETA OF AMERITECH COMPARE WITH THOSE OF THE OTHER RBOC'S?

A. Ameritech has the lowest beta of any of the RBOC's. The other RBOC's have Value Line betas between 0.80 and 0.95.

56. Q. WHAT ARE YOUR RESULTS FOR AMERITECH USING THE CAPM?

A. As given in equation (8), the form of the CAPM is:

$$r_s = r_f + \beta_s \times RP \tag{11}$$

and, as discussed above:

r_f = 7.02%, β_s = 0.75, and RP = 7.2%,

so that r_s, or the cost of equity, for Ameritech equals

7.02% + (0.75 × 7.2%) = 12.4% (rounded).

These results are summarized in Attachment 32.7.

57. Q. HOW DOES THE COST OF EQUITY YOU COMPUTED FOR AMERITECH USING THE CAPM COMPARE TO THAT OF THE OTHER MAJOR TELEPHONE UTILITIES?

A. In estimating the cost of equity for a particular firm, it is sometimes helpful to compare the results with the costs of equity for other firms in the same line of business, for the purpose of corroboration. I have performed CAPM analyses on the other RBOC's and the results for each are shown in Attachment 32.7.

The estimated CAPM costs of equity for these firms are close to one another and to that of Ameritech, ranging from a high of 13.9 percent (Southwestern Bell) to a low of 12.8 percent (BellSouth, NYNEX, and U S WEST). These results would tend to support a CAPM cost of equity of at least 12.4 percent for Ameritech, before allowance for flotation costs.

Flotation Costs

58. Q. DO YOUR DCF AND CAPM RESULTS INCLUDE ALL OF THE FACTORS THAT SHOULD BE CONSIDERED WHEN ESTIMATING AMERITECH'S COST OF EQUITY?

A. No, there is an additional adjustment which is often incorporated into the cost of equity. This is an adjustment to compensate for equity issue (or "flotation") costs. These costs must be paid by the firm to attract capital, so they should be included in the cost of equity. However, they are not received by the investor, and consequently cannot be discerned by observing market data. One must make an explicit adjustment to the cost of equity as determined by any of the methods I have previously discussed.

59. Q. WHY IS THIS A NECESSARY ADJUSTMENT?

A. The flotation adjustment is necessary because the proceeds received by the firm from a new issue are less than the amount of capital contributed by the investors. Investors, however, expect to receive a return on their entire capital contribution, not just the portion that has been realized by the company. Furthermore, investors' return expectations are formulated based upon the returns on other stocks with similar risk characteristics which investors could purchase on the open market. This is the expected return which the models I discussed earlier are estimating. For the investor to have the expectation of realizing such a return, an adjustment must be made for the diminution of the equity as a result of *all future* issuance costs.

As a very simplified example, if a company actually receives $9,600,000 of a $10,000,000 offering (that is, it bears flotation costs of 4 percent) and the investors expect a 12 percent rate of return, the company will actually have to realize a 12.5 percent rate of return in order to meet the investors' expectations. This is because the dollar earnings represented by 12.5 percent of $9,600,000 is equal to the dollar earnings represented by 12 percent of $10,000,000.

60. Q. HAVE THERE BEEN ANY EMPIRICAL STUDIES TO QUANTIFY FLOTATION COSTS?

A. Various studies have estimated the flotation costs associated with the raising of equity capital. Dennis E. Logue and Robert A. Jarrow have estimated that underwriting costs and expenses average four percent of gross proceeds for utility stock offerings. This same study (and another by John W. Bowyer and Jess B. Yawitz) suggest a market price pressure effect of about one percent. Thus, the total flotation costs amount to at least four percent, and about five percent if one incorporates the price pressure effect. (These studies address flotation costs for new equity issued by established companies and not for initial public offerings, for which these issuance costs are much higher.) The adjustment resulting from correcting for flotation costs is called an underpricing adjustment because underwriters of new issues price their offerings below market value to assure timely sale.

61. Q. HOW DID YOU ESTIMATE THE FLOTATION COSTS RELATED TO AMERITECH'S EQUITY?

A. I begin with the 4 percent estimate of direct underwriting costs and expenses from Logue and Jarrow -- for conservatism, I do not include the 1 percent price pressure effect. Now, for shareholders to recover flotation costs fairly, it is appropriate to distribute these costs over an indefinitely long period of time. The perpetuity model,

$$V = X/r ,$$

or

$$V \times r = X ,$$

where

V	=	present value of a perpetual cash flow stream,
X	=	periodic amount of the cash flow stream, and
r	=	discount rate or cost of capital,

suggests that the payment of a 4% flotation cost once is equivalent to payment of a flotation cost of

$$4\% \times 12.6\% = 0.504\%, \text{ or (rounding), } 0.5\%$$

per year in perpetuity. (I have used the average of the DCF and CAPM estimates of the cost of equity for Ameritech as the value of r in the perpetuity model.) I conclude that 0.5 percent per year should be added to the cost of equity to compensate for flotation costs.

Summary of Ameritech Cost of Equity

62. Q. PLEASE SUMMARIZE YOUR RESULTS FOR THE COST OF EQUITY OF AMERITECH USING THE METHODS YOU HAVE DISCUSSED.

A. Based on the analyses I have presented here, my estimates of Ameritech's market-determined cost of equity are:

Methodology	Base Cost of Equity	Flotation Costs	Total Cost of Equity
DCF	12.8%	0.5%	13.3%
CAPM	12.4%	0.5%	12.9%
Average	12.6%	0.5%	13.1%

I believe that the best estimate of the cost of equity for Ameritech is 13.1 percent.

