BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

IN THE MATTER OF THE APPLICATION	)	
OF ATMOS ENERGY CORPORATION	)	Docket No.
FOR REVIEW AND ADJUSTMENT OF ITS	)	19-ATMG-525-RTS
NATURAL GAS RATES	)	

REBUTTAL TESTIMONY OF DYLAN W. D'ASCENDIS, CRRA, CVA

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, AFFILIATION AND BUSINESS ADDRESS.

A. My name is Dylan W. D'Ascendis. I am a Director of ScottMadden, Inc. ("ScottMadden"). My business address is 3000 Atrium Way, Suite 200, Mount Laurel, NJ 08054.

Q. ARE YOU THE SAME DYLAN W. D'ASCENDIS WHO SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my rebuttal testimony is two-fold. First, I provide an updated overall weighted average cost of capital ("WACC"), including an updated rate of return on common equity ("ROE") for Atmos Energy Corporation's Kansas jurisdictional operations ("Atmos Energy" or the "Company") reflecting its updated capital structure, which reflects known and measurable changes, as well as current market conditions. Second, I respond to the direct testimonies of Mr. Adam H. Gatewood on behalf of the Utilities Division of the Commission ("Staff"), and Dr. J. Randall Woolridge on behalf of the Citizens' Utility Ratepayer Board ("CURB"), (sometimes collectively referred to herein as the "Opposing ROE Witnesses") as their testimonies relate to the Company's WACC, including ROE.

Q. ARE YOU SPONSORING AN EXHIBIT AS PART OF YOUR REBUTTAL TESTIMONY?

A. Yes. I am sponsoring rebuttal Exhibit No. DWD-2, consisting of rebuttal Schedules

DWD-10 through DWD-22, which have been prepared by me or under my direction.

Q. HOW IS THE REMAINDER OF YOUR REBUTTAL TESTIMONY ORGANIZED?

A. The remainder of my rebuttal testimony is organized as follows:

- <u>Section II</u> – Provides my updated analyses and discussion regarding current and expected capital market conditions;
- <u>Section III</u> – Discusses my capital structure recommendations;
- <u>Section IV</u> – Contains my response to Staff Witness Gatewood;
- <u>Section V</u> – Contains my response to CURB Witness Woolridge; and
- <u>Section VI</u> – Summarizes my conclusions and recommendations.

Q. PLEASE SUMMARIZE THE KEY ISSUES AND RECOMMENDATIONS ADDRESSED IN YOUR REBUTTAL TESTIMONY.

A. First, I will discuss my updated analyses for the Company, which indicates WACCs of 7.68% (using test year data) and 7.58% (using known and measurable data), and my updated ROE recommendation of 9.90%. I will also address the current and expected capital market conditions that gave rise to my updated recommendation. Second, I will respond to the direct testimony of Mr. Gatewood. Mr. Gatewood's analyses fall short in the following respects:

- The inapplicability of alternative discounted cash flow ("DCF") models in determining the ROE for utility companies;
- His misapplication of the capital asset pricing model ("CAPM");
- His failure to recognize the Company's greater relative risk to the utility proxy group; and
- His failure to reflect flotation costs.

Third, I will then respond to the direct testimony of Dr. Woolridge and address shortcomings in his analyses, including:

- His sole reliance on the constant-growth DCF model for his ROE recommendation;
- His CAPM analysis;
- His failure to recognize the Company's greater relative risk to the utility proxy group; and
- His failure to reflect flotation costs.

Fourth and finally, my rebuttal testimony also addresses the unfounded critiques of my direct testimony by the Opposing ROE Witnesses.

II. UPDATED ANALYSES AND CURRENT AND EXPECTED CAPITAL MARKET CONDITIONS

Q. HAVE YOU UPDATED YOUR ANALYSES IN THIS PROCEEDING TO REFLECT CURRENT AND EXPECTED CAPITAL MARKET CONDITIONS?

A. Yes, I have. My updated analyses use data available as of October 31, 2019 and is contained in Schedule DWD-10. My updated recommended WACCs of 7.68% (using test year data) and 7.58% (using known and measurable changes) are shown in Tables 1 and 2, below:

Table 1: Summary of Recommended Weighted Average Cost of Capital

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	39.88%	4.35%	1.73%
Common Equity	60.12%	9.90%	5.95%
Total	100.00%		7.68%

Table 2: Summary of Recommended Weighted Average Cost of Capital

Type of Capital	Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	41.78%	4.35%	1.82%
Common Equity	58.22%	9.90%	5.76%
Total	100.00%		7.58%

The detail of my updated ROE of 9.90% is shown in Table 3, below:

Table 3: Summary of Common Equity Cost Rates

Discounted Cash Flow Model	9.01%
Risk Premium Model	9.64%
Capital Asset Pricing Model	9.10%
Cost of Equity Models Applied to Comparable Risk, Non-Price Regulated Companies	10.23%
Indicated Cost of Common Equity Before Adjustments	9.45%
Size Adjustment	0.40%
Flotation Cost Adjustment	0.03%
Indicated Cost of Common Equity after Adjustment	9.88%
Recommended Cost of Common Equity	9.90%

Q. HAVE YOU APPLIED THE ROE MODELS IN THE SAME MANNER AS YOU APPLIED THEM IN YOUR DIRECT TESTIMONY?

A. No. Because of the extreme, but temporary in my opinion, changes in interest rates since my direct testimony, I have placed greater weight on the measure of long-term average predicted variance (75%) in the application of the predictive risk premium model ("PRPM"). In my direct analyses, I gave equal weight to the long-term average predicted variance and the spot predicted variance.

Q. PLEASE DISCUSS THE CHANGES IN INTEREST RATES SINCE YOUR DIRECT TESTIMONY.

A. There was an extraordinary decline in interest rates since my direct testimony was filed, occurring over a relatively short period of time encompassing the month of August into early September of this year. Specifically, over the 30-trading days ended August 28, 2019, the 30-year Treasury bond yield declined 66 basis points, or 25.10%. This is noteworthy because since 1977, there are only two other instances with a 30-trading day decline of 30-year Treasury bond yields of 66 basis points or more and a percentage decline of 30-year Treasury bond yields greater than 24%. The first occurrence happened during December 2008 through January 2009 as a part of the Great Recession, with the second occurrence in early September 2011, which attended the European Sovereign Debt Crisis.

<u>Chart 1: Occurrences of Substantial Declines in 30-Year Treasury Bond Yields – 2008 to Present</u>

As shown in the Chart above, even though the overall trend is downward since 2008, interest rates after these two events have recovered shortly thereafter. Because of this, I expect that the current 30-year Treasury bond yield will also recover (30-year Treasury bond yields are 2.43% as of November 8, 2019, up over 25% from the August 28, 2019 low of 1.94%.), so I have placed slightly greater weight on the long-term predicted variance in my PRPM analyses.

Q. YOU MENTIONED THAT THE OVERALL TREND IN INTEREST RATES HAS BEEN DOWNWARD FROM 2008. DOES THAT MEAN THAT YOU AGREE WITH THE OPPOSING ROE WITNESSES THAT THE ECONOMY AS A WHOLE WILL NOT ACHIEVE THE RETURNS THEY HAVE FOR THE LAST 80 YEARS?

A. No. Mr. Gatewood cites that projected long-run nominal growth in gross domestic product ("GDP") is around 4.50%, lower than the historical nominal GDP growth of 6.11%;[1] that investment managers use these measures as a yard stick for corporate earnings growth;[2] and that the Federal Energy Regulatory Commission ("FERC") also recognizes the importance of the long-run projected growth in GDP.[3] Dr. Woolridge cites surveys of professional forecasters and articles from McKinsey & Company ("McKinsey") in addition to Mr. Gatewood's sources.[4] Specifically, Dr. Woolridge cites a McKinsey article, "Can Long-Term Growth be Saved?" in which McKinsey states that two factors drive real GDP over time; (1) the number of workers in the economy and (2) the productivity of those workers.[5]

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1 Gatewood Direct Testimony, at 23.
2 *Ibid.*, at 24.
3 *Ibid.*
4 Woolridge Direct Testimony, at 54-58, 81-85.
5 McKinsey & Co. "Can Long-Term Growth be Saved?", McKinsey Global Institute, January 2015.

The article also states that if the productivity growth stays at the average level from 1964-2014, global GDP growth will fall to 2.1%. What Dr. Woolridge does not mention from the same McKinsey article is that McKinsey believes that despite projected slow employment growth, increased productivity growth can pick up the slack in GDP growth. McKinsey's case studies of five sectors (agricultural, automotive, food processing, healthcare, and retailing) found the scope to grow productivity at 4% per year, three quarters of that growth coming from broader adoption of already existing processes.

Because most GDP forecasts, and in turn, forecasts of market returns assume average or close to average productivity growth, the projection of market returns could be understated if productivity growth does spike as the McKinsey article deems as a possibility. The unpredictability of productivity growth is well known. Janet Yellen, former Chairman of the Federal Reserve Bank, stated that "the outlook for productivity growth is a 'key uncertainty for the U.S. economy'".[6] This view of uncertainty is echoed by an Economic Letter published by the Federal Reserve Bank of San Francisco ("Letter").[7] The Letter stated that the history of productivity growth has shifted between normal and exceptional periods. Unusually influential innovations (*e.g.* internal combustion engine, microprocessor) typically lead to complementary innovations that boost productivity growth. The periods including 1948-1973 and 1995-2004 are

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[6] http://www.wsj.com/articles/u-s-productivity-dropped-at-0-5-pace-in-the-second-quarter-1470746092.

[7] John Fernald, "What is the New Normal for U.S. Growth?", *Economic Letter 2016*-30, Federal Reserve Bank of San Francisco (October 11, 2016) at 1. http://www.frbsf.org/economic-research/publications/economic-letter/2016/october/new-normal-for-gdp-growth/.

classified as "exceptional" by Fernald because of the expansion of critical infrastructure (such as electricity and highways) and information technology. The periods including 1973-1995 and 2004-2015 are classified as "normal" or mean-reverting. As to the nature of productivity growth, the Letter states: “The major source of uncertainty about the future concerns productivity growth rather than demographics. Historically, changes in trend productivity growth have been unpredictable and large.”

It is unclear why the Opposing ROE Witnesses rely on GDP forecasts, which in turn, primarily rely on assumptions of productivity growth, for their conclusion that GDP will grow slowly when it is assumptions of productivity growth that are the most unpredictable factor of GDP. IHS Markit, the firm which supplies projections for the Social Security Administration’s GDP growth expectations, states the following about its projections:

> The Content contains certain statements, estimates and financial and operating information ("Estimates") that constitute forward-looking statements or information. Forward-looking statements or information may be identified by using the words "targets", "believes", "estimates", "expects", "aims", "intends", "will", "can", "may", "anticipates", "would", "should", "could" and similar expressions in such statements or the negative thereof. These forward-looking statements or information involve known and unknown risks and uncertainties that could cause actual outcomes and results to be materially different from the Estimates or results implied or expressed in such forward-looking statements. While in some cases presented with numerical specificity, the Estimates are based upon (i) certain assumptions that are inherently subject to significant business, economic, regulatory, environmental, seasonal, competitive uncertainties, contingencies and risks and (ii) assumptions with respect to future business decisions that are subject to change.
>
> There can be no assurance that the Estimates or the underlying assumptions will be realized and that actual results of operations or future events will not be materially different from the Estimates.

> Under no circumstances should the inclusion of the Estimates be regarded as a representation, undertaking, warranty or prediction by IHS Markit, or any other person with respect to the accuracy thereof or the accuracy of the underlying assumptions, or that IHS Markit will achieve or is likely to achieve any particular results. IHS Markit disclaims any intent or obligation to update publicly or to revise any of the Estimates, whether as a result of new information, future events or otherwise, except as required by law. Visitors to this website are cautioned that forward-looking statements or information are not guarantees of future performance and, accordingly, visitors are expressly cautioned not to put undue reliance on forward-looking statements or information due to the inherent uncertainty therein. Except as required by law, IHS Markit undertakes no obligation to publicly release any update or revisions to these forward-looking statements to reflect events or circumstances after their time of publication.

Absent specific knowledge to the contrary, it is reasonable to assume that over time, real GDP growth will revert to its long-term mean of approximately 3.3%.[8]

Q. IS GDP RANDOM, MEANING THAT IT IS MEAN REVERTING AND NOT SERIALLY CORRELATED?

A. Yes. The distribution of historical GDP from 1929-2018 is presented on Chart 2, below, which shows that the distribution of historical GDP growth approximates the normal distribution.[9] As such, any future value of GDP growth should be expected to revert to its true mean (*i.e.,* the long-term historical mean) over time.

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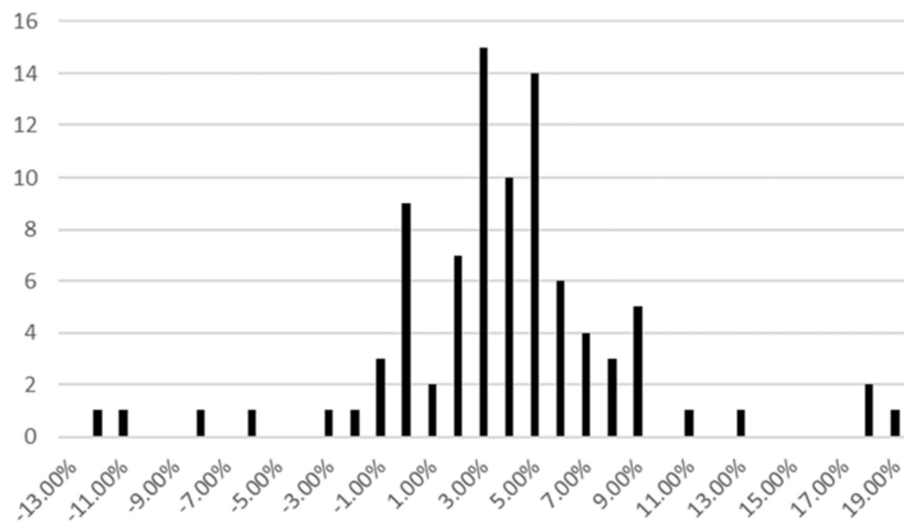
[8] Source: Bureau of Economic Analysis.

[9] The average and median of the historical data are 3.34% and 3.29%, respectively, and the mode was not available. A dataset that has the similar mean and median is an indicator of a close to normally distributed dataset.

Chart 2: Distribution of GDP Growth 1929-2018[10]



Q. DO BROKERAGE HOUSES ALSO USE PROJECTIONS OF GDP GROWTH, WHICH RELIES ON PROJECTIONS OF PRODUCTIVITY GROWTH IN THEIR FORECASTS OF MARKET RETURNS?

A. Yes. Since their projected market returns are based on an understated GDP forecast which was based on average or close to average productivity growth, their expected market returns, which are not investor-required returns are also significantly understated, as will be discussed later in this testimony.

Q. DO YOU HAVE ANY CONCERNS ABOUT THE USE OF SURVEY RESULTS?

A. Yes. The Duke CFO survey, on which Dr. Woolridge partially relies for his market risk premium ("MRP") calculation, predicts that the 10-year projected annual return on the S&P 500 is 6.47%, or 223 basis points less than Dr. Woolridge's 8.70% ROE recommendation, which applies to a utility that is less risky than the

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[10] Source: Bureau of Economic Analysis.

overall market. If the survey were a reasonable method of determining the expected market return, Dr. Woolridge's ROE recommendation would be no higher than 6.47%.[11] Lastly, over time the survey results have significantly underestimated actual market performance (*see,* Table 4, below).

Table 4: S&P 500 Market Return: Accuracy of Survey Estimates[12]

	Actual	Survey Estimate
2018	-4.38%	6.57%
2017	21.83%	5.00%
2016	11.96%	4.32%
2015	1.38%	6.07%
2014	13.69%	5.00%
2013	32.39%	3.40%
2012	16.00%	4.00%
2011	2.11%	5.30%
2010	15.06%	6.28%
Average	12.23%	5.10%

In my view, Dr. Woolridge's reference to a 4.05% expected MRP estimate based on the Duke CFO Survey should be given little weight. The Fernandez survey suffers the same flaws as the Duke CFO survey, since the survey's predicted market return is 8.30%, 40 basis points less than Dr. Woolridge's recommendation, and that over time, the survey results have consistently underestimated actual market performance:

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11 6.47% equals the expected annual average market return over the next 10 years suggested by the Duke CFO survey. Duke/CFO Magazine Global Business Outlook survey – U.S., Second Quarter 2019.

12 Source: Duff & Phelps, 2019 SBBI Yearbook Appendix A-1; http://www.cfosurvey.org (One-year return estimates as of fourth quarter of the previous year).

Table 5: Market Risk Premium: Accuracy of Survey Estimates[13]

	Actual	Survey Estimate
2018	-7.20%	5.40%
2017	19.16%	5.70%
2016	9.66%	5.30%
2015	-1.09%	5.50%
2014	10.28%	5.40%
2013	29.51%	5.70%
2012	13.54%	5.50%
2011	-1.79%	5.50%
2010	10.81%	6.00%
Average	9.21%	5.56%

In view of the foregoing reliance on surveys of flawed predictive value, it is clear that the Opposing ROE Witnesses' conclusions regarding expected equity returns (*i.e.*, the cost of common equity) and GDP growth should be afforded little, if any, weight by the Commission.

III. CAPITAL STRUCTURE

Q. WHAT ARE THE OPPOSING ROE WITNESSES' RECOMMENDATIONS REGARDING CAPITAL STRUCTURE?

A. Mr. Gatewood and Dr. Woolridge both recommend actual capital structures consisting of 43.68% long-term debt and 56.32% common equity for the Company, which reflects a post-test year adjustment of an $800 million debt issuance on October 2, 2019.[14] The Opposing ROE Witnesses have calculated different proposed embedded costs of long-term debt; 4.35% (Gatewood) and 4.37% (Woolridge).[15] Mr. Gatewood claimed that the after-test year adjustment was "a

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13 Source: Duff & Phelps, 2019 SBBI Yearbook Appendices A-1 and A-7; https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2776636

14 Gatewood Direct Testimony, at 3, Woolridge Direct Testimony, at 5.

15 *Ibid.*

better estimate of Atmos' costs going forward"[16] and Dr. Woolridge claims that his proposed capital structure "reflects Atmos' actual current capitalization."[17]

Q. WHAT IS YOUR REACTION TO THE OPPOSING ROE WITNESSES' CAPITAL STRUCTURE AND DEBT COST RATE RECOMMENDATIONS?

A. In my opinion, it is important to note that all three witnesses in this proceeding agree that the use of an actual capital structure is appropriate for Atmos Energy in this proceeding. The issues I have with the Opposing ROE Witnesses' recommendations are that they have (1) included known and measurable changes in the debt portion of Atmos Energy's capital structure, when post-test year adjustments to the equity portion of capital structure have not been made under similar circumstances in the past[18]. and (2) while the Opposing ROE Witnesses selectively made known and measurable changes to the Company's long-term debt balance, they did not also include known and measurable changes in Atmos Energy's common equity balance.

Q. PLEASE EXPLAIN.

A. According to the Atmos Energy 2019 SEC Form 10-K,[19] the Company is expected to issue 2,155,698 common shares at $94.03 per share on or before March 31, 2020

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16 Gatewood Direct Testimony, at 17.

17 Woolridge Direct Testimony, at 24.

18 See Docket No. 14-ATMG-320-RTS, Direct Testimony of Mr. Gatewood, Table at the top of Page 3. The Company had issued 9.2 million shares of equity in February 2014. Staff's testimony was filed on May 20, 2014, thus providing ample time to reflect the impact of the Company's equity offering.

19 In fairness to Mr. Gatewood and Mr. Woolridge, the Company's 2019 SEC Form 10-K was not available at the time they filed their answering testimony.

and 2,474,162 common shares at $105.35 per share on or before September 30, 2020, resulting in approximately $463.4 million in common equity.[20] This equity balance is both known and measurable to investors and should be included in the capital structure if known and measurable changes are to be considered by the Commission in this Docket.

Q. WHAT WOULD THE COMPONENTS OF THE COMPANY'S CAPITAL STRUCTURE BE IF KNOWN AND MEASURABLE CHANGES ARE TO BE CONSIDERED BY THE COMMISSION IN THIS PROCEEDING?

A. Please see Table 6, below for the calculation of the capital structure including known and measurable changes to both long-term debt and common equity for Atmos Energy.

Table 6: Capital Structure of Atmos Energy with Known and Measurable Changes[21]

Type of Capital	Dollars	Ratio
Long-Term Debt	$4,446,532,959	41.78%
Common Equity	$6,195,681,487	58.22%
	$10,642,214,446	100.00%

If the Commission were to choose to consider known and measurable changes in the capital structure, I recommend the Commission approve a capital structure containing 41.78% long-term debt at an embedded debt cost rate of 4.35% (Staff's recommendation), and 58.22% common equity. I note that if the Commission does consider post-test year adjustments reflecting known and measurable changes to the Company's capital structure, I assume that adjustments

[20] 2019 SEC Form 10-K, Atmos Energy Corporation, at Footnote 7.

[21] Beginning balances of long-term debt and common equity are from the Company's response to Staff 1-319. The proceeds from the expected common equity issuance ($463,356,388.80) was added to the common equity balance to arrive at the known and measurable capital structure.

would be to both debt and to equity.

If the Commission decides to rely on test year data, my recommended capital structure would be unchanged from the 39.88% long-term debt / 60.12% common equity capital structure supported in my direct testimony.[22]

IV. RESPONSE TO STAFF WITNESS GATEWOOD

Q. PLEASE BRIEFLY SUMMARIZE MR. GATEWOOD'S ROE ANALYSES AND RECOMMENDATIONS.

A. Mr. Gatewood estimates the Company's ROE by using a modified FERC "two-step" DCF, a two-stage DCF Mr. Gatewood terms an Internal Rate of Return ("IRR") model, and projected and historical CAPM approaches, each applied to the same proxy group of six gas distribution utilities used in my analyses. Based on those analyses, Mr. Gatewood believes the Company's ROE is within the range of 8.85% to 9.35%, with a point estimate of 9.10%. Mr. Gatewood checks his ROE recommendation by calculating a spread between Atmos Energy's most senior debt cost rate during his pricing period (in this case from September 17, 2018 to September 20, 2019) and his recommendation. If there is an approximate 500 basis point spread between the Company's debt and his recommendation, he deems his results reasonable.[23]

Q. WHAT ARE THE SPECIFIC AREAS IN WHICH YOU DISAGREE WITH MR. GATEWOOD'S ANALYSES AND RECOMMENDATIONS?

A. There are several areas in which I disagree with Mr. Gatewood, including: (1) the

[22] D'Ascendis Direct Testimony, at 10-25.
[23] Gatewood Direct Testimony, at 5-6.

applicability of alternative DCF models to utility companies; (2) his misapplication of the CAPM; (3) his failure to reflect the Company's greater business risk due to its smaller relative size to the proxy group; and; (4) the recovery of flotation costs.

A. DCF ANALYSIS

Q. PLEASE SUMMARIZE MR. GATEWOOD'S DCF ANALYSES.

A. Mr. Gatewood's first DCF model is a modified FERC "two-step" DCF model, which uses projected 2020 dividends from Value Line and maximum and minimum weekly trading prices for the period September 17, 2018 to September 20, 2019 to calculate maximum and minimum dividend yields for each proxy company.[24] For his projected growth rate, Mr. Gatewood averages analyst projected growth rates in earnings per share ("EPS") from Value Line, IBES, FactSet, and Zacks with Value Line's projected growth rate in dividends per share ("DPS"),[25] and then averages that number with a long-term projected growth rate in nominal GDP, which combines forecasts from the Energy Information Association and the Social Security Administration.[26] Mr. Gatewood's modified FERC "two-step" DCF produces results ranging from 7.76% to 8.54%.[27] Mr. Gatewood's second DCF analysis is his IRR model, which grows the projected 2020 dividend used in his first analyses by the average 3-5 year growth rate projections for each company for the first five years, and then uses his long-term projected GDP growth rate for years 6 through 250 and makes an IRR calculation on those cash flows. Mr. Gatewood's

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24 *Ibid.*, at 42-43.
25 *Ibid.*, at 44.
26 *Ibid.*, at 50.
27 *Ibid.*, at 52-53.

multi-stage IRR model produces results ranging from 7.07% to 9.08%.

