**BEFORE THE TENNESSEE REGULATORY AUTHORITY**
**NASHVILLE, TENNESSEE**

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| Petition of Tennessee American Water Company to Change and Increase Certain Rates and Charges so as to Permit It to Earn a Fair and Adequate Rate of Return on Its Property Used and Useful in Furnishing Water Service to Its Customers | ) ) ) ) ) ) | DOCKET NO. 10-00189 |

# CORRECTION TO

# PRE-FILED DIRECT TESTIMONY OF

# CHRISTOPHER C. KLEIN, PH.D.

**ON BEHALF OF THE TENNESSEE ATTORNEY GENERAL**
**CONSUMER ADVOCATE AND PROTECTION DIVISION**

**JANUARY 21, 2011**

**BEFORE THE TENNESSEE REGULATORY AUTHORITY**
**NASHVILLE, TENNESSEE**

**January 21, 2011**

**DOCKET NO. 10-00189**

**CORRECTION TO**

**PRE-FILED DIRECT TESTIMONY AND EXHIBITS OF**
**DR. CHRISTOPHER C. KLEIN**

**Q. Please state your name and your current position.**

A. My name is Christopher C. Klein and I am an Associate Professor in the Economics and Finance Department at Middle Tennessee State University (MTSU) in Murfreesboro, Tennessee.

**Q. Are you the same Christopher C. Klein who previously filed direct testimony in this Docket?**

A. Yes.

**Q. What is the purpose of this testimony?**

A. I will describe corrections to my pre-filed direct testimony and exhibit, the need for which was discovered on January 19, 2011.

**Q. Describe the first correction?**

A. The first correction is to page 2 of my Exhibit. The percent of the double leverage capital structure accounted for by Parent Common Equity should appear as 33.72%, not 35.80% as originally filed. Either an error was made in the calculation of this number or the result was copied incorrectly when preparing my Exhibit. Because this figure is used in some subsequent calculations, this correction also changes the weighted cost of Parent

Common Equity to 3.03% (instead of 3.22%) and the overall weighted cost of capital to 6.79% (instead of 6.97%).

**Q. Did these corrections to page 2 of your Exhibit also necessitate corrections to your direct testimony?**

A. Yes. On page 6, line 7, of my prefiled direct testimony, my recommended overall weighted cost of capital should be 6.79%, not 6.97% as originally filed.

**Q. Did these corrections to page 2 of your Exhibit necessitate any other corrections to your direct testimony?**

A. No.

**Q. Did these corrections to page 2 of your Exhibit necessitate any changes to any of the conclusions you reached as reflected in your direct testimony?**

A. No.

**Q. Do you have any additional corrections to make at this time?**

A. Yes. On page 15, line 3, there is a typographical error. "AGL" should be "AWWC."

**Q. Are these all the corrections that you have to make to your direct testimony?**

A. Yes.

**Q. Have you prepared corrected direct testimony and exhibits?**

A. Yes. My corrected prefiled direct testimony and exhibit are being filed along with this correction.

**Q. Does this conclude your testimony at this time?**

A. Yes.

**BEFORE THE TENNESSEE REGULATORY AUTHORITY**
**NASHVILLE, TENNESSEE**

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| Petition of Tennessee American Water Company to Change and Increase Certain Rates and Charges so as to Permit It to Earn a Fair and Adequate Rate of Return on Its Property Used and Useful in Furnishing Water Service to Its Customers | ) ) ) ) ) ) | DOCKET NO. 10-00189 |

# CORRECTED

# PRE-FILED DIRECT TESTIMONY OF

# CHRISTOPHER C. KLEIN, PH.D.

**ON BEHALF OF THE TENNESSEE ATTORNEY GENERAL**
**CONSUMER ADVOCATE AND PROTECTION DIVISION**

**JANUARY 21, 2011**

**BEFORE THE TENNESSEE REGULATORY AUTHORITY**
**NASHVILLE, TENNESSEE**

**January 5, 2011**

**DOCKET NO. 10-00189**

**PRE-FILED DIRECT TESTIMONY AND EXHIBITS OF**
**DR. CHRISTOPHER C. KLEIN**

**Q. Please state your name and your current position.**

A. My name is Christopher C. Klein and I am an Associate Professor in the Economics and Finance Department at Middle Tennessee State University (MTSU) in Murfreesboro, Tennessee.

**Q. What is your educational background?**

A. I received a B. A. in Economics from the University of Alabama in 1976 and I received a Ph. D. in Economics from the University of North Carolina at Chapel Hill in 1980.

**Q. What is your professional experience involving regulated industries?**

A. I was employed as an Economist in the Antitrust Division of the Bureau of Economics at the Federal Trade Commission (FTC) in Washington, D.C., for six years starting in 1980. In 1986, I was hired as the first Economist for the Tennessee Public Service Commission (TPSC). Although my title changed over the years, I functioned as the Chief Economist for the TPSC and, after 1996, the Tennessee Regulatory Authority (TRA), until August of 2002, when I assumed my current position with MTSU.

**Q. What were your duties at the FTC?**

A. I performed the economic analysis in antitrust investigations involving more than 20 industries and contributed to staff reports on mergers in the petroleum industry, competition in grocery retailing, and the economics of predatory or sham litigation.

**Q. What was your primary responsibility at the TPSC?**

A. I was an expert witness for the staff of the TPSC in rate cases and other similar proceedings involving telecommunications, natural gas, electric and water utilities, as well as motor carriers. I testified in 36 dockets before the TPSC on the issues of cost of capital, rate design, and competitive effects. I also filed testimony before the Federal Communications Commission (FCC).

**Q. How did your responsibilities change when the TRA supplanted the TPSC?**

A. I oversaw the Utility Rate Division and then the Economic Analysis Division. The TRA staff no longer testified in proceedings before the agency, but provided analysis and advice to the TRA Directors. I was responsible for all such advice and analysis provided to the Directors by these Divisions, either individually or in concert with other TRA staff, in all proceedings that came before the agency for resolution. These proceedings included rate cases and tariff filings by public utilities, as well as those associated with the implementation of the federal Telecommunications Act of 1996.

**Q. Were you a member of any regulatory committees or boards while you worked for the TPSC and the TRA?**

A. Yes. I was a member of the National Association of Regulatory Utility Commissioners (NARUC) Staff Subcommittee on Gas. I was a member of, and Chaired, the Research Advisory Committee to the Board of Directors of the National Regulatory Research Institute (NRRI). I also served on the State Staff of the FCC's Federal-State Joint Board in CC Docket No.80-286 (the "Separations" Joint Board) and as a Group Leader on the NARUC Staff Subcommittee on Accounts Multi-state Audit Team that produced the 1988 Report on Bell Communications Research.

**Q. What is your primary responsibility at MTSU?**

A. I teach classes in the general area of applied microeconomics, including Principles of Microeconomics, Intermediate Microeconomic Theory, Managerial Economics, Economics of Antitrust and Regulation, and Econometrics, as well as undertaking scholarly research, participating in various university committees, and serving on dissertation committees.

**Q. Have you taught at any other universities?**

A. I taught classes in the Economics of Regulation and in Antitrust Economics in the Economics Department at Vanderbilt University for several years while I was employed at the TRA.

**Q. Are you a member of any professional organizations?**

A. I am a member of the American Economic Association, the Southern Economic Association, the Western Economic Association, the Industrial Organization Society, and Alpha Pi Mu: the National Industrial Engineering Honor Society, as well as Beta Gamma Sigma: the International Honor Society for Collegiate Schools of Business.

