

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

Petition of Kingsport Power Company)	
d/b/a AEP Appalachian Power Company)	DOCKET NO. 16-00001
General Rate Case and Motion for)	
Protective Order)	

PRE-FILED DIRECT TESTIMONY OF

CHRISTOPHER C. KLEIN, PH.D.

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

June 24, 2016

IN THE TENNESSEE REGULATORY AUTHORITY
AT NASHVILLE, TENNESSEE

IN RE:

PETITION OF KINGSPORT POWER
COMPANY d/b/a AEP APPALACHIAN
POWER GENERAL RATE CASE AND
MOTION FOR PROTECTIVE ORDER

DOCKET NO. 16-00001

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 21st day of June, 2016.

Angela A. Price
NOTARY PUBLIC

My commission expires: 12-16-18



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

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

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

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

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

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

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

8 **A. I was employed as an Economist in the Antitrust Division of the Bureau of Economics at**
9 the Federal Trade Commission (FTC) in Washington, D.C., for six years starting in 1980.
10 In 1986, I was hired as the first Economist for the Tennessee Public Service Commission
11 (TPSC). Although my title changed over the years, I functioned as the Chief Economist
12 for the TPSC and, after 1996, the Tennessee Regulatory Authority (TRA), until August of
13 2002, when I assumed my current position with MTSU.

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

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

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

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

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

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

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

16 **A.** Yes. I was a member of the National Association of Regulatory Utility Commissioners
17 (NARUC) Staff Subcommittee on Gas. I was a member of, and Chaired, the Research
18 Advisory Committee to the Board of Directors of the National Regulatory Research
19 Institute (NRRI). I also served on the State Staff of the FCC's Federal-State Joint Board
20 in CC Docket No.80-286 (the "Separations" Joint Board) and as a Group Leader on the
21 NARUC Staff Subcommittee on Accounts Multi-state Audit Team that produced the
22 1988 Report on Bell Communications Research.

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

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

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

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

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

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

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

17 **A.** More than 40 of my articles have appeared in professional or academic journals such as
18 *Energy Economics*, *Utilities Policy*, *The Electricity Journal*, *The Journal of Applied*
19 *Regulation* and many others. I have made more than 80 presentations at professional
20 meetings.

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

22 **A.** Yes. I have testified before various committees of the Tennessee General Assembly on
23 regulatory issues, especially issues involving competition in the telecommunications

1 industry, as well as before the Tennessee Advisory Commission on Intergovernmental
2 Relations and the Tennessee Regulatory Authority. A complete list is provided in my
3 Vita beginning on page 7 of my Exhibit.

4
5 **PURPOSE OF TESTIMONY**
6

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

8 A. I will address the Cost of Capital for Kingsport Power Company (Kingsport) and
9 recommend an allowed rate of return for ratemaking purposes. This includes issues
10 regarding capital structure, cost of debt, and cost of equity.

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

12 A. Yes. I concur in part with the capital structure presented by Kingsport's witness Patrick
13 M. Bourke, but apply the double-leverage method to account for the parent-subsidary
14 relationship between Kingsport and its parent holding company, American Electric
15 Power, Inc. (AEP). The resulting capital structure calculated using Mr. Bourke's
16 recommended structure for Kingsport and the year-end 2015 parent-only capital structure
17 of AEP is shown on page 2 of my Exhibit.

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

19 A. I recommend a cost of equity of 8.8% based on the Discounted Cash Flow (DCF) and
20 Capital Asset Pricing Model (CAPM) methods shown on pages 3 and 4 of my Exhibit. I
21 recommend no additional adjustment for quarterly payment of dividends.

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

1 A. I recommend an overall weighted cost of capital of 5.752% as shown on page 2 of my
2 Exhibit.

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

4 A. I will address the concept of cost of capital first, then capital structure and cost of debt.
5 This is followed by cost of equity. Where appropriate, I will comment on the testimony
6 of Kingsport's witnesses Patrick M. Bourke and Dr. Phillip R. Daves.

7
8 **COST OF CAPITAL**
9

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

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

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

16 A. The cost of capital concept embodies the economic principles for determining the
17 allowed rate of return set out by the U.S. Supreme Court in *Bluefield Waterworks &*
18 *Improvement Co. v. P.S.C. of W. Va.*, 262 U.S. 679 (1973) and *Fed. Power Comm'n v.*
19 *Hope Natural Gas Co.*, 320 U.S. 591 (1944). For instance, the Court stated in *Hope* that,
20 "...the return to the equity owner should be commensurate with returns on investments in
21 other enterprises having corresponding risks. That return, moreover, should be sufficient
22 to assure confidence in the financial integrity of the enterprise, so as to maintain its credit
23 and to attract capital." (320 U.S. at 603). In my opinion, the allowed rate of return on the

capital employed by Kingsport should be set equal to its cost of capital to achieve the goals that the Supreme Court established.