Q. ARE ALTERNATIVE DCF MODELS, SUCH AS THE FERC "TWO-STEP" AND THE TWO-STAGE DCF MR. GATEWOOD USES IN HIS ANALYSIS, APPLICABLE TO UTILITIES?

A. No. The alternative DCF models used by Mr. Gatewood are premised on two factors: (1) that growth is limited by the long-term growth in GDP and (2) utility companies are not in the "steady-state" stage in the company/industry life cycle. Both of these premises are false.

Q. WHY IS LONG-TERM GROWTH IN GDP NOT AN UPPER LIMIT FOR GROWTH, AS MR. GATEWOOD CONTENDS?

A. First, GDP is not a market measure – Rather it is a measure of the value of the total output of goods and services excluding inflation in an economy. While I understand that EPS growth is also not a market measure, as I will discuss in detail when discussing Dr. Woolridge's direct testimony, it is well established in the financial literature that projected growth in EPS is the superior measure of dividend growth in a DCF model.[28] Furthermore, GDP is simply the sum of all private industry and government output in the United States, and its growth rate is simply an average of the value of those industries. To illustrate, Schedule DWD-11 presents the compound growth rate of the industries that comprise GDP from 1947

[28] Robert Harris, "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return," Financial Management, Spring 1986; Christofi, Christofi, Lori and Moliver, "Evaluating Common Stocks Using Value Line's Projected Cash Flows and Implied Growth Rate," Journal of Investing, Spring 1999; Robert Harris and Felicia Marston, "Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts," Financial Management, Summer 1992; and Vander Weide and Carleton, "Investor Growth Expectations: Analysts vs. History," The Journal of Portfolio Management Spring 1988.

to 2018. Of the 15 industries represented, seven industries, including utilities, grew faster than the overall GDP and eight industries grew slower than the overall GDP.[29]

Q. IS THERE A REALISTIC POSSIBILITY THAT A SINGLE INDUSTRY WOULD BECOME THE ENTIRE ECONOMY WITH A PERPETUAL, SUSTAINABLE GROWTH RATE HIGHER THAN THE GDP GROWTH RATE?

A. No, and even if one assumed it was realistically possible, it would take an extraordinary amount of time to do so. To illustrate, I used the value added by industry from 1947 to 2018 in Schedule DWD-11 and used the compound annual growth rates for the highest growth rate industry (Educational Services, Healthcare, and Social Assistance, 8.76% / year) to see when that industry would comprise the entire economy. In the year 2247, or 300 years from the 1947 starting point, the industry would comprise over 50% of GDP, and in the year 5433, 3,476 years after the 1947 starting point, the industry would comprise 100% of GDP.[30]

Dr. Woolridge's example in his direct testimony is that of the growth of aggregate net income of S&P 500, which is a portion of the "private industries" portion of GDP and compares that with the growth rate of nominal GDP,[31] which are not equal measures. His example also falls short because he assumes that the

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[29] Source of Information: Bureau of Economic Analysis.

[30] To put the amount of time that will take these two milestones to happen in perspective, 300 years ago, in the year 1719, France and Spain were at war in New France (now Louisiana), and approximately 3,476 years ago, in the year 1457 BC, the first recorded battle in military history, the Battle of Megiddo, was waged between the Egyptians, led by Pharaoh Thutmose III against Kadesh, Canaanite, Mitanni, and Amurru forces. *See also* Zager and Evans, *In the Year 2525*, *on* 2525 (Exordium & Terminus) (RCA 1968).

[31] Woolridge Direct Testimony, at 89.

industries that add to become GDP grow independently of each other, which cannot be true. His example, and his argument, is without merit.

Q. WHY IS A NON-CONSTANT DCF MODEL INAPPROPRIATE FOR THE DERIVATION OF THE COST OF COMMON EQUITY FOR UTILITY COMPANIES?

A. A non-constant DCF model, like those presented by Mr. Gatewood in this proceeding, are based on the company/industry life cycle. The company/industry life cycle, as described by Dr. Woolridge on pages 34 through 36 of his direct testimony, is typically described in three stages: (1) the growth stage, which is characterized by rapidly expanding sales, profits, and earnings. In the growth stage, dividend payout ratios are low in order to grow the firm; (2) the transition stage, which is characterized by slower growth in sales, profits, and earnings. In the transition stage, dividend payout ratios increase, as their need for exponential growth diminishes; and (3) the maturity (steady-state) stage, which is characterized by limited, slightly attractive investment opportunities, and steady earnings growth, dividend payout ratios, and returns on equity.

As Dr. Woolridge states on page 35 of his direct testimony, "The economics of the public utility business indicate that the industry is in the steady-state, or constant-growth stage of a multi-stage DCF." In this case, I agree with Dr. Woolridge's assessment that non-constant DCF models, like Mr. Gatewood's IRR model, is not applicable to utilities.

Q. ARE THERE EXAMPLES IN BASIC FINANCE TEXTS THAT SUPPORT YOUR POSITION?

A. Yes. In Investments, Bodie, Kane, and Marcus discuss life cycles and multi-stage growth models:

> As useful as the constant-growth DDM (dividend discount model) formula is, you need to remember that it is based on a simplifying assumption, namely, that the dividend growth rate will be constant forever. In fact, firms typically pass through life cycles with very different dividend profiles in different phases. In early years, there are ample opportunities for profitable reinvestment in the company. Payout ratios are low, and growth is correspondingly rapid. In later years, the firm matures, production capacity is sufficient to meet market demand, competitors enter the market, and attractive opportunities for reinvestment may become harder to find. In this mature phase, the firm may choose to increase the dividend payout ratio, rather than retain earnings. The dividend level increases, but thereafter it grows at a slower pace because the company has fewer growth opportunities.
>
> Table 18.2 illustrates this pattern. It gives Value Line's forecasts of return on assets, dividend payout ratio, and 3-year growth in earnings per share for a sample of the firms in the computer software industry versus those of east coast electric utilities…
>
> By in large, the software firms have attractive investment opportunities. The median return on assets of these firms is forecast to be 19.5%, and the firms have responded with high plowback ratios. Most of these firms pay no dividends at all. The high return on assets and high plowback result in rapid growth. The median growth rate of earnings per share in this group is projected at 17.6%
>
> In contrast, the electric utilities are **more representative of mature firms**. Their median return on assets is lower, 6.5%; dividend payout is higher, 68%; and median growth is lower, 4.6%.
>
> ***
>
> To value companies with temporarily high growth, analysts use a multistage version of the dividend discount model. Dividends in the early high-growth period are forecast and their combined present value is calculated. Then, once the firm is projected to settle down to a **steady-growth phase, the constant-growth DDM is applied**

> **to value the remaining stream of dividends**. (Clarification and emphasis added)[32]

Q. WAS THE FERC "TWO-STEP" MODEL ADDRESSED RECENTLY BY THE FERC IN TERMS OF ITS ABILITY TO DETERMINE A FAIR RATE OF RETURN FOR INVESTORS?

A. Yes. FERC Opinion No. 531, which speaks to the use of various methods to determine the ROE for electric transmission facilities, raises concerns about the "two-step" model:

> We acknowledge that under the DCF analysis, the Commission typically sets the base ROE with regard to multiple entities at the midpoint of the zone of reasonableness. However, for the reasons set forth below, we conclude that a mechanical application of the DCF methodology with the use of the midpoint here would result in an ROE that does not satisfy the requirements of Hope and Bluefield. Therefore, based on the record in this case, including the unusual capital market conditions present, we conclude that the just and reasonable base ROE for the NETOs should be set halfway between the midpoint of the zone of reasonableness and the top of the zone of reasonableness.
>
> ***
>
> We are concerned that capital market conditions in the record are anomalous, thereby making it more difficult to determine the return necessary for public utilities to attract capital. In these circumstances, we have less confidence that the midpoint of the zone of reasonableness established in this proceeding accurately reflects the equity returns necessary to meet the Hope and Bluefield attraction standards.[footnote omitted] We find it is necessary and reasonable to consider additional record evidence, including evidence of alternative benchmark methodologies and state commission-approved ROEs, to gain insight into the potential impacts of these unusual capital market conditions on the appropriateness of using the resulting midpoint. [footnote omitted][33]

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32 Bodie, Z., Kane, A., and Marcus, A. J., Investments, 7th Edition, McGraw-Hill Irwin, 2008, at 616-617.

33 Opinion No. 531, Order on Paper Hearing, 147 FERC ¶ 61,234 (2014).

Opinion No. 531 indicates that under current market conditions, the "two-step" DCF method may understate the investor-required return, and that analysts should look to other benchmarks to determine the cost of common equity. The FERC more recently addressed its longstanding focus on the DCF method. In its November 15, 2018 *Order Directing Briefs*, the FERC found that "in light of current investor behavior and capital market conditions, relying on the DCF methodology alone will not produce a just and reasonable ROE."[34] In its October 16, 2018 *Order Directing Briefs*, the FERC found that although it "previously relied solely on the DCF model to produce the evidentiary zone of reasonableness…", it is "…concerned that relying on that methodology alone will not produce just and reasonable results."[35] As the FERC explained, it is important to understand "how investors analyze and compare their investment opportunities."[36] The FERC also explained that although certain investors may give some weight to the DCF approach, other investors "place greater weight on one or more of the other methods…"[37] In Mr. Gatewood's application of his modified "two-step" DCF, the understatement of the investor-required return would be exacerbated, as his GDP growth rate comprises more of the blended growth rate, driving indicated ROE results lower.

Those other common equity models, as mentioned by the FERC, include the CAPM and the risk premium model ("RPM"), which I have applied in this

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[34] Docket Nos. EL14-12-003 and EL15-45-000, *Order Directing Briefs*, 165 FERC ¶ 61,118 (November 15, 2018) at para. 34.

[35] Docket No. EL11-66-001, *et al.*, *Order Directing Briefs* 165 FERC ¶ 61,030 (October 16, 2018) at para. 30.

[36] *Ibid*., at para. 33.

[37] *Ibid*., at para. 35.

proceeding. In view of the above, the use of the modified FERC "two-step" DCF or the IRR model, as applied by Mr. Gatewood are not applicable to utility companies.

Q. IF MR. GATEWOOD'S DCF ANALYSIS CORRECTLY USED ONLY PROJECTED EPS GROWTH RATES IN HIS DCF ANALYSIS, WHAT WOULD BE THE INDICATED ROE?

A. It would be 8.97%, as shown on Schedule DWD-12. This result should be viewed with caution, however, as the DCF model is currently understating the investor-required return, as will be discussed in detail below while discussing Dr. Woolridge's exclusive reliance on the DCF model for his recommendation.

B. CAPM ANALYSES

Q. PLEASE SUMMARIZE MR. GATEWOOD'S CAPM ANALYSES.

A. Mr. Gatewood performs four CAPM analyses, three projected and one historical, with average results that range from 5.32% to 9.89%. All of his CAPM analyses uses low, average and high beta coefficients of 0.60, 0.67, and 0.80 from Value Line, respectively. His first CAPM analysis calculates an expected MRP, which projects the market total return based on an estimate of the arithmetic annual return on common stocks of 6.76% from JP Morgan Asset Management, and the forecasted total return on ten-year Treasury bonds of 3.31%. This analysis results in low and high indicated ROEs of 5.32% and 6.01%, respectively.[38]

Mr. Gatewood's second CAPM analysis calculates an expected MRP based on BlackRock Investments' projected geometric annual return of 7.70%, and the

[38] Gatewood Direct Testimony, at 60.

forecasted geometric total return on ten-year Treasury bonds of 2.80%. This analysis results in low and high indicated ROEs of 6.34% and 7.32%, respectively.[39]

Mr. Gatewood's third CAPM analysis uses Duff & Phelps U.S. Equity Risk Premium estimate of 5.50%, which is based on a 9.00% expected market return and a 3.50% "normalized" risk-free rate. This analysis results in low and high indicated ROEs of 6.80% and 7.90%, respectively.[40]

Mr. Gatewood's fourth CAPM analysis calculates the historical annual return on common stocks from 1928-2018 of 11.36% and the annual total returns on intermediate-term government bonds from 5.10%, resulting in an historical MRP of 6.26%. Mr. Gatewood then applies the low and high beta coefficients to the historical MRP, and then applies the historic yield (*i.e.* income return) on intermediate-term government bonds to arrive at indicated ROEs of 8.64% and 9.89%, respectively.[41]

Q. DO YOU AGREE WITH MR. GATEWOOD'S APPLICATION OF THE CAPM?

A. No, I do not. In particular I disagree with (1) Mr. Gatewood's use of the total return on intermediate-term government bonds as a proxy of the risk-free rate; (2) his estimates of the MRP; and (3) his failure to use an Empirical CAPM ("ECAPM").

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39 *Ibid.*
40 *Ibid.*
41 *Ibid.*

Q. PLEASE COMMENT ON MR. GATEWOOD'S USE OF INTERMEDIATE YEAR TREASURY BONDS AS HIS RISK-FREE RATE IN HIS CAPM ANALYSIS.

A. As discussed below, the tenor of the risk-free rate used in the CAPM should match the life (or duration) of the underlying investment. As noted by Morningstar:

> The traditional thinking regarding the time horizon of the chosen Treasury security is that it should match the time horizon of whatever is being valued. When valuing a business that is being treated as a going concern, the appropriate Treasury yield should be that of a long-term Treasury bond. Note that the horizon is a function of the investment, not the investor. If an investor plans to hold stock in a company for only five years, the yield on a five-year Treasury note would not be appropriate since the company will continue to exist beyond those five years.[42]

Morin also confirms this when he states:

> [b]ecause common stock is a long-term investment and because the cash flows to investors in the form of dividends last indefinitely, the yield on very long-term government bonds, namely, the yield on 30-year Treasury bonds, is the best measure of the risk-free rate for use in the CAPM (footnote omitted)… The expected common stock return is based on long-term cash flows, regardless of an individual's holding time period.[43]

Pratt and Grabowski recommend a similar approach to selecting the risk-free rate: "In theory, when determining the risk-free rate and the matching equity risk premium ("ERP") you should be matching the risk-free security and the ERP with the period in which the investment cash flows are expected."[44] To that point, a 2004 paper titled *Applying The Capital Asset Pricing Model* by Robert Harris

42 Morningstar, Inc., 2013 Ibbotson Stocks, Bonds, Bills and Inflation Valuation Yearbook, at 44.
43 Morin, at 151.
44 Shannon Pratt and Roger Grabowski, Cost of Capital: Applications and Examples, 3rd Ed. (Hoboken, NJ: John Wiley & Sons, Inc., 2008), at 92. Clarification added.

reviews current practices for application of the CAPM and, when summarizing best current practices, concludes "[t]he risk-free rate should match the tenor of the cash flows being valued."[45] As a practical matter, equity securities represent a perpetual claim on cash flows; 30-year Treasury bonds are the longest-maturity securities available to match that perpetual claim. Mr. Gatewood's use of an intermediate-term Treasury bond does not match the life of the assets being valued. Therefore, the use of a 30-year Treasury bond is the more appropriate risk-free rate.

Q. WHAT DOES DUFF & PHELPS, THE SOURCE OF ONE OF MR. GATEWOOD'S PROJECTED MRPS, USE FOR A PROXY FOR THE RISK-FREE RATE?

A. Concerning the risk-free rate used for the MRP calculation, Duff & Phelps state:

> Our methodology for estimating the long-horizon equity risk premium makes use of the income return on a 20-year Treasury bond; however, the Treasury stopped issuing 20-year bonds in 1986. The 30-year bond that the Treasury returned to issuing in 2006 is theoretically more correct when dealing with the long-term nature of business valuation.[46]

Concerning the applicability of income versus total returns for the risk-free asset, Duff & Phelps state:

> Another point to keep in mind when calculating the equity risk premium is that the income return on the appropriate-horizon Treasury security rather than the total return, is used in the calculation.
>
> The total return comprises three return components: the income return, the capital appreciation return, and the investment return. The income return is defined as the portion of the total return that results from a periodic cash flow or, in this case, the bond coupon payment… The income return is thus used in the estimation of the

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45 Paper cited with permission of author.
46 Duff & Phelps, 2019 SBBI Yearbook at 10-22.

equity risk premium because it represents the truly riskless portion of the return.[47]

Additionally, as shown in SBBI – 2019, page 6-17, the standard deviation for the income return on long-term Government bonds is 2.6%, which is the lowest (*i.e.,* least risky) measure of all returns followed by SBBI – 2019. Mr. Gatewood's recommended measure of the risk-free rate, the total return on intermediate-term Government bonds, has a standard deviation of 5.6%, which indicates higher risk.

Q. DO YOU HAVE ANY CONCERNS WITH MR. GATEWOOD'S MARKET RETURN ESTIMATES ASSUMED FROM JP MORGAN'S ASSET MANAGEMENT GROUP AND BLACKROCK?

A. Yes, I do. Mr. Gatewood's reference to the return estimates published by JP Morgan's Asset Management group and BlackRock assumes there is no distinction between the *expected* returns assumed in pension plan funding assumptions, and the *required* returns that are the subject of his (and my) testimony.

ROE is a measure of investors' required returns. A pension fund asset manager will match the expected returns available from various asset classes to the expected liabilities that must be funded. Investors seeking to maximize their risk-adjusted return will only invest in a security if the expected return is equal to or greater than the required return. If it is not, investors will look to alternative investments for which the expected return is compensatory relative to the expected risks. Because expected returns may or may not equal required returns, it is not clear that pension funding assumptions (*i.e.*, expected returns) should be viewed as a measure of investors' required returns.

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47 *Ibid.*

From the perspective of a pension asset manager, asset allocation and investment decisions must be made based on expected risks and returns for various asset classes, and subject to the investment objective or expected timing and nature of the liabilities being funded by those investments. In the U.S., they must consider: (1) the diversification of the portfolio; (2) the liquidity and current return of the portfolio relative to the expected cash flow requirements under the plan; (3) the portfolio's projected return relative to the plan's funding objective; and (4) the return expected on alternative investments with similar risks.[48] Pension asset managers, therefore, are concerned with investing funds at an expected return to meet expected liabilities over a finite period.

An individual equity investor, on the other hand, decides whether to commit capital to a given security based on the return that they require to be compensated for the risks associated with that security, in perpetuity. As noted earlier, if the expected return is less than the required return, the investor would not commit capital, but instead commit their capital to alternative investments with appropriate risk-adjusted returns.

Lastly, Mr. Gatewood does not consider the limiting language often contained in documents providing expected market returns. For example, JP Morgan Asset Management's *2019 Long-Term Capital Market Assumptions* (the source document for the 6.76% expected market return) states:

> Please note that all information shown is based on qualitative analysis. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future

48 *See*, Department of Labor, 29 CFR 2509.08-1, Interpretive bulletin relating to the fiduciary standard under ERISA in consider economically targeted investments, October 17, 2008

> performance. Note that these asset class and strategy assumptions are passive only – they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only.[49]

BlackRock states:

> This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even estimate – of future performance.[50]

Q. WHAT IS YOUR POSITION ON THE 5.50% MRP QUOTED BY DUFF & PHELPS?

A. As stated above regarding capital market conditions and projected returns in both GDP growth and overall returns on the market, a forecast is only as good as its inputs, and if the assumptions within those forecasts are by its nature, unpredictable (*e.g.* productivity growth forecasts), they are of little value. In addition, the determination of the MRP as calculated by Duff & Phelps is not transparent, especially in view of the historical data presented in SBBI – 2019 or the composition of its supply side method, which are already well known by investors. Because of the transparency of the historical data and how to gather and use the components of the supply side model, both the historical MRP using the long-term arithmetic mean return on large company stocks, less the long-term arithmetic income return on long-term Government bonds, using data compiled by the Center for Research in Security Prices, and the supply side model are superior measures of the MRP than the Duff & Phelps simplistic and opaque MRP forecast.

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49 JP Morgan Asset Management, *2019 Long-Term Capital Market Assumptions*, at PDF 112.

50 https://www.blackrock.com/institutions/en-zz/insights/charts/capital-market-assumptions

Q. ARE THERE STUDIES THAT SHOW THAT THE LONG-TERM ARITHMETIC MEAN IS A GOOD PREDICTOR OF THE NEXT VALUE IN A RANDOM STRING OF DATA (*E.G.* MARKET RETURNS)?

A. Yes. John Y. Campbell, of Harvard University, states: "When returns are serially uncorrelated, the arithmetic average represents the best forecast of future return in any randomly selected future year."[51]. As shown on pages 6-14 and 6-15 of SBBI – 2019, returns on large stocks and equity risk premiums have serial correlations of 0.01 and 0.02, respectively, showing serial uncorrelation.

Additionally, in SBBI – 2019, regarding the use of the arithmetic mean Duff & Phelps state:

> The equity risk premium data presented in this book are arithmetic average risk premiums as opposed to geometric average risk premiums. The arithmetic average equity risk premium can be demonstrated to be the most appropriate when discounting cash flows. For use as he expected equity risk premium in either the CAPM or the building-block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building-block approach are additive models, in which the cost of capital is the sum of its parts.

Therefore, the long-term historical arithmetic average MRP is useful, when calculated correctly, in the application of the CAPM.

Q. WHAT WOULD BE BETTER MEASURES OF THE MRP FOR MR. GATEWOOD TO USE IN HIS PROJECTED CAPM ANALYSES?

A. As stated in his direct testimony, his definition of Rm, or the return on the market is "The expected return on the market as measured by a broad market index such

51 Campbell, John Y., "Forecasting US Equity Returns in the 21st Century", July 2001.

as the S&P 500. This represents the total return consisting of the price change of the index plus dividends earned for the year."[52] In my direct testimony, I perform three calculations of the expected return on the market as described in Mr. Gatewood's description: (1) an expected return using the 3-5 year expected capital appreciation of the approximate 1,600 companies covered by Value Line plus an expected dividend yield; (2) a market capitalization weighted DCF of the member companies of the S&P 500 using Value Line data; and (3) a market capitalization weighted DCF of the member companies of the S&P 500 using Bloomberg data. From these market returns, I would then subtract a projected long-term Treasury bond as a proxy for the risk-free rate to determine projected MRPs for use in the CAPM. Using data available at September 20, 2019, the spot date of Mr. Gatewood's analysis, projected MRPs of 10.16%, 11.84%, and 11.64% are indicated.

Q. DO YOU HAVE ANY CONCERNS WITH MR. GATEWOOD'S HISTORICAL CAPM ANALYSIS?

A. Yes. As discussed previously, I do not agree with the total returns of intermediate-term Government bonds in CAPM analyses.

Q. WHAT RISK-FREE RATE DO YOU PROPOSE FOR USE IN MR. GATEWOOD'S HISTORICAL CAPM?

A. I propose the use of the long-term arithmetic mean income returns on long-term Government bonds for the period 1928-2018 from SBBI – 2019 to match the time series described by Dr. Damodaran.

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[52] Gatewood Direct Testimony, at 57.

Q. DOES MR. GATEWOOD EMPLOY AN ECAPM IN HIS ANALYSES?

A. No. Mr. Gatewood failed to consider the ECAPM, despite the fact that numerous tests of the CAPM have confirmed the ECAPMs validity by showing that the empirical Security Market Line ("SML") described by the traditional CAPM is not as steeply sloped as the predicted SML. Numerous tests of the CAPM have measured the extent to which security returns and betas are related, as predicted by the CAPM, and confirmed its validity. While the results of these tests support the notion that beta is related to security returns, the empirical SML described by the CAPM formula is not as steeply sloped as the predicted SML.[53]

The ECAPM reflects this empirical reality. Fama and French clearly state regarding their Figure 2, below, that "[t]he returns on the low beta portfolios are too high, and the returns on the high beta portfolios are too low." [54]

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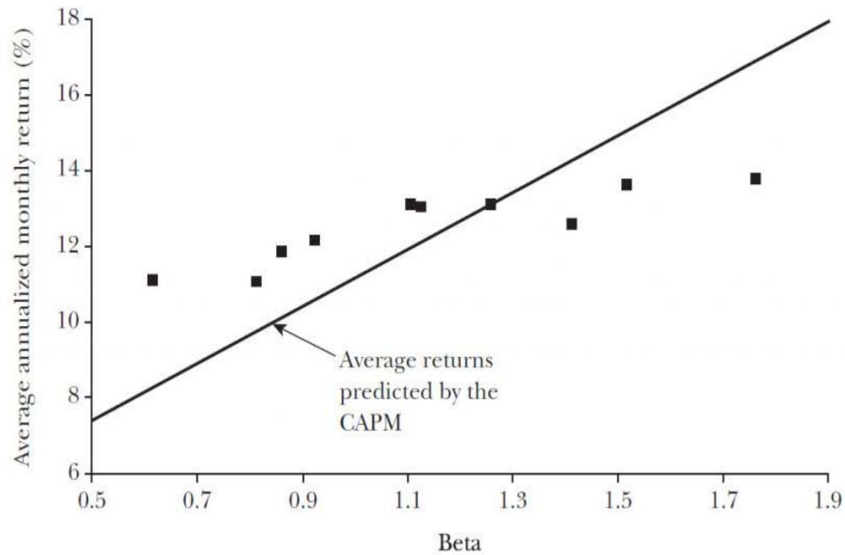
53 Morin 175.