63. Q. DOES YOUR 13.1 PERCENT COST OF EQUITY ESTIMATE REPRESENT YOUR VIEW OF THE COST OF EQUITY FOR THE TWELVE MONTH BASE YEAR IN THIS CASE, OCTOBER 1992 TO SEPTEMBER 1993?

A. No, it does not. My 13.1 percent cost of equity conclusion was based on DCF and CAPM estimates developed using the most recent stock prices, dividends, bond yields, and betas available. These data reflect economic and capital market conditions that prevail at the present time, not over the period from October 1992 to September 1993.

64. Q. IF YOU WERE TO ESTIMATE THE COST OF EQUITY SPECIFICALLY ASSOCIATED WITH THAT TIME PERIOD, HOW WOULD YOU DO THAT?

A. Since the cost of equity is a forward looking opportunity cost concept, the cost of equity for that time period should be estimated at the beginning of that time period.

65. Q. WOULD YOUR APPROACH TO ESTIMATING THE COST OF EQUITY BE THE SAME AS THAT WHICH YOU HAVE DESCRIBED PREVIOUSLY IN THIS TESTIMONY?

A. Yes, it would.

66. Q. HAVE YOU CONDUCTED AN ANALYSIS OF WHAT THE FORWARD LOOKING COST OF EQUITY RESULTS WOULD HAVE BEEN AT THE BEGINNING OF THAT TIME PERIOD?

A. Yes, I have. Using the same sources of DCF and CAPM variables as I have described and used previously in this testimony, I conclude that Ameritech's cost of equity would be 13.9 percent. The month-end Ameritech stock prices for July, August, and September 1992 were $69.50, $68.50, and $68.50 respectively (before adjustment for the January 1, 1994 stock split). The month-end Treasury bond yields for those same months were 7.44%, 7.45%, and 7.34% respectively. Applying the annual two stage DCF methodology previously described produces a result of 13.3 percent. Adjusting that to reflect the quarterly payment of dividends produces a result of 13.4 percent. Incorporating the effect of flotation costs produces a DCF cost of equity of 13.9 percent. Calculating the CAPM as I have previously described produces a result of 13.3 percent. Incorporating the effect of flotation costs produces a CAPM cost of equity of 13.8 percent. I conclude from these results that Ameritech's cost of equity at that time was 13.9 percent.

Application to Ameritech Ohio Cost of Equity

67. Q. HOW IS YOUR ESTIMATE FOR AMERITECH'S COST OF EQUITY APPLICABLE TO AMERITECH OHIO'S COST OF EQUITY?

A. As I indicated previously, Ameritech is a good proxy for Ohio Bell. This is consistent with the views expressed by the Commission.

Comments on the Staff Report of Investigation

68. Q. HAVE YOU HAD THE OCCASION TO READ AND FAMILIARIZE YOURSELF WITH THE RATE OF RETURN PORTION OF THE STAFF REPORT OF INVESTIGATION IN THIS PROCEEDING?

A. Yes.

69. Q. WHAT IS THE OVERALL APPROACH USED BY THE STAFF TO ESTIMATE THE COST OF EQUITY FOR AMERITECH OHIO?

A. The Staff uses a single stage, annual model applied to a group of telecommunications companies that they deem to be comparable to Ameritech. Within their model they use a variety of estimators for long-term dividend growth, one-year's historical dividend values, and twelve months of past stock prices.

70. Q. DO YOU HAVE ANY COMMENTS WITH RESPECT TO THE STAFF'S DIFFERENT DIVIDEND GROWTH RATES?

A. Yes. As I stated in my testimony, I believe that the expected growth in earnings is the best growth rate to use in the DCF approach. The Staff has included two Value Line measures of dividend growth (VLDG and VL Box Div), even though they recognize these as somewhat biased downward. I also note that the Staff has taken particular care to criticize approaches that are problematic, including the historical earnings growth rate and the B × R approach. Unfortunately, although they cite the inappropriateness of using B × R to estimate future growth for utilities in an increasingly competitive environment, they nonetheless use a forward looking B × R to develop a DCF cost of equity estimate.

71. Q. DO YOU HAVE ANY COMMENTS WITH RESPECT TO THE STAFF'S USE OF ONE YEAR HISTORICAL DIVIDEND VALUES AND TWELVE MONTHS OF PAST STOCK PRICES?

A. Yes. As I stated previously, I believe it is important to use current data whenever possible, including recent stock prices. The use of twelve months of historical prices may not be consistent with the current cost of equity. Also, the dividend value to be used in the DCF model is the dividend expected to be received in the future, not the past. Without the benefit of a stated DCF formula, one must guess how the historical dividends were used.

72. Q. DO YOU HAVE ANY COMMENTS WITH RESPECT TO THE STAFF'S USE OF A SINGLE STAGE, ANNUAL DCF MODEL?

A. Yes. As I stated in my testimony it is more realistic to construct a DCF model which takes into account different growth rates at different future stages. The

Staff apparently recognizes this need when they discuss the fact that using five-year EPS growth projections may produce a downward bias in the cost of equity estimate when future earnings growth is expected to accelerate after the projection period. Unfortunately, the Staff does not utilize a two stage DCF model that can account for different growth rates. Furthermore, the Staff's use of an annual DCF model does not reflect the fact that dividends are paid quarterly and that DCF estimates must incorporate the impact of such payments.