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 price of the firm's stock rises to reflect the higher return and the firm's stockholders realize a capital gain. 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 Kingsport?

A. My first step was to determine the appropriate capital structure and cost of debt for Kingsport. Although Kingsport proposed a 2014 test year, my analysis is also consistent with the Consumer Advocate's proposed 2015 test year. I started with the capital structure proposed by Kingsport's witness Patrick M. Bourke. Mr. Bourke starts with the

1 year-end 2014 stand-alone capital structure of Kingsport and adjusts it for changes
2 expected by the end of 2015. The major change is the replacement of short term debt by
3 a new long term debt issuance. Given the current low level of long term interest rates and
4 the likelihood that interest rates may increase in the future, it makes sense to lock-in long
5 term debt at the low rates available now. Consequently, I find Mr. Bourke's
6 recommended capital structure and cost rates for Kingsport to be reasonable, except for
7 ignoring the parent-subsidary relationship between Kingsport and AEP.

8 **Q. Why is the parent-subsidary relationship between Kingsport and AEP important?**

9 A. Mr. Bourke's testimony (2:14-3:3, 3:11-4:21) and Kingsport's response to CPAD
10 Discovery Request 1-048 make clear that Kingsport is solely dependent upon AEP or
11 AEP subsidiaries for all of its debt and equity financing. Moreover, Kingsport purchases
12 inputs or services from other AEP subsidiaries or has costs allocated to it from other
13 subsidiaries in the course of providing electricity to its customers, giving rise to several
14 of the issues in this Docket. Obviously, Kingsport is not a mere arms-length investment
15 for AEP, but is an integral part of the AEP family of companies. In this context, it is
16 inappropriate to view Kingsport independently of AEP.

17 **Q. How have the TRA and its predecessor, the TPSC, taken parent-subsidary**
18 **relationships into account for regulated public utilities in Tennessee?**

19 A. The TRA and the TPSC have applied the so-called double-leverage approach to capital
20 structures for regulated subsidiaries of parent companies to take into account the parent-
21 subsidiary relationship. The TRA and the TPSC have applied this approach across all
22 regulated public utility industries in the past.

23 **Q. Did you apply double leverage to arrive at your recommended capital structure?**

1 A. Yes. I took the December 30, 2015, parent-only capital structure and debt cost rates for
2 AEP from Kingsport's Response to CPAD Discovery Request 1-046 and imputed AEP's
3 capital structure to the equity portion of Mr. Bourke's recommended capital structure for
4 Kingsport. The result is the double-leverage capital structure for Kingsport shown on
5 page 2 of my Exhibit.

6 **Q. How is double leverage defined?**

7 A. Double leverage "usually refers to a situation where a holding company raises debt and
8 downstreams it as equity capital, or subordinated debt, to a subsidiary, i.e., it is the use of
9 debt by both the parent company and the subsidiary, in combination with the company's
10 equity capital, to finance the assets of the subsidiary."

11 (www.ventureline.com/accounting-glossary/D/double-leverage-definition/, accessed June
12 3, 2016.) In the regulatory context, "double leverage...as commonly propounded
13 instructs that the weighted average cost of capital of the parent company of a subsidiary
14 be used as a measure of the cost of equity of a subsidiary." (Michael S. Rozeff,
15 "Modified Double Leverage – A New Approach," *Public Utilities Fortnightly*, March 31,
16 1983.) Or more simply, double leverage states that the equity of a subsidiary is "part
17 equity and part the debt of the parent." (Kolbe, A. Lawrence, James A. Read, Jr. and
18 George R. Hall, "The Cost of Capital," Cambridge:MIT Press, 1984, p. 146.)

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

20 A. The purpose of the double-leverage approach is to recognize the parent-subsidiary
21 relationship by sharing some of the benefits of that relationship with ratepayers. Double
22 leverage also discourages strategic financing behavior aimed only at raising a regulated

1 subsidiary's regulated rate of return by manipulating the subsidiary's capital structure,
2 while recognizing the role of the parent company in providing funds to the subsidiary.

