BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE

Petition of Tennessee American Water Company to Change and Increase Certain Rates and Charges so Far 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. 12-00049

filed electronically in docket office on 08/27/12

PRE-FILED DIRECT TESTIMONY OF

CHRISTOPHER C. KLEIN, PH.D.

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

AUGUST 27, 2012

IN THE TENNESSEE REGULATORY AUTHORITY
AT NASHVILLE, TENNESSEE

IN RE: PETITION FOR A GENERAL RATE INCREASE, IMPLEMENTATION OF A DISTRIBUTION SYSTEM INFRASTRUCTURE CHARGE AND THE ESTABLISHMENT OF TRACKING MECHANISMS FOR PURCHASED POWER, PENSIONS AND CHEMICAL EXPENSES	))))))	**DOCKET NO. 12-00049**

AFFIDAVIT

I, Christopher C. Klein, Regulatory Economist, on behalf of the Consumer Advocate Division of the Attorney General's Office, hereby certify that the attached Direct Testimony represents my opinion in the above-referenced case and the opinion of the Consumer Advocate Division.

CHRISTOPHER C. KLEIN

Sworn to and subscribed before me
this the 22nd day of August, 2012.

NOTARY PUBLIC

My commission expires: July 6, 2015

EMILY KNIGHT
STATE OF TENNESSEE NOTARY PUBLIC
DAVIDSON COUNTY, TENN.
My Commission Expires JULY 6, 2015

BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE

August 27, 2012

DOCKET NO. 12-00049

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, including 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 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.

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 adopt the cost of TAWC's long term debt and preferred stock proposed by TWAC's witness Mr. Verdouw. The cost of short term debt proposed by Mr. Verdouw, however, is too high. I recommend a lower rate between the historical figures and Mr. Verdouw's projection.

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

A. I recommend a cost of equity of 9.15% 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 TAWC?

A. I recommend an overall weighted cost of capital of 6.94% for TAWC as shown on page 2 of my Exhibit.

Q. Do you recommend any adjustments to TAWC's cost of capital if the TRA approves the proposed Distribution System Infrastructure Charge (DSIC), Purchased Power and Chemicals Charge (PPCC), and the Pension Expense Tracker.

A. Yes. If adopted, these proposals will reduce the risk faced by TAWC. Consequently, its equity return should be reduced to reflect the risk reduction. Consistent with the TRA's decision in Docket 09-00183, I recommend a reduction of 25 basis points in TAWC's equity return to account for the risk-reducing effects of these mechanisms. This reduces TAWC's overall cost of capital to 6.86%.

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. I conclude with my recommended overall weighted cost of capital.

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 TAWC?

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. Verdouw. I then compared this to the historical capital structures of TAWC as shown on page 3 of my Exhibit. The structure proposed by Mr. Verdouw primarily differs from the historical average structure of TAWC in the proportions of short term debt and preferred stock. Mr. Verdouw proposes 3.65% short term debt, whereas the historical average over 2009-2012 is 1.55%. Mr. Verdouw also proposes to retire all of TAWC's preferred stock and replace it with short and long term debt. Given the current historically low interest rates for debt, this is a reasonable proposal. Consequently, I add TAWC's historical average proportion of preferred stock to its historical average proportion of short term debt to arrive at the capital structure for TAWC shown on page 2 of my exhibit. This results in a capital structure for TAWC with 2.45% short term debt and 0.00% preferred stock along with similar proportions of long term debt and common stock to those proposed by Mr.

Verdouw. It also represents the longer term historical capital structure of TAWC while allowing for the retirement of TAWC's preferred stock.

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. 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, while recognizing the role of the parent company in providing funds to the subsidiary. As Mr. Verdouw 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 American Water Capital Corp. ('AWCC') to meet its debt financing needs. AWCC is an American Water Works Company subsidiary, and an affiliate of Tennessee American. AWCC 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 Gary M. Verdouw, p. 16, lines 3-8.)