73. Q. ARE THE FLOTATION COSTS THAT THE STAFF IMPUTED TO AMERITECH'S EQUITY REASONABLE?

A. The 3.5 percent estimate is a little lower than the 4 to 5 percent estimate that I believe is appropriate. However, the Staff applies it only to externally raised equity. The part of Ameritech's equity that arises from retained earnings is considered by the Staff to have a zero issuance cost. This represents a misunderstanding; the Staff should have imputed issuance costs to all of Ameritech's equity.

74. Q. WHY?

A. The purpose of adjusting the cost of equity for flotation expenses is to ensure that Ameritech can issue shares *in the future* without diluting the existing shareholders' interests. To demonstrate, assume that in the absence of expected future flotation expenses, the fair market value per share of Ameritech stock is V and that flotation expenses are 4 percent of total issuance proceeds. To sell new shares without diluting the old ones, Ameritech must be able to sell shares at price (V ÷ 0.96). That is, the present value of expected future cash flows must be increased by a little more than 4 percent. In order to be fair to investors who buy Ameritech stock at different points in time, *each* cash flow should be increased by that amount. This is the effect of the 0.5 percent per year adjustment I have recommended.

Note that every dollar of the existing Ameritech shareholders' interest is protected from dilution by applying this formula. If one applies the Staff's formula, only about 40 percent of the existing Ameritech shareholders' interest is protected from dilution. This latter outcome, if implemented, would erode Ameritech's ability to secure new equity financing over time.

75. Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

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***Curriculum Vitae*, April 1994**

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Academic Appointments

Professor in Practice of Finance, Yale University, School of Management, 1984 to present.

Senior Lecturer in Finance, University of Chicago, Graduate School of Business, 1979 to 1984.

Executive Director, Center for Research in Security Prices, University of Chicago, 1979 to 1984.

Assistant Professor of Finance, University of Chicago, Graduate School of Business, 1975 to 1979.

Lecturer in Finance, University of Chicago, Graduate School of Business, 1971 to 1975.

Education

University of Chicago, Graduate School of Business, Ph.D., finance and economics, 1974.

Indiana University, Graduate School of Business, MBA, finance, 1967.

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Purdue University, BS, mathematics, 1965.

Business Experience

President, Ibbotson Associates, Inc., Chicago, a consulting firm specializing in economics, investments, and finance, 1977 to present.

Director and Principal, BIRR Portfolio Analysis Inc., Durham, NC, 1989 to present.

Director, DFA Investment Dimensions Group, Inc., Santa Monica, 1981 to present.

Director, Constitution Capital Management Company, Hartford and Boston, 1985 to 1992.

Director and Chairman of the Investment Committee, Hospital Fund, Inc., New Haven, 1985 to present.

Director, The Institute for the Study of Security Markets, 1987 to present, Memphis State University.

Director, JLS Industries, Inc., Hamden, CT, 1983 to present, a consulting firm jointly owned with Jody L. Sindelar.

Director, The Hospital Foundation for Research and Education, New Haven, CT, 1991 to present.

Treasurer, Phyllis Bodell Infant Toddler Program, Yale University, 1988 to 1989.

Advisory Board Member, Oberweis Securities, Inc., Aurora, Illinois, 1982 to 1986.

Director, CAPM Corporation, an educational corporation affiliated with the University of Chicago, 1983 to 1987, member of Executive Committee, 1983 to 1984.

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Bond Portfolio Manager, Treasurer's Office, University of Chicago, 1972 to 1975.

Securities Trading Department Manager, Treasurer's Office, University of Chicago, 1974 to 1975.

Consultant, Treasurer's Office, University of Chicago, 1971 to 1972.

Developer, Tau Investments, Botswana, Africa, 1970.

Economist, Bank of Japan, Tokyo, 1969.

Assistant to Vice President, Pfizer International, New York, 1967 to 1968.

Administrative Coordinator, Nevada Garvey Ranches, Winnemucca, Nevada, 1967.

Security Analyst, First National City Bank of New York, 1966.

Awards

Graham and Dodd Scroll, 1980, 1982, 1984.

Investment Education Institute, Distinguished Service Award in the field of Economist, 1986.

Who's Who in the World, 1985 onward.

Who's Who in Finance and Industry, 1983 onward.

Who's Who in Emerging Leaders, 1987 onward.

Professional Organizations

Associate Editor, *Financial Management*, 1979 to present.

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Associate Editor, *Journal of Applied Corporate Finance*, 1979 to present.

Editorial Board Member, *Financial Analysts Journal*, 1988 to present.

Advisory Board Member, *Investing*, 1988 to 1991.

Editorial Review Board Member, *AREUEA Journal*, 1985 to 1987.

Advisory Board Member, *Financial Analysts Handbook*, 1985 to 1988.

Advisory Committee of Economists to the Inter University Consortium for Political and Social Research; Correspondent Committee, 1990 to present.

American Finance Association

Western Finance Association

American Economic Association

Financial Management Association

American Real Estate and Urban Economics Association

Society for Financial Studies

List of Publications and Working Papers

Books:

1. *Stocks, Bonds, Bills, and Inflation: The Past (1926-1976) and the Future (1977-2000)*, with Rex A. Sinquefield (Foreword by Jack L. Treynor), Financial Analysts Research Foundation, Charlottesville, Virginia, 1977, (Abridged version translated into Japanese by Noboru Terada, and published by Nomura Research Institute.)