**Q. Have you published articles in professional or academic journals and presented papers at professional meetings?**

A. More than 30 of my articles have appeared in professional or academic journals such as *Energy Economics*, *Utilities Policy*, *The Electricity Journal*, *The Journal of Applied Regulation* and many others. I have made more than 50 presentations at professional meetings.

**Q. Have you testified before any other governmental bodies in Tennessee?**

**A.** Yes. I have testified before various committees of the Tennessee General Assembly on regulatory issues, especially telecommunications issues and competition in the telecommunications industry, as well as before the Tennessee Advisory Commission on Intergovernmental Relations and the Tennessee Regulatory Authority. A complete list is provided in my Vita, beginning on page 9 of my Exhibit.

## PURPOSE OF TESTIMONY

Q. **What is the purpose of your testimony?**

A. I will address the Cost of Capital for Tennessee American Water Company (TAWC) and recommend an allowed rate of return to be adopted for ratemaking purposes. This includes issues regarding capital structure, cost of debt and cost of equity. I will also comment on Dr. Spitznagel's weather normalization study.

**Q. Can you summarize your testimony pertaining to capital structure and cost of debt?**

A. Yes. I recommend a double leverage capital structure consistent with the TRA's findings in previous rate cases involving TAWC. This capital structure, shown on page 2 of my Exhibit, imputes the parent company's capital structure to the common equity portion of TAWC's capital structure. I recommend using the historical average capital structures for American Water Works Company (AWWC) and TAWC for this purpose. I find the cost of TAWC's short term debt, long term debt, and preferred stock proposed by TWAC's witness Mr. Miller to be reasonable.

**Q. Can you summarize your testimony on cost of equity?**

A. I recommend a cost of equity of 9.0% based on the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM) methods summarized on pages 5 through 8 of my Exhibit. I recommend no additional adjustments for issuance costs, or quarterly payment of dividends.

**Q. What overall cost of capital do you recommend for use as the allowed rate of return for CGC?**

A. I recommend an overall weighted cost of capital of 6.79% for CGC as shown on page 2 of my Exhibit.

**Q. What is your recommendation in regard to Dr. Spitznagel's weather normalization proposal?**

A. I recommend against adopting Dr. Sptznagel's weather normalization proposal. His study lacks statistical precision and does not follow common methods used in the literature on estimating water demand.

**Q. How is your testimony organized?**

A. I will address the concept of cost of capital first, then capital structure and cost of debt. This is followed by cost of equity. Then I will comment on weather normalization.

## COST OF CAPITAL

**Q. What do you mean by cost of capital?**

A. I mean the rate of return necessary to induce investors to hold the debt and stock of a company. This rate of return should be equal to that available to investors on alternative investments of similar risk.

**Q. How is the cost of capital related to the legal principles of determining the allowed rate of return for regulated utilities?**

A. The cost of capital concept embodies the economic principles for determining the allowed rate of return set out by the U.S. Supreme Court in *Bluefield Water Works v. P.S.C.* (262 U.S. 679, 1923) and *F. P. C. v. Hope Natural Gas Co.* (320 U. S. 591, 1944). For instance, the Court stated in Hope that, "...the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital." (320 U.S. 603) In my opinion, the allowed rate of return on the capital employed by TAWC should be set equal to its cost of capital.

**Q. What are the consequences of not setting the allowed rate of return equal to the cost of capital?**

A. If the allowed rate of return is set below the cost of capital, then the company's credit rating will fall and its cost of debt will rise. The price of its stock will decline to reflect the lower expected return. Eventually, the company may face difficulties in financing investments in new plant and equipment, causing the quality of its products and services to decline.

If the allowed rate of return is set above the cost of capital, then the firm's stockholders realize a capital gain as the price of the firm's stock rises to reflect the higher return. Moreover, the capital gain is paid for by the firm's customers in the form of excessively high prices.

Clearly, failure to set the allowed rate of return equal to the firm's cost of capital is detrimental to the firm's customers as well as its stockholders.

## CAPITAL STRUCTURE AND COST OF DEBT

**Q. What was your first step in estimating the cost of capital for CGC?**

A. My first step was to determine the appropriate capital structure and cost of debt for TAWC. I started with the capital structure proposed by TAWC's witness Mr. Miller. I then compared this to the historical capital structures of TAWC as shown on page 3 of my Exhibit. The structure proposed by Mr. Miller differs from the historical average structure of TAWC primarily in the proportion of short term debt. Mr. Miller proposes 3.45% short term debt, whereas the historical average over 2007-2010 is 6.45%. In this context, Mr. Miller's figure likely represents a brief departure from the longer term average capital structure of TAWC. For this reason, I propose a capital structure containing 6.45% TAWC short term debt as shown on my page 2 of my Exhibit.

**Q. How did you apply double leverage to arrive at your recommended capital structure?**

A. I calculated the historical average capital structure for TAWC's parent, AWWC, as shown on page 3 of my Exhibit. Due to the small proportion of preferred stock in AWWC's structure, I combined preferred stock with common equity. I then imputed AWWC's average capital structure to the equity portion of TAWC's capital structure. The result is shown on page 2 of my Exhibit.

**Q. What is the purpose of the double leverage approach to capital structure?**

A. The purpose of the double leverage approach is to recognize the parent-subsidiary relationship by sharing some of the benefits of that relationship with rate payers. Double leverage also discourages strategic financing behavior aimed only at raising a regulated subsidiary's regulated rate of return by manipulating the subsidiary's capital structure. Double leverage also recognizes the role of the parent company in providing funds to the subsidiary. As Mr. Miller explains in his testimony for TAWC, TAWC obtains all of its debt financing through AWCC, another AWWC subsidiary: "The Company is currently utilizing the services of AWCC to place its required financing needs. AWCC is an American Water Works Company affiliate and was created to consolidate the financing activities of the operating subsidiaries to effect economies of scale on debt issuance and legal costs, and to attract lower debt interest rates through larger debt issues in the public market." (Testimony of Michael A. Miller, p. 21, lines 11-15.)

**Q. How did you arrive at the cost of debt shown on page 2 of your Exhibit?**

A. Again, I started with the cost of long term and short term debt, as well as preferred stock, proposed by Mr. Miller for TAWC. I found these to be reasonable and have adopted them in my recommended capital structure. For AWWC's portion of the double levered capital structure, I used Mr. Miller's recommended cost of short term debt and AWWC's embedded cost of long term debt at September 30, 2010. September 30, 2010, was the most recent capital structure and debt cost information provided for AWWC.

## COST OF EQUITY

**Q. How do you approach the cost of equity of CGC?**

A. I look to the cost of equity of the parent enterprise, AWWC, to estimate the cost of equity financing. This recognizes that the AWWC subsidiaries are financed centrally, indicating that the corporation is financed and managed as a whole from which the piece-parts, such as subsidiaries, cannot be easily separated. Moreover, AWWC is the only entity in which outside investors may invest.

**Q. How do you estimate the cost of equity of AWWC?**

A. I use the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM) methods. Several characteristics of AWWC and the water utility industry in general complicate the application of these methods.

**Q. What characteristics of AWWC complicate the use of these methods?**

A. AWWC was acquired by RWE, AG, in the past and then spun-off from RWE in approximately 2007. While AWWC was owned by RWE, its stock was not traded publicly. This means that stock price and other stock market data for AWWC are not available until 2008. Consequently, stock market investors and analysts do not have much information on AWWC upon which to base their expectations, nor is there much historical information available to compute such items as growth rates for dividends.