3 **Q. What difference does double leverage make to the overall cost of capital for**
4 **Kingsport?**

5 A. Page 2 of my Exhibit shows the overall cost of capital for Kingsport in both the stand-
6 alone capital structure recommended by Mr. Bourke and the double-leverage capital
7 structure that I recommend, using my recommended cost of equity. The use of double-
8 leverage reduces the overall cost of capital by less than 15 basis points, from 5.90% to
9 5.752%.

10
11 **COST OF EQUITY**
12

13 **Q. How do you estimate Kingsport's cost of equity?**

14 A. In my recommended double-leverage capital structure, the equity of the parent AEP
15 appears in Kingsport's capital structure. Therefore, I look to the cost of equity of the
16 parent enterprise, AEP, to estimate the cost of equity financing. This recognizes that the
17 AEP subsidiaries are financed centrally, indicating that the corporation is financed and
18 managed as a whole from which the piece-parts, such as subsidiaries, cannot be
19 separated. The capital structure of the parent company (not consolidated) supports the
20 financing of all the subsidiaries. Moreover, AEP is the only entity in which outside
21 investors may invest.

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

1 A. I use the Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM)
2 methods.

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

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

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

12 A. Yes. Page 3 of my Exhibit shows this calculation for AEP and four electric-only utilities
13 of comparable size (total capital) to AEP selected from Value Line. I start with recent
14 dividend yields reported by the *Wall Street Journal* for closing prices on June 1, 2016.
15 Prices for the stocks of these companies were between their highs and lows for the past
16 year on this date, although stock prices for these companies have generally increased
17 since the beginning of the year. For instance, if I had used prices from June 21, 2016, the
18 dividend yields for these companies would be 6 to 12 basis points lower as their stock
19 prices continued to rise. I believe the June 1 dividend yields are reasonably
20 representative of investor expectations at this point in time.

21 I use both expected growth in earnings per share and in dividends per share from
22 Value Line for the growth rate in the DCF formula. Earnings are the source of dividend
23 payments to stockholders, so earnings growth is often an indicator of dividend growth.

1 For AEP, Value Line projects an annual earnings growth rate of 4.5% and a dividend
2 growth rate of 5%. Consequently, the calculated DCF cost of equity for AEP indicates a
3 range of 7.95% to 8.45%, with a midpoint of 8.20%. The midpoint of the DCF range for
4 the five electric-only utilities based on their average dividend yield and growth rates
5 rounds to 8.80%, very close to that of AEP.

6 **Q. How did you select the four electric utilities for your DCF analysis?**

7 A. I looked for electric utilities covered by Value Line that were comparable in size and
8 riskiness to AEP. I limited the companies to those with total capital of over \$20 billion. I
9 then eliminated companies that were involved in significant activities unrelated to
10 electricity distribution, for example, a number of companies classified by Value Line as
11 electric utilities operate natural gas utilities, and some of these actually serve more gas
12 customers than electricity customers. Other firms classed as electric utilities are only
13 involved in generation or transmission activities and do not serve distribution customers.

14 The four comparable firms shown on pages 3 and 4 of my Exhibit operate
15 electricity distribution utilities, as well as some transmission and generation facilities, as
16 does AEP. Specifically, Edison International is the holding company for Southern
17 California Edison. First Energy is the holding company for eight electric utilities in the
18 Midwest and Northeast. NextEra Energy is the holding company for Florida Power and
19 Light. Southern Company operates electric utilities in Alabama, Florida, Georgia, and
20 Mississippi.

21 I also examined the "beta," a measure of relative risk, for these comparable
22 companies. Betas for these companies ranged from 0.60 to 0.70, all less than 1.0, and
23 similar to AEP's beta of 0.70, indicating similar riskiness.

Q. What do you conclude from the DCF analysis?

A. The midpoint of the DCF cost of equity range for AEP is 8.20% and is similar to the DCF midpoint based on averages for the comparable firms of approximately 8.80%. This suggests that the appropriate DCF cost of equity estimate for AEP is in the vicinity of 8.80%. To try to confirm the DCF analysis, 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 expect a higher return in order to invest in a riskier enterprise. 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 *Ibbotson® S&P® 2014 Classic Yearbook*, submitted in response to the CAPD DR Set No. 1, Question No. 1-41, in TRA Docket 14-00146. 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?