2. *Stocks, Bonds, Bills, and Inflation: Historical Returns (1926-1978)*, with Rex A. Sinquefield, Financial Analysts Research Foundation, Charlottesville, Virginia, 1979.

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***Curriculum Vitae*, April 1994**

3. *Stocks, Bonds, Bills, and Inflation: The Past and the Future* (1982 Edition), with Rex A. Sinquefield (Foreword by Laurence B. Siegel), Financial Analysts Research Foundation, Charlottesville, Virginia, 1982.

4. *Stocks, Bonds, Bills and Inflation* (1989 Edition), with Rex A. Sinquefield, co-published by Institute for Chartered Financial Analysts, Charlottesville, VA, and Dow Jones-Irwin, New York, 1989.

5. *Investment Markets: Gaining the Performance Advantage*, with Gary P. Brinson, McGraw-Hill Book Company, New York, 1987.

6. *Stocks, Bonds, and Inflation Japan*, with Yasushi Hamao, Ibbotson Associates, Chicago, 1989.

7. *U.S. Treasury Yield Curves, 1926 - 1988*, with Thomas S. Coleman and Lawrence Fisher, Moody's Investors Service, New York 1989.

8. *Global Investing: The Professional's Guide to the World's Capital Markets*, with Gary P. Brinson, McGraw-Hill Book Company, 1992.

Professional Publications:

1. "Price Performance of Common Stock New Issues," *Journal of Financial Economics*, September 1975, pp. 235-72; reprinted in *The Modern Theory of Corporate Finance*, edited by Michael C. Jensen and Clifford W. Smith, Jr., published by McGraw-Hill, New York, 1984.

2. "Hot Issue Markets," with Jeffrey F. Jaffe, *Journal of Finance*, September 1975, pp. 1027-42 (Condensed version in *The CFA Digest*, Spring 1976).

3. "Stocks, Bonds, Bills, and Inflation: Year-by-Year Historical Returns (1926-1974)," with Rex A. Sinquefield, *Journal of Business*, January 1976, pp. 11-47. (Translated into Japanese by Noboru Terada and published by Nomura Research Institute.)

4. "Stocks, Bonds, Bills, and Inflation: Simulations of the Future (1976-2000)," with Rex A. Sinquefield, *Journal of Business*, July 1976, pp. 318-38. (Translated into Japanese by Noboru Terada and published by Nomura Research Institute.)

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***Curriculum Vitae*, April 1994**

5. "Capital Market Returns (1926-1976)," *The Dow Jones-Irwin Business Almanac*, 1978; updated version (1926-1978) in *Investment Manager's Handbook*, 1979; updated versions (1926-1979), (1926-1980), (1926-1981), (1926-1982),(1926-1983), (1926-1984), (1926-85), (1926-86), (1926-87), (1926-88), (1926-89) in *The Dow Jones-Irwin Business Almanac* (annual) 1980, 1981, 1983, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, all thirteen books edited by Sumner N. Levine and published by Dow Jones-Irwin, Homewood, Illinois.

6. "Stocks, Bonds, Bills, and Inflation: Updates," with Rex A. Sinquefield, *Financial Analysts Journal*, July-August 1979. (Winner of 1980 Graham and Dodd Scroll.)

7. "The United States Market Wealth Portfolio," with Carol L. Fall, *Journal of Portfolio Management*, Fall 1979.

8. "Historical Returns on Principal Types of Investments," with Rex A. Sinquefield and Laurence B. Siegel, *Encyclopedia of Investments*, (1984) edited by Marshall Blume and Jack Friedman, and new edition with Laurence B. Siegel and Marvin B. Waring in *Encyclopedia of Investments*, (1989), edited by Jack Friedman, and both editions published by Warren, Gorham & Lamont, New York.

9. "International Equity and Bond Returns," with Richard C. Carr and Anthony W. Robinson, *Financial Analysts Journal*, July/August 1982. (Winner of 1982 Graham and Dodd Scroll.) Reprinted in *International Financial Management: Theory and Application*, Second Edition 1985, edited by Donald R. Lessard, John Wiley & Sons. and reprinted in *Empirical Research in Capital Markets*, edited by G. William Schwert and Clifford Smith, forthcoming, 1992.

10. "The World Market Wealth Portfolio," with Laurence B. Siegel, *Journal of Portfolio Management*, Winter 1983; reprinted in *International Investing*, edited by Peter L. Bernstein, Institutional Investor Books, New York, 1983; reprinted in *The CFA Study Guide*, published by The Institute of Chartered Financial Analysts, Charlottesville, Virginia 1985. (Condensed version in *The CFA Digest*, Summer 1983.)

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11. "The Demand For Capital Market Returns: A New Equilibrium Theory," with Laurence B. Siegel and Jeffrey J. Diermeier, *Financial Analysts Journal*, January/February 1984. (Winner of 1984 Graham and Dodd Scroll.)

12. "The Supply of Capital Market Returns," with Jeffrey J. Diermeier and Laurence B. Siegel, *Financial Analysts Journal* March/April 1984. (Winner of 1984 Graham and Dodd Scroll.)

13. "Real Estate Returns: A Comparison With Other Investments," with Laurence B. Siegel, *American Real Estate and Urban Economics Association Journal*, Summer 1984.