Q. **What aspects of the water utility industry complicate the use of these methods?**

A. Only nine water utility companies have stock that is publicly traded, but most of these companies are small. AWWC is the largest publicly traded water utility company, with total capital of over $11 billion. The two next largest companies, Aqua America and California Water, also have total capital over $1 billion, but California Water is only one-tenth the size of AWWC. Thus there are few water utility companies that are comparable to AWWC. For this reason, I also examine natural gas distribution

companies as possible comparables to AWWC. Most gas companies are smaller than AWWC, but they are regulated by the states and provide a similar utility service.

**Q. Can you explain the Discounted Cash Flow method?**

A. Yes. The DCF method views investors as valuing a company's stock based on the present value of the cash flows a stockholder expects to receive from owning the stock over an infinite time horizon. These cash flows from stock ownership are just the dividends paid by the company. Consequently, some simple mathematics show that the rate of return an investor expects on stock ownership in a company is the dividend yield for the current period plus the expected growth rate in that dividend. The dividend yield is just the expected dividend divided by the current price of the stock.

**Q. Have you computed a DCF cost of equity for AWWC?**

A. Yes. Page 5 of my Exhibit shows this calculation for AWWC, three of the larger water companies, and nine natural gas distribution utilities selected from Value Line. I start with dividend yields reported by Value Line, as well as more recent yields reported by the *Wall Street Journal*. I use both expected growth in earnings per share and in dividends for the growth rate in the DCF formula. Earnings are the source of dividend payments to stockholders, so earnings growth is often an indicator of dividend growth. For AWWC, Value Line does not provide earnings growth and its dividend growth estimate is extremely high at 16%. Consequently the calculated DCF indicates a range of 3.5% to over 19%, with a midpoint of 11.6%. The wide range in the DCF calculations for AWWC suggests that they may be unreliable. Further, the midpoints of the DCF ranges for water companies and natural gas companies are much lower, 9.1% and 8.65%

respectively. Thus the DCF estimate for AWWC appears to be out of line with that of comparable firms. I then sought to refine my growth rate for AWWC.

**Q. How did you refine the expected dividend growth rate for AWWC?**

A. I examined the data on historical dividend payments and earnings per share for AWWC as reported by Value Line as shown on page 6 of my Exhibit. The percentage changes in earnings per share are highly variable and not much use in trying to narrow the range of possible growth rates. Quarterly dividend payments, however, have increased by one cent per share in each of the past two years, or by about 5%. It is reasonable to assume that investors should expect a minimum dividend growth rate for AWWC in the neighborhood of 5%.

**Q. Now can you refine your DCF estimate of the cost of equity for AWWC?**

A. Yes. The dividend yield range of 3.5% to 3.7% added to the minimum expected dividend growth of 5% yields a range of minimum DCF cost of equity estimates of 8.5% to 8.7%.

**Q. How did you select the three water utilities and nine natural gas utilities for your DCF analysis?**

A. I looked for water and natural gas utilities covered by Value Line's "Ratings and Reports" that were comparable in size and riskiness to AWWC. I sought to limit the companies to those with total capital of over $1.0 billion. This was possible for the gas utilities, but due to the small number of water utilities, I also included American States Water even though its total capital is about $0.9 billion. I then eliminated companies that were not primarily utilities or for whom adequate earnings and dividend data were not available. I then examined the "beta", a measure of relative risk, for the remaining companies. Betas for these companies ranged from 0.6 to 0.8, all significantly less than

1.0, and encompassing AWWC's beta of 0.65, indicating that they are all of similar riskiness.

**Q. What do you conclude from the DCF analysis?**

A. The minimum DCF cost of equity for AWWC is approximately 8.6%. This is similar to the midpoint of the DCF range for natural gas utilities (8.65%) and just lower that the midpoint for large water companies (9.1%). Consequently, I use 8.6% for the lower bound of my range of cost of equity estimates for AWWC. The upper end of the range of reasonable cost of equity estimates for AWWC is yet to be determined. To set the upper end of that range, I turn to the Capital Asset Pricing Model or CAPM.

**Q. Can you explain the CAPM?**

A. Yes. In the CAPM, an investor's required return on an investment is based on the relative riskiness of the investment. That is, an investor must be compensated with a higher expected return for investing in a riskier investment. The CAPM begins by estimating the risk premium required on a broad portfolio of common stocks relative to a risk-free asset. This risk premium is then adjusted for a particular stock's riskiness relative to the market – that is, the broad portfolio of stocks. This is done by using the stock's beta, which measures the riskiness of the stock relative to the market. The resulting CAPM cost of equity consists of the risk-free return plus beta times the market risk premium.

**Q. How do you estimate the risk premium?**

A. I calculate risk premia from *2010 Ibbotson® SBBI®, Stocks, Bonds, Bills and Inflation® Valuation Yearbook,* submitted in response to CAPD first discovery request, Part II, question 9. I calculate these risk premia by subtracting the income portion of the return

on intermediate government bonds and short term bills from the total return on large company stocks. U. S. government bills and bonds are widely considered to have the lowest risk of default of all available debt instruments.

**Q. How do you choose the risk-free instrument and the appropriate risk premium?**

A. Technically, the lowest risk is associated with very short term Treasury bills, because the short time frame provides the least opportunity for default and little chance that the expected inflation rate will not be realized over the life of the investment. Nevertheless, these short term bills also embody short term returns that may not reflect all factors affecting the expected return on a stock for a multi-year period. If one chooses longer term bonds as the "risk-free" instrument, however, then expected returns over multiple years may be better captured, but more risk is also introduced. This is the risk that the actual inflation rate over the life of the bond may differ from expectations. If this occurs then the real, inflation adjusted, return on the bond also differs from expectations. This inflation risk in a longer term bond raises the necessary return above the risk-free rate. The analyst must then trade-off any bias introduced by higher risk in longer term instruments against capturing the factors affecting the risk-free return over a longer period.

**Q. How do you make this trade-off?**

A. Since current interest rates on Treasury bills (T-bills) are at historically very low levels, some consideration for longer term bonds is appropriate. The risk premium of stocks over T-bills from Ibbotson is 8.1%, while the risk premium of stocks over the income component of Intermediate term bonds (5-year) is 7.1%. The most recent yield for five-year T-bonds is 2.1%, but I also recognize the 52-week high of 2.5% in order to mitigate

the unusually low current returns. Using these figures, the CAPM cost of equity for an "average" stock – a stock whose beta is 1.0 - is 9.2 to 9.6%.

**Q. How do you adjust these estimates for specific companies such as AWWC?**

A. The risk premium is adjusted using a stock's beta. I use betas for AWWC and the water and gas utilities previously selected as reported by Value Line. These companies are less risky than the average stock, so their betas range from 0.6 to 0.80. An average stock, or a broad portfolio of stocks representing the market return, has a beta of 1.0. Page 7 of my Exhibit shows the resulting range of CAPM cost of equity estimates. For AWWC, the CAPM cost of equity is 6.72%. Since the CAPM for each company is determined by each company's beta, the comparable water and natural gas utilities all have very similar CAPM cost of equity estimates between 6.36% and 7.78%.