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

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

15 A. Since current interest rates on Treasury bills (T-bills) are at historically very low levels,
16 some consideration for longer term bonds is appropriate. The risk premium of stocks
17 over T-bills from Ibbotson is 8.6%, while the risk premium of stocks over the income
18 component of intermediate term bonds (5-year) is 7.6%, and the risk premium over long
19 term bonds is 7.0%. The most recent yield for T-bills is 0.293%, for five-year T-notes is
20 1.351%, and for 30-year T-bonds is 2.577%. Using these figures, the CAPM cost of
21 equity for an “average” stock – a stock whose beta is 1.0 – ranges from 8.893% to
22 9.577%.

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

1 A. The risk premium is adjusted using a stock's beta. I use betas for AEP and the four
2 electric-only utilities previously selected as reported by Value Line. These companies
3 are less risky than the average stock, so their betas range from 0.6 to 0.7. An average
4 stock, or a broad portfolio of stocks representing the market return, has a beta of 1.0.
5 Page 4 of my Exhibit shows the resulting range of CAPM cost of equity estimates. Here,
6 I substitute the recent 5-year T-bond yield for the yield on T-bills to reflect the likelihood
7 that interest rates will rise in the near future. For AEP, the CAPM cost of equity is
8 7.371%. Since the CAPM for each company is determined by each company's beta, the
9 comparable electric-only utilities all have very similar CAPM cost of equity estimates
10 between 6.51% and 7.371%. The CAPM for a stock with a beta of one, the market
11 average, is 9.95% in the case that interest rates rise.

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

13 A. Yes. The pertinent factor at this time is the tendency for the risk premium to expand
14 when interest rates and bond yields are low and shrink when interest rates and bond
15 yields are high. Consequently, because short term interest rates are near zero, the CAPM
16 cost of equity estimates may underestimate the current cost of equity. Also, there is some
17 evidence that the CAPM underestimates the cost of equity for firms with betas less than
18 one. Nevertheless, it is reasonable to expect that the cost of equity of relatively low-risk
19 utilities is less than the cost of equity of the market portfolio – that is, the CAPM estimate
20 for a beta of one.

21 **Q. What range of cost of equity estimates is associated with a beta equal to one?**

22 A. Using short term instruments, a stock with a beta of one has a cost of equity equal to the
23 current T-bill rate (0.293%) plus the risk premium for stocks over T-bills (8.6%) or

8.893%. Using 5-year instruments, the cost of equity for a stock with a beta of one is $1.351\% + 7.6\% = 8.951\%$. Similarly, using long term bonds, the cost of equity for a beta of one becomes $2.577\% + 7.0\% = 9.577\%$.

Q. How do you get the CAPM cost of equity of 9.95% for a stock with a beta of one shown on page 4 of your Exhibit?

A. For the CAPM shown on page 4 of my Exhibit, I substitute the current yield on 5-year T-notes for the rate on T-bills as the risk-free instrument. I do this to infer the effect of higher interest rates in the future, even though higher risk is introduced by the possibility that inflation will differ from expectations over the 5-year term of the T-note. This also offsets the possibility that the CAPM underestimates the cost of equity when interest rates are low or for firms with a beta less than one.

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

A. The DCF estimates suggest a cost of equity of between 8.20% and 8.80% for AEP and the four comparable electric-only utilities. My CAPM cost of equity estimate for AEP is 7.731%. The maximum CAPM cost of equity results from using a beta of one which yields a range of 8.893% to 9.951%. This suggests that the cost of equity for AEP is less than 8.893% to 9.951%, but at least 8.2%. I recommend a cost of equity of 8.80% for AEP in Kingsport's double-leverage capital structure similar to the midpoint for the comparable firms.

Q. How does your cost of equity of 8.80% compare to that recommended by Kingsport's witness Dr. Phillip Daves?

A. Dr. Daves recommends a cost of equity range for Kingsport from 10.02% to 11.06% with a midpoint of 10.66%, but this is based on several items with which I disagree, especially

1 the adjustment for quarterly payment of dividends, the choice of comparable firms, and a
2 novel cost of equity method using leveraged and unleveraged cost of equity estimates that
3 has never been proposed in Tennessee before.

4 **Q. Do you agree with Dr. Daves's choice of comparable firms?**

5 A. No. These firms are much too small judged by total capital to be comparable to AEP,
6 with three possible exceptions. See page 5 of my Exhibit. Neither are these firms
7 comparable to a small distribution company like Kingsport, even though this is Dr.
8 Daves's stated goal in selecting them. Five of Dr. Daves's eight firms operate gas
9 utilities as well as electric utilities, and three of these (Black Hills, Centerpoint, Sempra)
10 actually have more gas customers than electric. Two of the eight are comparable in size
11 to AEP (Edison and PG&E). The most troubling of all is UIL Holdings, for which
12 current data are not available from Value Line due to a merger that occurred in December
13 2015. The resulting firm, AVANGRID, owns a variety of energy operations in more than
14 20 states and is certainly not comparable to Kingsport.