14. "Historical Returns on Investment Instruments" with Rex A. Sinquefield and Laurence B. Siegel in *Handbook of Modern Finance*, (1984) updated version with Laurence B. Siegel and Stanley V. Smith in *1985 Update*, 1986 and new edition with Laurence B. Siegel and Marvin B. Waring in *Handbook of Modern Finance* (1989), all publications edited by Dennis Logue, Warren, Gorham & Lamont, New York.

15. "World Wealth: U.S. and Foreign Market Values and Returns," with Laurence B. Siegel and Kathryn S. Love, *The Journal of Portfolio Management*, Fall 1985; (Condensed version in the *CFA Digest*, Spring 1986.) (Reprinted and translated into Japanese by Nomura Research Institute.)

16. "Initial Public Offerings," with Jay R. Ritter and Jody L. Sindelar, *Journal of Applied Corporate Finance*, Summer, 1988.

17. "International Equity Returns," with Laurence B. Siegel, in *Handbook for International Investors*, edited by Carl R. Beidleman, Probus Publishing Co., Chicago, 1987.

18. "Quantitative Methods in Fixed Income Analysis," with Margaret A. Corwin, in *Quantitative Methods in Financial Analysis*, edited by Stephen J. Brown and Mark P. Kritzman, Dow Jones-Irwin, Inc., Homewood, Illinois, 1987, (Revised version in 1989 edition.)

19. "The Asset Mix Decision," with Laurence B. Siegel in *Asset Allocation*, edited by Robert D. Arnott and Frank J. Fabozzi, Probus, Chicago 1988.

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20. "How to Forecast Long Run Asset Returns" *Investment Management Review*, September/October 1988 (Translated into Japanese and republished in *Investment Management Review*, January/February 1989.)

21. "Introduction to International Equities," with Laurence B. Siegel and Marvin B. Waring, *Quantitative International Investing*, edited by Brian R. Bruce, Probus Publishing, 1990.

22. "On the Cheap," *Financial Analysts Journal*, September/October 1989 (Reprinted as "When is a `Cheap' Asset a Bargain to Investors?" *AAJI Journal*, March, 1990).

23. "Macroeconomic Factors and the Spanish Stock Market," (in Spanish) with Cesar Gonzalez-Bueno and William N. Goetzmann, *Informacion Commercial Espanola*, December 1990.

24. "The Performance of Real Estate as an Asset Class," with William N. Goetzmann, *Journal of Applied Corporate Finance*, Fall, 1990.

25. "World Equities', The Past and the Future," with Laurence B. Siegel and Paul D. Kaplan, in *Global Portfolios, Quantitative Strategies for Maximum Performance*, edited by Robert Z. Aliber and Brian R. Bruce, Probus Publishing, 1991.

26. "Initial Public Offerings," with Jay R. Ritter, in *Handbooks in Operations Research and Management Science, Volume: Finance*, Edited by R.A. Jarrow, V. Maksimovic, and W.T. Ziemba, North-Holland, Amsterdam, forthcoming.

27. "The World Bond Market: Market Values, Yields, and Returns" with Laurence B. Siegel, *Fixed Income Journal*, June, 1991.

28. "Risk and Return: Implications for the Asset Mix," with Laurence B. Siegel and Mark W. Riepe in *Asset Allocation*, 2nd Edition, Edited by Robert Arnott and Frank J. Fabozzi, Probus Publishing, forthcoming.

29. "Growth Investing, How Good Do You Have To Be?" with Mark W. Riepe, *Journal of Investing*, Summer 1992 Premier Issue.

30. "Price Earnings Ratios," *The New Palgrave Dictionary of Money and Finance*, The MacMillan Press Ltd., 1992.

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31. "Survivorship Bias in Performance Studies," with Stephen J. Brown, William N. Goetzmann, and Stephen A. Ross, *Review of Financial Studies*, forthcoming.

Working Papers, Additional Publications, and Classroom Materials:

1. *Stocks, Bonds, Bills, and Inflation Yearbook*, 1983 edition, 1984 edition, 1985 edition, 1986 edition, 1987 edition, 1988 edition, 1989 edition, 1990 edition, 1991 edition, and 1992 edition, Ibbotson Associates, Inc., Chicago.

2. *Stocks, Bonds, Bills, and Inflation Quarterly Service*, Vol. #1, No. 1, April 1983; each January, February, April, July, and October, Ibbotson Associates, Inc., Chicago.

3. *SBBI/PC*, quarterly microcomputer date service, Vol. 1, No.1, October 1985; each January, April, July, and October, Ibbotson Associates, Inc., Chicago.

4. "Real Estate Returns, Inflation, and Taxes," with Laurence B. Siegel, Occasional Paper, Office of Real Estate Research, condensed version published in *Illinois Business Review*, April, 1984.

5. "Review of The Changing Roles of Debt and Equity in *Financing US Capital Formation*, Edited by Benjamin M. Friedman," *Journal of Economic Literature*, December, 1984.

6. "Small Company Stocks," *The Executive Program Club Newsletter*, University of Chicago, May 1983.

7. "Evergreen Industries: Setting Pension Fund Objectives," with Jody L. Sindelar, *Journal of Management Cases*, 1986.

8. "Windsor Laboratories: Money Manager Selection," with Jody L. Sindelar, 1985.

9. "Capital Market Returns With Heterogeneous Investor Costs," working paper, September 1983.

10. "Capital Market Game," unpublished classroom game, March 1977.

11. "The Corporate Bond Market: Structure and Returns," second draft February 1979.