**Q. Are there other factors that can affect these CAPM cost of equity estimates?**

A. Yes. The pertinent factor at this time is the tendency for the risk premium to expand when interest rates, and bond returns, are low and shrink when interest rates are high. Consequently, because short term interest rates are near zero, the CAPM cost of equity estimates likely underestimate the current cost of equity slightly. Also, as Dr. Vander Weide points out in his testimony for TAWC, there is some evidence that the CAPM underestimates the cost of equity for firms with betas less than one. Nevertheless, it is reasonable to expect that the cost of equity of relatively low-risk utilities is less than the cost of equity of the market portfolio – that is, the CAPM estimate for a beta of one.

**Q. What do you conclude on the cost of equity for AWWC?**

A. The DCF and CAPM estimates taken as a group suggest a cost of equity for AWWC between 8.60% and 9.60%. My minimum DCF estimate for AWWC (8.60%) marks the

lower bound and the CAPM estimate for a stock of average riskiness (beta = 1) marks the upper bound. I recommend the midpoint of this range, or 9.0%, for AWWC's cost of equity and for the cost of equity in the double leverage capital structure as shown on page 2 of my Exhibit. My recommendation also falls within the bounds set by the DCF estimates for water utilities (9.1%) and natural gas utilities (8.65%).

**Q. How does your cost of equity of 9.0% compare to that recommended by TAWC's witness Dr. Vander Weide?**

A. Dr. Vander Weide recommends a cost of equity range for TAWC of 10.9% to 12.3%, but this includes several items with which I disagree, especially the adjustment for flotation or issuance costs and quarterly payment of dividends. Page 8 of my Exhibit provides a comparison of DCF calculations for the common companies that we examine based on Dr. Vander Weide's I/B/E/S growth rates, but not adjusting for issuance costs or quarterly payment of dividends. The column marked DCF range contains these estimates and I have included Dr. Vander Weide's estimates from his testimony as well. This demonstrates that the higher I/B/E/S growth rates as well as his adjustments are responsible for much of our differences.

**Q. What aspects of Dr. Vander Weide's analysis prompt his recommendation of 10.9% to 12.3%?**

A. His choice of "comparable" firms and I/B/E/S growth rates, his risk premium analysis, and his adjustments for flotation costs and quarterly payment of dividends appear to be the main drivers of his recommendation.

**Q. Do you agree with Dr. Vander Weide's choice of comparable firms?**

A. No. Although Dr. Vander Weide's water and natural gas utilities selected from Value Line often overlap with those I select, many are not comparable to either TAWC or AWWC. He includes small water companies that are closer in size to TAWC, but also includes the large water companies that are more comparable to AWWC. The same is true for his natural gas utilities, but he also includes gas companies that are not primarily utilities. I purposefully select utilities comparable to AWWC to avoid these mismatches.

**Q. Do you agree with his risk premium analysis?**

A. No. He applies the risk premium method to utility equity returns compared to returns on utility bonds. The CAPM employs similar methods, but measures the risk premium of stocks relative to government instruments that are risk-free in that there is little chance of default. Moreover, short term government bills are preferred because the chance that inflation and interest rates will diverge from investor expectations over the life of a short-term bill is virtually nil. The difference between stock returns and a risk-free rate of return reflects *only* the added return required for the risk embodied in stocks over and above the return required to offset the time value of money.

The problem with Dr. Vander Weide's utility risk premium is that the returns on utility bonds do not embody only the time value of money, but also include some return for inflation or interest rate risk, as well as the risk of default. Stocks are not subject to inflation risk, because stock prices and stock returns will adjust for changes in inflation as firms adjust their prices for their products, nor are they subject to default risk in the same way that bonds are, since stocks returns can rise when profits far exceed default levels even if the probability of default does not change. Consequently, there is no reason to

expect this difference in returns on utility bonds and utility stocks to be stable over time and this can introduces bias into these risk premium estimates.

Further, in his application of the CAPM, even though he does not rely on it, Dr. Vander Weide uses Long Term Government Bonds (20-year bonds) to calculate his risk premium for stocks. These returns include compensation for inflation or interest rate risk and cannot be risk-free returns as the CAPM requires.

**Q. How do you agree with Dr. Vander Weide's adjustments for flotation costs and quarterly dividend payments?**

A. No. These adjustments, properly conceived, are offsetting and can be ignored for ratemaking purposes. The quarterly dividend payment adjustment, for example, is based on the idea that since the firm has to pay these sums out over the course of the year, rather than all at once at the end, then the firm has to borrow that money at a cost that should be recognized in its cost of equity. The problem with this is that it ignores the profits the firm will earn over the course of the year. The profits of the firm for regulatory purposes are not calculated in this way, but we all know that the firm's profits are not all earned at once at the end of the year. Consequently, a firm earning profits over the course of the year will have the money available to pay quarterly dividends out of those profits and still have profits left to invest to earn an additional return before the end of the year. The end result is that the firm earns higher profits, even after paying quarterly dividends, than those calculated for regulatory purposes when these timing issues are taken into account. These higher profits are sufficient to cover any adjustment for flotation coasts.

I should point out that I am not advocating trying to capture these timing effects for regulatory purposes. Assuming that profits for return purposes are earned all at once at the end of the year is a convenient fiction that removes countless small and difficult to resolve issues from rate proceedings. If one were to try to account for the time value of profits earned over the course of the year, then one would have to decide how often to measure them (daily, weekly, monthly, or quarterly) – shorter periods will require much finer measurement of costs and revenues – and at what rate to value them over time. The timing of rate cases could also become issues for companies affected by weather. The result for a natural gas company with a test year beginning in October would be far different than the result for a test year beginning in June, for example. As I have suggested, many of these timing effects will be offsetting or very difficult to measure accurately or to some degree arbitrary, making them best ignored for most purposes.

## COMMENTS ON DR. SPITZNAGEL'S WEATHER NORMALIZATION STUDY

**Q. Do you agree with Dr. Spitznagel's weather normalization study?**

A. No.

**Q. Do you agree with Mr. Novak's criticism of Dr. Spitznagel's study?**

A. Yes and I would also add an additional criticism. There is a considerable literature on estimating water demand that Dr. Spitznagel either ignores or is unfamiliar with. [1]

[1] Some examples include: "Seasonal Residential Water Demand Forecasting for Census Tracts," Austin S. Polebitski and Richard N. Palmer, *Journal of Water Resources Planning and Management*, January/February 2010; "Peak Daily Water Demand Forecast Modeling Using Artificial Neural Networks," Jan Franklin Adamowski, *Journal of Water Resources Planning and Management*, March/April, 2008; "Short Term Municipal Water Demand Forecasting," John Bougadis, Kaz Adamowski, and Roman Diduch, *Hydrological Processes*, 19, 2005; "On Weather Normalizing Customer Level Billing Data," Anil Bamezai, Water Resources Research, 33(5), 1997.

These studies take pains to match weather data to customer billing cycles and include many more explanatory variables, such as price, income, household size, lot size, population density, and the presence or absence of voluntary or mandatory water restrictions. Dr. Spitznagel includes only weather as measured by the Palmer Drought Index. None of these studies makes use of that index. Failure to include relevant variables can bias the results.

Moreover, he has very little data, only ten data points for each month. Measures of goodness of fit and statistical significance are generally unreliable for such small samples. Even when he gets seemingly strong results, such as for the months of November and December, these should not be trusted for this reason.