15 **Q. Do you agree with Dr. Daves's adjustment for quarterly dividend payments?**

16 A. No. The quarterly dividend payment adjustment is based on the idea that since the firm
17 has to pay these sums out over the course of the year, rather than all at once at the end,
18 then the firm has to borrow that money at a cost that should be recognized in its cost of
19 equity. The problem with this is that it ignores the profits the firm will earn over the
20 course of the year. The profits of the firm for regulatory purposes are not calculated in
21 this way, but we all know that the firm's profits are not earned all at once at the end of
22 the year. Consequently, a firm earning profits over the course of the year will have the
23 money available to pay quarterly dividends out of those profits and still have profits left

1 to invest to earn an additional return before the end of the year. The end result is that the
2 firm earns higher profits, even after paying quarterly dividends, than those calculated for
3 regulatory purposes when these timing issues are taken into account.

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

14 **Q. Do you agree with Dr. Daves's CAPM estimates of the cost of equity?**

15 A. No. I disagree with his use of long-term government bonds, rather than short-term bills,
16 to calculate the risk premium. Nevertheless, his resulting so-called “levered” CAPM
17 estimates fall in a range of 7.02% to 9.55% (Exhibit 8(PRD)). The midpoint of this range
18 is 8.29%, which roughly agrees with my recommendation for AEP. If I use Dr. Daves's
19 risk premium with my Value Line betas and the current rate on 30-year Treasury bonds, I
20 find CAPM estimates for my comparable firms that are close to those I calculated
21 previously (Klein Exhibit, p. 4). Even though we disagree on the application of the
22 CAPM, the end result is not determinative of the difference in our cost of equity
23 recommendations.

1 **Q. Do you agree with Dr. Daves's use of the "unlevered" cost of equity in developing**
2 **his cost of equity recommendation?**

3 A. No.

4 **Q. How does Dr. Daves make use of the unlevered cost of equity in developing his cost**
5 **of equity recommendation for Kingsport?**

6 A. Dr. Daves estimates the cost of equity for his comparable firms by conventional means.
7 He then calculates an unlevered cost of equity that takes into account the capital structure
8 and debt cost of the comparable firms. In fact, the unlevered cost of equity is equal to
9 each firm's weighted average cost of capital (WACC). He then compares these
10 unlevered costs of equity (or WACC) estimates across firms to develop an unlevered cost
11 of equity (or WACC) for Kingsport. To get to his recommended cost of equity for
12 Kingsport, he "levers" the unlevered cost of equity estimates (or WACC) using a specific
13 capital structure and debt cost rates for Kingsport. (Response to CPAD Discover Request
14 1-052 and attachment.)

15 **Q. What are the problems with Dr. Daves's approach?**

16 A. There are several. These fall into two groups. First, what one might call academic issues
17 and, second, practical issues.

18 **Q. What are the academic issues with Dr. Daves's approach?**

19 A. Dr. Daves's "unlevering" and "relevering" of his cost of equity estimates derives from
20 theoretical analysis of the proper discount rate to apply to the so-called tax shield on debt.
21 This tax shield refers to business income tax that does not tax interest paid on debt, but
22 does tax returns to equity, giving debt a tax advantage. Dr. Daves's method is somewhat
23 controversial in the Finance community, because the issue of valuing the debt tax shield

1 remains unresolved (for example, see Massimiliano Barbi, *On the risk-neutral value of*
2 *debt tax shields*. 22 J. OF APPLIED FINANCE 251-258 (2012)).

3 Even if one ignores this issue, the theory underlying Dr. Daves's approach is
4 untestable, because the unlevered cost of equity for a levered firm (one that has debt) is
5 unobservable. Thus, even if one believes the theory underlying Dr. Daves's calculation
6 of the unlevered cost of equity, there is no way to confirm it, because the true unlevered
7 cost of equity is unknown.

8 **Q. What are the practical issues with Dr. Daves's approach?**

9 A. There are several practical issues for Dr. Daves's approach in a regulatory context. First,
10 this approach to the cost of equity has never been proposed to the TRA before. The
11 companies regulated by the TRA have remained financially viable despite this. Hence,
12 there seems to be no necessity for taking into account the WACC and comparing the
13 "unlevered" cost of equity across firms as Dr. Daves proposes.