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

A. Again, I started with the cost rates for long term and short term debt proposed by Mr. Verdouw for TAWC. I found the cost rate for long term debt to be reasonable and have adopted it in my recommended capital structure. The cost rate for short term debt projected by TAWC in the previous rate case (TRA Dkt. No. 10-00189), however, has far exceeded the actual cost of short term debt incurred by TAWC since that time. I accepted the cost rate of 1.20% for short run debt proposed by TAWC in that docket, but the actual cost realized by TAWC in 2011-2012 ranged from 0.41% to 0.75%. For that reason, I expect that Mr. Verdouw's projected short term debt cost of 1.40% for the attrition year will likely overstate TAWC's actual cost of short term debt by 45 basis points or more. Consequently, I recommend a cost rate for short term debt of 1.0%. For AWWC's portion of the double levered capital structure, I used AWWC's embedded cost of long term debt and preferred stock at December 30, 2011. (See TAWC's Response to the First Discovery Request of the Consumer Advocate and Protection Division, Question 1.)

Q. Did you review the capital structure for TAWC adopted by the TRA in the previous rate case, Docket No. 10-00189?

A. Yes.

Q. Do you recommend a similar approach to TAWC's capital structure in this case?

A. No.

Q. Why not?

A. For two reasons: first, the derivation of the capital structure adopted by the TRA is not clear; and second, it is not, technically, a double leverage capital structure.

Q. What is unclear about the derivation of the capital structure adopted by the TRA in Docket 10-00189?

A. I was unable to replicate the overall cost of capital of 7.83% adopted by the TRA from the description of the capital structure in the TRA's Order. The TRA's Order does not specifically show the adopted capital structure. Given the cost of equity of 10% and the overall return of 7.83% adopted by the TRA, along with the description of the AWWC capital structure used for "double-levering," I have calculated the implied capital structure from Docket 10-00189 on page 5 of my Exhibit. The TRA apparently imputed AWWC's historical average consolidated capital structure to the proportion of TAWC's capital structure that was not held or arranged by other AWWC affiliates. This produces an overall cost of capital of 7.824%, however. Since this is less than the 7.83% overall cost of capital adopted by the TRA, the actual capital structure underlying the overall cost of capital remains unclear.

Q. How is double leverage defined?

A. Double leverage "usually refers to a situation where a holding company raises debt and downstreams it as equity capital, or subordinated debt, to a subsidiary, i.e., it is the use of debt by both the parent company and the subsidiary, in combination with the company's equity capital, to finance the assets of the subsidiary." (www.ventureline.com/accounting-glossary/D/double-leverage-definition/, accessed August 13, 2012.) In the regulatory context, "double leverage…as commonly propounded instructs that the weighted average cost of capital of the parent company of a subsidiary be used as a measure of the cost of equity of a subsidiary." (Michael S. Rozeff, "Modified Double Leverage – A New Approach," *Public Utilities Fortnightly*, March 31,

1983.) Or more simply, double leverage states that the equity of a subsidiary is "part equity and part the debt of the parent." (Kolbe, A. Lawrence, James A. Read, Jr. and George R. Hall, "The Cost of Capital," Cambridge:MIT Press, 1984, p. 146.)

Q. Why is the capital structure adopted by the TRA in Docket 10-00189 not a double-leverage capital structure?

A. The TRA's apparent method is to substitute the consolidated cost of capital of the parent for the subsidiary's cost of **all** capital sourced through affiliated companies. The consolidated capital structure of the parent is the sum of the debt and equity of the parent holding company and all of its subsidiaries, whether that debt and equity can be said to support the subsidiary in question or not. This double-counts the subsidiary's outside debt, because it is attributed to the subsidiary directly and is also included in the consolidated debt of the parent. Plus, the debt and equity held directly by other subsidiaries is attributed to supporting the subsidiary in question as well. Clearly the capital structure adopted by the TRA in Docket 10-00189 is not a double leverage capital structure.

COST OF EQUITY

Q. How do you approach the cost of equity of TAWC?

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. The capital structure of the parent holding

company (not consolidated) supports the equity of all the subsidiaries. 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 have less than five-years of historical information on AWWC upon which to base their expectations or 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 in size and geographic scope. For this reason, I also examine natural gas distribution companies as possible comparables to AWWC. Most gas utilities also are smaller than AWWC, but they are closer in size to AWWC than are the other

water companies. Gas utilities are regulated by the states and provide a similar utility service through a system of pipes.