**Q. What do you recommend?**

A. I recommend that the TRA not adopt Dr. Spitznagel's weather normalization procedure.

**Q. Does this conclude your testimony at this time?**

A. Yes.

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**ON BEHALF OF THE TENNESSEE ATTORNEY GENERAL**
**CONSUMER ADVOCATE AND PROTECTION DIVISION**

**JANUARY 21, 2011**

**Tennessee American Water Company**
**Double Leverage Capital Structure**
**And Cost of Capital**

| Component | % | Cost Rate | Wtd. Cost |
|---|---|---|---|
| Short Term Debt | 6.45% | 1.20% | 0.077% |
| Long Term Debt | 48.71% | 6.20% | 3.02% |
| Preferred Stock | 1.24% | 5.00% | 0.06% |
| Common Equity | 43.60% | | |
| Parent Short Term Debt | 0.43% | 1.20% | 0.005% |
| Parent Long Term Debt | 9.45% | 6.27% | 0.59% |
| Parent Common Equity | 33.72% | 9.00% | 3.03% |
| Total | | | 6.79% |

**Tennessee American Water Company**
**Capital Structures**
**2007, 2008, 2009, Forecasted 2010[1]**
**And TAWC's Attrition Year[2]**

| Component | TAWC | 2010 | 2009 | 2008 | 2007 | Historical Average |
|---|---|---|---|---|---|---|
| Short Term Debt | 3.453% | 1.29% | 2.14% | 13.03% | 9.35% | 6.45% |
| Long Term Debt | 51.386% | 53.48% | 50.60% | 40.96% | 49.80% | 48.71% |
| Preferred Stock | 1.126% | 1.18% | 1.26% | 1.23% | 1.28% | 1.24% |
| Common Equity | 44.035% | 44.05% | 46.00% | 44.78% | 39.57% | 43.60% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

1 Response to TN-CAPD-01-Part II-Q4 Attachment 2.
2 Exhibit MAM-5, Page 1.

**American Water Works**
**Capital Structures**
**December 31, 2007-2009**
**And September 30, 2010**

**Parent-only**[3]

| Component | 2007 | 2008 | 2009 | 2010 | Average |
|---|---|---|---|---|---|
| Short Term Debt | 1.99% | 0.53% | 0.37% | 1.07% | 0.99% |
| Long Term Debt | 20.31% | 22.15% | 22.53% | 21.73% | 21.68% |
| Common Equity | 77.70% | 77.32% | 77.10% | 77.20% | 77.33% |
| Total | 100% | 100% | 100% | 100% | 100% |

**Consolidated**[4]

| Component | 2007 | 2008 | 2009 | 2010 | Average |
|---|---|---|---|---|---|
| Short Term Debt | 2.30% | 5.09% | 1.26% | 1.87% | 2.63% |
| Long Term Debt | 49.90% | 51.01% | 56.30% | 55.30% | 53.13% |
| Preferred Stock | 0.25% | 0.26% | 0.24% | 0.25% | 0.25% |
| Common Equity | 47.55% | 43.64% | 42.20% | 42.58% | 43.99% |
| Total | 100% | 100% | 100% | 100% | 100% |

[3] Response to CAPD-01-PART II-Q4, Attachment 1, Page 2.
[4] Response to CAPD-01-PART II-Q4, Attachment 1, Page 1.

**Discounted Cash Flow Analysis**
**Water and Gas Distribution Utilities**

| Company | Beta | Total Capital | Div. Yield | Projected Growth Rates Earnings | Dividends | DCF Range |
|---|---|---|---|---|---|---|
| AWWC | 0.65 | $11.150b | 3.5-3.7% | NMF | 16% | 3.5-19.7% |
| Midpoint | | | | | | 11.6% |
| Aqua Am. | 0.65 | $4.035b | 2.8-3.0% | 11% | 6.5% | 9.3-14.0% |
| Am. States | 0.80 | $0.875b | 2.9-3.0% | 8.0% | 3.5% | 6.4-11.0% |
| Cal. Water | 0.75 | $1.100b | 3.2% | 6.0% | 1.0% | 4.2-9.2% |
| Overall Range (Water w/o AWWC) | | | | | | 4.2-14.0% |
| Midpoint | | | | | | 9.10% |
| AGL Res. | 0.75 | $3.985b | 4.8-4.9% | 4.5% | 3.5% | 8.3-10.40% |
| Atmos En. | 0.65 | $6.0b | 4.3-4.5% | 5.5% | 2.0% | 6.3-10.0% |
| NiSource | 0.85 | $11.365b | 5.3-5.5% | 6.0% | 0.5% | 5.8-11.5% |
| NJR | 0.65 | $1.440b | 3.3% | 5.0% | 5.5% | 8.3-8.8% |
| NW Nat. Gas | 0.60 | $1.320b | 3.6-3.7% | 3.0% | 4.0% | 6.6-7.7% |
| Piedmont | 0.65 | $1.9b | 3.8% | 3.5% | 3.5% | 7.3% |
| SJI | 0.65 | $1.25b | 2.8-2.9% | 7.0% | 8.5% | 9.8-11.4% |
| SW Gas | 0.75 | $2.85b | 2.7-3.0% | 8.0% | 5.0% | 7.7-11.0% |
| WGL | 0.65 | $2.09b | 4.2% | 1.5% | 3.0% | 6.7-7.2% |
| Overall Range (Gas) | | | | | | 5.8-11.5% |
| Midpoint (Gas) | | | | | | 8.65% |

Sources: 1) Beta, Total Capital, Dividend Yield, and Growth Rates from Value Line, *Ratings and Reports*, October 22, 2010 (Water Companies) and December 10, 2010 (Gas Companies).
2) Dividend Yield, *Wall Street Journal* (WSJ.com), December 23, 2010.

**American Water Works**
**Earnings Per Share and Quarterly Dividend**
**2008-2011**

| Year | Earnings/share | % Change | Dividend(9/30) | % Change |
|---|---|---|---|---|
| 2008 | $1.10 | ------- | $0.20 | ------ |
| 2009 | $1.25 | 13.6% | $0.21 | 5.0% |
| 2010 | $1.45* | 16.0% | $0.22 | 4.8% |
| 2011 | $1.55* | 6.9% | $0.23** | 4.5% |

Source: Value Line, *Ratings and Reports*, October 22, 2010.

* Value Line projection
** Assuming a $0.01 increase in quarterly dividend, Sept. 30, 2011.

**Capital Asset Pricing Model**
**Water and Natural Gas Distribution Companies**

| Company | Beta | Risk Premium | Weighted RP | 5-year T-bond Current Yield | CAPM |
|---|---|---|---|---|---|
| AWWC | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| Aqua Am. | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| Am. States | 0.80 | 7.1% | 5.68% | 2.10% | 7.78% |
| Cal. Water | 0.75 | 7.1% | 5.33% | 2.10% | 7.43% |
| AGL Res. | 0.75 | 7.1% | 5.33% | 2.10% | 7.43% |
| Atmos En. | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| NiSource | 0.85 | 7.1% | 6.04% | 2.10% | 8.14% |
| NJR | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| NW Nat. Gas | 0.60 | 7.1% | 4.26% | 2.10% | 6.36% |
| Piedmont | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| SJI | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| SW Gas | 0.75 | 7.1% | 5.33% | 2.10% | 7.43% |
| WGL | 0.65 | 7.1% | 4.62% | 2.10% | 6.72% |
| Market | 1.0 | 7.1% | 7.10% | 2.10% | 9.20% |

Sources: Beta: Value Line, *Ratings and Reports*, October 22 and December 10, 2010.
Risk Premium: calculated from *2010 Ibbotson® SBBI®, Stocks, Bonds, Bills and Inflation® Valuation Yearbook,* submitted in response to CAPD first discovery request, Part II, question 9.
Current Yield on 5-year Treasury Bond: *Wall Street Journal* (WSJ.com), December 23, 2010.