54 Eugene F. Fama and Kenneth R. French, "The Capital Asset Pricing Model: Theory and Evidence", *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer 2004 at 33 "Fama & French".

Figure 2 http://pubs.aeaweb.org/doi/pdfplus/10.1257/0895330042162430

Average Annualized Monthly Return versus Beta for Value Weight Portfolios Formed on Prior Beta, 1928–2003



In addition, Morin observes that while the results of these tests support the notion that beta is related to security returns, the empirical SML described by the CAPM formula is not as steeply sloped as the predicted SML. Morin states:

> With few exceptions, the empirical studies agree that … low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.[55]
>
> * * *
>
> Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:
>
> $$K = R_F + x\,\beta(R_M - R_F) + (1-x)\,\beta(R_M - R_F)$$
>
> where x is a fraction to be determined empirically. The value of x that best explains the observed relationship [is] Return = 0.0829 + 0.0520 β is between 0.25 and 0.30. If x = 0.25, the equation becomes:
>
> $$K = R_F + 0.25(R_M - R_F) + 0.75\,\beta(R_M - R_F)$$[56]

[55] Morin at 175.
[56] Morin at 190.

Fama and French provide similar support for the ECAPM when they state:

> The early tests firmly reject the Sharpe-Lintner version of the CAPM. There is a positive relation between beta and average return, but it is too 'flat.'… The regressions consistently find that the intercept is greater than the average risk-free rate… and the coefficient on beta is less than the average excess market return… This is true in the early tests… as well as in more recent cross-section regressions tests, like Fama and French (1992).[57]

Finally, Fama and French further note:

> Confirming earlier evidence, the relation between beta and average return for the ten portfolios is much flatter than the Sharpe-Linter CAPM predicts. The returns on low beta portfolios are too high, and the returns on the high beta portfolios are too low. For example, the predicted return on the portfolio with the lowest beta is 8.3 percent per year; the actual return as 11.1 percent. The predicted return on the portfolio with the t beta is 16.8 percent per year; the actual is 13.7 percent.[58]

Clearly, the justification from Morin, Fama, and French along with their review of other academic research on the CAPM, validate the use of the ECAPM. In view of theory and practical research, both the traditional CAPM and the ECAPM should have been used in a CAPM analysis.

Q. DOES THE USE OF ADJUSTED BETA COEFFICIENTS ADDRESS THE EMPIRCAL ISSUES WITH THE CAPM?

A. No. A common critique of the ECAPM is the claim that using adjusted betas in a CAPM analysis addresses the empirical issues with the CAPM, discussed above, by increasing the expected returns for low beta stocks and decreasing the returns for high beta stocks, concluding that there is no need to use the ECAPM. This is an incorrect understanding of the ECAPM. Using adjusted betas in a CAPM

57 Fama & French at 32.

58 *Ibid.,* at 33.

analysis is not equivalent to using the ECAPM, nor is it an unnecessary redundancy.

Betas are adjusted because of their general regression tendency to converge toward 1.0 over time, *i.e.*, over successive calculations of beta. As also noted above, numerous studies have determined that the SML described by the CAPM formula at any given moment in time is not as steeply sloped as the predicted SML. Morin states:

> Some have argued that the use of the ECAPM is inconsistent with the use of adjusted betas, such as those supplied by Value Line and Bloomberg. This is because the reason for using the ECAPM is to allow for the tendency of betas to regress toward the mean value of 1.00 over time, and, since Value Line betas are already adjusted for such trend [sic], an ECAPM analysis results in double-counting. This argument is erroneous. Fundamentally, the ECAPM is not an adjustment, increase or decrease, in beta. This is obvious from the fact that the expected return on high beta securities is actually lower than that produced by the CAPM estimate. The ECAPM is a formal recognition that the observed risk-return tradeoff is flatter than predicted by the CAPM based on myriad empirical evidence. The ECAPM and the use of adjusted betas comprised two separate features of asset pricing. Even if a company's beta is estimated accurately, the CAPM still understates the return for low-beta stocks. Even if the ECAPM is used, the return for low-beta securities is understated if the betas are understated. Referring back to Figure 6-1, the ECAPM is a return (vertical axis) adjustment and not a beta (horizontal axis) adjustment. Both adjustments are necessary.[59]

Moreover, the slope of the SML should not be confused with beta. As Brigham and Gapenski state:

> The slope of the SML reflects the degree of risk aversion in the economy – the greater the average investor's aversion to risk, then (1) the steeper is the slope of the line, (2) the greater is the risk premium for any risky asset, and (3) the higher is the required rate of return on risky assets.[12]
> 12Students sometimes confuse beta with the slope of the SML. This is a mistake. As we saw earlier in connection with Figure 6-8, and as is developed further in Appendix 6A, beta does represent the

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[59] Morin at 191.

> slope of a line, but *not* the Security Market Line. This confusion arises partly because the SML equation is generally written, in this book and throughout the finance literature, as $k_i = R_F + b_i(k_M - R_F)$, and in this form b_i looks like the slope coefficient and $(k_M - R_F)$ the variable. It would perhaps be less confusing if the second term were written $(k_M - R_F)b_i$, but this is not generally done.[60]

In addition, in Appendix 6A of Brigham and Gapenski's textbook entitled "Calculating Beta Coefficients," the authors demonstrate that beta, which accounts for regression bias, is not a return adjustment but rather is based on the slope of a different line.

Hence, using adjusted betas does not address the previously discussed empirical issues with the CAPM. In view of the foregoing, using adjusted betas in both the traditional and empirical applications of the CAPM is neither incorrect nor inconsistent with the financial literature, and is not an unnecessary redundancy. In view of financial theory and practical research, it is therefore appropriate to include the ECAPM when estimating the cost of common equity.

Q. IF CORRECTED FOR THE ABOVE, WHAT WOULD BE THE RESULTS OF MR. GATEWOOD'S CAPM ANALYSIS?

A. Schedule DWD-13 presents the results of the correct applications of both the traditional CAPM and the ECAPM for Mr. Gatewood’s proxy group. The projected CAPM results indicate a range of cost of common equity from 8.81% to 12.77%. The average result applying the average proxy group company beta coefficient of 0.67 is 10.69%. The historical CAPM results using the proxy group average beta coefficient indicates a cost of common equity of 9.50%. I will rely on the average

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60 Eugene F. Brigham and Louis C. Gapenski, Financial Management – Theory and Practice, 4th Ed. (The Dryden Press, 1985) at 201-204.

of the projected and historical CAPM analyses using the proxy group average beta coefficient, or 10.10% as the indicated ROE using the CAPM.

C. SIZE PREMIUM

Q. DOES MR. GATEWOOD REFLECT THE GREATER RELATIVE RISK OF ATMOS ENERGY DUE TO ITS SMALL SIZE COMPARED TO THE PROXY GROUP IN HIS RECOMMENDED ROE?

A. No, he does not. Mr. Gatewood rejects the size premium for Atmos Energy for the following reasons:

- The Kansas jurisdictional operations of Atmos Energy are a part of ATO, the country's largest pure-play natural gas company;[61]
- If each operating division of ATO received small company premiums, the total risk of the parts (operating divisions) would be greater than the whole;[62]
- Size (as measured by market capitalization) is not a determinant of risk;[63] and
- The "survivorship bias" of returns overstate the size premium, citing an article by Shumway and Warther.[64]

Q. SHOULD THE COMMISSION CONSIDER THE KANSAS OPERATIONS OF ATMOS ENERGY AS A STAND-ALONE COMPANY?

A. Yes, it should. Because it is the rate base of Atmos Energy's Kansas operations to which the overall rates of return set forth in this proceeding will be applied, they should be evaluated as a stand-alone entity. To do otherwise would be

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61 Gatewood Direct Testimony, at 24.
62 *Ibid.*, at 26-27.
63 *Ibid.*, at 27.
64 *Ibid.*, at 27-28.

discriminatory, confiscatory and inaccurate. It is also a basic financial precept that the use of the funds invested give rise to the risk of the investment. As Brealey and Myers state:

> The true cost of capital depends on the use to which the capital is put.
>
> ***
>
> ***Each project should be evaluated at its own opportunity cost of capital; the true cost of capital depends on the use to which the capital is put***. (italics and bold in original) [65]

Morin confirms Brealey and Myers when he states:

> Financial theory clearly establishes that the cost of equity is the risk-adjusted opportunity cost of the investors and not the cost of the specific capital sources employed by the investors. The true cost of capital depends on the use to which the capital is put and not on its source. The Hope and Bluefield doctrines have made clear that the relevant considerations in calculating a company's cost of capital are the alternatives available to investors and the returns and risks associated with those alternatives.[66]

Additionally, Levy and Sarnat state:

> The firm's cost of capital is the discount rate employed to discount the firm's average cash flow, hence obtaining the value of the firm. It is also the weighted average cost of capital, as we shall see below. The weighted average cost of capital should be employed for project evaluation… only in cases where the risk profile of the new projects is a "carbon copy" of the risk profile of the firm[67]

Although Levy and Sarnat discuss a project's cost of capital relative to a firm's cost of capital, these principles apply equally to the use of a proxy group-based cost of capital. Each company must be viewed on its own merits, regardless

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[65] Brealey and Myers, at pp. 173, 198.

[66] Morin, at p. 523.

[67] Haim Levy & Marshall Sarnat, Capital Investment and Financial Decisions, Prentice/Hall International, 1986, p. 465.

of the source of its equity capital. As *Bluefield* clearly states:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; [68]

In other words, it is the "risks and uncertainties" surrounding the property employed for the "convenience of the public" which determines the appropriate level of rates. In this proceeding, the property employed "for the convenience of the public" is the rate base of the Kansas operations of Atmos Energy. Thus, it is only the risk of investment in the Kansas rate base that is relevant to the determination of the cost of common equity to be applied to the common equity-financed portion of that rate base.

In addition, in the Fama and French article previously cited, the authors[69] proposed that their three-factor model include the SMB (Small Minus Big) factor, which indicates that small capitalization firms are more risky than large capitalization firms, confirming that size is a risk factor which must be taken into account in estimating the cost of common equity.

Consistent with the financial principle of risk and return discussed previously and the stand-alone nature of ratemaking, an upward adjustment must be applied to the indicated cost of common equity derived from the cost of equity models of the proxy groups used in this proceeding.

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68 *Bluefield*, p. 6.

69 Fama and French, p. 39.

Q. **DO YOU AGREE WITH MR. GATEWOOD'S STATEMENT THAT IF EACH OPERATING DIVISION OF ATO RECEIVED A SMALL SIZE PREMIUM, THE SUM OF THE DIVISION RETURNS WOULD EXCEED THE REQUIRED RETURN BY INVESTORS IN ATO STOCK?**[70]

A. No. My reasoning, as demonstrated by Mr. Gatewood, is tantamount to following portfolio theory, which theorizes that owning a basket of risky securities is less risky than individual owners owning separate securities. Atmos Energy, as a multistate utility, invests in individual operating jurisdictions, all at their assumed individual levels of risk. As the company diversifies its holdings over several geographic and regulatory territories, the overall riskiness of the portfolio decreases even if some of the underlying individual investments are riskier than the portfolio. This portfolio effect would indeed lower the investors' required return for ATO stock, but this does not imply that the individual jurisdictional investments made by the company are less risky.

Q. MR. GATEWOOD DISCUSSES THE FINANCIALS OF ATMOS ENERGY'S COMBINED OPERATIONS AND SOMEHOW JUSTIFIES THAT THE KANSAS REGULATORY OPERATIONS ARE A SIGNIFICANT POSITIVE CONTRIBUTOR TO THE WHOLE OF ATMOS ENERGY'S OPERATIONS. PLEASE RESPOND.

A. Mr. Gatewood is mistaken in this respect in at least two ways: (1) the Kansas operations are not significant in terms of earnings, revenues, customers, or assets compared to the combined entity and (2) the authorized and earned returns of the

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70 Gatewood Direct Testimony, at 26-27.

Kansas operations of Atmos Energy underperform when compared to the overall returns earned by the Company. As shown on Table 7, below, the Kansas operations as measured by earnings, revenues, customers, and net plant are so small compared to the entirety of ATO, that any change to its operations (positive or negative) is unlikely to significantly impact overall earnings or stock price.

Table 7: Relative Size of Kansas Operations to ATO

Measure	ATO[71]	ATO - KS[72]	% of ATO
Operating Income	$721,278	$15,245	2.11%
Revenues	$3,089,863	$132,367	4.28%
Customers	3,264,178	134,807	4.13%
Net Plant	$10,698,229	$220,999	2.07%

That being said, the earned returns on equity for Atmos Energy's Kansas operations are consistently below the earned return on equity for ATO, effectively dragging down corporate results as shown in Table 8, below:

Table 8: Earned Returns of ATO and Kansas Operations

Earned ROE	ATO[73]	ATO - KS[74]
2014	10.23%	7.97%
2015	10.03%	7.17%
2016	10.52%	7.50%
2017	10.77%	7.46%
2018	13.91%	7.67%

In view of the tables above, the credit Mr. Gatewood gives to the regulatory climate in Kansas for the overall success of ATO is misplaced.

71 Source of Information: SNL Financial.
72 Annual Report submitted to the Commission for year ending 12/31/2018.
73 Source of Information: SNL Financial.
74 Company response to CURB 1-09.

Q. MR. GATEWOOD IS SKEPTICAL REGARDING THE USE OF MARKET CAPITALIZATION AS A MEASURE OF SIZE.[75] ARE YOU AWARE OF EMPIRICAL ANALYSES OF THE SIZE PREMIUM IN ADDITION TO THE STUDY INCLUDED IN YOUR DIRECT TESTIMONY?

A. Yes. Duff & Phelps' *2019 Cost of Capital Navigator* presents a Size Study based on the relationship of various measures of size and return. Relative to the relationship between average annual return and the various measures of size, Duff & Phelps states:

> The size of a company is one of the most important risk elements to consider when developing cost of equity estimates for use in valuing a firm. Traditionally, researchers have used market value of equity (*i.e.,* "market capitalization" or "market cap") as a measure of size in conducting historical rate of return research. For example, the Center for Research in Security Prices (CRSP) "deciles" are developed by sorting U.S. companies by market capitalization. Another example is the Fama-French "Small Minus Big" (SMB) series, which is the difference in return of "small" stocks minus "big" (*i.e.*, large) stocks, as defined by market capitalization. (emphasis added) [76]

The Size Study uses the following eight measures of size:

- Market Value of Common Equity (or total capital if no debt / equity);
- Book Value of Common Equity;
- Net Income (five-year average);
- Market Value of Invested Capital;
- Total Assets (Invested Capital);
- Earnings Before Interest, Taxes, Depreciation & Amortization ("EBITDA") (five-year average);

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75 Gatewood Direct Testimony, at 27.

76 Duff & Phelps 2019 *Cost of Capital Navigator,* at 10-1.

- Sales / Operating Revenues; and
- Number of Employees.

I applied the Duff & Phelps Size Study to determine the approximate risk premium associated with Atmos Energy's relatively small size as shown on Schedule DWD-14. The indicated size adjustments based on those measures range from 1.35% to 3.55%, and average 2.22%.[77] In view of these indicated size risk premiums and my original size study, which indicated a 1.61% size premium, my recommended size adjustment of 0.40% is appropriate, if not conservative.

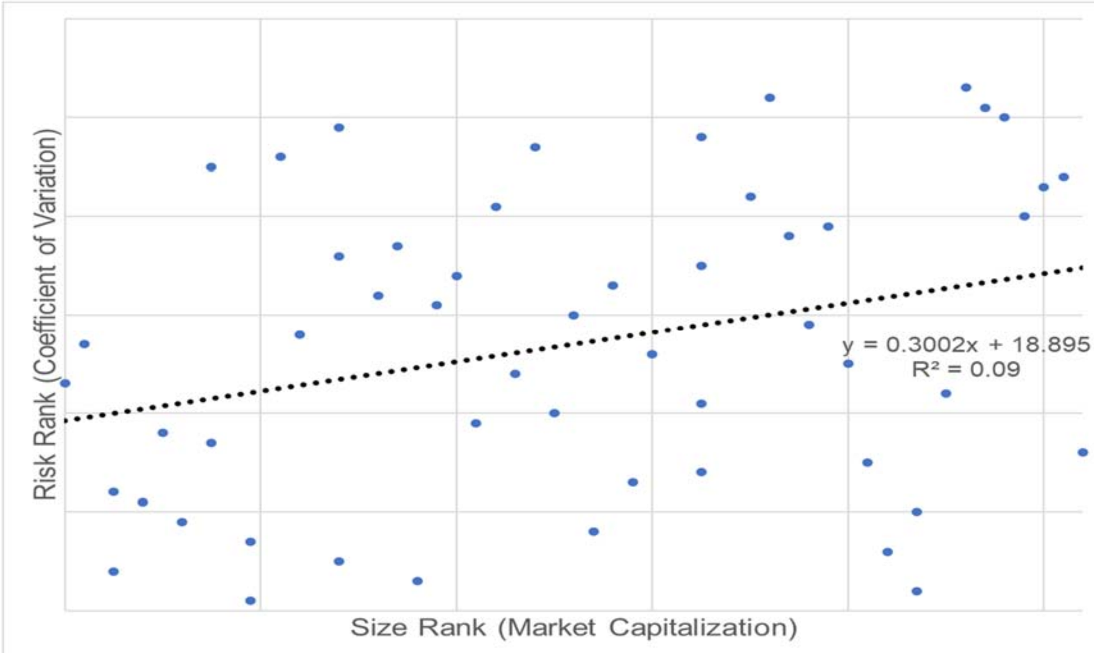
Q. HAVE YOU PERFORMED A STUDY FOR UTILITY COMPANIES THAT LINK SIZE AND RISK?

A. Yes, I have. I performed a study on whether or not the size effect is in fact applicable to utilities. The study included the universe of electric, gas, and water companies included in Value Line Standard Edition. From each of the utilities' Value Line Ratings & Reports, I calculated the 10-year coefficient of variation[78] ("CoV") of net profit (a measure of risk) and current market capitalization (a measure of size) for each company. After ranking the companies by size (largest to smallest) and risk (least risky to most risky), I made a scatter plot of the data, as shown on Chart 3, below:

77 I did not have values for book value of common equity or market value of invested capital, so I did not include those measures in my study.

78 The coefficient of variation is used by investors and economists to determine volatility.

Chart 3: Relationship Between Size and Risk for The Value Line Universe of Utility Companies



As shown in Chart 3 above, as company size decreases (increasing size rank), the CoV increases, linking size and risk for utilities. The R-Squared of 0.09 means that approximately 9% of the change in risk rank is explained by the size rank. While a 0.09 R-Squared does not appear to have strong explanatory power, it is somewhat greater than the average R-Squared of each of the Opposing ROE Witnesses' utility proxy groups' beta coefficients as will be discussed later in this testimony.

Q. PLEASE ADDRESS SURVIVORSHIP BIAS AS IT PERTAINS TO THE SMALL SIZE PREMIUM.

A. While the small size risk premium is a premium that attempts to measure the risk of smaller companies over larger companies, the risk, as measured by variance of returns, is ever-present. The survivorship and de-listing biases as described by Shumway and Warther would only serve to increase the variance of the returns of those small companies, increasing risk and therefore, the investor-required return. I discuss the applicability of survivorship bias to the U.S. market later in this testimony in terms of the MRP. Additionally, I did not use the entire indicated small size premium of 1.61%, but 0.40% to reflect the increased risk of Atmos Energy relative to the proxy group.

Q. MR. GATEWOOD EXPRESSES CONCERNS REGARDING THE SIZE ADJUSTMENT BEING APPLIED TO ALL MODELS, AND NOT JUST THE CAPM.[79] PLEASE RESPOND.

A. If I applied a size adjustment to just my CAPM analysis, I would use the full indicated size adjustment, or 1.61% to my updated CAPM result of 9.10% to arrive at 10.71%. My indicated average and median ROE result would then be 9.90% and 9.94%, averaging 9.92%. Adding flotation costs of 0.03% to the 9.92% cost rate would result in a recommended ROE of 9.95% for Atmos Energy.

D. FLOTATION COSTS

Q. DOES MR. GATEWOOD PROPOSE A FLOTATION COST ADJUSTMENT FOR ATMOS ENERGY?

A. No, he does not. As discussed in my direct testimony,[80] since common equity has an indefinite life, flotation costs should be recovered though an adjustment to the ROE. As such, Mr. Gatewood should have included this cost in his recommended ROE.

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79 Gatewood Direct Testimony, at 25.

80 D'Ascendis Direct Testimony, at 52-55.

E. CRITIQUES ON COMPANY TESTIMONY

Q. DID MR. GATEWOOD HAVE ANY CRITIQUES OF YOUR ANALYSES?

A. Yes, he did. Mr. Gatewood's critiques of my analyses are summarized below: [81]

- Not reflecting long-run economic growth by not using expected GDP growth rates in my DCF analysis;
- My exclusive use of expected EPS growth rates in the DCF analysis;
- My reflection of Atmos Energy's increased risk due to its small size relative to the proxy group.

As I have responded to these critiques while discussing Mr. Gatewood's analyses, I will not repeat those discussions here.

V. <u>RESPONSE TO CURB WITNESS WOOLRIDGE</u>

Q. PLEASE BRIEFLY SUMMARIZE DR. WOOLRIDGE'S ROE ANALYSES AND RECOMMENDATIONS.

A. Dr. Woolridge argues the Company's Cost of Equity is within a range of 7.50% to 8.70%, and provides a specific recommendation of 8.70%, which is the result of his constant-growth DCF model.[82]

Q. WHAT ARE THE SPECIFIC AREAS IN WHICH YOU DISAGREE WITH DR. WOOLRIDGE'S ANALYSES AND RECOMMENDATIONS?

A. There are several areas in which I disagree with Dr. Woolridge, including: (1) his sole reliance on and his application of the DCF model; (2) his application of the CAPM; (3) his failure to reflect the Company's greater risk due to their small size relative size to the proxy group; and (4) his failure to reflect flotation costs.

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[81] Gatewood Direct Testimony, at 22-28.
[82] Woolridge Direct Testimony, at 58.

A. RECOMMENDED ROE AND DCF ANALYSES

Q. IS DR. WOOLRIDGE'S 8.70% ROE RECOMMENDATION CONSISTENT WITH RETURNS RECENTLY AUTHORIZED FOR NATURAL GAS UTILITIES ACROSS THE COUNTRY?

A. No, it is not. As shown in Schedule DWD-15, Since 2018, the average and median authorized ROEs for natural gas utilities are 9.63% and 9.70%, respectively, 93 and 100 basis points higher than Dr. Woolridge's recommended ROE. In 2019, mean and median authorized ROEs for natural gas utilities are both 9.73%, more than 100 basis points over Dr. Woolridge's recommended ROE in this proceeding. This discussion also demonstrates that authorized ROEs are relatively flat, or rising, as opposed to falling, as Dr. Woolridge contends.[83]

Q. WHY IS DR. WOOLRIDGE'S RECOMMENDED ROE SO LOW, ESPECIALLY IN VIEW OF CURRENTLY AUTHORIZED ROES FOR NATURAL GAS COMPANIES?