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 6 of my Exhibit shows this calculation for AWWC, five water companies for which growth rates are available, 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 projects an annual earnings growth rate of 8% and a dividend growth rate of 6.5%. Consequently the calculated DCF indicates a range of 9.14% to 10.9%, with a midpoint of 10.02%. 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 per share for AWWC as shown on page 6 of my Exhibit. Quarterly dividend payments, however, have increased by one cent per share in each of the past three years, or by about 4.5% of the current dividend. It is reasonable to assume that investors should expect a minimum dividend growth rate for AWWC in the neighborhood of 4.5%.

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

A. Yes. The dividend yield range of 2.64% to 2.9% added to the minimum expected dividend growth of 4.5% yields a range of minimum DCF cost of equity estimates of 7.14% to 7.4%.

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 included all of the water utilities covered by Value Line. I 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 0.85, 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 7.14%. This is similar to the midpoint of the DCF range for water utilities (7.70%) and just lower than the midpoint for the gas utilities (8.15%). The maximum DCF estimate for AWWC is 10.90%. As 10.90% is considerably above the midpoint DCF estimates for the comparable firms, a reasonable cost of equity for AWWC is certainly less than this. To try to narrow this 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 *2012 Ibbotson® SBBI®, Stocks, Bonds, Bills and Inflation® Valuation Yearbook,* submitted in response to CAPD First Discovery Request, question 7. I calculate these risk premia by subtracting the income portion of the return on long term government bonds, 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 8.2%, while the risk premium of stocks over the income component of intermediate term bonds (5-year) is 7.2%, and the risk premium over long term bonds is 6.6%. The most recent yield for five-year T-bonds is 0.725% and has been below 1.0% since November of 2011. Using the figures for five-year bonds, the CAPM cost of equity for an "average" stock – a stock whose beta is 1.0 - is 7.925 to 8.2%.

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 8 of my Exhibit shows the resulting range of CAPM cost of equity estimates. For AWWC, the CAPM cost of equity is 5.68%. 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 5.32% and 7.12%.

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 range of cost of equity estimates is associated with a beta equal to one?

A. Using short term instruments, a stock with a beta of one has a cost of equity equal to the current T-bill rate (0.114%) plus the risk premium for stocks over T-bills (8.2%) or 8.314%. Using 5-year instruments, the cost of equity for a stock with a beta of one is 0.725% + 7.2% = 7.925%. Similarly, using long term bonds, the current rate is 2.748%

on 30-year T-bonds and the risk premium is 6.6%, which yields a cost of equity of 9.348%.

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

A. The DCF estimates suggest a cost of equity for AWWC between 7.40% and 10.90%. The midpoint of this range is 9.15%. The CAPM cost of equity range for a beta of one encompasses this figure (7.925 – 9.348%). It also lies within the ranges of DCF estimates for my comparable firms and somewhat above their midpoints. Giving more weight to the specific cost of equity estimates for AWWC, I recommend a cost of equity of 9.15%.

Q. How does your cost of equity of 9.15% compare to that recommended by TAWC's witness Dr. Vander Weide?

A. Dr. Vander Weide recommends a cost of equity range for TAWC of 10.7% to 11.3%, but this includes several items with which I disagree, especially the adjustment for flotation or issuance costs and quarterly payment of dividends. Page 9 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 11.3%?

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. This is an inherent problem due to the few water companies available. But, he does the same for his natural gas utilities and 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 introduce bias into these risk premium estimates.

Q. 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 earned all 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 as well.

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, very difficult to measure accurately, or to some degree arbitrary, making them best ignored for most purposes.

OTHER TAWC PROPOSALS AFFECTING THE COST OF CAPITAL

Q. Are there other proposals by TAWC in this rate case that could affect the cost of capital and the appropriate allowed rate of return for TAWC?

A. Yes. TAWC witness Mr. Verdouw refers to these as the Distribution System Infrastructure Charge (DSIC), the Purchased Power and Chemicals Charge (PPCC), and the Pension Expense Tracker. The DISC provides for increases in revenues for the recovery of rate of return on additions to net plant made between rate cases; the PPCC allows for surcharges or refunds to cover increases or decreases in purchased power and chemicals expenses between rate cases; and the pension expense tracker provides for

deferring recovery or refunds of pension expenses over or under a "reasonable expense" level established in this docket until the next rate case when the net recovery or refund would be built into rates.