14 Secondly, his calculation of the WACC for his comparable firms requires some
15 estimation of the capital structure and debt costs of these firms. To the extent these
16 approximations are not accurate, his estimates of the WACC for his comparable firms
17 may be inaccurate or biased.

18 Third, his method requires another set of calculations that can result in errors in
19 application. This appears to have led Kingsport's Mr. Bourke into an error in his
20 recommended overall WACC for Kingsport. I have provided a correction on page 6 of
21 my Exhibit. The correction shows that the correct cost of equity in Mr. Bourke's
22 recommended capital structure for Kingsport that is consistent with Dr. Daves's midpoint
23 unlevered cost of equity of 6.23% should actually be approximately 9.59%.

1 **Q. Can you explain Mr. Bourke's error?**

2 A. Yes, but first I need to explain Dr. Daves's approach in more detail. Dr. Daves's first
3 step is to estimate a cost of equity for his comparable firms by conventional means. Past
4 cost of equity witnesses before the TRA would use these estimates to recommend a cost
5 of equity for the regulated firm directly. This is not what Dr. Daves does, however.

6 Dr. Daves takes his cost of equity estimates for his comparable firms and
7 calculates the unlevered cost of equity. His equation for the unlevered cost of equity is
8 the following:

9
$$r_u = r_d w_d + r_l w_e = \text{WACC}$$

10
$$= (\text{debt cost})(\text{debt proportion}) + (\text{cost of equity})(\text{equity proportion})$$

11 where w_d is the proportion of debt in a company's capital structure and w_e is the
12 equity proportion, r_d is the cost rate for debt and r_l is the levered cost of equity (estimated
13 cost of equity from DCF and CAPM methods). Thus, r_u , the unlevered cost of equity, is
14 merely the weighted average cost of capital for the comparable firms as conventionally
15 calculated.

16 Dr. Daves then takes these WACC figures from the averages of his DCF and
17 CAPM cost of equity estimates to develop a WACC range for the comparable firms of
18 5.93% to 6.42% with a midpoint of 6.23%. To get to a levered cost of equity for
19 Kingsport, he calculates the cost of equity in a capital structure for Kingsport that yields
20 these same WACC figures. This produces his recommended range of cost of equity for
21 Kingsport of 10.02% to 11.02% with a midpoint of 10.66%. See Response to CPAD
22 Discovery Request 1-053 and attachment. In equations,

23
$$r_l = r_u + (r_u - r_d)(w_d/w_e), \text{ or}$$

1 Cost of Equity = $WACC + \{(WACC - \text{Debt Cost}) \times [(\text{Debt Prop.}) / (\text{Equity Prop.})]\}$

2 where I have translated Dr. Daves's equation into a more familiar form for the
3 calculation of the cost of equity equivalent to any given WACC.

4 It is clear that Dr. Daves's method attempts to take into account both the cost of
5 equity of the comparable firms, and the differences in the cost of equity attributable to
6 differences in capital structure, as well as the capital structure and debt cost of Kingsport.

7 **Q. Where does Mr. Bourke commit his error?**

8 A. Mr. Bourke's error arises when he takes Dr. Daves's recommended cost of equity for
9 Kingsport and inserts it in his recommended capital structure for Kingsport to get a
10 WACC for Kingsport. This is inconsistent with Dr. Daves's approach to cost of equity,
11 because the capital structure recommended by Mr. Bourke is not the same as that used by
12 Dr. Daves's to calculate his cost of equity recommendation. In Dr. Daves's approach,
13 capital structure and cost of debt will affect the resulting cost of equity, but Mr. Bourke
14 ignores this.

15 **Q. What should Mr. Bourke have done to avoid this inconsistency?**

16 To get a cost of equity for Kingsport that is consistent with Dr. Daves's method, Mr.
17 Bourke should have taken the WACC that Dr. Daves used to calculate his recommended
18 cost of equity for Kingsport and calculated the cost of equity that produces that WACC in
19 Mr. Bourke's recommended capital structure. That is what I have done to get the figures
20 in the Bourke Corrected Capital Structure and Cost of Equity on page 6 of my Exhibit.
21 The WACC of 6.23% is consistent with a cost of equity of about 9.59% after applying
22 Dr. Daves's equations.