A. It is a combination of two factors; first, Dr. Woolridge solely relied on the DCF model for his ROE recommendation, and second, as addressed previously in this testimony regarding Mr. Gatewood, and will be discussed later in this testimony, Dr. Woolridge did not reflect the Company's greater relative business risk due to their small size.

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[83] *Ibid.,* at 15-16.

Q TO WHAT EXTENT DOES DR. WOOLRIDGE'S RECOMMENDED ROE RELY ON HIS DCF MODEL?

A. As previously stated, Dr. Woolridge relies exclusively on his constant-growth DCF model results for his recommendations for the cost of common equity for the Companies. As discussed in my direct testimony,[84] the use of multiple models adds reliability to the estimation of the common equity cost rate, with the prudence of using multiple cost of common equity models supported in both the financial literature and regulatory precedent.

Q. CAN YOU PLEASE PROVIDE SOME EXAMPLES FROM THE FINANCIAL LITERATURE WHICH SUPPORT THE USE OF MULTIPLE COST OF COMMON EQUITY MODELS IN DETERMINING THE INVESTOR-REQUIRED RETURN?

A. Yes. In one example, Morin states:

> Each methodology requires the exercise of considerable judgment on the reasonableness of the assumptions underlying the methodology and on the reasonableness of the proxies used to validate a theory. The inability of the DCF model to account for changes in relative market valuation, discussed below, is a vivid example of the potential shortcomings of the DCF model when applied to a given company. Similarly, the inability of the CAPM to account for variables that affect security returns other than beta tarnishes its use.
>
> **No one individual method provides the necessary level of precision for determining a fair return, but each method provides useful evidence to facilitate the exercise of an informed judgment.** Reliance on any single method or preset formula is inappropriate when dealing with investor expectations because of possible measurement difficulties and vagaries in individual companies' market data. (emphasis added)

[84] D'Ascendis Direct Testimony, at 5, 48.

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The financial literature supports the use of multiple methods. Professor Eugene Brigham, a widely respected scholar and finance academician, asserts(footnote omitted):

> Three methods typically are used: (1) the Capital Asset Pricing Model (CAPM), (2) the discounted cash flow (DCF) method, and (3) the bond-yield-plus-risk-premium approach. **These methods are not mutually exclusive – no method dominates the others**, and all are subject to error when used in practice. Therefore, when faced with the task of estimating a company's cost of equity, we generally use all three methods and then choose among them on the basis of our confidence in the data used for each in the specific case at hand. (emphasis added)

Another prominent finance scholar, Professor Stewart Myers, in an early pioneering article on regulatory finance, stated(footnote omitted):

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, **only a fool throws away useful information**. That means you should not use any one model or measure mechanically and exclusively. Beta is helpful as one tool in a kit, to be used in parallel with DCF models or other techniques for interpreting capital market data. (emphasis added)

Reliance on multiple tests recognizes that no single methodology produces a precise definitive estimate of the cost of equity. As stated in Bonbright, Danielsen, and Kamerschen (1988), '*no single or group test or technique is conclusive*.' Only a fool discards relevant evidence. (italics in original) (emphasis added)

* * *

While it is certainly appropriate to use the DCF methodology to estimate the cost of equity, there is no proof that the DCF produces a more accurate estimate of the cost of equity than other methodologies. Sole reliance on the DCF model ignores the capital market evidence and financial theory formalized in the CAPM and other risk premium methods. **The DCF model is one of many tools to be employed in conjunction with other methods to estimate the cost of equity.** It is not a superior methodology that supplants other financial theory and market evidence. The broad usage of the

> DCF methodology in regulatory proceedings in contrast to its virtual disappearance in academic textbooks does not make it superior to other methods. The same is true of the Risk Premium and CAPM methodologies. (emphasis added) [85]

Finally, Brigham and Gapenski note:

> In practical work, *it is often best to use all three methods* – CAPM, bond yield plus risk premium, and DCF – and then apply judgment when the methods produce different results. People experienced in estimating equity capital costs recognize that both careful analysis and some very fine judgments are required. It would be nice to pretend that these judgments are unnecessary and to specify an easy, precise way of determining the exact cost of equity capital. Unfortunately, this is not possible. Finance is in large part a matter of judgment, and we simply must face this fact. (italics in original) [86]

In the academic literature cited above, three methods are consistently mentioned: the DCF, CAPM, and the RPM, all of which I used in my analyses.

Q. IN ADDITION TO THE ABOVE, WHY IS SOLE RELIANCE ON THE DCF MODEL PROBLEMATIC AT THIS TIME?

A. Traditional rate base/rate of return regulation, where a market-based common equity cost rate is applied to a book value rate base, presumes that M/B ratios are at unity or 1.00. However, that is rarely the case. Morin states:

> The third and perhaps most important reason for caution and skepticism is that application of the DCF model produces estimates of common equity cost that are consistent with investors' expected return only when stock price and book value are reasonably similar, that is, when the M/B is close to unity. As shown below, application of the standard DCF model to utility stocks understates the investor's expected return when the market-to-book (M/B) ratio of a given stock exceeds unity. This was particularly relevant in the capital market environment of the 1990s and 2000s where utility stocks were trading at M/B ratios well above unity and have been

[85] Roger A. Morin, New Regulatory Finance, Public Utilities Reports, Inc., 2006, at 428-431. ("Morin")

[86] Eugene F. Brigham and Louis C. Gapenski, Financial Management – Theory and Practice, 4th Ed. (The Dryden Press, 1985) at 256. ("Brigham and Gapenski")

> for nearly two decades. The converse is also true, that is, the DCF model overstates that investor's return when the stock's M/B ratio is less than unity. The reason for the distortion is that the DCF market return is applied to a book value rate base by the regulator, that is, a utility's earnings are limited to earnings on a book value rate base.[87]

As he explains, DCF models assume an M/B ratio of 1.0 and therefore under- or over-states investors' required return when market value exceeds or is less than book value, respectively. It does so because equity investors evaluate and receive their returns on the market value of a utility's common equity, whereas regulators authorize returns on the book value of common equity. This means that the market-based DCF will produce the total annual dollar return expected by investors, only when market and book values of common equity are equal, a very rare and unlikely situation.

Q. WHY DO MARKET AND BOOK VALUES DIVERGE?

A. Market values can diverge from book values for a myriad of reasons including, but not limited to, earnings per share ("EPS") and dividends per share ("DPS") expectations, merger/acquisition expectations, interest rates, etc. As noted by Phillips:

> Many question the assumption that market price should equal book value, believing that 'the earnings of utilities should be sufficiently high to achieve market-to-book ratios which are consistent with those prevailing for stocks of unregulated companies.[88]

In addition, Bonbright states:

> In the first place, commissions cannot forecast, except within wide limits, the effect their rate orders will have on the market prices of the stocks of the companies they regulate. In the second place,

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87 Morin, at 434.

88 Charles F. Phillips, The Regulation of Public Utilities, Public Utilities Reports, Inc., 1993, at 395. ("Phillips")

> *whatever the initial market prices may be, they are sure to change not only with the changing prospects for earnings, but with the changing outlook of an inherently volatile stock market*. In short, market prices are beyond the control, though not beyond the influence of rate regulation. Moreover, even if a commission did possess the power of control, any attempt to exercise it ... would result in harmful, uneconomic shifts in public utility rate levels. (italics added)[89]

Q. CAN THE UNDER- OR OVER-STATEMENT OF INVESTORS' REQUIRED RETURN BY THE DCF MODEL BE DEMONSTRATED MATHEMATICALLY?

A. Yes. Schedule DWD-16 demonstrates how a market-based DCF cost rate of 8.70%, when applied to a book value substantially below market value, will understate investors' required return on market value. As shown, there is no realistic opportunity to earn the expected market-based rate of return on book value. In Column [A], investors expect an 8.70% return on an average market price of $71.84 for Dr. Woolridge's gas proxy group. Column [B] shows that when Dr. Woolridge's 8.70% return rate is applied to a book value of $30.37,[90] the total annual return opportunity is $2.642. After subtracting dividends of $1.868, the investor only has the opportunity for $0.774 in market appreciation, or 1.08%. The magnitude of the understatement of investors' required return on market value using Dr. Woolridge's 8.70% cost rate is 5.02%, which is calculated by subtracting the market appreciation based on book value of 0.774% from Dr. Woolridge's expected growth rate of 6.10%.

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89 James C. Bonbright, Albert L. Danielsen and David R. Kamerschen, Principles of Public Utility Rates (Public Utilities Reports, Inc., 1988), at 334. ("Bonbright")

90 Representing a market-to-book ratio of 222.69%.

Q. HOW DO M/B RATIOS OF DR. WOOLRIDGE'S PROXY GROUP COMPARE TO THEIR TEN-YEAR AVERAGE?

A. The M/B ratio of Dr. Woolridge's natural gas proxy group is currently extraordinarily high compared to the ten-year average. As shown in Chart 4, below, since early 2016, the M/B ratios of the Dr. Woolridge's natural gas proxy group has increased significantly over its ten-year average M/B ratio of approximately 1.75 times, respectively.

Chart 4: M/B Ratios of the Combined Gas Utility Proxy Group Compared with Ten-Year Average[91]

The significance of this is that even though the ten-year average M/B ratio has always been different than 1.0x, the current M/B ratio is even further removed from 1.0x, further distorting DCF results.

[91] Source: Bloomberg Financial Services.

Q. IS THERE ANOTHER WAY TO QUANTIFY THE INACCURACY OF THE DCF MODEL WHEN M/B RATIOS ARE DIFFERENT THAN UNITY?

A. Yes. One can quantify the inaccuracy of the DCF model when M/B ratios are not at unity by estimating the implied DCF model results (based on a market-value capital structure) to reflect a book-value capital structure. This can be measured by first calculating the market value of each proxy company's capital structure, which consists of the market value of the company's common equity (shares outstanding multiplied by price) and the fair value of the company's long-term debt and preferred stock. All of these measures, except for price, are available in each company's SEC Form 10-K.

Second, one must de-leverage the implied cost of common equity based on the DCF. This is derived using the Modigliani / Miller equation[92] as illustrated in Schedule DWD-17 and shown below:

$$ku = ke - (((ku - i)(1 - t))\ D/E) - (ku - d)\ P/E \quad \text{[Equation 1]}$$

Where:

ku	=	Unlevered (i.e., 100% equity) cost of common equity;
ke	=	Market determined cost of common equity;
i	=	Cost of debt;
t	=	Income tax rate;
D	=	Debt ratio;
E	=	Equity ratio;
d	=	Cost of preferred stock; and
P	=	Preferred equity ratio.

[92] The Modigliani / Miller theorem is an influential element of economic theory and forms the basis for modern theory on capital structure. *See* Modigliani, F., and Miller, M. "The Cost of Capital, Corporation Finance and the Theory of Investment", The American Economic Review, Vol. 48, No. 3, (June 1958), at 261-297.

For example, using Dr. Woolridge's average proxy group-specific data, the equation becomes:

ku = 8.70% - (((ku – 4.31%)(1 - 21%)) 30.93% / 69.07%) - (ku – 0.00%) 0.00% / 69.07%

Solving for ku results in an unlevered cost of common equity of 7.55%.

Next, one must re-lever those costs of common equity by relating them to each proxy group's average book capital structure as shown below:

ke = ku + (((ku – i)(1 – t)) D/E) + (ku – d) P/E [Equation 2]

Once again, using Dr. Woolridge's average proxy group-specific data, the equation becomes:

ke =7.75% + (((7.75%-4.31%)(1-21%))48.31%/51.69%) + (7.55%-0.00%)0.00%/51.69%

Solving for ke results in a 9.95% indicated cost of common equity relative to the book capital structure of the proxy group, which is an increase of 1.25% over Dr. Woolridge's indicated DCF result of 8.70%. The leverage-adjusted DCF results of Dr. Woolridge's are still not applicable to the Companies, as they do not reflect the higher risk that the Companies face relative to their proxy groups given their smaller size, nor does it reflect flotation costs. Additionally, as stated above, consideration of multiple ROE models is also necessary to gain further insight into the investor-required return, where the DCF is only one tool among many.

Q. ARE YOU ADVOCATING A SPECIFIC ADJUSTMENT TO THE DCF RESULTS TO CORRECT FOR ITS MIS-SPECIFICATION OF THE INVESTOR-REQUIRED RETURN?

A. No. The purpose of this discussion was to demonstrate that like all cost of common equity models, the DCF has its limitations and that the use of multiple cost of common equity models in conjunction with informed expert judgment provides a more accurate and reliable picture of the investor-required ROE than does a narrow evaluation of the results of one model.

B. CONSTANT GROWTH DCF MODEL

Q. PLEASE SUMMARIZE DR. WOOLRIDGE'S APPLICATION OF THE CONSTANT GROWTH DCF MODEL.

A. For the dividend yield, Dr. Woolridge uses a current annual dividend and then divides that by the 30-, 90-, and 180-trading day average stock prices to derive a range of dividend yields between 2.5% and 2.7%. Dr. Woolridge reviewed a number of growth rates, including historical and projected DPS, book value per share ("BVPS"), and EPS growth rates as reported by Value Line; analysts' consensus EPS growth rate projections from Yahoo!, Reuters, and Zacks; and an estimate of "Sustainable Growth" derived from data provided by Value Line.[93] Dr. Woolridge states that in arriving at his 8.70% DCF estimate for the proxy group he gave more weight to projected EPS growth rates[94] despite stating that analysts' projected growth rates in EPS are biased.[95]

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93 Woolridge Direct Testimony, at 44.

94 *Ibid.*

95 *Ibid.*, at 40-42

Q. DO YOU AGREE WITH DR. WOOLRIDGE'S POSITION THAT ANALYSTS' EARNINGS GROWTH PROJECTIONS ARE CONSISTENTLY BIASED?

A. No, I do not. Dr. Woolridge argues analysts' earnings growth estimates are "overly optimistic and upwardly biased" and asserts that "the DCF growth rate needs to be adjusted downward from the projected EPS growth rate"[96] as a result of that bias. Dr. Woolridge's position, however, is based on observations of the broad market; he has provided no evidence that any of the growth rates used in my (or his) DCF analyses are the result of a consistent and pervasive bias on the part of the analysts providing those projections. Notably, despite his view that they are biased, it was by "[g]iving primary weight to the projected EPS growth rate of Wall Street analysts" that Dr. Woolridge arrived at his assumed growth rates.[97]

Over the long run, there can be no growth in DPS without growth in EPS. Earnings expectations have a more significant, but not sole, influence on market prices than dividend expectations. Thus, the use of earnings growth rates in a DCF analysis provides a better match between investors' market appreciation expectations implicit in market prices and the growth rate component of the DCF. Consequently, earnings expectations have a significant influence on market prices which affect market price appreciation and hence, the "growth" experienced by investors. This should be evident even to relatively unsophisticated investors just by listening to financial news reports on radio, TV, or reading newspapers. In fact,

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96 *Ibid.*, at 42.
97 *Ibid.*, at 44.

Dr. Morin states:

> Because of the dominance of institutional investors and their influence on individual investors, analysts' forecasts of long-run growth rates provide a sound basis for estimating required returns. Financial analysts exert a strong influence on the expectations of many investors who do not possess the resources to make their own forecasts, that is, they are a cause of g. The accuracy of these forecasts in the sense of whether they turn out to be correct is not at issue here, as long as they reflect widely held expectations. As long as the forecasts are typical and/or influential in that they are consistent with current stock price levels, they are relevant. The use of analysts' forecasts in the DCF model is sometimes denounced on the grounds that it is difficult to forecast earnings and dividends for only one year, let alone for longer time periods. This objection is unfounded, however, because it is present investor expectations that are being priced; it is the consensus forecast that is embedded in price and therefore in required return, and not the future as it will turn out to be.
>
> * * *
>
> Published studies in the academic literature demonstrate that growth forecasts made by security analysts represent an appropriate source of DCF growth rates, are reasonable indicators of investor expectations and are more accurate than forecasts based on historical growth. These studies show that investors rely on analysts' forecasts to a greater extent than on historic data only.[98]

However, while EPS is a significant factor influencing market prices, it is by no means the only factor that affects market prices, a fact recognized by Bonbright with regard to public utilities as discussed previously.

In addition, studies performed by Cragg and Malkiel demonstrate that analysts' forecasts are superior to historical growth rate extrapolations. They state:

> Efficient market hypotheses suggest that valuation should reflect the information available to investors. Insofar as analysts' forecasts are more precise than other types we should therefore expect their differences from other measures to be reflected in the market. It is therefore noteworthy that our regression results do support the

98 Morin 298.

> hypothesis that analysts' forecasts are needed even when calculated growth rates are available. As we noted when we described the data, security analysts do not use simple mechanical methods to obtain their evaluations of companies. The growth-rate figures we obtained were distilled from careful examination of all aspects of the companies' records, evaluation of contingencies to which they might be subject, and whatever information about their prospects the analysts could glean from the companies themselves of from other sources. It is therefore notable that the results of their efforts are found to be so much more relevant to the valuation than the various simpler and more "objective" alternatives that we tried.[99]

In addition, Vander Weide and Carleton conclude:

> . . . our studies affirm the superiority of analyst's forecasts over simple historical growth extrapolations in the stock price formation process. Indirectly, this finding lends support to the use of valuation models whose input includes expected growth rates.[100]

Additionally, it does not really matter what the level of accuracy of those analysts' forecasts is well after the fact. What is important is that they influence investors and hence the market prices they pay. Moreover, there is no empirical evidence that investors, consistent with the Efficient Market Hypothesis ("EMH"), would discount or disregard analysts' estimates of growth in EPS. According to Fama,[101] a market in which prices always "fully reflect" available information is called "efficient." There are three forms of the EMH, namely:

(1) The "weak" form asserts that all past market prices and data are fully reflected in securities prices. In other words, technical analysis cannot enable an investor to "outperform the market."

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99 John G. Cragg and Burton G. Malkiel, Expectations and the Structure of Share Prices (University of Chicago Press, 1982) Chapter 4.

100 James H. Vander Weide and Willard T. Carleton, "Investor Growth Expectations: Analysts vs. History" (The Journal of Portfolio Management, Spring 1988) 78-82.

101 Eugene F. Fama. "Efficient Capital Markets: A Review of Theory and Empirical Work", *The Journal of Finance*, Vol. 25, No. 2. (May 1970), pp. 383-417

(2) The "semi-strong" form asserts that all publicly available information is fully reflected in securities prices. In other words, fundamental analysis cannot enable an investor to "outperform the market."

(3) The "strong" form asserts that all information, both public and private, is fully reflected in securities prices. In other words, even insider information cannot enable an investor to "outperform the market."

The "semi-strong" form is generally considered the most realistic because the illegal use of insider information can enable an investor to "beat the market" and earn excessive returns, thereby disproving the "strong" form. The "semi strong" form of the EMH is generally held to be true where all perceived risks are taken into account by investors in the prices they pay for securities, with investors aware of all publicly-available information, including bond ratings, discussions about companies by bond rating agencies and investment analysts, as well as the many analysts' earnings growth forecasts available. In addition, as stated previously, since investors are aware of the accuracy of such projections as well as the literature supporting the superiority of such projection, security analysts' earnings growth projections should be used exclusively in a cost of common equity analysis.

In addition to the empirical and academic support discussed previously in this rebuttal testimony regarding the superiority of analysts' EPS growth forecasts, there should be no concern about the use of analysts' forecasts in 2019. Dr. Burton G. Malkiel, the Chemical Bank Chairman's Professor of Economics at Princeton University is the author of the widely read national bestseller book on investing entitled, "A Random Walk Down Wall Street" (2011). In testimony before the Public Service Commission of South Carolina, in November 2002, Professor Malkiel affirmed his belief in the superiority of analysts' earnings forecasts when he testified:

> With all the publicity given to tainted analysts' forecasts and investigations instituted by the New York Attorney General, the National Association of Securities Dealers, and the Securities & Exchange Commission, I believe the upward bias that existed in the late 1990s has indeed diminished. In summary, I believe that current analysts' forecasts are more reliable than they were during the late 1990s. *Therefore, analysts' forecasts remain the proper tool to use in performing a Gordon Model DCF analysis.* (Rebuttal testimony, South Carolina Electric and Gas Co., pp. 16-17, Docket No. 2002-223-E) (italics added)

Considering that The Regulation Fair Disclosure ("FD") and Global Analysts Research Settlements ("GARS") were more than fifteen years ago, investors have been fully aware since then of the steps that have been taken to eliminate and prevent analysts' bias. In view of the foregoing, it is apparent that analysts' forecasts of earnings remain the best predictor of growth for use in the DCF model. Clearly, Dr. Woolridge's concerns are misplaced as they no longer reflect the practices in the industry.

In addition, there is no empirical evidence that investors would disregard analysts' estimates of growth in earnings per share. "Do Analyst Conflicts Matter? Evidence from Stock Recommendations" examines whether conflicts of interest with investment banking [IB] and brokerage businesses induced sell-side analysts to issue optimistic stock recommendations and whether investors were misled by such biases. They conclude:

> Overall, our findings do not support the view that conflicted analysts are able to systematically mislead investors with

optimistic stock recommendations.

Agrawal and Anup state:

> Overall, our empirical findings suggest that while analysts do respond to IB and brokerage conflicts by inflating their stock recommendations, the market discounts these recommendations after taking analysts' conflicts into account. These findings are reminiscent of the story of the nail soup told by Brealey and Myers (1991), except that here analysts (rather than accountants) are the ones who put the nail in the soup and investors (rather than analysts) are the ones to take it out. Our finding that the market is not fooled by biases stemming from conflicts of interest echoes similar findings in the literature on conflicts of interest in universal banking (for example, Kroszner and Rajan, 1994, 1997; Gompers and Lerner 1999) and on bias in the financial media (for examples, Bhattacharya et al. forthcoming; Reuter and Zitzewitz 2006). Finally, while we cannot rule out the possibility that some investors may have been naïve, our findings do not support the notion that the marginal investor was systematically misled over the last decade by analysts' recommendations.[102]

In view of all of the foregoing, the use of analysts' forecasts of EPS growth should be used exclusively when estimating the cost rate of common equity capital. Note that notwithstanding Dr. Woolridge's lengthy discussion about the bias and inaccuracy of security analysts' forecasts of EPS growth, he himself, gave "primary weight" to them in arriving at his conclusion of a DCF-derived cost rate.[103]

Q. DO YOU AGREE WITH DR. WOOLRIDGE THAT HISTORICAL GROWTH RATES, OR DIVIDEND AND BOOK VALUE GROWTH RATES ARE APPROPRIATE MEASURES OF EXPECTED GROWTH FOR THE CONSTANT GROWTH DCF MODEL?[104]

A. No. I have already discussed the superiority of EPS growth rates for use in the DCF

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102 Anup Agrawal and Mark A. Chen, "Do Analysts' Conflicts Matter? Evidence from Stock Recommendations", (Journal of Law and Economics, August 2008), Vol. 51.

103 Woolridge Direct Testimony, at 44.

104 *Ibid.,* at 38-39.

and will not repeat that discussion here. As to the applicability of historical growth rates, Dr. Woolridge points out himself that "to best estimate the cost of common equity capital using the conventional DCF model, one must look to long-term growth rate expectations",[105] and I agree. The growth component of the Constant Growth DCF model is a forward-looking measure. To the extent historical growth influences investors' expectations of future growth, it already will be reflected in analysts' consensus earnings estimates. Professors Carleton and Vander Weide found "overwhelming evidence that consensus analysts' forecast of future growth is superior to historically oriented growth measures in predicting the firm's stock price."[106] Consequently, historical growth rates are not appropriate for the Constant Growth DCF model.

Q. HAVE YOU CONDUCTED ANY ANALYSES TO DETERMINE WHICH MEASURES OF GROWTH ARE STATISTICALLY RELATED TO COMPANY STOCK VALUATION LEVELS?

A. Yes, I have. My analysis is based on the methodological approach used by Professors Carleton and Vander Weide, who (as noted earlier) compared the predictive capability of historical growth estimates and analysts' forecasts on the valuation levels of sixty-five utility companies.[107] The analysis was structured to understand whether projected earnings, dividend, or book value growth rates best explain utility stock valuations. In particular, my analysis examined the statistical relationship between the P/E ratios of companies found in my proxy group, and the

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105 *Ibid*., at 39.