Q. How would the adoption of these proposals affect the appropriate rate of return for TAWC in this docket?

A. All of these proposals reduce TAWC's risk by guaranteeing the recovery of certain costs in between rate cases. Ordinarily, a utility puts the approved rates into effect after a rate case and is at risk for increased or decreased profits due to variations in costs or revenues from those adopted in the rate case. These proposals insulate TAWC from various cost fluctuations that would otherwise affect its profitability, thus reducing its risk. The DSIC and the PPCC, for example, adjust rates annually to recover additional revenues as needed to guarantee that the allowed return is earned on additions to net plant (DSIC) and to recover increased purchased power and chemicals expenses (PPCC). The PPCC also passes through any decreases in these expenses to consumers by reducing rates in that event. The pension expense tracker would defer over- or under-collection of pension expenses until the next rate case in which the net deferred amount would be built into rates going forward. Without these mechanisms, TAWC faces the risk that deviations from the revenue or expense amounts determined in the rate case may cause it to over- or under-earn its allowed rate of return. TAWC's proposals remove that risk for these categories.

Q. How do decreases in risk affect the cost of capital?

A. Decreases in risk will reduce the cost of equity going forward.

Q. Can the effect of this decrease in risk on the cost of equity for TAWC be quantified?

A. Quantifying a reduction in risk of this type is difficult because there are few historical data on TAWC or AWWC available to assess the magnitude of the effect on the cost of equity. The usual techniques of examining comparable firms, for example, also suffer from lack of data and will not capture the effect of any new policy proposal that has not been previously implemented for those firms.

Q. Has the TRA ever adopted a reduction in the cost of equity to capture the risk reducing aspects of a new utility proposal similar to these?

A. Yes. In docket 09-00183, the TRA approved a so-called "decoupling mechanism" for Chattanooga Gas Company (CGC) and reduced the equity return by 25 basis points to account for the risk-reducing effects of this mechanism. The decoupling procedure adjusted CGC's rates annually to make up for revenue shortfalls, thus "decoupling" CGC's revenues from the volumes of natural gas sold to residential and small commercial customers. In this way, the risk that CGC would sell more or less gas than was projected in the rate case for these customers was removed.

Q. Do you recommend that the TRA adopt a similar adjustment if it approves these three proposals by TAWC?

A. Yes. To the extent that all three proposed mechanisms are adopted, I recommend a 25 basis point reduction in TAWC's equity return. If some of these proposals are rejected by the TRA, then the 25 basis point reduction in the equity return should be reduced.

Q. Do you favor the use of trackers such as those proposed by TAWC for public utilities in general?

A. No. Trackers shift risk from the utility to consumers, reduce the incentives for the utility to minimize the costs affected by the trackers, and ignore any offsetting changes in costs

not covered by trackers. Without trackers, consumers pay a fixed rate for a service in between rate cases and know what the rate will be with certainty. There is no risk that rates will change between rate cases. With trackers, the rates that consumers pay will vary with the tracker, exposing consumers to the risk of uncertain rates. Since changes to the tracked costs will be passed to consumers in rate adjustments, the utility has no opportunity to profit from lower costs or suffer from higher costs. Thus, there is no incentive for the utility to minimize the tracked costs. Further, rates are adjusted based on the tracked costs regardless of changes in untracked costs. For example, if tracked costs rise then rates are adjusted upward, even though untracked costs may have fallen such that a rate adjustment is unnecessary.

CONCLUSION

Q. Can you summarize your recommendations for cost of capital for TAWC?

A. Yes. I recommend using the three year average capital structure for TAWC, adjusted for the retirement of preferred stock, and double levered using the three-year average parent-only capital structure of AWWC. This capital structure is shown on page 2 of my Exhibit. I generally agree with the TAWC's witnesses on the cost rates of long term debt and preferred stock. I recommend a cost rate of 1.00% on short term debt and a cost of equity of 9.15%. This results in an overall cost of capital of 6.94%. If the TRA approves the DSIC, PPCC, and pension expense tracker, then the equity return should be reduced by 25 basis points. This produces an overall cost of capital of 6.86%.