**Discounted Cash Flow Analysis**
**Using I/B/E/S Growth Rates**
**Common Water and Gas Distribution Utilities**

| Company | Div. Yield | I/B/E/S Growth Rate | DCF Range | Vander Weide's DCF |
|---|---|---|---|---|
| AWWC | 3.5-3.7% | 9.92% | 13.42-13.72% | 14.5% |
| Aqua Am. | 2.8-3.0% | 8.33% | 11.13-11.33% | 13.1% |
| Am. States | 2.9-3.0% | 4.00% | 6.9-7.0% | 10.3% |
| Cal. Water | 3.2% | 6.00% | 9.2% | 11.0% |
| Range (Water w/o AWWC) | | | 6.9 – 11.33% | 10.3-13.1% |
| Midpoint | | | 9.115% | 11.7% |
| AGL Res. | 4.8-4.9% | 5.07% | 9.87-9.97% | 10.5% |
| Atmos En. | 4.3-4.5% | 4.20% | 8.5-8.7% | 9.6% |
| NiSource | 5.3-5.5% | 3.00% | 8.3-8.5% | 9.9% |
| NW Nat. Gas | 3.6-3.7% | 5.50% | 9.1-9.2% | 9.7% |
| Piedmont | 3.8% | 7.00% | 10.8% | 11.9% |
| SJI | 2.8-2.9% | 11.67% | 14.47-14.57% | 15.6% |
| Range (Gas) | | | 8.3-14.57% | 9.6-15.6% |
| Midpoint | | | 11.435% | 12.6% |

Sources: Klein Exhibit, page 5; Exhibit JVW-1, Schedules 1 and 2.

VITA

**CHRISTOPHER C. KLEIN**

**EDUCATION:**

Ph. D. (Economics), University of North Carolina - Chapel Hill (1980)
B. A. (Economics), University of Alabama - Tuscaloosa (1976)

**EXPERIENCE:**

2002-Present **Middle Tennessee State University**
Associate Professor of Economics

2002-Present **Consultant**
Clients include: AGL Resources, Inc.; Reseller Coalition; Tennessee Advisory Commission on Intergovemmental Relations; Tennessee American Water Company, Inc.; Tennessee Department of Environment and Conservation; US LEC of Tennessee, Inc.; Verizon Wireless; West Virginia American Water Company, Inc.; Z-Tel Communications, Inc.

1996-2002 **Tennessee Regulatory Authority**
Chief, Economic Analysis Division, 1997-2002
Chief, Utility Rate Division, 1996-97

1998-2001 **Vanderbilt University**
Adjunct Associate Professor of Economics

1986-1996 **Tennessee Public Service Commission**
Director, Utility Rate Division, 1994-96
Economist & Research Director, 1993-94
Commission Economist, 1986-1993

1990-1994 **Middle Tennessee State University**
Adjunct Faculty, Department of Economics and Finance

1980-1986 **Federal Trade Commission**
Economist, Bureau of Economics - Antitrust Division

**PROFESSIONAL ACTIVITIES:**

Editor, *Journal for Economic Educators*, 2007 to present.
Member 1994-96, State Staff, Federal-State Joint Board, Federal Communications Commission CC Docket No.80-286 ("Separations" Joint Board).
Chair 1993-95, member 1990-95, Research Advisory Committee to the Board of Directors of the National Regulatory Research Institute at Ohio State University.
Member 1990-95, Staff Subcommittee on Gas, National Association of Regulatory Utility Commissioners.

Group Leader: Economics, Contracts, and Non-affiliate Revenue; NARUC* Staff Subcommittee on Accounts Multi-state Audit Team, 1988 Report on Bell Communications Research.
Referee: *Contemporary Economic Policy, Eastern Economic Journal, Land Economics, Review of Industrial Organization, Social Science Quarterly, Southern Economic Journal.*
Memberships: American Economic Association (AEA, since 1981), Southern Economic Association (1982), Industrial Organization Society (1986), Western Economic Association (2003).

**HONORS:**

Beta Gamma Sigma, International Honor Society for Collegiate Schools of Business, 2008
Top 30 Score, 2003-2004 Student Evaluation of Faculty Performance, Jones College of Business, Middle Tennessee State University.
Resolution of Recognition, National Regulatory Research Institute, 1995
Listed in various Who's Who publications, 1990-
Certificate of Commendation, Federal Trade Commission,1985
First in my class to complete the Ph. D., 1980
Alpha Pi Mu, National Industrial Engineering Honorary, 1973

**GRANTS RECEIVED:**

MTSU Jones College Summer Research Grant: 2004, 2005, 2007.
MTSU Faculty Research and Creative Activity Academic Year Grant: 2004-2005 (with Reuben Kyle)
MTSU Faculty Research and Creative Projects Committee Summer Salary Grant: 2006, 2009.

**TEACHING**

**At MTSU**

ECON 2420, Principles of Economics – Microeconomics
ECON 3520, Intermediate Microeconomic Theory
ECON 4400, Economics of Antitrust and Regulation
ECON 4570, Managerial Economics
ECON 4620, Econometrics and Forecasting
ECON 7121, Seminar in Applied Microeconomic Theory (Ph.D. Program)
ECON 7250, Methods of Outcome Assessment (Ph.D. Program)
Student Internships (ECON/FIN 4890, ECON/FIN 5890, ECON/FIN 6440)

**At Vanderbilt University**

ECON 252, Antitrust Economics
ECON 283, Economics of Regulation

**MTSU Dissertation Committees**

Shea W. Slonaker, Chair, *Three Essays on the Recorded Music Industry*, Ph. D. 2009.
Hua Liu, *U.S. Trade Deficit, Productivity Growth and Offshore Outsourcing*, Ph. D. 2006.

Jennifer Wilgus, *A Life-Cycle Approach to Human Capital Investment and Skill-Biased Technological Change*, Ph. D. 2005.

Anealia Sasser, *A Theoretical Examination of Title IV Financial Aid for Higher Education*, D.A. 2004.

**Vanderbilt University Dissertation Committees**:

Aster Adams, *The Impact of Deregulation and Competition on Efficiency, Financial Performance, and Shareholder Wealth of Electric Utilities in the United States*, Ph. D. 2009.

David B. Sapper, *Trial Selection and the Effects of Sentencing Reform in Criminal Antitrust Cases: A Theoretical and Empirical Analysis*, Ph. D. 2006.

T. Randolph Beard, *Bankruptcy, Safety Expenditure, and Safety Regulation in the Motor Carrier Industry*, Ph. D. 1988

**PUBLICATIONS AND WORKING PAPERS**

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, in revision, 2010.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, in revision, 2010.

"Do State Funded Merit Scholarships Induce Students to Learn more in High school?" with Elizabeth A. Perry-Sizemore, in revision, 2010.

"Chart Turnover and Sales in the Recorded Music Industry: 1990-2005," with Shea W. Slonaker, *Review of Industrial Organization*, 36:351-372, 2010.

"What Can We Learn from Education Production Studies?" with E. Anthon Eff, *Eastern Economic Journal*, 36:450-479, 2010.