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CONCLUSION

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

A. Yes. I recommend the double-leverage capital structure for Kingsport shown on page 2 of my Exhibit. I recommend a cost of equity of 8.8% resulting in an overall cost of capital of 5.752%.

Q. Does this conclude your testimony at this time?

A. Yes.

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

Petition of Kingsport Power Company)	
d/b/a AEP Appalachian Power Company)	DOCKET NO. 16-00001
General Rate Case and Motion for)	
Protective Order)	

PRE-FILED DIRECT EXHIBIT OF

CHRISTOPHER C. KLEIN, PH.D.

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

June 24, 2016

Capital Structure and Cost of Capital

Kingsport Power Company Stand Alone Capital Structure¹

<u>Component</u>	<u>%</u>	<u>Cost Rate</u>	<u>Wtd. Cost</u>
Short Term Debt	2.79%	0.29%	0.008%
Long Term Debt	54.78%	3.94%	2.158%
Common Equity	<u>42.43%</u>	8.80%	<u>3.734%</u>
Total	100%		5.90%

Kingsport Power Company Double Leverage Capital Structure and Cost of Capital²

<u>Component</u>	<u>%</u>	<u>Cost Rate</u>	<u>Wtd. Cost</u>
Short Term Debt	2.79%	0.29%	0.008%
Long Term Debt	54.78%	3.94%	2.160%
Common Equity	42.43%		
Parent Short Term Debt	0.28%	1.35%	0.004%
Parent Long Term Debt	1.897%	2.109%	0.040%
Parent Common Equity	40.253%	8.80%	<u>3.540%</u>
Total			5.752%

¹ Proportions for each component and cost rates for debt from Bourke Testimony, Exhibit No. 1 (PMB).

² Kingsport debt proportions and cost rates from Bourke Testimony, Exhibit No. 1 (PMB). 2015 Parent-only debt and equity proportions and cost rates on debt from response to CPAD Discovery Request 1-046.

**Discounted Cash Flow Analysis
Electric-Only Utilities**

<u>Company</u>	<u>Beta</u>	<u>Total Capital</u>	<u>Div. Yield</u>	<u>Projected Growth Rates</u>		<u>DCF Range</u>
				<u>Earnings</u>	<u>Dividends</u>	
AEP	0.70	\$35.6b	3.45%	4.5%	5.0%	7.95-8.45%
Midpoint						8.20%
<u>Electric-Only Utilities</u>						
Edison Intl.	0.70	\$24.35b	2.68%	3.5%	9.0%	6.18-11.68%
First Energy	0.65	\$32.25b	4.35%	7.5%	-1.5%	2.85-11.85%
NextEra En.	0.70	\$49.25b	2.90%	7.0%	10.5%	9.90-13.40%
Southern Co.	0.60	\$46.70b	4.52%	2.5%	3.0%	7.02-7.52%
Averages (without AEP)			3.61%	5.125%	5.25%	8.735-8.86%
Midpoint						8.7975%

Sources: 1) Beta, Total Capital, and Growth Rates from Value Line, *Ratings and Reports*, Feb. 19, March 18, and April 19, 2016; www.valueline.com .
2) Dividend Yield, *Wall Street Journal* (WSJ.com), June 2, 2016, for closing prices on June 1, 2016.

**Capital Asset Pricing Model
Electric-Only Utilities**

<u>Company</u>	<u>Beta</u>	<u>Risk Premium</u>	<u>Weighted RP</u>	<u>Current Yield</u>		<u>CAPM</u>
				<u>3-mth T-bill</u>	<u>5-year T-Note</u>	
AEP	0.70	8.6%	6.02%	0.293	1.351%	6.313-7.371%
Edison Intl.	0.70	8.6%	6.02%	0.293	1.351%	6.313-7.371%
First Energy	0.65	8.6%	5.59%	0.293	1.351%	5.883-6.941%
NextEra En.	0.70	8.6%	6.02%	0.293	1.351%	6.313-7.371%
Southern Co.	0.60	8.6%	5.16%	0.293	1.351%	5.453-6.51%
Market	1.0	8.6%	8.60%	0.293	1.351%	8.893-9.951%

CAPM Using Dr. Daves's Risk Premium

<u>Company</u>	<u>Beta</u>	<u>Risk Premium</u>	<u>Wtd. RP</u>	<u>Current Yield 30-yr. T-Bond</u>	<u>CAPM</u>
AEP	0.70	5.75%	4.025%	2.577%	6.602%
Edison Intl.	0.70	5.75%	4.025%	2.577%	6.602%
First Energy	0.65	5.75%	3.74%	2.577%	6.317%
NextEra En.	0.70	5.75%	4.025%	2.577%	6.602%
Southern Co.	0.60	5.75%	3.45%	2.577%	6.027%
Market	1.0	5.75%	5.75%	2.577%	8.327%

Sources:

Beta: Value Line, *Ratings and Reports*, Feb. 19, March 18, and April 19, 2016;
www.valueline.com.