12. "Estimating the Term Structure of Interest Rates," with Thomas S. Coleman and Lawrence Fisher, Yale Working Paper, June, 1987; revised version May 1989, March 1991.

13. "Stock Ticker" and "Stock Exchange" in World Book Encyclopedia, Chicago.

14. "Do Winners Repeat: An Analysis of Mutual Fund Performance," with William N. Goetzmann, Yale Working Paper April, 1991.

15. "Reading Lists and Course Outlines for Financial Management I and II" in *Corporate Finance and Investment*, Vol. 3, compiled by Richard Schwindt for Eno River Press, 1990.

16. "The S&P Inclusion Effect: A New Assessment" with Reid W. Click, Paul D. Kaplan, and Laurence B. Siegel, in Kemper Asset Management Working Paper Series, October 1990.

Partial List of Speaking Engagements (Titles Available on Request)

1. Workshops: University of Chicago - April 1972, April 1973, May 1974, June 1974, October 1975, January 1979, October 1983; Wharton - February 1976, November 1978, Columbia University - November 1976; University of Southern California - February 1979; University of Utah - March 1979; October 1983, University of Virginia - November 1981; Yale University - October 1983, University of Pittsburgh - June 1985. State University of New York at Stony Brook - April 1988.

2. Center for Research in Security Prices, University of Chicago, Graduate School of Business: May 1972, May 1973, May 1974, November 1974, November 1975, May 1977, November 1979, November 1981, November 1983, and February 1985.

3. Yale University Conferences: Yale Alumni Conference, April 1985; Yale Club of New York City, March 1986; SOM Tenth Anniversary Conference, November 1987; SOM Crash of '87 Panel, October 1987; SOM Partner's Day, April 1988, Alumni Conference, October 1991.

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4. University of Chicago Conferences: Management Conference, March 1975, March 1978, March 1980, April 1981, April 1982, April 1984; Young Presidents Organization, January 1976; Life Officers Investment Seminar, Rockford, June 1977, June 1987; General Electric Education Conference, August 1977, August 1978, August 1979; Inflation Conference, June 1980; XP Alumni Conference, October 1980, GSB Box Luncheon, August 1986; Alumni Conference, Stamford, CT, November 1987; Business Club, Chicago, February 1988, 100th Anniversary Conference, April 1992.

5. Other University Conferences: Berkeley Seminar in Finance, September 1979; University of Michigan Corporate Financial Management Seminar, May 1982, October 1982; Singapore National Productivity Board, July 1984; Wichita State University Ad Valorem Taxation Conference, July 1985; University of Rochester Investment Banking Seminar, April 1986; University of New Hampshire, May 1987; Southern Connecticut State University, April 1988; John Carroll University Global Investment Conference, November, 1990.

6. Academic Associations: American Finance Association, Atlantic City, September 1976, New York, December 1977, San Francisco, December 1983, Dallas, December 1984, New York, 1985; American Statistical Association, Washington, D.C., October 1979, Chicago, December 1983; Southern Finance Association, Atlanta, November 1979; Western Economic Association, Seattle, July 1983, Financial Management Association, October 1988, Midwest Finance Association Featured Speaker, March 1992.

7. Financial Analysts Societies and Financial Analysts Federation Conferences: Chicago, December 1974; New York, May 1975; Boston, May 1975; Milwaukee, October 1975; Atlanta, October 1975; Chicago, January 1976; Atlanta, January 1977; Kansas City, April 1977; Montreal, May 1977; Chicago, November 1981; Rockford, August 1983; Rockford, August 1984; Boston, December 1984, Rockford, August 1985, Rockford, August 1986, New York, January 1989, Palm Beach, February 1990.

8. Institute for International Research: New York, October; San Diego, November, 1977; New York, May, 1988; New York, June, 1988, New York, February 1990, New York, June 1992.

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9. Company Sponsored Conferences: Wells Fargo Conference, Chicago, August 1971, San Francisco, August 1973; TPF&C Conference, Chicago, April 1978, July 1985; Alliance Capital Management Conference, New York, April 1978, Chicago, June 1981, New York, May 1982; American National Bank of Chicago, New York, May 1978, Chicago, June 1978; First National Bank of Chicago, October 1978, September 1984, September 1985; Continental Insurance Company, New York, September 1980; Harris Bank Conference, Chicago, September 1981; Chase Manhattan Bank, Chicago, June 1982; Yamaichi Securities, Inc., Chicago, January 1983; Templeton Investment Counsel, Ft. Lauderdale, February 1983; American Bell, Inc., Chicago, May 1983; Chemical Bank, New York, June 1984, October 1984; Northern Master Trust Conference, Rancho Bernardo, March 1985; New England Life, Boston, November 1985, Massachusetts Mutual, Boston, October 1986, Skye Investments, New York, November 1986; DFA Investors Conference, London, March 1987; Alliance Capital Management International Seminar, New York, May 1988, Rye Brook, May 1989, New York, May 1992.

10. Ibbotson Associates sponsored conferences; Asset Allocation Seminars; Los Angeles, October 1988, New York, October 1988, Chicago, New York, October 1988, Chicago, September, 1989, San Francisco, October 1989, Boston, October 1989, New York, November 1989, Dallas, December 1989, New York, January 1990, Chicago, February 1990, Zurich, April 1990, New York, June 1990, Chicago, March 1991, New York, May 1991, Boston, June, 1991, Chicago, October 1991, Boston, March 1992, New York, April 1992, Madrid, April 1992.