Q. Does this conclude your testimony at this time?

A. Yes.

BEFORE THE TENNESSEE REGULATORY AUTHORITY
NASHVILLE, TENNESSEE

Petition of Tennessee American Water Company to Change and Increase Certain Rates and Charges so Far 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. 12-00049

PRE-FILED DIRECT EXHIBIT OF

CHRISTOPHER C. KLEIN, PH.D.

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

AUGUST 27, 2012

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

Component	%	Cost Rate	Wtd. Cost
Short Term Debt	2.45%	1.00%	0.0245%
Long Term Debt	52.94%	6.02%	3.1870%
Preferred Stock	0.00%	n.a.	0.00%
Common Equity	44.61%		
Parent Short Term Debt	0.85%	1.00%	0.0085%
Parent Long Term Debt	9.35%	6.15%	0.5750%
Parent Preferred	0.03%	4.93%	0.0015
Parent Common Equity	34.38%	9.15%	3.1458%
Total			6.94%

Tennessee American Water Company
Capital Structures
2009, 2010, 2011, Forecasted 2012[1]
And TAWC's Attrition Year[2]

Component	TAWC	2012	2011	2010	2009	Historical Average
Short Term Debt	3.65%	3.72%	0.33%	0.00%	2.14%	1.55%
Long Term Debt	51.35%	51.95%	54.09%	55.15%	50.57%	52.94%
Preferred Stock	0.00%	0.00%	1.18%	1.18%	1.26%	0.90%
Common Equity	45.00%	44.32%	44.40%	43.66%	46.04%	44.61%
Total	100%	100%	100%	100%	100%	100%

1 Response to First Discovery Request of the Consumer Advocate and Protection Division, Question 1.
2 Exhibit CS-1-Capital Structure-GMV, Schedule CS 1.1, Page 1.

American Water Works
Capital Structures
December 31, 2009-2011

Parent-only[3]

Component	2009	2010	2011	Average
Short Term Debt	0.38%	0.95%	4.40%	1.91%
Long Term Debt	22.52%	21.86%	18.46%	20.95%
Preferred Stock	0.09%	0.08%	0.08%	0.08%
Common Equity	77.01%	77.11%	77.06%	77.06%
Total	100%	100%	100%	100%

Consolidated[4]

Component	2009	2010	2011	Average
Short Term Debt	1.26%	2.33%	5.08%	2.89%
Long Term Debt	56.29%	55.33%	52.92%	54.84%
Preferred Stock 1	0.25%	0.23%	0.21%	0.23%
Preferred Stock 2	0.05%	0.05%	0.04%	0.05%
Common Equity	42.15%	42.06%	41.75%	41.99%
Total	100%	100%	100%	100%

[3] Response to First Discovery Request of the Consumer Advocate and Protection Division, Question 1.
[4] Response to First Discovery Request of the Consumer Advocate and Protection Division, Question 1.

Tennessee American Water Company
Capital Structure and Cost of Capital
Final TRA Order, Dkt. No. 10-00189

Component	%	Cost Rate	Wtd. Cost
Long Term Debt (outside)	6.81%	8.30%	0.565%
Other (AWWC)	93.19%		
Parent Short Term Debt	2.45%	1.90%	0.047%
Parent Long Term Debt	49.51%	6.27%	3.10%
Parent Preferred	0.233%	5.0%	0.012%
Parent Common Equity	41.0%	10.00%	4.10%
Total			7.824%

American Water Works
Consolidated[5] Capital Structures
December 31, 2007-2009
And September 30, 2010

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%

[5] Response to CAPD-01-PART II-Q4, Attachment 1, Page 1, Dkt. No. 10-00189.