Risk Premium: calculated from *Ibbotson® S&P® 2014 Classic Yearbook*,
submitted in response to the CAPD DR Set No. 1, Question No. 1-41, Docket 14-
00146.

Current Yields: 3-month T-bill 0.293%; 5-year T-Note 1.351%; 30-year T-Bond
2.577% : *Wall Street Journal* (WSJ.com), June 2, 2016.

Dr. Daves's Comparable Firms

<u>Firm</u>	<u>Total Capital</u>	<u>Comments</u>
Ameren	\$16.5b	Also operates gas utilities
Black Hills	\$4.6b	Majority gas customers
Centerpoint	\$12.7b	Majority gas customers
Edison Intl.	24.35b	Klein:comparable to AEP
ITC Holdings	\$8.1b	Transmission only
PG&E	\$32.9b	Also operates gas utilities
Sempra	\$24.96b	Majority gas customers
UIL Holdings	n.a.	Merged with Iberdrola USA in December 2015 to become AVANGRID, Inc. No current data available from Value Line. The merged firm operates eight electric and gas utilities in New York and New England, plus windfarms, hydro, solar, and geothermal generation units, as well as natural gas storage facilities, in 20 other states.

**Bourke Recommended
Capital Structure and Cost of Equity**

	<u>Proportion</u>	<u>Cost Rate</u>	<u>Wtd. Cost</u>
Short-Term Debt	0.0279	0.29	0.008091
Long-Term Debt	0.5478	3.94	2.158332
Preferred Equity	0	0	0
Common Equity	<u>0.4243</u>	10.66	<u>4.523038</u>
	1		6.689461

**Bourke Corrected
Capital Structure and Cost of Equity**

	<u>Proportion</u>	<u>Cost Rate</u>	<u>Wtd. Cost</u>
Short-Term Debt	0.0279	0.29	0.008091
Long-Term Debt	0.5478	3.94	2.158332
Preferred Equity	0	0	0
Common Equity	<u>0.4243</u>	9.594921046	<u>4.071125</u>
	1		6.237548

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 Professor of Economics, 2013-Present Associate Professor of Economics, 2002-2013
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, Media 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).

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 4720, Economic Issues in the Music Industry

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.

Anelia 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

"The Music Industry as a Vehicle for Economic Analysis," *Journal of Economic Education*, 46(4),403-411, 2015.

"Education Production Functions," *Encyclopedia of Educational Theory and Philosophy*, D. Phillips ed., Sage: Los Angeles, 2014.

"Econometrics as a Capstone Course in Economics," *Journal of Economic Education*, 2013.

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"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.

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- "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 Regulation 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 High School Graduation Rates?" with Elizabeth Perry-Sizemore, Southern Economic Association Annual Conference, New Orleans, LA, November 2015.

- “Sequence of MBA Core Course Completion and Student Performance in an MBA Program,” with E. Anthon Eff, Southern Economic Association Annual Conference, New Orleans, LA, November 2015.
- “The Music Industry as a Vehicle for Economic Analysis,” Southern Economic Association Annual Conference, Atlanta, GA, November 2014.
- “The Music Industry as a Vehicle for Economic Analysis,” American Economic Association National Conference on Teaching Economics, Chicago, IL, May 2013.
- “Supply Innovation and Sales of Recorded Music: 1990-2010,” Southern Economic Association Annual Conference, New Orleans, LA, November 2012.
- “Econometrics as a Capstone Course in Economics,” American Economic Association National Conference on Teaching Economics, Boston, MA, May 2012.
- “Music Supply, Chart Turnover, and the Random Copying Hypothesis in the Digital Age,” with Shea Slonaker, International Industrial Organization Conference, Arlington, VA, March 2012.
- “Econometrics as a Capstone Course in Economics,” Southern Economic Association Annual Conference, Washington, DC, November 2011.
- “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.
- “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.
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- "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.

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

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

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"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.

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

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

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"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.

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"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

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"Report on Pole Attachment Rate Study," with Reuben Kyle, January 18, 2007.

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