"Public Transportation Ridership Levels," with Christopher R. Swimmer, *Journal for Economic Educators*, 10(1): 40-46, Summer 2010.

"Analysis of U.S. Foreign Aid Determinants for 2003," with Joshua M. Hill, *Journal for Economic Educators*, 9(1): 48-52, Summer 2009.

"Intra-district Public School Funding Equity and Performance in Nashville, Tennessee," *Journal of Education Finance*, Summer 2008.

"A Tale of Three Inputs: Cost and Production Duality with Time Utilization of Capital," *Applied Economics Research Bulletin*, 1(1) 2008.

"Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?" with Aster R. Adams and David B. Sapper, *Journal of Applied Regulation*, 2, November 2004, pp,. 87-108.

"A Switching Regime Approach to Measuring the Effects of Technological Change in Ocean Shipping," with J. David Bass and Reuben Kyle, *Journal of Productivity Analysis*, 22:1-2, July-September, 2004, pp. 29-49..

"The Financial Implications of Unbundling on Bell Company Profits: A Review of the Evidence," with T. Randolph

Beard and George S. Ford, *CommLaw Conspectus: The Journal of Communications Law and Policy*, v. 12 n.1, Fall/Winter 2003.

"Bell Companies as Profitable Wholesale Firms: The Financial Implications of UNE-P," with T. Randolph Beard, *Phoenix Center Policy Paper No. 17*, November 2002, www.phoenix-center.org.

"Connecting Tennessee: Bridging the Digital Divide," with Rose M. Gregory, *NRRI Quarterly Bulletin*, vol. 21 no. 3, Spring 2001.

"Regulation vs. Deregulation: It's All in the Externalities," *Tennessee's Business*, Middle Tennessee State University, v. 11, n. 3 (November), 2001.

"The Role of Public Power in a Restructured Electric Power Industry," with David Sapper, *The Electricity Journal*, August/September 2001.

"Regulator Preferences and Utility Prices: Evidence from Natural Gas Distribution Utilities," with George Sweeney, *Energy Economics*, vol. 21, n. 1, 1999.

"Competition in Telecommunications: A Progress Report for Tennessee," *Tennessee's Business*, Middle Tennessee State University, Murfreesboro, TN; vol. 9, n. 1, 1999.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, *Review of Industrial Organization*, December 1997.

"The Haunting of Universal Service: Open Markets, Efficient Funding and the Ghost of the Fair Rate of Return," *Proceedings of Tenth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," *Proceedings of Tenth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1996.

"Capture vs. Compromise: Entry Regulation of Intrastate Trucking," with Reuben Kyle and Jennifer Wilgus, *Logistics and Transportation Review*, v. 32 n. 3, September 1996.

"Price Discrimination: What is 'Undue' for a U.S. Utility?" *Utilities Policy*, vol. 4 no. 4, October 1994.

"Single Service Price Variations and 'Subsidies' in the Pricing of Telecommunications Services," *Proceedings of Ninth NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1994.

"What Is Undue Price Discrimination by a Regulated Utility?" *NRRI Quarterly Bulletin*, March 1994.

"A Comparison of Cost-Based Pricing Rules for Natural Gas Distribution Utilities," *Energy Economics*, July 1993.

"Negotiating a Transportation Rate Under Threat of Bypass: A Case Study," *Proceedings of the Eighth Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1992.

"A Multinomial Logit Model of Intrastate Trucking Regulation in Tennessee," with Jennifer Jose and Reuben Kyle, *Papers and Proceedings of the Nineteenth Annual Meeting of the Midsouth Academy of Economics and Finance*, v. 16 ,1992.

"Ramsey Prices for Natural Gas Distribution Utilities," *Proceedings of the Seventh NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1990.

"Intervention as Entry Deterrence: Evidence from Sham Litigation Cases," *Proceedings of the Seventh NARUC Biennial Regulatory Information Conference*, National Regulatory Research Institute, Columbus, OH, 1990.

Book Review, *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Edited by Robert W. Crandall and Kenneth Flamm, Brookings 1989; *Review of Industrial Organization*, Fall 1990.

"Double Leverage and Strategic Financing Decisions," *NRRI Quarterly Bulletin*, v. 11, n. 3, September 1990.

"Predation in the Courts: Legal Versus Economic Analysis in Sham Litigation Cases," *International Review of Law & Economics*, June 1990.

"Rate Design for Natural Gas Utilities: A Comparison of Ramsey and Cost of Service Pricing," *NRRI Quarterly Bulletin*, December 1989.

"Dissecting Divestiture: A Telecommunications Book Review Article," *Review of Industrial Organization*, October 1989.

*The Economics of Sham Litigation: Theory, Cases, and Policy*, Bureau of Economics Staff Report, Federal Trade Commission, April 1989.

"New Agreements, Non-affiliate Revenues, and Economic Issues," with Mike Amato and Francis Fok, in *Report on Bell Communications Research*, National Association of Regulatory Utility Commissioners, 1988.

"Merger Incentives and Cost of Capital Regnlation of Subsidiaries," *Midsouth Journal of Economics and Finance*, March 1988.

"Strategic Sham Litigation: Economic Incentives in the Context of the Case Law," *International Review of Law & Economics*, December 1986.

"Is There a Principle for Defining Industries? Comment," *Southern Economic Journal*, October 1985.

"A Note on Defining Geographic Markets," with Ed Rifkin and Noel Uri, *Regional Science and Urban Economics*, February 1985.

"Process Analysis, Capital Utilization, and the Existence of Dual Cost and Production Functions," FTC Bureau of Economics Working Paper No. 116, May 1984.

"A General Theory of Hedonic Pricing of Capital as a Factor of Production," FTC Bureau of Economics Working Paper No. 105, December 1983.

"The International Market for Crude Oil," with Fred Lipson and Harvey Blumenthal, in *Mergers in the Petroleum Industry*, Federal Trade Commission, 1982.

**PRESENTATIONS**

"Do State Funded Merit Scholarships for Higher Education Improve Pre-College Academic Performance?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Atlanta, GA, November 2010.

"The Effect of State Funded Merit Scholarships for Higher Education on Pre-College Academic Performance," with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, San Antonio, TX, November 2009.

"The Effect of State Funded Merit Scholarships for Higher Education on High School Graduation Rates," with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Washington, DC, November 2008.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, Southern Economic Association Annual Conference, Washington, DC, November 2008.

"Product Variety and Sales in the Recorded Music Industry: 1990-2005," with Shea Slonaker, International Industrial Organization Conference, Arlington, VA, May 2008.

"Identifying the Best Buys in U.S. Higher Education," with E. Anthon Eff and Reuben Kyle, Academy of Economics and Finance Annual Meeting, Nashville, TN, February 2008.

"Product Variety and Sales in the Recorded Music Industry: 1990-2005," with Shea Slonaker, Academy of Economics and Finance Annual Meeting, Nashville, TN, February 2008.

"Do State Funded Merit Scholarships Induce Students to Learn more in High school?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, New Orleans, LA, November 2007.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, Southern Economic Association Annual Conference, New Orleans, LA, November 2007.

"The Shifting Appeal of Sham Litigation: Evidence from Appellate Decisions 1971-2006," International Industrial Organization Conference, Savannah, GA, April 2007.