11. Other Conferences: Public Employee Retirement Conference, Atlanta, March 1976; Western Pension Conference, Seattle, August 1976; Institutional Investor Bond Conference, New York, October 1976; TIAA/CREF Conference, New York, April 1977; Institutional Investor Pension Conference, New York, January 1978; Federal Energy Regulatory Commission Rate of Return Conference, Washington, D.C., May 1978; American Academy of Actuaries, Washington, D.C., January 1979; Pennsylvania Petroleum Association, Hyannisport, July 1979; Textile Bag Manufacturer's Association, Chicago, January 1980; Chief Executives Forum, Chicago, May 1981; National Society of Rate of Return Analysts, Chicago, October 1982; Individual Investors Society, North Haven, CT, November 1987; New York Stock Exchange, December 1987, International Association of Financial Planners, Washington DC, June 1991.

12. Television and Radio: TV, Channel 26, "Ask an Expert," November 1974, December 1979; TV Channel 7, "Perspectives," March 1975; Radio, "Conversations at Chicago," August 1976, June 1979; TV, Channel 26, "Ruth Graham Show," November 1977, December 1978, September 1979, October 1980; "Catching Winners Early," Financial News Network, January 1987; "Steve Kalb Show" WELI, November 1987, "Money Radio News", KMNY, January 1988, WTNH Channel 8, Evening News, July 1990.

The Relative Size of Ameritech's Regulated Subsidiaries

	1993	1992	1991	1990	1989	1988
Annual Revenue ($ mill.):						
Ameritech	*$11,710*	*$10,818*	*$10,663*	*$10,211*	*$9,903*	*$9,548*
Illinois Bell	2,946	2,886	2,847	2,828	2,712	2,640
Indiana Bell	1,046	1,034	1,040	1,018	986	970
Michigan Bell	2,679	2,575	2,618	2,515	2,459	2,340
Ohio Bell	2,041	2,014	2,012	1,991	1,993	1,866
Wisconsin Bell	1,087	1,073	1,060	961	959	944
Total Bell	*$9,799*	*$9,582*	*$9,577*	*$9,313*	*$9,109*	*$8,760*
% in Regulated	*84%*	*89%*	*90%*	*91%*	*92%*	*92%*
Net Income ($ mill.):						
Ameritech	*$1,451*	*$1,166*	*$1,254*	*$1,238*	*$1,237*	*$1,188*
Illinois Bell	413	352	359	344	347	333
Indiana Bell	163	153	155	155	151	153
Michigan Bell	326	291	326	318	317	308
Ohio Bell	265	238	245	251	252	247
Wisconsin Bell	117	109	114	111	128	132
Total Bell	*$1,284*	*$1,143*	*$1,199*	*$1,179*	*$1,195*	*$1,173*
% in Regulated	*88%*	*98%*	*96%*	*95%*	*97%*	*99%*

Note: 1993 income figures are before cumulative effect of change in accounting principles.

Source: 1993 Ameritech Annual Report and 1993 10Ks

The Relative Size of Ameritech's Regulated Subsidiaries

	1993	1992	1991	1990	1989	1988
Total Assets ($ mill.):						
Ameritech	*$22,818*	*$22,290*	*$21,715*	*$19,833*	*$19,163*	*$18,780*
Illinois Bell	6,684	6,008	5,866	5,508	5,419	5,350
Indiana Bell	2,195	2,045	2,038	1,960	1,971	1,957
Michigan Bell	5,738	5,252	5,193	5,001	4,965	4,914
Ohio Bell	4,202	3,833	3,865	3,711	3,697	3,756
Wisconsin Bell	2,195	2,048	2,066	2,011	2,014	1,996
Total Bell	*$21,014*	*$19,186*	*$19,028*	*$18,191*	*$18,066*	*$17,973*
% in Regulated	*92%*	*86%*	*88%*	*92%*	*94%*	*96%*

Note: 1993 asset figures are before cumulative effect of change in accounting principles.

Source: 1993 Ameritech Annual Report and 1993 10Ks

Summary of DCF Cost of Equity
for Ameritech

3-Month Average Stock Price	$39.21
Current Quarterly Dividend	$0.480
Implied Yield	4.90%
Dividend Growth for Years:	
1 to 5	6.0%
6 and Above	7.8%
COST OF EQUITY (Assumes annual payment of dividends)	12.7%
COST OF EQUITY (Assumes quarterly payment of dividends)	12.8%

Sources: Ibbotson Associates;
The Wall Street Journal (3/1/94, 4/1/94, and 5/2/94);
Value Line Investment Survey, April 15, 1994;
DRI/McGraw-Hill and Bureau of Economic Analysis; and
I/B/E/S, April 14, 1994.

	Arithmetic Mean: 1926-1993
Real GDP Growth	3.1%
Total Returns:	
S&P 500 Stocks	12.3%
Small Cap. Stocks	17.6
Long-Term Corporate Bonds	5.9
Long-Term Government Bonds	5.4
Intermediate-Term Government Bonds	5.4
Treasury Bills	3.7
Long-Term Government Income	5.1

Sources: "Stocks, Bonds, Bills, and Inflation 1994 Forecast Edition," Ibbotson Associates, 1994; and
DRI/McGraw -Hill and Bureau of Economic Analysis

Forecasting the Inflation Rate

Since 1976, Ibbotson and Sinquefield, and later Ibbotson Associates, have provided probabilistic forecasts of future total returns on the principal capital market asset classes of the United States. These asset classes are large and small company stocks, long-term corporate and long- and intermediate-term government bonds, and U.S. Treasury bills. In addition, inflation is forecast, as are inflation-adjusted total returns on these asset classes. Total returns include the reinvestment of dividend and coupon income.