106 Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management (Spring 1988).

107 *Ibid.*

projected EPS, DPS, and BVPS reported by Value Line. To determine which, if any, of those growth rates are statistically related to utility stock valuations, I performed a series of regression analyses in which the projected growth rates were explanatory variables and the P/E ratio was the dependent variable. The results of those analyses are presented in Schedule DWD-18.

In that analysis, I performed three separate regressions with the P/E as the dependent variable, and projected EPS, DPS, and BVPS growth rates, respectively, as the independent variable. A single regression, with the P/E as the dependent variable and projected EPS, DPS, and BVPS growth rates as the independent variables also was run, and the T- and F-Statistics were reviewed to determine whether the variables and equations were statistically significant.[108]

Q. WHAT DID THOSE ANALYSES REVEAL?

A. As shown in Schedule DWD-18, the only growth rate that was statistically significant and positively related to the P/E ratio was projected EPS. Because projected EPS growth is the only growth rate that is both statistically and positively related to utility valuation, projected earnings is the proper measure of growth in the DCF model.

C. CAPITAL ASSET PRICING MODEL

Q. PLEASE DESCRIBE DR. WOOLRIDGE'S CAPM ANALYSIS AND RESULTS.

A. Dr. Woolridge combines a "normalized" risk-free rate of 3.75% and an MRP of

[108] In general, a T-Statistic of 2.00 or greater indicates that the variable is likely to be different than zero, or "statistically significant." The F-Statistic is used to determine whether the model as a whole has statistically significant predictive capability.

5.75% to the average beta coefficient in his proxy group (0.65). In estimating his MRP of 5.75%, Dr. Woolridge reviews a series of studies that calculate the MRP using different methodologies; from which he places significant weight on the Duke CFO survey (4.05%), Duff & Phelps MRP (5.50%), KPMG MRP (5.50%), Fernandez survey (5.60%), and Damodaran MRP (5.32%).[109] His indicated ROE using these inputs is 7.50%.[110] Dr. Woolridge ultimately did not place any weight on his CAPM results in the determination of his ROE recommendation.[111]

Q. WOULD YOU LIKE TO COMMENT ON DR. WOOLRIDGE'S APPLICATION OF HIS CAPM?

A. Since Dr. Woolridge does not rely on the results of his CAPM for his ROE recommendation, and to reduce the scope of this rebuttal testimony, I will not address Dr. Woolridge's application of the CAPM. As Dr. Woolridge dismissed his own CAPM analysis, I would recommend that the Commission to do the same.

D. SIZE PREMIUM

Q. DOES DR. WOOLRIDGE REFLECT THE GREATER RELATIVE RISK OF THE COMPANY DUE TO ITS SMALLER SIZE COMPARED TO HIS PROXY GROUP?

A. No, he does not. Dr. Woolridge rejects the size premium for Atmos Energy for the following reasons:

- The "survivorship bias" of returns and portfolio rebalancing overstate

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109 Woolridge Direct Testimony, at 57; Exhibit JRW-8, at 5.
110 *Ibid.*, at 58.
111 *Ibid.*

the size premium;[112] and

- Utility stocks do not exhibit a significant size premium, as described by Wong.[113]

I have already addressed the reasons why survivorship bias actually increases the variance of returns (*i.e.*, risk) of smaller companies, and presented a study that links size and risk for utility companies while addressing Mr. Gatewood's testimony, I will not repeat those discussions here.

Q. DR. WOOLRIDGE CITES A STUDY BY DR. ANNIE WONG FOR THE PROPOSITION THAT THERE IS NO SIZE PREMIUM FOR UTILITIES. DOES THIS STUDY ESTABLISH THAT CONTENTION?

A. No. Dr. Wong's study is flawed because she attempts to relate a change in size to beta coefficients, which accounts for only a small percentage of diversifiable company-specific risk. However, size is company-specific and therefore diversifiable. For example, the average R-squared, or coefficient of determination for Dr. Woolridge's natural gas proxy group, is 0.0788, as shown on Schedule DWD-19. An R-squared of 0.0788, for example, means that approximately 8% of total risk is explained by beta, leaving 92% unexplained by beta.

Q. IS THERE ALSO A PUBLISHED RESPONSE TO DR. WONG'S ARTICLE?

A. Yes, there is. In response to Professor Wong's article, *The Quarterly Review of Economics and Finance* published an article in 2003, authored by Thomas M. Zepp, which commented on the Wong article cited by Dr. Woolridge. Relative to Dr.

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112 Woolridge Direct Testimony, at 94.
113 *Ibid.*

Wong's results, Dr. Zepp concluded in the Abstract on page 1 of his article: "Her weak results, however, do not rule out the possibility of a small firm effect for utilities."[114] Dr. Zepp also noted on page 582 that: "Two other studies discussed here support a conclusion that smaller water utility stocks are more risky than larger ones. To the extent that water utilities are representative of all utilities, there is support for smaller utilities being more risky than larger ones."[115]

Q. ARE YOU AWARE OF ANY OTHER ACADEMIC ARTICLE RELATING TO THE APPLICABILITY OF A SIZE PREMIUM?

A. Yes. An article by Michael A. Paschall, ASA, CFA, and George B. Hawkins ASA, CFA, "Do Smaller Companies Warrant a Higher Discount Rate for Risk?" also supports the applicability of a size premium. As the article makes clear, all else equal, size is a risk factor which must be taken into account when setting the cost of capital or capitalization (discount) rate. Paschall and Hawkins state in their conclusion as follows:

> The current challenge to traditional thinking about a small stock premium is a very real and potentially troublesome issue. The challenge comes from bright and articulate people and has already been incorporated into some court cases, providing further ammunition for the IRS. Failing to consider the additional risk associated with most smaller companies, however, is to fail to acknowledge reality. Measured properly, small company stocks have proven to be more risky over a long period of time than have larger company stocks. This makes sense due to the various advantages that larger companies have over smaller companies. Investors looking to purchase a riskier company will require a greater return on investment to compensate for that risk. There are numerous other risks affecting a particular company, yet the use of a size premium is one way to quantify the risk associated with

[114] Thomas M. Zepp, Thomas M. "Utility Stocks and the Size Effect --- Revisited", The Quarterly Review of Economics and Finance, 43 (2003) at 578-582.

[115] *Ibid, at 578-583*

smaller companies.[116]

Hence, Paschall and Hawkins corroborate the need for a small size adjustment, all else equal. Consistent with the financial principle of risk and return, discussed previously, and the stand-alone nature of ratemaking, an upward adjustment must be applied to any indicated cost of common equity derived from the cost of equity models of the utility proxy groups used in this proceeding.

Q. DR. WOOLRIDGE USES CREDIT RATINGS AS A MEASURE OF RISK. DO YOU BELIEVE THAT CREDIT RATINGS ARE AN APPROPRIATE MEASURE TO DETERMINE THE EQUITY RISK OF THE COMPANY RELATIVE TO THE PROXY GROUP?

A. As stated in my direct testimony,[117] total investment risk is the sum of financial risk (as proxied by credit ratings) and business risk, of which one element is company size. One needs to look at both types of risk to determine any relative risk adjustment to the ROE of the proxy group.

E. FLOTATION COSTS

Q. DID DR. WOOLRIDGE ADDRESS THE ISSUE OF FLOTATION COSTS IN HIS DIRECT TESTIMONY?

A. Yes, Dr. Woolridge devotes a few pages towards the end of his testimony discussing various reasons why he believes such an adjustment is not necessary.[118] Dr. Woolridge does not account for flotation costs, reasoning that flotation costs

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116 Michael A. Paschall, ASA, CFA and George B. Hawkins ASA, CFA, "Do Smaller Companies Warrant a Higher Discount Rate for Risk?", CCH Business Valuation Alert, Vol. 1, Issue No. 2, December 1999.

117 D'Ascendis Direct Testimony, at 4-8.

118 Woolridge Direct Testimony, at 96-99.

for stock issuances are not out-of-pocket costs and, even if they were, current market conditions suggest that a *reduction* to the Cost of Equity is required to account for flotation costs.[119]

Q. PLEASE RESPOND TO DR. WOOLRIDGE IN THAT REGARD.

A. I disagree with Dr. Woolridge's position that flotation costs for stock issuances are different than issuance costs associated with long-term debt. Dr. Woolridge tries to draw some conclusion from the market-to-book ratio and flotation costs by analogizing the sale of stock at a market-to-book ratio in excess of one as being somehow comparable to a issuing a bond at a price in excess of book value.[120] This analogy fails. Bonds are eventually redeemed at book value. Investors in utility stocks are not buying them with the plan to one day "redeem" them for book value. Companies pay the same types of fees (both direct and indirect) regardless of whether they are issuing equity or debt. As to Dr. Woolridge's observation that underwriter fees are not "out-of-pocket" expenses,[121] I view that to be a distinction without a meaningful difference. Whether paid directly or via an underwriting discount, the cost results in net proceeds that are less than the gross proceeds.

I also disagree with Dr. Woolridge's position that flotation costs could represent a *reduction* in Cost of Equity. Flotation costs are true and necessary costs to the issuer and represent funds that otherwise would be invested in long-lived assets. Tellingly, Dr. Woolridge is unable to rebut my core argument for a recovery of flotation costs – that they are a just and reasonable expense that an investor-

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119 *Ibid*.

120 *Ibid*.

121 *Ibid.,* at 98.

owned utility must incur in order to issue stock. As explained in my direct testimony, to the extent flotation costs are not recovered, the issuing company is denied a portion of the opportunity to earn its expected (or required) return.[122]

F. CRITIQUES ON COMPANY TESTIMONY

Q. DID DR. WOOLRIDGE HAVE ANY CRITIQUES OF YOUR ANALYSES?

A. Yes, he did. Dr. Woolridge's critiques of my analyses are summarized below: [123]

- The size of my proxy group is too small;
- My expectation of higher interest rates and capital costs;
- My exclusive use of projected EPS growth rates in my DCF analysis;
- My use of the ECAPM;
- My use of projected measures of interest rates in my CAPM and RPM analyses;
- My PRPM analysis is based on the historical relationship between stocks and bonds;
- My PRPM analysis produces high and variable equity cost rate estimates;
- The use of historical MRPs and ERPs in my CAPM and RPM analyses;
- My MRPs and ERPs are exaggerated because of unrealistic assumptions about future earnings and economic growth;
- My use of a non-price regulated proxy group comparable in total risk to my utility proxy group;
- My application of a size premium to my indicated ROE; and
- My reflection of flotation costs.

I have already addressed my expectations of current and future capital costs, the supremacy of projected EPS growth rates for use in the DCF, the appropriateness of using the ECAPM, the necessity of reflecting the Company's

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122 D'Ascendis Direct Testimony, at 54-55.

123 Woolridge Direct Testimony, at 62-64.

increased relative risk due to its small size compared to the proxy group, and why flotation costs need to be recognized in an ROE analysis. Therefore, I will not repeat those discussions here.

Q. DO YOU AGREE THAT YOUR PROXY GROUP IS TOO SMALL TO ESTIMATE A COMMON EQUITY COST RATE?

A. No. My proxy group of six natural gas companies is comparable in risk to Atmos Energy and is sufficiently large enough to estimate the ROE for the Company.

Q. IS THERE ANY SPECIFIC GUIDANCE YOU CAN POINT TO THAT SUPPORTS YOUR POSITION?

A. Yes. On page 46 of FERC Opinion 486 b in Docket No. RP04-274-000, *et al*, the FERC states regarding the acceptable size of a proxy group in an ROE analysis:

> The Commission concludes that a proxy group should consist of at least four, and preferably at least five members, if representative members can be found. First, in *Williston II*, the Commission expressly found that three members were too small.[footnote omitted] In *HIOS*, the Commission reluctantly relaxed the proxy group members in an effort to obtain four members even though a four member gas pipeline proxy group had previously been rejected by the Commission in *Enbridge Pipelines* (KPC), where the Commission stated:
>
>> The removal of Sonat from the proxy group has the effect of reducing the number of comparable natural gas pipelines to four. In Transcontinental Gas Pipe Line Corporation, we rejected a proxy group containing only four companies because it was determined that four companies are too small a sample and may not be representative of industry conditions. Staff's analysis included five companies. Thus, this is another reason Staff's analysis is preferable.[footnote omitted]
>
> Utilizing a proxy group of at least five members serves this goal and, as did the Commission's historical practice, will help address BP's statistical concerns. At the same times, the proxy group members must be representative and have reasonably comparable

> risks under *Petal v. FERC*. Thus, while the Commission agrees that adding more members to the proxy group results in greater statistical accuracy, this is true only if the additional members are appropriately included in the proxy group as representative firms.

In view of the above, my six-company gas utility proxy group is sufficiently large to conduct an ROE analysis. Additionally, as the only witness in this proceeding that presented the selection criteria used to select their utility proxy group, I have proven that my proxy group companies are of similar risk to Atmos Energy, and why I eliminated certain companies in selecting my utility proxy group. Dr. Woolridge selected his proxy group on an ad-hoc basis with no support at all on how his member companies are comparable to the Company.

Q. HOW DO YOU RESPOND TO DR. WOOLRIDGE'S CRITICISM OF YOUR USE OF PROJECTED INTEREST RATES IN YOUR CAPM AND RPM ANALYSES?

A. My use of expected interest rates in my analyses is consistent with both the cost of capital and ratemaking. The cost of capital, including the ROE, is expectational, as it reflects investors' expectations of future capital markets, including an expectation of interest rate levels, as well as risks. Ratemaking is expectational, as the rates set in this proceeding will be in effect for a period of time in the future.

Throughout his testimony, Dr. Woolridge has acknowledged the expectational nature of the cost of capital. On page 25 of his direct testimony, Dr. Woolridge states "The cost of common equity capital is the expected return on a firm's common stock." On page 39 of his direct testimony, Dr. Woolridge discusses his preferred growth rate in the DCF: "Therefore, to best estimate the cost of common equity capital using the conventional DCF model, one must look to long-term growth rate expectations." Finally, on page 49 of his direct testimony, Dr. Woolridge discusses the difficulty in calculating the MRP: "However, while the market risk premium is easy to define conceptually, it is difficult to measure, because it requires an estimate of the expected return on the market." Therefore, consistent with Dr. Woolridge's own statements, and the forward-looking nature of the cost of capital and ratemaking, the use of expected interest rates is appropriate for cost of capital purposes.

Q. DO YOU HAVE ANY FURTHER COMMENT ON THE USE OF PROJECTED INTEREST RATES IN A COST OF CAPITAL ANALYSIS?

A. Yes. Dr. Woolridge states that his 3.75% risk-free rate is a "normalized" risk-free rate which is synchronized with the MRPs he selected.[124] Since all of his MRPs are ex-ante, or projected MRPs, his risk-free rate must also be projected, regardless of what he claims.

Q. DR. WOOLRIDGE CITES TWO "PROBLEMS" WITH THE PRPM. PLEASE COMMENT.

A. The first "problem" relates to the so-called errors associated with the use of historical market returns to calculate ERPs. Specifically, he cites his discussion of the "Peso problem" or U.S. stock market survivorship bias, as well as what he terms "unattainable return bias".[125] There are two flaws with this "problem." The first is that none of them are applicable to the individual gas company PRPM derived ERPs and ROEs as the individual company results are based on the historical monthly

124 Woolridge Direct Testimony, at 47-48.
125 Woolridge Direct Testimony, at 73.

company specific ERPs and not those of a broad-based index. Second, even relative to a broad-based index, these two "issues" are related to one another. Ibbotson® SBBI® 2013 Valuation Yearbook, Market Results for Stocks, Bonds, Bills, and Inflation 1926-2012 (SBBI – 2013) notes:

> One common problem in working with financial data is properly accounting for survivorship. In working with company-specific historical data, it is important for researchers to include data from companies that failed as well as companies that succeeded before drawing conclusions from elements of that data.
>
> The same argument can be made regarding markets as a whole. The equity risk premium data outlined in this book represent data on the United States stock market. The United States has arguably been the most successful stock market of the twentieth century. That being the case, might equity risk premium statistics based only on U.S. data overstate the returns of equities as a whole because they only focus on one successful market?
>
> In a recent paper, Goetzmann and Jorion study this question by looking at returns from a number of world equity markets over the past century.[6 (footnote omitted)] The Goetzmann-Jorion paper looks at the survivorship bias from several different perspectives. They conclude that once survivorship is taken into consideration the U.S. equity risk premium is overstated by approximately 60 basis points.[7 (footnote omitted)] The non-U.S. equity risk premium was found to contain significantly more survivorship bias.
>
> *While the survivorship bias evidence may be compelling on a worldwide basis, one can question its relevance to a purely U.S. analysis. If the entity being valued is a U.S. company, then the relevant data set should be the performance of equities in the U.S market.* (italics added)[126]

Thus, given that the "entity being valued" is Atmos Energy, a U.S. company, the relevant data should be the performance of the U.S. equity market and given that the thrust of Dr. Woolridge's criticism of the PRPM relates to the company specific

[126] SBBI-2013 Valuation 62.

PRPM results, this first "problem" is not applicable and irrelevant.

Dr. Woolridge's second "problem" relates to the actual PRPM derived company specific cost rates. He states on lines 18 - 19 on page 72 of his direct testimony that the model "produces very high and variable equity cost rate estimates." He then notes that the range of results are from 9.12% to 24.76% and make no comparable sense. The problem with Dr. Woolridge's observation is that I eliminated the 24.76% result due to the subject company's (ONE Gas, Inc.) short trading history, as the short trading history would affect relative variance and the GARCH model results. Companies with a substantial trading history have a range of indicated ROEs of 8.59% to 10.92% or an approximate 230 basis point spread as shown on page 11 of Schedule DWD-10. That is comparable to the approximate 220 basis point spread in Dr. Woolridge's DCF analysis, given his proxy group range of dividend yields of 2.5% to 2.7% and growth rates of 4.8% to 6.8%.[127] This spread would be exacerbated if the individual proxy group companies were used. In view of all of the foregoing, Dr. Woolridge's "problems" with the PRPM are nonexistent and irrelevant.

Q. IN ADDITION TO SURVIVORSHIP BIAS, DR. WOOLRIDGE ALSO PROVIDES A LISTING OF "A MYRIAD OF EMPIRICAL PROBLEMS" WHICH PRODUCE "INFLATED ESTIMATES OF EXPECTED MARKET RISK PREMIUMS".[128] PLEASE COMMENT.

A. In addition to survivorship bias, which was addressed above, Dr. Woolridge

[127] Woolridge Direct Testimony, at Exhibit JRW-7 pages 2 and 6. (2.50%*(1+(0.5*4.80%))+4.80% = 7.36% and 2.70%*(1+(0.5*6.80%))+6.80% = 9.59% 9.59%-7.36 = 2.23%, or 223 basis points)

[128] *Ibid.*, at 73.

mentions that the measure of central tendency; the historical time horizon; the change in risk and required return over time; the downward bias in bond historical returns; and unattainable return bias as his "myriad factors" that inflate the historical market return, and the risk premiums calculated from those returns. While he mentions them, he does not explain anything as to why these phenomena happen or how they affect the overall returns. Earlier in this testimony, I demonstrated why the arithmetic mean is the best measure of central tendency for cost of capital purposes.

The change in risk and required return over time, the downward bias in bond historical returns, and unattainable return bias are all a function of the historical time horizon. As to the appropriate time horizon to use in a historical MRP or ERP calculation; SBBI – 2019 states:

> Our equity risk premium covers 1926 to the present. The original data source for the time series comprising the equity risk premium is the Center for Research in Security Prices. CRSP chose to begin its analysis of market returns with 1926 form two main reasons. CRSP determined that 1926 was approximately when quality financial data became available. They also made a conscious effort to include the period of extreme market volatility from the late 1920s and early 1930s; 1926 was chosen because it includes one full business cycle before the market crash of 1929.
>
> Implicit in using history to forecast the future is the assumption that investors' expectations for future outcomes conform to past results. This method assumes that the price of taking on risk changes only slowly, if at all, over time. *This "future equals past" assumption is most applicable to a random time-series variable.* A time-series variable is random if its value in one period is independent of its value in other periods.
>
> The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical

> equity risk premium is relatively stable. Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants.
>
> Some analysts estimate the expected equity risk premium using a shorter, more recent periods on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain unusual events. Some of the most unusual of the last 100 years took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, the development of the European Economic Community, the attacks of Sept. 11, 2001, and the more recent global financial crisis of 2008-2009.
>
> It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impeding short-term volatility without considering the stock market crash and market volatility of the 1929-1931 period.
>
> Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 93-year period starting with 1926 represents what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect unusual events to occur from time to time, and their return expectations reflect this.[129]

To this point, Dr. Woolridge cites the downward bias in bond historical returns, which references the 1940s and the immediate post-war period, when the Federal Reserve Bank ("Fed") artificially held down government bond yields, increasing historical MRPs for that period. It could be argued that in the period

[129] SBBI – 2019, at 10-23 to 10-24.

between 2008 and 2015, the Fed did the same (artificially held down lending rates) to spur growth. As Duff & Phelps stated above, without a view of the prior period, it would be improbable for an analyst to predict future events during similar circumstances. As far as unattainable return bias (that market returns cannot achieve the average returns), such comments are meaningless given that the large company common stocks have consistently earned over the 11.88% long-term average market return recently. Specifically, returns of 26.46% (2009), 15.06% (2010), 16.00% (2012), 32.39% (2013), 13.69% (2014), 11.96% (2016), and 21.83% (2017) have occurred in the past ten years.[130]

In view of all of the foregoing, it is indeed appropriate to use long-term historical equity risk premiums derived from the arithmetic mean long-term historical return on large company common stocks and the arithmetic mean long-term historical income return on long-term U.S. government securities for cost of capital purposes.

Q. DR. WOOLRIDGE CHARACTERIZED YOUR PROJECTED MARKET RETURNS, MRPS, AND ERPS AS EXCESSIVE. PLEASE RESPOND.

A. Dr. Woolridge is mistaken. My projected returns on the market of 13.83%, using Value Line's Summary & Index, 14.50%, by calculating the market capitalization weighted DCF of the members of the S&P 500 using Value Line data, and 12.81%, by calculating the market capitalization weighted DCF of the members of the S&P 500 using Bloomberg data in my rebuttal analysis were in the 50th, 51st, and 49th deciles respectively when compared to actual market returns during the 1926-2018

130 SBBI – 2019, at Appendix A-1.

period. Additionally, my average MRP of 9.89% was in the 54th percentile when compared to the historical MRPs of the same period and my average ERP of 5.43% was in the 45th percentile when compared to ERPs in the 1928-2018 time period. In view of actual return data, my projected market returns, MRPs, and ERPs should not be considered excessive. Dr. Woolridge's concern should be dismissed.

Q. WHAT CONCERNS DOES DR. WOOLRIDGE HAVE WITH YOUR USE OF A NON-PRICE REGULATED PROXY GROUP COMPARABLE IN TOTAL RISK TO YOUR UTILITY PROXY GROUP AS A MEASURE OF INDICATED ROE FOR ATMOS ENERGY?

A. Dr. Woolridge's concerns are as follows:[131]

- The line of businesses of the non-price regulated proxy group are not subject to regulation;
- The non-price regulated proxy group's beta coefficients are higher than the utility proxy group's; and
- The projected EPS growth rates for the non-price regulated group companies are too high.

I have already discussed the superiority of projected EPS growth rates for use in the DCF model, so I will not repeat that discussion here. I will continue to note, however, that Dr. Woolridge places primary weight on his projected EPS growth rates in his DCF model.[132]

As to the comparability of my non-price regulated and utility proxy groups, The selection criteria for my non-price regulated proxy groups were based on ranges of two measures of risk, the unadjusted beta of the proxy group, which

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[131] Woolridge Direct Testimony, at 93.