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	$11.550b	2.64-2.9%	8.0%	6.5%	9.14-10.9%
Midpoint						10.02%
Am. States	0.70	$0.805b	2.8-3.26%	5.5%	4.0%	6.8-8.76%
Aqua Am.	0.65	$2.885b	2.55-2.6%	7.0%	5.0%	7.55-9.6%
Artesian*	0.55	$0.245b	3.51-3.7%	na	na	
Cal. Water	0.65	$1.200b	3.38-3.4%	6.0%	4.0%	7.38-9.4%
Conn. Water*	0.75	$0.355b	3.05-3.2%	na	na	
Middlesex*	0.70	$0.320b	3.9%	5.5%	1.5%	5.4-9.4%
SJW	0.85	$0.825b	3.0%	7.0%	4.0%	7.0-10.0%
York*	0.65	$0.181b	2.93-3.0%	na	na	
Overall Range (Water w/o AWWC)						5.4-10.0%
Midpoint						7.70%
AGL Res.	0.75	$7.260b	4.54-4.9%	5.5%	2.0%	6.54-10.40%
Atmos En.	0.70	$7.0b	3.81-4.3%	4.0%	1.5%	4.31-8.3%
NiSource	0.85	$11.655b	3.8%	8.0%	Nil	3.8-11.8%
NJR	0.65	$1.48b	3.33-3.6%	5.5%	4.0%	7.33-9.1%
NW Nat. Gas	0.60	$1.44b	3.66-3.8%	4.0%	3.0%	6.66-7.8%
Piedmont	0.70	$1.99b	3.78-4.0%	2.5%	3.5%	6.18-7.5%
SJI	0.65	$1.60b	3.06-3.5%	9.0%	9.0%	12.06-12.5%
SW Gas	0.75	$3.60b	2.65-2.9%	9.0%	8.0%	10.65-11.9%
WGL	0.65	$2.115b	3.0-3.95%	2.5%	3.0%	5.5-6.95%
Overall Range (Gas)						3.8-12.5%
Midpoint (Gas)						8.15%

Sources: 1) Beta, Total Capital, Dividend Yield, and Growth Rates from Value Line, *Ratings and Reports*, July 20, 2012(Water Companies) and June 8, 2012 (Gas Companies).
2) Dividend Yield, *Wall Street Journal* (WSJ.com), August 8, 2012.

*Listed on NASDAQ only.

American Water Works
Quarterly Dividends Paid on Common Stock
2008-2012

Date	Dividend	% Change
9/2/08	$0.20	------
12/1/08	$0.20	0.0
3/2/09	$0.20	0.0
6/1/09	$0.20	0.0
9/1/09	$0.21	**5.0**
12/1/09	$0.21	0.0
3/1/10	$0.21	0.0
6/1/10	$0.21	0.0
9/1/10	$0.22	**4.8**
12/1/10	$0.22	0.0
3/1/11	$0.22	0.0
6/1/11	$0.22	0.0
9/1/11	$0.23	**4.5**
12/1/11	$0.23	0.0
3/1/12	$0.23	0.0
6/1/12	$0.23	0.0
9/1/12	$0.24*	**4.3***

Source: Response to the First Discovery Request of the Consumer Advocate and Protection Division, Question 5.

* Assuming a $0.01 increase in quarterly dividend, Sept. 1, 2012.

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	7.2%	4.68%	1.00%	5.68%
Aqua Am.	0.65	7.2%	4.68%	1.00%	5.68%
Am. States	0.70	7.2%	5.04%	1.00%	6.04%
Cal. Water	0.65	7.2%	4.68%	1.00%	5.68%
SJW	0.85	7.2%	6.12%	1.00%	7.12%
AGL Res.	0.75	7.2%	5.40%	1.00%	6.40%
Atmos En.	0.70	7.2%	5.04%	1.00%	6.04%
NiSource	0.85	7.2%	6.12%	1.00%	7.12%
NJR	0.65	7.2%	4.68%	1.00%	5.68%
NW Nat. Gas	0.60	7.2%	4.32%	1.00%	5.32%
Piedmont	0.70	7.2%	5.04%	1.00%	6.04%
SJI	0.65	7.2%	4.68%	1.00%	5.68%
SW Gas	0.75	7.2%	5.40%	1.00%	6.40%
WGL	0.65	7.2%	4.68%	1.00%	5.68%
Market	1.0	7.2%	7.20%	1.00%	8.20%

Sources: Beta: Value Line, *Ratings and Reports*, October 22 and December 10, 2010.

Risk Premium: calculated from *2012 Ibbotson® SBBI®, Stocks, Bonds, Bills and Inflation® Valuation Yearbook,* submitted in response to the First Discover Request of the Consumer Advocate and Protection Division, Question 7.

Current Yields: 3-month T-bill 0.114%; 1-year T-Note 0.183%; 5-year T-Note 0.725%; 10-year T-note 1.649%; 30-year T-Bond 2.748% : *Wall Street Journal* (WSJ.com), August 8, 2012.