"The Shifting Appeal of Sham Litigation: Evidence from Appellate Decisions 1980-2006," Scholar's Week Poster Fair, MTSU, April 2007

"Causality Tests for Public School Funding and Performance," Southern Economic Association Meeting, Charleston, SC, November 2006.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, Southern Economic Association Meeting, Washington, November 2005.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, International Industrial Organization Conference, Atlanta, April 2005.

"Anticompetitive Litigation and the "Baselessness" Standard for Antitrust Liability," Southern Economic Association Meeting, New Orleans, November 2004.

"The Price of Quality: Hedonic Estimation of Implicit Market Models for Higher Education," with Reuben Kyle, Southern Economic Association Meeting, New Orleans, November 2004.

"VoIP: Let's Ask the Right Questions," Tennessee Regulatory Authority Forum on VoIP, Nashville Public Library, April 30, 2004.

"Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?" with Aster Rutibablira and David B. Sapper, Southern Economic Association Meeting, San Antonio, TX, November 2003.

"Telephone Penetration in Tennessee: Are Intrastate Universal Service Policies Effective?" with Aster Rutibablira and David B. Sapper, International Industrial Organization Conference, Boston MA, April 4-5, 2003.

"A Critique of Educational Production Functions," Southern Economic Association meeting, New Orleans, LA, November 2002.

"Connecting Tennessee: Bridging the Digital Divide," with Rose M. Gregory, American Economic Association meeting, joint session with the Transportation and Public Utilities Group, Atlanta, GA, January 2002.

"Long Term Contracts as Anticompetitive Devices in Telecommunications," Southern Economic Association Annual Meeting, Tampa, FL, November 2001.

"The Role of Public Power in a Restructured Electric Power Industry," American Economic Association meeting, joint session with the Transportation and Public Utilities Group, Boston, MA, January 2000.

"Universal Telephone Service in Tennessee: A Pre-Competition Assessment," with David Sapper, Southern Economic Association meeting, New Orleans, LA, November 1999.

"Trucks, Planes, Trains, and Wires? Short-haul vs. Long-haul Long Distance Rates in Telecommunications," with Reuben Kyle, Southern Economic Association meeting, Baltimore, MD, November 1998.

"The Economics of Time as a Resource," Southern Economic Association meeting, Atlanta, GA, November 1997.

"Cost and Production Duality with Capital Utilization," Department of Economics Seminar Series, Vanderbilt University, February 1997.

"Maximum Impropriety: The 'Baselessness' Standard for Improper Litigation," Southern Economic Association meeting, Washington, November 1996.

"Cost and Production Duality with Capital Utilization," Southern Economic Association meeting, Washington, November 1996.

"The Haunting of Universal Service: Open Markets, Efficient Pricing, and the Ghost of the Fair Rate of Return," Tenth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," Tenth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1996.

"Productivity Growth in Telecommunications: The Case of Tennessee," Advanced Workshop in Regulation and Public Utility Economics, 15th Annual Conference, Lake George, NY, May 1996.

"A Switching Regime Approach to Measuring the Effects of Technological Change in Ocean Shipping," with Reuben Kyle, Southern Economic Association meeting, New Orleans, November 1995.

"Productivity Growth in Telecommunications: The Case of Tennessee," Southern Economic Association meeting, New Orleans, November 1995.

"Local Service Price Variations and 'Subsidies' in Telecommunications," Southern Economic Association meeting, Orlando, November 1994.

"Dynamic Effects of Regulatory Policy on Intrastate Long Distance Telephone Rates," Southern Economic Association meeting, Orlando, November 1994.

"Single Service Price Variations and 'Subsidies' in the Pricing of Telecommunications Services," Ninth NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1994.

"Suit, Countersuit, and Settlement in Sham Litigation," Annual Meeting of the Midsouth Academy of Economics and Finance, Nashville, February 1994.

"New Evidence on the Effect of Regulation on Intrastate Long Distance Telephone Rates," Annual Meeting of the Midsouth Academy of Economics and Finance, Nashville, February 1994.

"What is Undue Price Discrimination for a Public Utility?" Southern Economic Association meeting, New Orleans, November 1993.

"Regulated Utility Prices and the Preferences of Regulators," with George Sweeney, Southern Economic Association meeting, New Orleans, November 1993.

"A Test for Strategic Behavior Under Rate of Return Regulation," Southern Economic Association meeting, Washington, November 1992.

"New Evidence on the Effect of Regulatory Policy on Intrastate Long Distance Telephone Rates," Southern Economic Association meeting, Washington, November 1992.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, Atlantic Economic Association meeting, Plymouth, MA, October 1992.

"Negotiating a Transportation Rate Under Threat of Bypass: A Case Study," Eighth Biennial Regulatory Information Conference, Columbus, OH, September 1992.

"A Multinomial Logit Model of Intrastate Trucking Regulation in Tennessee," with Jennifer W. Jose and Reuben Kyle, Midsouth Academy of Economics and Finance annual meeting, Mobile, February 1992.

"Technological Change and the Production of Ocean Shipping Services," with Reuben Kyle, Southern Economic Association meeting, Nashville, November 1991.

"Suit, Countersuit, and Settlement in Sham Litigation Cases," Southern Economic Association meeting, Nashville, November 1991.

"Implementing Third Best Pricing Rules for Natural Gas Distribution Utilties," Southern Economic Association meeting, Nashville, November 1991.

"Trucking Regulation in Tennessee," with Jennifer Jose and Reuben Kyle, Southern Economic Association meeting, Nashville, November 1991.

"Research and Development in Regulated Markets: The Case of Bell Communications Research," Southern Economic Association meeting, New Orleans, November 1990.

"Incentives for Trial and Settlement in Sham Litigation," Southern Economic Association meeting, New Orleans, November 1990.

"Ramsey Prices for Natural Gas Distribution Utilities," Seventh NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1990.

"Intervention as Entry Deterrence: Evidence from Sham Litigation Cases," Seventh NARUC Biennial Regulatory Information Conference, Columbus, OH, September 1990.

"Funding Research and Development in Regulated Industries: The Case of Bell Communications Research," Ninth Annual Conference of the Advanced Workshop in Regulation and Public Utility Economics, New Paltz, NY, May 30 - June 1, 1990.

"Incentives for Trial and Settlement in Sham Litigation," Bureau of Economics Seminar, Federal Trade Commission, February 1990.

"Estimating Ramsey Prices for Natural Gas Utilities," Southern Economic Association meeting, Orlando, November 1989.

"Incentives for Trial and Settlement in Sham Litigation," Department of Economics Seminar Series, Auburn University, November 1989.

"Natural Gas Rate-Making: Now and In the Future," Associated Valley Industries Natural Gas Seminar, Nashville, October 1989.

"Estimating Ramsey Prices for Natural Gas Utilities," Advanced Workshop in Regulation and Public Utility Economics, Eighth Annual Conference, Newport, RI, May 29-31, 1989.

"The Role of Bell Communications Research in the Telecommunications Markets," Midsouth Academy of Economics and Finance Annual Conference, Nashville, February 1989.

"The Organizational Structures of Public Utilities Under Different Regulatory Regimes," Southern Economic Association meeting, San Antonio, November 1988.

"New Agreements, Non-affiliate Revenues, and Economic Issues," Report on Bell Communications Research, NARUC Multi-state Audit Team, presented to NARUC Staff Sub-committee on Accounts, Kalispell, Montana, September 1988.

"Predation in the Courts: Empirical Analysis of Sham Litigation Cases," Joint Session of the Industrial Organization Society and the American Economic Association, Chicago, December 1987.

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