[132] *Ibid.,* at 44.

measures systematic, or market risk, and the standard error of the regression, which gave rise to those betas, measuring non-systematic or diversifiable risk. Systematic plus non-systematic risk is one definition of total risk.[133] This is agreed to by Dr. Woolridge, stating on page 45 of his direct testimony: "In the CAPM, two types of risk are associated with a stock: firm-specific risk or unsystematic risk, and market risk or systematic risk, which is measured by a firm's beta."[134]

Each company I selected for my non-price regulated proxy group was required to have an unadjusted beta (a measure of systematic risk) and a standard error of the regression (a measure of unsystematic risk) within the ranges generated by each utility proxy group, as explained in page 45 of my direct testimony and on Exhibit DWD-1, Schedule DWD-6. Business and financial risks may vary between companies and proxy groups, but if the collective average betas and standard errors of the regression of the group are similar, then the total, or aggregate, non-diversifiable market risks and diversifiable risks are similar, as noted in "Comparable Earnings: New Life for an Old Precept" provided in Schedule DWD-20. Thus, because the non-price regulated companies are selected based on analyses of market data, they are comparable in total risk (even though individual risks may vary) to my utility proxy group. This is demonstrated clearly on page 273 of Jack C. Francis' Investments: Analysis and Management (page 3 of Schedule DWD-21), which shows that total risk can be "partitioned into its systematic and unsystematic components." Essentially, companies that have similar betas and standard errors of regression have similar total investment risk.

133 Business risk plus financial risk is a second definition of total risk.
134 Woolridge Direct Testimony, at 44.

Q. DID YOU CONDUCT AN ADDITIONAL STUDY COMPARING THE RISK BETWEEN YOUR UTILITY AND NON-PRICE REGULATED UTILITY PROXY GROUPS?

A. I did. In order to provide more information to show similarity between the Utility and Non-Price Regulated Proxy Groups, I have analyzed the CoV of net profit for each group and the results of that study are shown on Schedule DWD-22. As shown, the mean and median CoV of net profit for the Non-Price Regulated Proxy Group is actually lower (indicating lower risk) than the mean and median of CoVs of net profit set by the Utility Proxy Group. Therefore, the Non-Price Regulated Proxy Group is indeed similar in risk to the Utility Proxy Group. Hence, it is entirely appropriate to rely on the results of the application of the DCF, RPM and CAPM analyses to Non-Price Regulated Proxy Group and is neither speculative nor subjective.

VI. CONCLUSION

Q. WHAT ARE YOUR OVERALL CONCLUSIONS AND RECOMMENDATIONS?

A. Based on the analyses discussed throughout my rebuttal testimony, I conclude that the Commission should authorize WACCs of 7.68% (if considering test year data) or 7.58% (if considering known and measurable changes) including an ROE of 9.90%.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes, it does.

VERIFICATION

STATE OF NEW JERSEY §
§
COUNTY OF BURLINGTON §

Dylan W. D'Ascendis, being duly sworn upon his oath, deposes and states that he is Director at ScottMadden, Inc.; that he has read and is familiar with the foregoing Rebuttal Testimony filed herewith; and that the statements made therein are true to the best of his knowledge, information and belief.

Dylan W. D'Ascendis

Subscribed and sworn before me this 15th day of November, 2019.

A Loughnane
Notary Public

My appointment expires: 10/17/2023

ADRIANA LOUGHNANE
NOTARY PUBLIC
STATE OF NEW JERSEY
MY COMMISSION EXPIRES OCT. 17, 2023

ADRIANA LOUGHNANE NOTARY PUBLIC NEW JERSEY

Atmos Energy Corporation
Recommended Capital Structure and Cost Rates
for Ratemaking Purposes

Using Test Year Data:

Type Of Capital	Ratios (1)	Cost Rate		Weighted Cost Rate
Long-Term Debt	39.88%	4.35%	(2)	1.73%
Common Equity	60.12%	9.90%	(3)	5.95%
Total	100.00%			7.68%

Using Known and Measurable Changes:

Type Of Capital	Ratios (4)	Cost Rate		Weighted Cost Rate
Long-Term Debt	41.78%	4.35%	(2)	1.82%
Common Equity	58.22%	9.90%	(3)	5.76%
Total	100.00%			7.58%

Notes:

(1) From Section 7 of the Company's Minimum Filing Requirements
(2) Mr. Gatewood's recommended embedded long-term debt cost rate.
(3) From page 2 of this Schedule.
(4) Capital structure reflecting known and measurable changes as explained in the accompanying rebuttal testimony.

Atmos Energy Corporation
Brief Summary of Common Equity Cost Rate

Line No.	Principal Methods	Proxy Group of Six Natural Gas Distribution Companies
1.	Discounted Cash Flow Model (DCF) (1)	9.01%
2.	Risk Premium Model (RPM) (2)	9.64%
3.	Capital Asset Pricing Model (CAPM) (3)	9.10%
4.	Market Models Applied to Comparable Risk, Non-Price Regulated Companies (4)	10.23%
5.	Indicated Common Equity Cost Rate before Adjustment for Company-Specific Risk	9.45%
6.	Size Risk Adjustment (5)	0.40%
7.	Flotation Cost Adjustment (6)	0.03%
8.	Indicated Common Equity Cost Rate	9.88%
9.	Recommended Common Equity Cost Rate	9.90%

Notes:
(1) From page 3 of this Schedule.
(2) From page 10 of this Schedule.
(3) From page 23 of this Schedule.
(4) From page 28 of this Schedule.
(5) Size risk adjustment to reflect Atmos Energy's greater business risk due to its smaller size realtive to his Utility Proxy Group as detailed in Mr. D'Ascendis' direct testimony.
(6) From page 34 of this Schedule.

Atmos Energy Corporation
Indicated Common Equity Cost Rate Using the Discounted Cash Flow Model for the
Proxy Group of Six Natural Gas Distribution Companies

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Proxy Group of Six Natural Gas Distribution Companies	Average Dividend Yield (1)	Value Line Projected Five Year Growth in EPS (2)	Zack's Five Year Projected Growth Rate in EPS	Yahoo! Finance Projected Five Year Growth in EPS	Average Projected Five Year Growth in EPS (3)	Adjusted Dividend Yield (4)	Indicated Common Equity Cost Rate (5)
Atmos Energy Corporation	1.89 %	7.50 %	7.00 %	7.00 %	7.17 %	1.96 %	9.13 %
NW Natural Holdings	2.70	NMF	5.00	4.00	4.50	2.76	7.26
ONE Gas, Inc.	2.16	8.00	6.10	5.00	6.37	2.23	8.60
South Jersey Industries, Inc.	3.58	10.50	8.50	4.60	7.87	3.72	11.59
Southwest Gas Holdings, Inc.	2.43	9.00	7.30	8.20	8.17	2.53	10.70
Spire, Inc.	2.81	5.50	5.50	3.23	4.74	2.88	7.62
						Average	9.15 %
						Median	8.86 %
						Average of Mean and Median	9.01 %

NA= Not Available

Notes:

(1) Indicated dividend at 10/31/2019 divided by the average closing price of the last 60 trading days ending 10/31/2019 for each company.

(2) From pages 4 through 9 of this Schedule.

(3) Average of columns 2 through 4 excluding negative growth rates.

(4) This reflects a growth rate component equal to one-half the conclusion of growth rate (from column 5) x column 1 to reflect the periodic payment of dividends (Gordon Model) as opposed to the continuous payment. Thus, for Atmos Energy Corporation, 1.89% x (1+(1/2 x 7.17%)) = 1.96%.

(5) Column 5 + column 6.

Source of Information:

Value Line Investment Survey
www.zacks.com Downloaded on 10/31/2019
www.yahoo.com Downloaded on 10/31/2019

ATMOS ENERGY CORP. NYSE-ATO

RECENT PRICE **110.21** | P/E RATIO **25.2** (Trailing: 25.7; Median: 16.0) | RELATIVE P/E RATIO **1.54** | DIV'D YLD **2.0%** | **VALUE LINE**

TIMELINESS 3 Lowered 11/30/18
SAFETY 1 Raised 6/6/14
TECHNICAL 3 Lowered 7/5/19
BETA .60 (1.00 = Market)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
High:	29.3	30.3	32.0	35.6	37.3	47.4	58.2	64.8	82.0	93.6	100.8	111.4
Low:	19.7	20.1	25.9	28.5	30.4	34.9	44.2	50.8	60.0	72.5	76.5	89.2

2022-24 PROJECTIONS

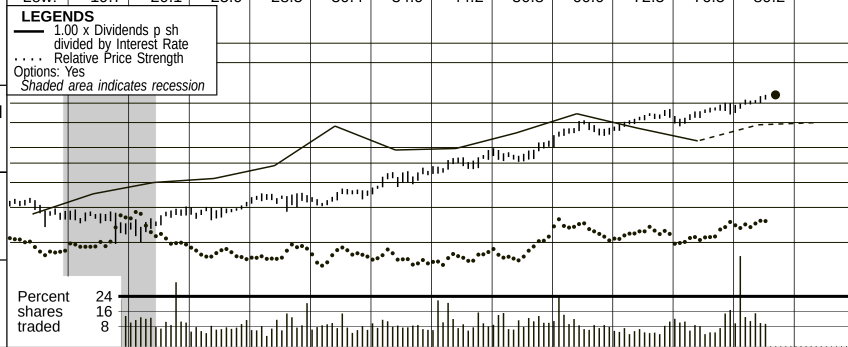
	Price	Gain	Ann'l Total Return
High	140	(+25%)	*8%*
Low	115	(+5%)	*3%*

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	0	0	0	0
Options	2	8	0	2	0	0	2	8	0
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	185	232	243
to Sell	175	177	204
Hld's(000)	82454	92261	96087



Target Price Range
2022 | 2023 | 2024
200
160
100
80
60
50
40
30
20

% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	21.2	-2.7
3 yr.	46.0	27.9
5 yr.	154.7	41.9

Atmos Energy's history dates back to 1906 in the Texas Panhandle. Over the years, through various mergers, it became part of Pioneer Corporation, and, in 1981, Pioneer named its gas distribution division Energas. In 1983, Pioneer organized Energas as a separate subsidiary and distributed the outstanding shares of Energas to Pioneer shareholders. Energas changed its name to Atmos in 1988. Atmos acquired Trans Louisiana Gas in 1986, Western Kentucky Gas Utility in 1987, Greeley Gas in 1993, United Cities Gas in 1997, and others.

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
53.69	53.12	48.15	38.10	42.88	49.22	40.82	32.23	26.01	28.00	*24.30*	*24.95*	Revenues per sh A	*37.95*
4.29	4.64	4.72	4.76	5.14	5.42	5.81	6.19	6.62	7.24	*7.50*	*7.80*	"Cash Flow" per sh	*9.20*
1.97	2.16	2.26	2.10	2.50	2.96	3.09	3.38	3.60	4.00	*4.30*	*4.55*	Earnings per sh AB	*5.60*
1.32	1.34	1.36	1.38	1.40	1.48	1.56	1.68	1.80	1.94	*2.10*	*2.24*	Div'ds Decl'd per sh C■	*2.70*
5.51	6.02	6.90	8.12	9.32	8.32	9.61	10.46	10.72	13.19	*14.15*	*14.40*	Cap'l Spending per sh	*13.80*
23.52	24.16	24.98	26.14	28.47	30.74	31.48	33.32	36.74	42.87	*47.65*	*48.90*	Book Value per sh	*56.05*
92.55	90.16	90.30	90.24	90.64	100.39	101.48	103.93	106.10	111.27	*120.00*	*125.00*	Common Shs Outst'g D	*145.00*
12.5	13.2	14.4	15.9	15.9	16.1	17.5	20.8	22.0	21.7	*Bold figures are*		Avg Ann'l P/E Ratio	*23.0*
.83	.84	.90	1.01	.89	.85	.88	1.09	1.11	1.17	*Value Line*		Relative P/E Ratio	*1.30*
5.3%	4.7%	4.2%	4.1%	3.5%	3.1%	2.9%	2.4%	2.3%	2.2%	*estimates*		Avg Ann'l Div'd Yield	*2.1%*
4969.1	4789.7	4347.6	3438.5	3886.3	4940.9	4142.1	3349.9	2759.7	3115.5	*2915*	*3120*	Revenues ($mill) A	*5500*
179.7	201.2	199.3	192.2	230.7	289.8	315.1	350.1	382.7	444.3	*515*	*570*	Net Profit ($mill)	*815*
34.4%	38.5%	36.4%	33.8%	38.2%	39.2%	38.3%	36.4%	36.6%	27.0%	*22.0%*	*22.5%*	Income Tax Rate	*24.0%*
3.6%	4.2%	4.6%	5.6%	5.9%	5.9%	7.6%	10.5%	13.9%	14.3%	*17.7%*	*18.3%*	Net Profit Margin	*14.8%*
49.9%	45.4%	49.4%	45.3%	48.8%	44.3%	43.5%	38.7%	44.0%	34.3%	*38.5%*	*37.0%*	Long-Term Debt Ratio	*35.0%*
50.1%	54.6%	50.6%	54.7%	51.2%	55.7%	56.5%	61.3%	56.0%	65.7%	*61.5%*	*63.0%*	Common Equity Ratio	*65.0%*
4346.2	3987.9	4461.5	4315.5	5036.1	5542.2	5650.2	5651.8	6965.7	7263.6	*9300*	*9700*	Total Capital ($mill)	*12500*
4439.1	4793.1	5147.9	5475.6	6030.7	6725.9	7430.6	8280.5	9259.2	10371	*11500*	*12600*	Net Plant ($mill)	*15800*
5.9%	6.9%	6.1%	6.1%	5.9%	6.4%	6.6%	7.2%	6.4%	6.9%	*6.5%*	*7.0%*	Return on Total Cap'l	*7.5%*
8.3%	9.2%	8.8%	8.1%	8.9%	9.4%	9.9%	10.1%	9.8%	9.3%	*9.0%*	*9.5%*	Return on Shr. Equity	*10.0%*
8.3%	9.2%	8.8%	8.1%	8.9%	9.4%	9.9%	10.1%	9.8%	9.3%	*9.0%*	*9.5%*	Return on Com Equity	*10.0%*
2.7%	3.5%	3.3%	2.8%	4.0%	4.7%	4.9%	5.1%	4.9%	4.8%	*4.5%*	*5.0%*	Retained to Com Eq	*5.0%*
68%	62%	62%	65%	56%	50%	51%	50%	50%	48%	*49%*	*49%*	All Div'ds to Net Prof	*48%*

CAPITAL STRUCTURE as of 6/30/19
Total Debt $3729.0 mill. **Due in 5 Yrs** $1150.0 mill.
LT Debt $3529.1 mill. **LT Interest** $200.0 mill.
(LT interest earned: 6.7x; total interest coverage: 6.7x)
Leases, Uncapitalized Annual rentals $17.7 mill.
Pfd Stock None
Pension Assets-9/18 $531.7 mill. **Oblig.** $504.7 mill.
Common Stock 118,200,689 shs. **as of 7/31/19**
MARKET CAP: $13.0 billion (Large Cap)

CURRENT POSITION ($MILL.)	2017	2018	6/30/19
Cash Assets	26.4	13.8	46.2
Other	513.2	465.1	457.3
Current Assets	539.6	478.9	503.5
Accts Payable	233.0	217.3	206.5
Debt Due	447.7	1150.8	199.9
Other	332.7	547.0	495.0
Current Liab.	1013.4	1915.1	901.4
Fix. Chg. Cov.	805%	926%	915%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	-9.0%	-8.0%	*5.0%*
"Cash Flow"	5.0%	6.5%	*5.5%*
Earnings	6.5%	10.0%	*7.5%*
Dividends	3.5%	5.5%	*7.0%*
Book Value	5.5%	7.0%	*7.0%*

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.) A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2016	906.2	1132.3	632.9	678.5	3349.9
2017	780.2	988.2	526.5	464.8	2759.7
2018	889.2	1219.4	562.2	444.7	3115.5
2019	877.8	1094.6	485.7	*456.9*	*2915*
2020	*900*	*1150*	*600*	*470*	*3120*

Fiscal Year Ends	EARNINGS PER SHARE A B E Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2016	1.00	1.38	.69	.33	3.38
2017	1.08	1.52	.67	.34	3.60
2018	1.40	1.57	.64	.41	4.00
2019	1.38	1.82	.68	*.42*	*4.30*
2020	*1.48*	*1.80*	*.77*	*.50*	*4.55*

Cal-endar	QUARTERLY DIVIDENDS PAID C■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.39	.39	.39	.42	1.59
2016	.42	.42	.42	.45	1.71
2017	.45	.45	.45	.485	1.84
2018	.485	.485	.485	.525	1.98
2019	.525	.525	.525		

BUSINESS: Atmos Energy Corporation is engaged primarily in the distribution and sale of natural gas to over three million customers through six regulated natural gas utility operations: Louisiana Division, West Texas Division, Mid-Tex Division, Mississippi Division, Colorado-Kansas Division, and Kentucky/Mid-States Division. Gas sales breakdown for fiscal 2018: 66%, residential; 28%, commercial; 5%, industrial; and 1% other. The company sold Atmos Energy Marketing, 1/17. Officers and directors own approximately 1.4% of common stock (12/18 Proxy). President and Chief Executive Officer: Michael E. Haefner. Inc.: Texas. Address: Three Lincoln Centre, Suite 1800, 5430 LBJ Freeway, Dallas, Texas 75240. Telephone: 972-934-9227. Internet: www.atmosenergy.com.

Atmos Energy appears to be en route to a decent fiscal 2019, which ends September 30th. Through the first nine months, the bottom line increased 7.5%, to $3.88 a share, versus $3.61 generated the previous year. One driver was the natural gas distribution division, which received a boost from higher rates, mainly in the Mid-Tex and Mississippi segments, plus growth of the customer base (primarily within the Mid-Tex unit). Also, results of the pipeline & storage segment were supported partly by increased rates from the Gas Reliability Infrastructure Program filings approved during fiscal 2018 and 2019. Total operating expenses rose 5.3% for the period, although that's to be expected as the company expands. In spite of the unspectacular start, we think share net will advance close to 8%, to $4.30, for the year as a whole. Regarding fiscal 2020, 6% or so growth (to $4.55 a share), seems plausible, if operating margins widen further.

Michael Haefner intends to step down as CEO on September 30th. His reason is to deal with a certain health problem. The anticipated successor, Kevin Akers, has held various key positions since joining the company almost 30 years ago, including executive vice president (his current post) and president of both the Kentucky/Mid-States and Mississippi units. So, we think Atmos would be in very capable hands.

Finances are rock-solid. At the conclusion of the first nine months, cash on hand stood at $46.2 million. Moreover, long-term debt was a reasonable 38.5% of total capital, and short-term commitments did not seem to be a major hurdle. Too, $1.3 billion of common stock and/or debt securities remained available for issuance under a shelf registration statement. Lastly, the company can access a $1.5 billion commercial paper program and three revolving credit facilities aggregating $1.5 billion. All told, we believe it's capable of meeting working capital, capital expenditures, and other cash needs for some time. Acquisitions are also possible.

For now, these top-quality shares have unspectacular total return potential. This reflects recent stock-price strength and a dividend yield that's less than average for a natural gas utility.

Frederick L. Harris, III *August 30, 2019*

(A) Fiscal year ends Sept. 30th. **(B)** Diluted shrs. Excl. nonrec. items: '09, 12¢; '10, 5¢; '11, (1¢); '18, $1.43. Excludes discontinued operations: '11, 10¢; '12, 27¢; '13, 14¢; '17, 13¢.
Next egs. rpt. due early Nov.
(C) Dividends historically paid in early March, June, Sept., and Dec. ■ Div. reinvestment plan. Direct stock purchase plan avail.
(D) In millions.
(E) Qtrs may not add due to change in shrs outstanding.

Company's Financial Strength	A+
Stock's Price Stability	100
Price Growth Persistence	95
Earnings Predictability	100

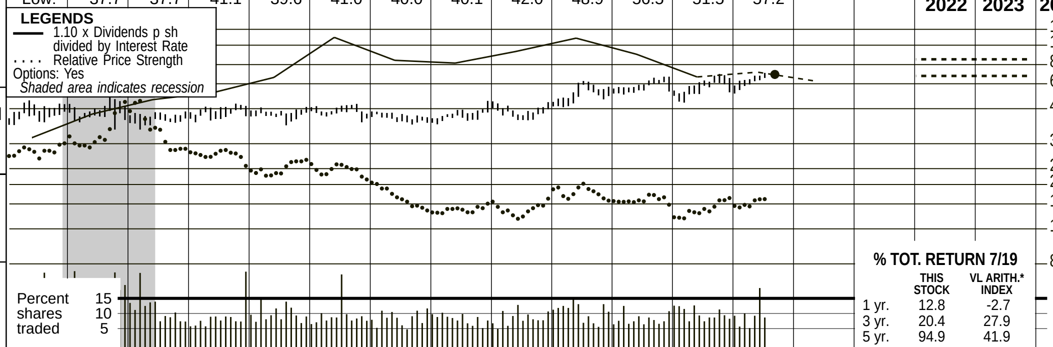
N.W. NATURAL NYSE-NWN

RECENT PRICE **71.40** | P/E RATIO **29.1** (Trailing: 29.1 Median: 21.0) | RELATIVE P/E RATIO **1.79** | DIV'D YLD **2.7%** | VALUE LINE

TIMELINESS **3** Raised 11/9/18
SAFETY **1** Raised 3/18/05
TECHNICAL **3** Lowered 7/26/19
BETA .60 (1.00 = Market)

High:	55.2	46.5	50.9	49.0	50.8	46.6	52.6	52.3	66.2	69.5	71.8	73.5	
Low:	37.7	37.7	41.1	39.6	41.0	40.0	40.1	42.0	48.9	56.5	51.5	57.2	

Target Price Range
2022 | 2023 | 2024



2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	85	(+20%)	7%
Low	70	(Nil)	2%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	1	0	13	3	0	0	0
to Sell	0	0	1	0	0	4	1	0	0

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	78	98	112
to Sell	95	95	78
Hld's(000)	19034	19492	19999

% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	12.8	-2.7
3 yr.	20.4	27.9
5 yr.	94.9	41.9

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
23.57	25.69	33.01	37.20	39.13	39.16	38.17	30.56	31.72	27.14	28.02	27.64	26.39	23.61	26.52	24.45	**27.20**	**28.05**	Revenues per sh	**28.45**
3.85	3.92	4.34	4.76	5.41	5.31	5.20	5.18	5.00	4.94	5.04	5.05	4.91	4.93	1.04	5.28	**5.10**	**5.45**	"Cash Flow" per sh	**6.35**
1.76	1.86	2.11	2.35	2.76	2.57	2.83	2.73	2.39	2.22	2.24	2.16	1.96	2.12	d1.94	2.33	**2.40**	**2.60**	Earnings per sh A	**3.50**
1.27	1.30	1.32	1.39	1.44	1.52	1.60	1.68	1.75	1.79	1.83	1.85	1.86	1.87	1.88	1.89	**1.93**	**1.97**	Div'ds Decl'd per sh B■	**2.20**
4.90	5.52	3.48	3.56	4.48	3.92	5.09	9.35	3.76	4.91	5.13	4.40	4.37	4.87	7.43	7.43	**6.55**	**6.65**	Cap'l Spending per sh	**6.25**
19.52	20.64	21.28	22.01	22.52	23.71	24.88	26.08	26.70	27.23	27.77	28.12	28.47	29.71	25.85	26.41	**26.55**	**26.85**	Book Value per sh D	**29.40**
25.94	27.55	27.58	27.24	26.41	26.50	26.53	26.58	26.76	26.92	27.08	27.28	27.43	28.63	28.74	28.88	**30.50**	**31.00**	Common Shs Outst'g C	**32.00**
15.8	16.7	17.0	15.9	16.7	18.1	15.2	17.0	19.0	21.1	19.4	20.7	23.7	26.9	26.9	26.6	*Bold figures are*		Avg Ann'l P/E Ratio	**22.0**
.90	.88	.91	.86	.89	1.09	1.01	1.08	1.19	1.34	1.09	1.09	1.19	1.41	1.41	1.44	*Value Line*		Relative P/E Ratio	**1.20**
4.6%	4.2%	3.7%	3.7%	3.1%	3.3%	3.7%	3.6%	3.9%	3.8%	4.2%	4.1%	4.0%	3.3%	3.0%	3.0%	*estimates*		Avg Ann'l Div'd Yield	**2.9%**

CAPITAL STRUCTURE as of 6/30/19
Total Debt $930.6 mill. **Due in 5 Yrs** $360.0 mill.
LT Debt $806.1 mill. **LT Interest** $40.0 mill.