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	2.64-2.9%	9.22%	11.86-12.12%	12.5%
Am. States	2.8-3.26%	5.70%	8.5-8.76%	9.2%
Aqua Am.	2.55-2.6%	7.52%	10.07-10.12%	10.9%
Artesian	3.51-3.7%	4.40%	7.91-8.10%	9.0%
Cal. Water	3.38-3.40%	9.93%	13.31-13.33%	14.0%
Conn. Water	3.05-3.20%	4.55%	7.60-7.75%	8.2%
Range (Water w/o AWWC)			7.6 –13.33%	8.2-14.0%
Midpoint			10.47%	11.1%
AGL Res.	4.54-4.9%	3.27%	7.81-8.17%	8.3%
Atmos En.	3.81-4.3%	3.53%	7.34-7.83%	8.4%
NiSource	3.8%	8.37%	12.17%	13.0%
NW Nat. Gas	3.66-3.8%	3.25%	6.91-7.05%	7.4%
Piedmont	3.78-4.0%	4.55%	8.33-8.55%	8.6%
SJI	3.06-3.5%	8.5%	11.56-12.00%	11.9%
WGL	3.00-3.95%	4.5%	7.50-8.45%	8.7%
Range (Gas)			6.91-12.17%	7.4-13.0%
Midpoint			9.54%	10.2%

Sources: Klein Exhibit, page 6; Exhibit JVW-1, Schedules 1 and 2.

VITA

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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 included: AGL Resources, Inc.; Reseller Coalition; Tennessee Advisory Commission on Intergovernmental Relations; Tennessee American Water Company, Inc.; Tennessee Attorney General, Consumer Advocate and Protection Division; 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: *Applied Economics, Contemporary Economic Policy, Eastern Economic Journal, Land Economics, Management and Decision 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, 2012.
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 4620/5620, 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

"Econometrics as a Capstone Course in Economics," submitted to *Journal of Economic Education*, 2012.

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PRESENTATIONS

"Supply Innovation and Sales of Recorded Music: 1990-2010, " Southern Economic Association Annual Conference, New Orleans, LA, November 2012, forthcoming.

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"Do State Funded Merit Scholarships for Higher Education Reduce High School Dropout Rates for All Students?" with Elizabeth A. Perry-Sizemore, Southern Economic Association Annual Conference, Washington, DC, November 2011.

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"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.

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

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"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.

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"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.

"Rate of Return on Equity," National Conference on Unit Valuation Standards, Nashville, December 1987.

"Merger Incentives and Organizational Structures Under Cost of Capital Regulation," Southern Economic Association meeting, Washington, November 1987.

"Merger Incentives and Cost of Capital Regulation of Subsidiaries," Midsouth Academy of Economics and Finance Annual Conference, Mobile, February 1987.

"The Incidence of Predatory Sham Litigation," Southern Economic Association meeting, New Orleans, November 1986.

"A Welfare Analysis of the Department of Justice Merger Guidelines," Southern Economic Association meeting, Dallas, November 1985.

"A Duality Approach to Labor Costs and Shiftwork," Southern Economic Association meeting, Atlanta, November 1984.

"Strategic Sham Litigation: Economic Incentives in the Context of the Case Law," Southern Economic Association meeting, Atlanta, November 1984.

"A General Theory of Hedonic Pricing of Capital as a Factor of Production," Southern Economic Association meeting, Washington, November 1983.

ECONOMIC TESTIMONY

Testimony before the Public Service Commissions of Alabama, Louisiana, North Carolina, and South Carolina on behalf of the Reseller Coalition, various docket numbers, August 2010-May 2011.

In the United States District Court for the Middle District of Tennessee: Owner-Operator Independent Drivers Association Inc. v. Keith Bissell, No. 3-90-0251, March 1992, (Affidavit).

Before the Federal Communications Commission: Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange Companies, CC Docket No. 89-624, March 1990.

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Before the Tennessee Advisory Commission on Intergovernmental relations:
"Report on Pole Attachment Rate Study," with Reuben Kyle, January 18, 2007.

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United Telephone - Southeast (95-02615) September 1995.
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Kingsport Power Co. (92-04425) October 1992.
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Nashville Gas Co. (89-10491) Oct. 1989.
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West Tennessee Telephone Co. (89-02323) May 1989.
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