A probabilistic forecast is the forecast of the entire distribution -- not just the median or mean of possible future outcomes. These forecasts are based on statistical time series properties of historical data and on current yields in the market. They are not an attempt to outguess, or beat, the market. They are an attempt to discern the market's expectation, i.e., to read what the market itself is forecasting. Hence, they are called Market Consensus Forecasts™.

Market Consensus Forecasts use historical data on security and component returns and the estimates of future interest rates as revealed in the U.S. government bond yield curve, to infer the market's forecast of asset returns. A key assumption is that the component historical returns which have been random in the past will continue to be random in the future. (In this context random means stationary and without autocorrelation.) Furthermore, the component returns which have followed a trend will continue to do so in the future. This approach is consistent with efficient capital market theory, which maintains that the market price of an asset reflects all currently available information about the asset and, therefore, securities are fairly priced.

Market Consensus Forecasts employ the market efficiency assumption in two principal ways. First, the yield curve is used to forecast future expected interest and inflation rates. Since the prices of the bonds included in the yield curve are market-determined, the interest and inflation rate forecasts are market-determined. Second, the forecasts of the four risk premia are based on the assumption of random walk behavior.

Common stock total returns are the sum of the equity risk premium, the real riskless interest rate, and the inflation rate (see *Stocks, Bonds, Bills, and Inflation 1992 Yearbook*). The equity risk premium has historically been a random variable centered on a 66-year arithmetic mean of 7.4 percent. The real riskless rate and

Forecasting the Inflation Rate

the inflation rate follow trends, i.e., they both exhibit high serial correlations which indicates a statistical relationship between this year's and last year's rate. The autoregressive equation for real riskless rates over 1970-1991 is:

$$R_T = 0.42\% + .72\ R_{T-1} + \varepsilon$$

where R_T is the annual real riskless rate for year T; R_{T-1} is the annual real riskless rate for the previous year (year T-1); and ε is a random error term. The annual real riskless rate for each year is calculated by subtracting the inflation rate for each year from the Treasury bill total return for the year.

In order to utilize the above equation for forecasting purposes, a starting real riskless rate is needed. The starting value used is the historical arithmetic mean real rate of 0.5%.

The inflation forecast equals the nominal minus real yield. Assuming no inflation, the yield curve would reflect: (1) the real riskless rate, which historically has averaged 0.5 percent; (2) the horizon premium, which can be estimated for each time to maturity; and (3) the default premium for the class of bonds under examination.

The market sets prices for bonds so that the investor will be compensated for expected inflation and other factors. The market's assessment of future inflation can be observed by looking at the difference between the observed yield curve and what the yield curve would be if inflation were not a factor.

Many forecasts incorporate macro-economic variables. Evidence supporting the efficient market hypothesis shows macroeconomic and microeconomic expectations of investors reflected in the prices of securities. Since the Market Consensus Forecast model uses security prices as inputs, the economic expectations of investors are implicitly contained in the forecasts.

Furthermore, the forecasts of economists, financial analysts, and long-range planners help to determine the prices in the market, because investors incorporate these forecasts into their decision making. Since these prices are used to generate Market Consensus Forecasts, other forecasters' predictions are incorporated into these forecasts.

Summary Statistics for Various Asset Classes
1926-1993

Asset	Compound Annual Return	Arithmetic Mean Return	Standard Deviation
Common Stocks	10.33%	12.32%	20.45%
Small Company Stocks	12.36%	17.63%	34.78%
Long-Term Corporate Bonds	5.59%	5.89%	8.36%
Long-Term Government Bonds	5.02%	5.35%	8.67%
Intermediate-Term Government Bonds	5.25%	5.39%	5.57%
U.S. Treasury Bills	3.69%	3.74%	3.32%

Source: *Stocks, Bonds, Bills, and Inflation 1994 Yearbook*, Ibbotson Associates, Chicago (annually updates work by Roger G. Ibbotson and Rex A. Sinquefield)

CAPM Cost of Equity Estimates
for Ameritech and Comparables

Ticker	Company	Average Riskless Rate		Value Line Beta		Expected Risk Premium		Cost of Equity
AIT	*Ameritech*	*7.02%*	+	*0.75*	×	*7.2%*	=	*12.4%*
BEL	Bell Atlantic	7.02%	+	0.90	×	7.2%	=	13.5%
BLS	Bellsouth	7.02%	+	0.80	×	7.2%	=	12.8%
NYN	NYNEX	7.02%	+	0.80	×	7.2%	=	12.8%
PAC	Pacific Telesis	7.02%	+	NMF	×	7.2%	=	NMF
SBC	Southwestern Bell	7.02%	+	0.95	×	7.2%	=	13.9%
USW	U S WEST	7.02%	+	0.80	×	7.2%	=	12.8%

Sources: *Stocks, Bonds, Bills, and Inflation 1994 Yearbook*, Ibbotson Associates, 1994 (annually updates work by Roger G. Ibbotson and Rex A. Sinquefield);
The Wall Street Journal (3/1/94, 4/1/94, and 5/2/94);
Value Line Investment Survey, April 15, 1994