(Total interest coverage: 3.7x)

Pension Assets-12/18 $257.8 mill. **Oblig.** $455.6 mill.

Pfd Stock None

Common Stock 30,442,700 shares **as of 7/26/19**

MARKET CAP $2.2 billion (Mid Cap)

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		22-24
1012.7	812.1	848.8	730.6	758.5	754.0	723.8	676.0	762.2	706.1	**830**	**870**	Revenues ($mill)	**910**
75.1	72.7	63.9	59.9	60.5	58.7	53.7	58.9	d55.6	67.3	**85.0**	**85.0**	Net Profit ($mill)	**90.0**
38.3%	40.5%	40.4%	42.4%	40.8%	41.5%	40.0%	40.9%	40.9%	26.4%	**21.0%**	**21.0%**	Income Tax Rate	**21.0%**
7.4%	8.9%	7.5%	8.2%	8.0%	7.8%	7.4%	8.7%	NMF	9.5%	**8.8%**	**9.3%**	Net Profit Margin	**12.3%**
47.7%	46.1%	47.3%	48.5%	47.6%	44.8%	42.5%	44.4%	47.9%	48.1%	**47.0%**	**47.0%**	Long-Term Debt Ratio	**46.5%**
52.3%	53.9%	52.7%	51.5%	52.4%	55.2%	57.5%	55.6%	52.1%	51.9%	**53.0%**	**53.0%**	Common Equity Ratio	**53.5%**
1261.8	1284.8	1356.2	1424.7	1433.6	1389.0	1357.7	1529.8	1426.0	1468.9	**1530**	**1615**	Total Capital ($mill)	**1750**
1670.1	1854.2	1893.9	1973.6	2062.9	2121.6	2182.7	2260.9	2255.0	2421.4	**2510**	**2640**	Net Plant ($mill)	**2745**
7.3%	7.0%	6.2%	5.7%	5.8%	5.8%	5.5%	5.1%	NMF	5.8%	**6.0%**	**6.0%**	Return on Total Cap'l	**7.5%**
11.4%	10.5%	8.9%	8.2%	8.1%	7.6%	6.9%	6.9%	NMF	8.8%	**9.0%**	**9.0%**	Return on Shr. Equity	**12.0%**
11.4%	10.5%	8.9%	8.2%	8.1%	7.6%	6.9%	6.9%	NMF	8.8%	**9.0%**	**9.0%**	Return on Com Equity	**12.0%**
5.0%	4.0%	2.4%	1.6%	1.5%	1.1%	.6%	.9%	NMF	2.1%	**2.0%**	**2.0%**	Retained to Com Eq	**4.5%**
56%	61%	73%	80%	81%	85%	92%	87%	NMF	76%	**80%**	**76%**	All Div'ds to Net Prof	**63%**

CURRENT POSITION ($MILL.)	2017	2018	6/30/19
Cash Assets	3.5	12.6	60.9
Other	266.4	283.3	178.2
Current Assets	269.9	295.9	239.1
Accts Payable	112.3	115.9	76.4
Debt Due	150.9	247.6	124.5
Other	118.7	145.6	106.1
Current Liab.	381.9	509.1	307.0
Fix. Chg. Cov.	362%	357%	369%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	-4.5%	-3.0%	*2.5%*
"Cash Flow"	-3.0%	-5.5%	*9.0%*
Earnings	-10.5%	-18.0%	*27.0%*
Dividends	2.5%	1.0%	*2.5%*
Book Value	2.0%	- -	*1.0%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	255.6	99.2	87.7	233.5	676.0
2017	297.3	136.3	88.2	240.4	762.2
2018	264.7	124.6	91.2	226.7	706.1
2019	285.3	123.4	***125***	***296.3***	***830***
2020	***300***	***140***	***130***	***300***	***870***

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	1.33	.07	d.29	1.01	2.12
2017	1.40	.10	d.30	d3.14	d1.94
2018	1.46	d.01	d.39	1.27	2.33
2019	1.50	.07	***d.45***	***1.28***	***2.40***
2020	***1.55***	***.10***	***d.35***	***1.30***	***2.60***

Cal-endar	QUARTERLY DIVIDENDS PAID B ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.465	.465	.465	.4675	1.86
2016	.4675	.4675	.4675	.470	1.87
2017	.470	.470	.470	.4725	1.88
2018	.4725	.4725	.4725	.475	1.89
2019	.475	.475	.475		

BUSINESS: Northwest Natural Holding Co. distributes natural gas to 1000 communities, 750,000 customers, in Oregon (89% of customers) and in southwest Washington state. Principal cities served: Portland and Eugene, OR; Vancouver, WA. Service area population: 3.7 mill. (77% in OR). Company buys gas supply from Canadian and U.S. producers; has transportation rights on Northwest Pipeline system. Owns local underground storage. Rev. breakdown: residential, 37%; commercial, 22%; industrial, gas transportation, 41%. Employs 1,167. BlackRock Inc. owns 15.0% of shares; officers and directors, 1.1% (4/19 proxy). CEO: David H. Anderson. Inc.: Oregon. Address: 220 NW 2nd Ave., Portland, OR 97209. Tel.: 503-226-4211. Internet: www.nwnatural.com.

Northwest Natural Holdings showed some improvement in its second-quarter results. Earnings per share rose to $0.07, helped by lower environmental expenses and higher allowable base rates in Oregon. The company added around 12,400 new customers in the past year, which also helped boost usage, and the Mist storage facility came into service and added to performance. Moreover, losses related to the company's stake in Gill Ranch were recorded as discontinued operations, owing to its pending sale. The second half of 2019 will likely be a bit weak, as the company returns some of the tax reform benefits to customers. Too, a rate case outcome will reduce interstate storage income. Meantime, both common stock and long-term debt were issued, driving interest expense higher and diluting share net. Still, a decent outcome on its Washington rate case, which covers around 11% of all customers, will probably offset this in the coming months. Overall, we think earnings will reach $2.40 per share this year.

The move into water utilities has helped operations considerably. The step into the space has helped diversify its business lines, while reducing seasonality a bit. Additionally, Northwest Natural recently acquired Falls Water Company, a municipal wastewater utility in Idaho Falls. This purchase will make up a smaller portion of the business, but allow for further growth in the years ahead. All told, we think earnings will reach $2.60 per share in 2020.

The Mist storage facility ought to help earnings expand in the coming years. This area was placed into service in May and will provide no-notice natural gas to Portland General Electric. Too, it will boost net income growth, especially when electricity demand is at its highest during weather extremes.

Dividend growth is steady. Though the yield is lower than at other utilities, the payout is safe and may start to expand at an improved rate in the coming years, aided by profits from the Mist facility.

Northwest Natural stock is neutrally ranked for Timeliness. Too, it is trading within our 3- to 5-year Target Price Range. Most accounts would be best served waiting for a dip in price.

John E. Seibert III *August 30, 2019*

(A) Diluted earnings per share. Excludes nonrecurring items: '06, ($0.06); '08, ($0.03); '09, 6¢; May not sum due to rounding. Next earnings report due in early November.
(B) Dividends historically paid in mid-February, May, August, and November.
■ Dividend reinvestment plan available.
(C) In millions.
(D) Includes intangibles. In 2018: $371.8 million, $12.87/share.

Company's Financial Strength	A
Stock's Price Stability	95
Price Growth Persistence	30
Earnings Predictability	5

ONE GAS, INC. NYSE-OGS

RECENT PRICE 90.60 | P/E RATIO 25.8 (Trailing: 26.9, Median: NMF) | RELATIVE P/E RATIO 1.58 | DIV'D YLD 2.3% | VALUE LINE

TIMELINESS 3 Lowered 8/9/19
SAFETY 2 New 6/2/17
TECHNICAL 2 Raised 6/14/19
BETA .65 (1.00 = Market)

High:	44.3	51.8	67.4	79.5	87.8	93.0	
Low:	31.9	38.9	48.0	61.4	62.2	75.8	

Target Price Range 2022 | 2023 | 2024

2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	135	(+50%)	12%
Low	100	(+10%)	5%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	0	4	0	0	5	0
to Sell	0	0	0	0	0	1	0	0	0

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	129	137	152
to Sell	134	138	124
Hld's(000)	39573	39774	40068

% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	21.1	-2.7
3 yr.	50.8	27.9
5 yr.	185.0	41.9

The shares of ONE Gas, Inc. began trading "regular-way" on the New York Stock Exchange on February 3, 2014. That happened as a result of the separation of ONEOK's natural gas distribution operation. Regarding the details of the spinoff, on January 31, 2014, ONEOK distributed one share of OGS common stock for every four shares of ONEOK common stock held by ONEOK shareholders of record as of the close of business on January 21. It should be mentioned that ONEOK did not retain any ownership interest in the new company.

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
--	--	--	--	--	34.92	29.62	27.30	29.43	31.08	31.40	32.70	Revenues per sh	40.00
--	--	--	--	--	4.52	4.82	5.43	5.96	6.32	6.90	7.25	"Cash Flow" per sh	9.00
--	--	--	--	--	2.07	2.24	2.65	3.02	3.25	3.45	3.65	Earnings per sh A	4.75
--	--	--	--	--	.84	1.20	1.40	1.68	1.84	2.00	2.16	Div'ds Decl'd per sh B■	2.65
--	--	--	--	--	5.70	5.63	5.91	6.81	7.50	8.50	8.70	Cap'l Spending per sh	8.90
--	--	--	--	--	34.45	35.24	36.12	37.47	38.86	41.05	42.75	Book Value per sh	47.90
--	--	--	--	--	52.08	52.26	52.28	52.31	52.57	53.00	53.50	Common Shs Outst'g C	55.00
--	--	--	--	--	17.8	19.8	22.7	23.5	23.1	Bold figures are		Avg Ann'l P/E Ratio	25.0
--	--	--	--	--	.94	1.00	1.19	1.18	1.25	Value Line		Relative P/E Ratio	1.40
--	--	--	--	--	2.3%	2.7%	2.3%	2.4%	2.5%	estimates		Avg Ann'l Div'd Yield	2.3%
--	--	--	--	--	1818.9	1547.7	1427.2	1539.6	1633.7	1665	1750	Revenues ($mill)	2200
--	--	--	--	--	109.8	119.0	140.1	159.9	172.2	185	195	Net Profit ($mill)	260
--	--	--	--	--	38.4%	38.0%	37.8%	36.4%	23.7%	21.5%	22.0%	Income Tax Rate	23.5%
--	--	--	--	--	6.0%	7.7%	9.8%	10.4%	10.5%	11.1%	11.1%	Net Profit Margin	11.8%
--	--	--	--	--	40.1%	39.5%	38.7%	37.8%	38.6%	38.0%	38.0%	Long-Term Debt Ratio	38.0%
--	--	--	--	--	59.9%	60.5%	61.3%	62.2%	61.4%	62.0%	62.0%	Common Equity Ratio	62.0%
--	--	--	--	--	2995.3	3042.9	3080.7	3153.5	3328.1	3510	3690	Total Capital ($mill)	4250
--	--	--	--	--	3293.7	3511.9	3731.6	4007.6	4283.7	4500	4700	Net Plant ($mill)	5400
--	--	--	--	--	4.4%	4.7%	5.2%	5.8%	6.0%	6.5%	6.5%	Return on Total Cap'l	7.5%
--	--	--	--	--	6.1%	6.5%	7.4%	8.2%	8.4%	8.5%	8.5%	Return on Shr. Equity	10.0%
--	--	--	--	--	6.1%	6.5%	7.4%	8.2%	8.4%	8.5%	8.5%	Return on Com Equity	10.0%
--	--	--	--	--	3.7%	3.1%	3.5%	3.7%	3.7%	3.5%	3.5%	Retained to Com Eq	4.5%
--	--	--	--	--	40%	53%	52%	55%	56%	57%	59%	All Div'ds to Net Prof	56%

CAPITAL STRUCTURE as of 6/30/19
Total Debt $1578.8 mill. **Due in 5 Yrs** $300.0 mill.
LT Debt $1285.8 mill. **LT Interest** $75.0 mill.
(LT interest earned: 5.4x; total interest coverage: 5.4x)
Leases, Uncapitalized Annual rentals $6.3 mill.
Pfd Stock None
Pension Assets-12/18 $814.1 mill. **Oblig.** $950.5 mill.
Common Stock 52,734,526 shs. as of 7/22/19
MARKET CAP: $4.8 billion (Mid Cap)

CURRENT POSITION ($MILL.)	2017	2018	6/30/19
Cash Assets	14.4	21.3	11.1
Other	574.6	522.0	365.7
Current Assets	589.0	543.3	376.8
Accts Payable	143.7	174.5	67.6
Debt Due	357.2	299.5	293.0
Other	172.4	224.9	217.8
Current Liab.	673.3	698.9	578.4
Fix. Chg. Cov.	774%	677%	700%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	--	--	5.5%
"Cash Flow"	--	--	7.5%
Earnings	--	--	8.0%
Dividends	--	--	8.5%
Book Value	--	--	4.5%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	508.4	245.9	232.2	440.7	1427.2
2017	550.4	279.7	247.1	462.4	1539.6
2018	638.5	292.5	238.3	464.4	1633.7
2019	661.0	290.6	245	468.4	1665
2020	700	320	255	475	1750

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	1.22	.38	.25	.80	2.65
2017	1.34	.39	.36	.93	3.02
2018	1.72	.39	.31	.84	3.25
2019	1.76	.46	.35	.88	3.45
2020	1.82	.51	.40	.92	3.65

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.30	.30	.30	.30	1.20
2016	.35	.35	.35	.35	1.40
2017	.42	.42	.42	.42	1.68
2018	.46	.46	.46	.46	1.84
2019	.50	.50	.50		

BUSINESS: ONE Gas, Inc. provides natural gas distribution services to over two million customers. It has three divisions: Oklahoma Natural Gas, Kansas Gas Service, and Texas Gas Service. The company purchased 180 Bcf of natural gas supply in 2018, compared to 137 Bcf in 2017. Total volumes delivered by customer (fiscal 2018): transportation, 56%; residential, 33%; commercial & industrial, 10%; wholesale & public authority, 1%. BlackRock owns approximately 11.9% of common stock; The Vanguard Group, 9.9%; T. Rowe Price Associates, 8.5%; officers and directors, less than 1% (4/19 Proxy). CEO: Pierce H. Norton II. Incorporated: Oklahoma. Address: 15 East Fifth Street, Tulsa, Oklahoma 74103. Telephone: 918-947-7000. Internet: www.onegas.com.

ONE Gas had a decent first half of 2019. In fact, earnings per share advanced 5.2%, to $2.22, relative to the previous year's tally of $2.11. That was made possible partially by new rates in Kansas and Texas. Another positive was a lower income tax rate. Increased volumes in Texas and customer growth in Oklahoma and Texas helped the company's results, as well. However, one detractor was a 28% jump in interest expense. Total operating expenses climbed 4.5% during the period, but this reflects necessary capital investments.

Right now, it seems that profits will grow around 6%, to $3.45 a share, for the entire year. That's compared to the 2018 figure of $3.25. Looking at next year, we expect ONE Gas' bottom line to rise at a similar percentage rate, to $3.65 a share, assuming additional expansion of operating margins.

***Value Line* is constructive about the company's prospects over the 2022-2024 period.** It is now the leading natural gas distributor (as measured by customer count) in both Oklahoma and Kansas, and holds the number-three position in Texas. What's more, these markets appear to have decent growth possibilities and are located in one of the most active drilling regions in the United States. Also, with solid finances, ONE Gas ought to be able to meet its working capital requirements, capital expenditures, and other commitments for quite a while.

There are risks to consider, nonetheless. Among them is the fact that businesses are concentrated in only three states, and it looks like leadership desires to keep things as they are. This lack of geographic diversification leaves the company somewhat more vulnerable to regional economic downturns and regulations. Furthermore, ONE Gas faces competition from other energy suppliers, including electric companies and propane dealers. Also, pipeline ruptures, leaks, and other unfortunate events can take a huge bite out of earnings if not sufficiently covered by insurance.

The stock's total return potential is decent versus other natural gas utilities we track. Meanwhile, the Timeliness rank resides at 3 (Average).

Frederick L. Harris, III *August 30, 2019*

(A) Diluted EPS. Excludes nonrecurring gain: 2017, $0.06. Next earnings report due early Nov. Quarterly EPS for 2018 don't add up due to rounding.
(B) Dividends historically paid in early March, June, Sept., and Dec. ■ Dividend reinvestment plan. Direct stock purchase plan.
(C) In millions.

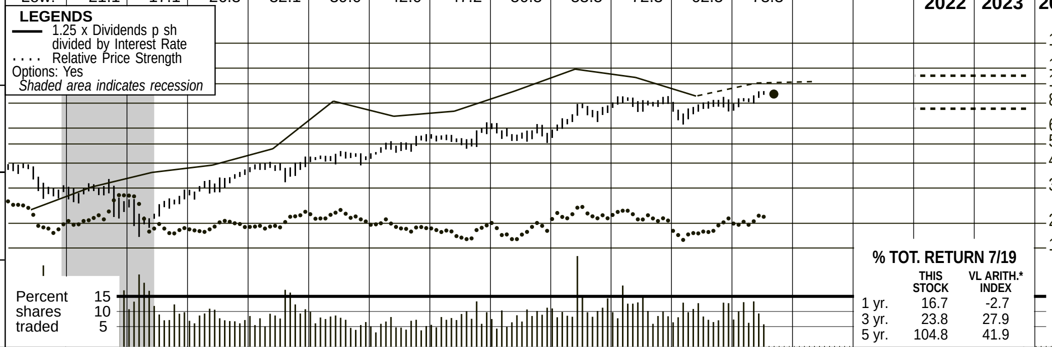
Company's Financial Strength	A
Stock's Price Stability	95
Price Growth Persistence	90
Earnings Predictability	95

SOUTHWEST GAS NYSE-SWX

RECENT PRICE 88.90 | P/E RATIO 21.5 (Trailing: 23.5; Median: 17.0) | RELATIVE P/E RATIO 1.32 | DIV'D YLD 2.5% | VALUE LINE

TIMELINESS 2 Raised 8/23/19
SAFETY 3 Lowered 1/4/91
TECHNICAL 3 Lowered 8/30/19
BETA .70 (1.00 = Market)

High:	33.3	29.5	37.3	43.2	46.1	56.0	64.2	63.7	79.6	86.9	86.0	91.9
Low:	21.1	17.1	26.3	32.1	39.0	42.0	47.2	50.5	53.5	72.3	62.5	73.3



2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	110	(+25%)	8%
Low	75	(-15%)	-1%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	1	0	0	1
Options	0	0	17	0	0	19	0	0	0
to Sell	0	0	0	0	0	2	0	2	1

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	122	140	150
to Sell	126	112	115
Hld's(000)	40794	44491	44254

% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	16.7	-2.7
3 yr.	23.8	27.9
5 yr.	104.8	41.9

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
35.96	40.14	43.59	48.47	50.28	48.53	42.00	40.18	41.07	41.77	42.08	45.61	52.00	51.82	53.00	54.31	*56.35*	*58.95*	Revenues per sh	*68.95*
5.11	5.57	5.20	5.97	6.21	5.76	6.16	6.46	6.81	7.73	8.24	8.47	8.62	9.29	8.83	8.14	*9.35*	*10.10*	"Cash Flow" per sh	*13.55*
1.13	1.66	1.25	1.98	1.95	1.39	1.94	2.27	2.43	2.86	3.11	3.01	2.92	3.18	3.62	3.68	*4.00*	*4.40*	Earnings per sh A	*5.80*
.82	.82	.82	.82	.86	.90	.95	1.00	1.06	1.18	1.32	1.46	1.62	1.80	1.98	2.08	*2.18*	*2.30*	Div'ds Decl'd per sh B■†	*2.60*
7.03	8.23	7.49	8.27	7.96	6.79	4.81	4.73	8.29	8.57	7.86	8.53	10.30	11.15	12.97	14.44	*16.35*	*16.95*	Cap'l Spending per sh	*20.70*
18.42	19.18	19.10	21.58	22.98	23.49	24.44	25.62	26.66	28.35	30.47	31.95	33.61	35.03	37.74	42.47	*45.45*	*48.20*	Book Value per sh	*58.60*
34.23	36.79	39.33	41.77	42.81	44.19	45.09	45.56	45.96	46.15	46.36	46.52	47.38	47.48	48.09	53.03	*55.00*	*56.00*	Common Shs Outst'g C	*58.00*
19.2	14.3	20.6	15.9	17.3	20.3	12.2	14.0	15.7	15.0	15.8	17.9	19.4	21.6	22.2	20.6	*Bold figures are*		Avg Ann'l P/E Ratio	*16.0*
1.09	.76	1.10	.86	.92	1.22	.81	.89	.98	.95	.89	.94	.98	1.13	1.12	1.11	*Value Line*		Relative P/E Ratio	*.90*
3.8%	3.5%	3.2%	2.6%	2.6%	3.2%	4.0%	3.2%	2.8%	2.8%	2.7%	2.7%	2.9%	2.6%	2.5%	2.7%	*estimates*		Avg Ann'l Div'd Yield	*2.8%*

CAPITAL STRUCTURE as of 6/30/19
Total Debt $2409.8 mill. **Due in 5 Yrs** $869.1 mill.
LT Debt $2373.0 mill. **LT Interest** $100.0 mill.
(Total interest coverage: 3.6x) (50% of Cap'l)
Leases, Uncapitalized Annual rentals $11.0 mill.
Pension Assets-12/18 $838.0 mill.
Oblig. $1186.0 mill.
Pfd Stock None

Common Stock 54,324,289 shs.
as of 7/31/19

MARKET CAP: $4.8 billion (Mid Cap)

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		22-24
1893.8	1830.4	1887.2	1927.8	1950.8	2121.7	2463.6	2460.5	2548.8	2880.0	*3100*	*3300*	Revenues ($mill)	*4000*
87.5	103.9	112.3	133.3	145.3	141.1	138.3	152.0	173.8	182.3	*215*	*240*	Net Profit ($mill)	*335*
34.0%	34.7%	36.2%	36.2%	35.0%	35.7%	36.4%	33.9%	32.8%	25.3%	*21.0%*	*21.0%*	Income Tax Rate	*21.0%*
4.6%	5.7%	6.0%	6.9%	7.4%	6.7%	5.6%	6.2%	6.8%	6.3%	*6.9%*	*7.3%*	Net Profit Margin	*8.4%*
53.5%	49.1%	43.2%	49.2%	49.4%	52.4%	49.3%	48.2%	49.8%	48.3%	*49.5%*	*48.5%*	Long-Term Debt Ratio	*45.5%*
46.5%	50.9%	56.8%	50.8%	50.6%	47.6%	50.7%	51.8%	50.2%	51.7%	*50.5%*	*51.5%*	Common Equity Ratio	*54.5%*
2371.4	2291.7	2155.9	2576.9	2793.7	3123.9	3143.5	3213.5	3613.3	4359.3	*4950*	*5250*	Total Capital ($mill)	*6250*
3034.5	3072.4	3218.9	3343.8	3486.1	3658.4	3891.1	4132.0	4523.7	5093.2	*5450*	*5850*	Net Plant ($mill)	*7000*
5.4%	6.1%	6.4%	6.4%	6.3%	5.7%	5.5%	5.8%	5.8%	5.2%	*5.5%*	*5.5%*	Return on Total Cap'l	*6.5%*
7.9%	8.9%	9.2%	10.2%	10.3%	9.5%	8.7%	9.1%	9.6%	8.1%	*8.5%*	*9.0%*	Return on Shr. Equity	*10.0%*
7.9%	8.9%	9.2%	10.2%	10.3%	9.5%	8.7%	9.1%	9.6%	8.1%	*8.5%*	*9.0%*	Return on Com Equity	*10.0%*
4.1%	5.1%	5.3%	6.1%	6.1%	5.0%	4.0%	4.1%	4.5%	3.6%	*4.0%*	*4.0%*	Retained to Com Eq	*5.5%*
48%	43%	43%	40%	41%	47%	54%	55%	53%	55%	*56%*	*54%*	All Div'ds to Net Prof	*45%*

CURRENT POSITION ($MILL.)	2017	2018	6/30/19
Cash Assets	43.6	85.4	38.4
Other	613.4	754.4	713.7
Current Assets	657.0	839.8	752.1
Accts Payable	228.3	249.0	196.9
Debt Due	239.8	185.1	36.8
Other	347.8	504.5	492.8
Current Liab.	815.9	938.6	726.5
Fix. Chg. Cov.	415%	370%	457%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	1.0%	5.0%	*4.5%*
"Cash Flow"	4.0%	3.0%	*7.5%*
Earnings	7.0%	4.5%	*9.0%*
Dividends	8.5%	10.5%	*5.0%*
Book Value	5.5%	6.0%	*7.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	731.2	547.8	540.0	641.5	2460.5
2017	654.7	560.5	593.2	740.4	2548.8
2018	754.3	670.9	668.1	786.7	2880.0
2019	833.5	713.0	*720*	*833.5*	*3100*
2020	*860*	*775*	*780*	*885*	*3300*

Cal-endar	EARNINGS PER SHARE A D Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	1.58	.19	.05	1.36	3.18
2017	1.45	.37	.21	1.58	3.62
2018	1.63	.44	.25	1.36	3.68
2019	1.77	.41	*.26*	*1.56*	*4.00*
2020	*1.90*	*.50*	*.30*	*1.70*	*4.40*

Cal-endar	QUARTERLY DIVIDENDS PAID B■† Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.365	.405	.405	.405	1.58
2016	.405	.450	.450	.450	1.76
2017	.450	.495	.495	.495	1.94
2018	.495	.520	.520	.520	2.06
2019	.520	.545			

BUSINESS: Southwest Gas Holdings, Inc. is the parent holding company of Southwest Gas and Centuri Construction Group. Southwest Gas is a regulated gas distributor serving about 2.0 million customers in sections of Arizona, Nevada, and California. Centuri provides construction services. 2018 margin mix: residential and small commercial, 85%; large commercial and industrial, 3%; transportation, 12%. Total throughput: 2.2 billion therms. Has 8,632 employees. Off. & dir. own .8% of common stock; BlackRock Inc., 11.7%; The Vanguard Group, Inc., 10.1% (3/19 Proxy). Chairman: Michael J. Melarkey. President & CEO: John P. Hester. Inc.: CA. Addr.: 5241 Spring Mountain Road, Las Vegas, Nevada 89193. Telephone: 702-876-7237. Internet: www.swgas.com.

Shares of Southwest Gas have recently come off an all-time high. The company posted decent results for the second quarter. The top line increased moderately, year over year. Southwest's natural gas utility operation benefited from customer growth and rate relief in California and Nevada. Offsetting these gains were the effects of surcharges and the regulatory impacts of tax reform. Growth in the utility infrastructure services segment was the result of the addition of Linetec Services, LLC (acquired last year) and a greater volume of pipe replacement work under existing master service agreements and bid contracts. Operating expenses also increased. All told, net profit advanced about 2%, to $22.1 million. Still, earnings per share of $0.41 came in shy of the prior-year tally, owing to a larger share count.

We anticipate solid performance in the coming quarters. We project that revenues and share earnings will advance 8% and 9%, respectively, for full-year 2019. Growth should continue from 2020 onward. Southwest's utility operation is experiencing healthy economic growth throughout its service territories. Investment in infrastructure should pay off. The company is seeking regulatory approval to construct the infrastructure necessary to expand natural gas service into Spring Creek, Nevada. On the nonutility side, expanded service offerings for the company's infrastructure services customers ought to benefit results.

This stock is ranked to outperform the broader market averages for the coming six to 12 months. Looking further out, we anticipate moderate top-line growth and healthy share-net improvement for the company over the pull to early next decade. But this seems to be partly discounted by the recent quotation. Long-term total return potential appears to be limited, as the shares presently trade well within our Target Price Range. The dividend yield does not stand out for a utility, either. In the plus column, Southwest Gas earns good marks for Price Stability, Growth Persistence, and Earnings Predictability. Volatility is below average, as well. A pullback some time in the future may present conservative investors with a better entry point.

Michael Napoli, CFA *August 30, 2019*

(A) Diluted earnings. Excl. nonrec. gains (losses): '02, (10¢); '05, (11¢); '06, 7¢. Next egs. report due late October. **(B)** Dividends historically paid early March, June, September, and December. ■† Div'd reinvestment and stock purchase plan avail. **(C)** In millions. **(D)** Totals may not sum due to rounding.

Company's Financial Strength	B++
Stock's Price Stability	85
Price Growth Persistence	80
Earnings Predictability	90

SOUTH JERSEY INDS. NYSE-SJI

RECENT PRICE 31.50 | P/E RATIO 26.0 (Trailing: 29.2 / Median: 18.0) | RELATIVE P/E RATIO 1.60 | DIV'D YLD 3.9% | VALUE LINE

TIMELINESS 3 Lowered 7/20/18
SAFETY 2 Lowered 1/4/91
TECHNICAL 2 Lowered 8/30/19
BETA .80 (1.00 = Market)

High:	20.3	20.4	27.1	29.0	29.0	31.1	30.6	30.4	34.8	38.4	36.7	34.5
Low:	12.6	16.0	18.6	21.4	22.9	25.3	25.9	21.2	22.1	30.8	26.0	26.6

2022-24 PROJECTIONS

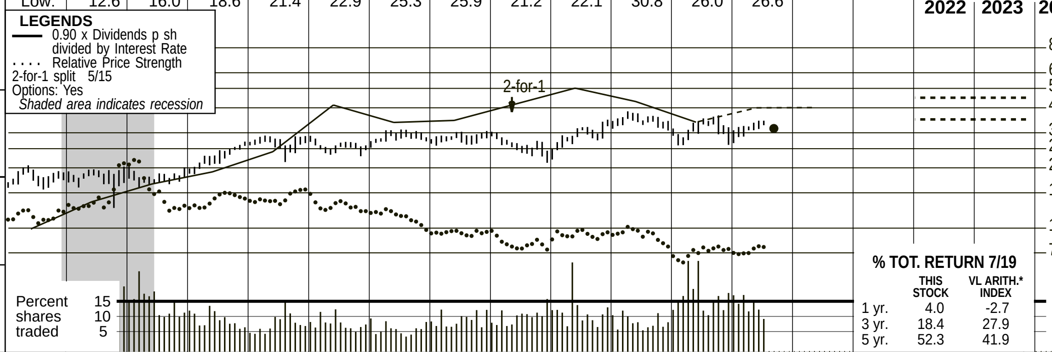
	Price	Gain	Ann'l Total Return
High	45	(+45%)	12%
Low	35	(+10%)	6%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	1	2	0	0	0	0	0	0
Options	0	0	0	16	0	8	0	0	4
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	99	125	137
to Sell	124	104	86
Hld's(000)	71247	72623	76619



% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	4.0	-2.7
3 yr.	18.4	27.9
5 yr.	52.3	41.9

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
13.17	14.75	15.89	15.88	16.15	16.18	14.19	15.48	13.71	11.16	11.18	12.98	13.52	13.04	15.63	19.20	17.55	17.95	Revenues per sh	21.00
1.12	1.22	1.25	1.75	1.60	1.74	1.86	2.10	2.23	2.34	2.48	2.67	2.42	2.67	2.79	2.91	2.15	2.70	"Cash Flow" per sh	3.75
.68	.79	.86	1.23	1.05	1.14	1.19	1.35	1.45	1.52	1.52	1.57	1.44	1.34	1.23	1.38	1.10	1.60	Earnings per sh A	2.40
.39	.41	.43	.46	.51	.56	.61	.68	.75	.83	.90	.96	1.02	1.06	1.10	1.13	1.20	1.25	Div'ds Decl'd per sh B ■	1.40
1.18	1.34	1.60	1.26	.94	1.04	1.83	2.79	3.20	4.01	4.84	5.01	4.87	3.50	3.43	3.99	5.65	5.90	Cap'l Spending per sh	7.50
5.63	6.20	6.75	7.55	8.12	8.67	9.12	9.54	10.33	11.63	12.64	13.65	14.62	16.22	14.99	14.82	16.50	17.20	Book Value per sh C	20.00
52.92	55.52	57.96	58.65	59.22	59.46	59.59	59.75	60.43	63.31	65.43	68.33	70.97	79.48	79.55	85.51	94.00	96.00	Common Shs Outst'g D	100.00
13.3	14.1	16.6	11.9	17.2	15.9	15.0	16.8	18.4	16.9	18.9	18.0	17.9	21.7	27.9	22.6	Bold figures are		Avg Ann'l P/E Ratio	16.0
.76	.74	.88	.64	.91	.96	1.00	1.07	1.15	1.08	1.06	.95	.90	1.14	1.40	1.22	Value Line		Relative P/E Ratio	.90
4.3%	3.7%	3.0%	3.2%	2.8%	3.1%	3.4%	3.0%	2.8%	3.2%	3.1%	3.4%	3.9%	3.6%	3.2%	3.6%	estimates		Avg Ann'l Div'd Yield	3.6%

CAPITAL STRUCTURE as of 6/30/19
Total Debt $2957.5 mill. **Due in 5 Yrs** $1623 mill.
LT Debt $1798.6 mill. **LT Interest** $75.0 mill.

Leases, Uncapitalized Annual rentals $.8 mill.
Pension Assets-12/18 $287.2 mill.
Oblig. $402.2 mill.
Pfd Stock None

Common Stock 92,390,349 shs.
as of 8/1/19

MARKET CAP: $2.9 billion (Mid Cap)

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		22-24
845.4	925.1	828.6	706.3	731.4	887.0	959.6	1036.5	1243.1	1641.3	1650	1725	Revenues ($mill)	2100
71.3	81.0	87.0	93.3	97.1	104.0	99.0	102.8	98.1	116.2	100	150	Net Profit ($mill)	235
23.0%	15.2%	22.4%	10.8%	- -	- -	5.9%	42.0%	42.0%	21.0%	22.0%	21.0%	Income Tax Rate	21.0%
8.4%	8.8%	10.5%	13.2%	13.3%	11.7%	10.3%	9.9%	7.9%	7.1%	6.1%	8.7%	Net Profit Margin	11.2%
36.5%	37.4%	40.5%	45.0%	45.1%	48.0%	49.2%	38.5%	48.5%	62.4%	56.5%	57.0%	Long-Term Debt Ratio	56.5%
63.5%	62.6%	59.5%	55.0%	54.9%	52.0%	50.8%	61.5%	51.5%	37.6%	43.5%	43.0%	Common Equity Ratio	43.5%
856.4	910.1	1048.3	1337.6	1507.4	1791.9	2043.9	2097.2	2315.4	3373.9	3550	3850	Total Capital ($mill)	4600
1073.1	1193.3	1352.4	1578.0	1859.1	2134.1	2448.1	2623.8	2700.2	3653.5	4100	4600	Net Plant ($mill)	6000
9.0%	9.5%	8.9%	7.4%	6.8%	6.4%	5.4%	5.4%	5.1%	4.4%	4.0%	5.0%	Return on Total Cap'l	6.0%
13.1%	14.2%	13.9%	12.7%	11.7%	11.2%	9.5%	8.0%	8.2%	9.2%	6.5%	9.0%	Return on Shr. Equity	12.0%
13.1%	14.2%	13.9%	12.7%	11.7%	11.2%	9.5%	8.0%	8.2%	9.2%	6.5%	9.0%	Return on Com Equity	12.0%
6.4%	7.1%	6.7%	5.8%	4.8%	4.3%	2.8%	1.6%	.9%	1.7%	NMF	2.0%	Retained to Com Eq	5.0%
51%	50%	52%	55%	59%	61%	71%	80%	89%	82%	NMF	80%	All Div'ds to Net Prof	60%

CURRENT POSITION ($MILL.)

	2017	2018	6/30/19
Cash Assets	7.8	30.0	12.2
Other	431.2	633.2	416.8
Current Assets	439.0	663.2	429.0
Accts Payable	284.9	410.5	288.9
Debt Due	410.2	1004.4	1158.9
Other	188.0	165.9	198.3
Current Liab.	883.1	1580.8	1646.1
Fix. Chg. Cov.	177%	112%	171%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	- -	6.0%	4.5%
"Cash Flow"	5.0%	3.5%	5.0%
Earnings	1.5%	-2.5%	10.5%
Dividends	8.0%	6.0%	4.0%
Book Value	6.5%	6.0%	4.5%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	333.0	154.4	219.1	330.0	1036.5
2017	425.8	244.4	227.1	345.8	1243.1
2018	521.9	227.3	302.5	589.6	1641.3
2019	637.3	266.9	275	470.8	1650
2020	650	275	300	500	1725

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	.75	.12	.05	.42	1.34
2017	.72	.06	d.05	.50	1.23
2018	1.19	.07	d.27	.39	1.38
2019	1.09	d.13	d.30	.44	1.10
2020	1.20	.05	d.15	.50	1.60

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	- -	.251	.251	.515	1.02
2016	- -	.264	.264	.536	1.06
2017	- -	.273	.273	.553	1.10
2018	- -	.280	.280	.567	1.13
2019	- -	.287	.287		

BUSINESS: South Jersey Industries, Inc. is a holding company. Dist. natural gas to approx. 685,000 customers in New Jersey and Maryland. South Jersey Gas rev. mix '18: residential, 46%; commercial, 22%; cogen. and electric gen., 13%; industrial, 19%. Acq. Elizabethtown Gas and Elkton Gas, 7/18. Nonutil. operations include South Jersey Energy, South Jersey Resources Group, South Jersey Exploration, Marina Energy, South Jersey Energy Service Plus, and SJI Midstream. Has about 1,100 employees. Off./dir. own less than 1% of common; BlackRock, 14.9%; The Vanguard Group, 10.9% (3/19 proxy). Pres. & CEO: Michael J. Renna. Chairman: Walter M. Higgins III. Inc.: NJ. Addr.: 1 South Jersey Plaza, Folsom, NJ 08037. Tel.: 609-561-9000. Internet: www.sjindustries.com.

Shares of South Jersey Industries have traded in a fairly narrow range in recent times. The company posted mixed results in the second quarter. The top line advanced roughly 17%, on a year-over-year basis. However, expenses also increased (excluding an impairment charge of $99.2 million in the year-ago period). All told, South Jersey posted a share deficit of $0.13 for the term. Results ought to remain mixed in the back half of the year. Overall, we anticipate a modest top-line advance along with a significant share-earnings pullback for full-year 2019.

Top-line growth ought to pick up in 2020, and we project a strong bottom-line rebound for the company in that year. Favorable results should continue thereafter. An ongoing transition ought to leave the company a more regulated entity. Utility South Jersey Gas should continue to benefit from customer growth, driven by conversions from alternative fuels by new customers. Infrastructure replacement programs allow this business to earn an authorized return on approved investments. Elizabethtown Gas (acquired along with Elkton Gas in July of 2018) is seeking a base-rate revenue increase of about $65 million to recognize infrastructure investments for its natural gas system. A final decision in the matter is expected by the end of the current year. Important infrastructure investments should modernize the company's system and allow it to meet strong demand for natural gas. We envision some improvement on the nonutility side, as well, though a measure of unevenness may well persist. Efforts by the company to divest noncore operations should pay off.

This stock is ranked to perform in line with the broader market averages for the coming six to 12 months. Looking further out, this equity offers decent risk-adjusted total return potential for the pull to early next decade. This should be supported by strong operating performance at the company and a healthy dividend yield. Moreover, South Jersey earns good marks for Safety, Financial Strength, and Price Stability. Volatility is subdued, as well. All told, conservative, income-seeking accounts may find something to like here.

Michael Napoli, CFA *August 30, 2019*

(A) Based on economic egs. from 2007. GAAP EPS: '08, $1.29; '09, $0.97; '10, $1.11; '11, $1.49; '12, $1.49; '13, $1.28; '14, $1.46; '15, $1.52; '16, $1.56; '17, ($0.04). Excl. nonrecur. gain (loss): '08, $0.16; '09, ($0.22); '10, ($0.24); '11, $0.04; '12, ($0.03); '13, ($0.24); '14, ($0.11); '15, $0.08; '16, $0.22; '17, ($1.27); '18, ($1.17). Next egs. rpt. early November.
(B) Div'ds paid early April, July, Oct., and late Dec. ■ Div. reinvest. plan avail. (C) Incl. reg. assets. In 2018: $663.0 mill., $7.75 per shr. (D) In mill., adj. for split.

Company's Financial Strength	A
Stock's Price Stability	80
Price Growth Persistence	20
Earnings Predictability	65

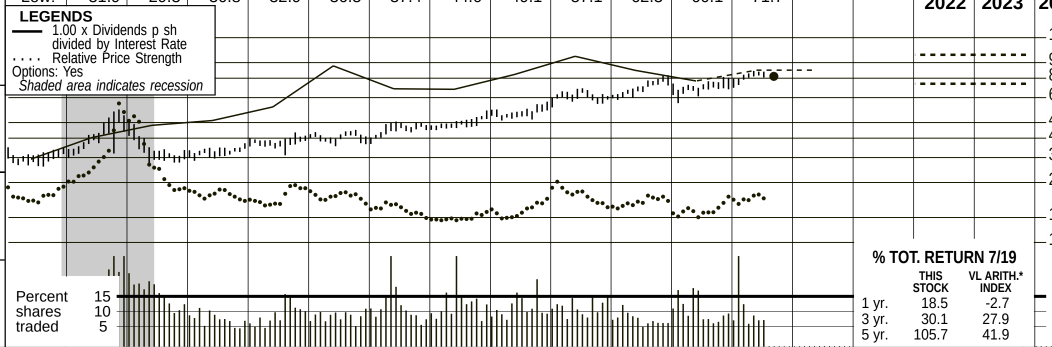
SPIRE INC. NYSE-SR

RECENT PRICE **81.66** | P/E RATIO **24.8** (Trailing: 21.7 Median: 17.0) | RELATIVE P/E RATIO **1.52** | DIV'D YLD **2.9%** | VALUE LINE

TIMELINESS	3 Lowered 11/30/18
SAFETY	2 Raised 6/20/03
TECHNICAL	1 Raised 8/9/19
BETA	.65 (1.00 = Market)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
High:	55.8	48.3	37.8	42.8	44.0	48.5	55.2	61.0	71.2	82.9	81.1	87.1
Low:	31.9	29.3	30.8	32.9	36.5	37.4	44.0	49.1	57.1	62.3	60.1	71.7

Target Price Range 2022 | 2023 | 2024



2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	105	(+30%)	9%
Low	75	(-10%)	1%

Insider Decisions

	O	N	D	J	F	M	A	M	J
to Buy	0	0	0	0	0	0	0	0	0
Options	0	5	5	0	8	0	0	0	0
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	3Q2018	4Q2018	1Q2019
to Buy	119	118	140
to Sell	124	106	114
Hld's(000)	42187	41743	40023

% TOT. RETURN 7/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	18.5	-2.7
3 yr.	30.1	27.9
5 yr.	105.7	41.9

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
54.95	59.59	75.43	93.51	93.40	100.44	85.49	77.83	71.48	49.90	31.10	37.68	45.59	33.68	36.07	38.78	**38.80**	**40.40**	Revenues per sh A	**54.55**
3.15	2.79	2.98	3.81	3.87	4.22	4.56	4.11	4.62	4.58	3.12	3.87	6.15	6.16	6.54	7.55	**7.25**	**7.55**	"Cash Flow" per sh	**9.55**
1.82	1.82	1.90	2.37	2.31	2.64	2.92	2.43	2.86	2.79	2.02	2.35	3.16	3.24	3.43	4.33	**3.70**	**3.90**	Earnings per sh A B	**5.00**
1.34	1.35	1.37	1.40	1.45	1.49	1.53	1.57	1.61	1.66	1.70	1.76	1.84	1.96	2.10	2.25	**2.37**	**2.46**	Div'ds Decl'd per sh C■	**2.67**
2.67	2.45	2.84	2.97	2.72	2.57	2.36	2.56	3.02	4.83	4.00	3.96	6.68	6.42	9.08	9.86	**15.30**	**15.40**	Cap'l Spending per sh	**14.90**
15.65	16.96	17.31	18.85	19.79	22.12	23.32	24.02	25.56	26.67	32.00	34.93	36.30	38.73	41.26	44.51	**49.20**	**52.30**	Book Value per sh D	**54.20**
19.11	20.98	21.17	21.36	21.65	21.99	22.17	22.29	22.43	22.55	32.70	43.18	43.36	45.65	48.26	50.67	**51.00**	**52.00**	Common Shs Outst'g E	**55.00**
13.6	15.7	16.2	13.6	14.2	14.3	13.4	13.7	13.0	14.5	21.3	19.8	16.5	19.6	19.8	16.7	*Bold figures are*		Avg Ann'l P/E Ratio	**18.0**
.78	.83	.86	.73	.75	.86	.89	.87	.82	.92	1.20	1.04	.83	1.03	1.00	.89	*Value Line*		Relative P/E Ratio	**1.00**
5.4%	4.7%	4.4%	4.3%	4.4%	3.9%	3.9%	4.7%	4.3%	4.1%	4.0%	3.8%	3.5%	3.1%	3.1%	3.1%	*estimates*		Avg Ann'l Div'd Yield	**3.0%**

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		22-24
1895.2	1735.0	1603.3	1125.5	1017.0	1627.2	1976.4	1537.3	1740.7	1965.0	**1980**	**2100**	Revenues ($mill) A	**3000**
64.3	54.0	63.8	62.6	52.8	84.6	136.9	144.2	161.6	214.2	**190**	**200**	Net Profit ($mill)	**275**
33.6%	33.4%	31.4%	29.6%	25.0%	27.6%	31.2%	32.5%	32.4%	32.4%	**23.5%**	**24.0%**	Income Tax Rate	**24.0%**
3.4%	3.1%	4.0%	5.6%	5.2%	5.2%	6.9%	9.4%	9.3%	10.9%	**9.6%**	**9.5%**	Net Profit Margin	**9.2%**
42.9%	40.5%	38.9%	36.1%	46.6%	55.1%	53.0%	50.9%	50.0%	45.7%	**44.0%**	**42.0%**	Long-Term Debt Ratio	**40.0%**
57.1%	59.5%	61.1%	63.9%	53.4%	44.9%	47.0%	49.1%	50.0%	54.3%	**56.0%**	**58.0%**	Common Equity Ratio	**60.0%**
906.3	899.9	937.7	941.0	1959.0	3359.4	3345.1	3601.9	3986.3	4155.5	**4500**	**4700**	Total Capital ($mill)	**4950**
855.9	884.1	928.7	1019.3	1776.6	2759.7	2941.2	3300.9	3665.2	3970.5	**4170**	**4300**	Net Plant ($mill)	**4825**
8.7%	7.4%	8.1%	7.9%	3.3%	3.1%	5.1%	4.9%	5.0%	6.3%	**5.5%**	**5.5%**	Return on Total Cap'l	**7.0%**
12.4%	10.1%	11.1%	10.4%	5.0%	5.6%	8.7%	8.2%	8.1%	9.5%	**7.5%**	**7.5%**	Return on Shr. Equity	**9.0%**
12.4%	10.1%	11.1%	10.4%	5.0%	5.6%	8.7%	8.2%	8.1%	9.5%	**7.5%**	**7.5%**	Return on Com Equity	**9.0%**
5.9%	3.6%	4.9%	4.3%	1.0%	1.5%	3.7%	3.3%	3.3%	4.7%	**2.5%**	**2.5%**	Retained to Com Eq	**4.5%**
53%	64%	56%	59%	81%	73%	58%	59%	60%	51%	**64%**	**63%**	All Div'ds to Net Prof	**53%**

CAPITAL STRUCTURE as of 6/30/19
Total Debt $2641.3 mill. **Due in 5 Yrs** $599.0 mill.
LT Debt $2042.3 mill. **LT Interest** $100.0 mill.
(Total interest coverage: 2.8x)

Leases, Uncapitalized Annual rentals $9.7 mill.
Pension Assets-9/18 $499.2 mill. **Oblig.** $664.6 mill.
Pfd Stock $242.0 mill. **Pfd Div'd** $1.6 mill.
Common Stock 50,809,437 shs.
as of 7/26/19

MARKET CAP: $4.1 billion (Mid Cap)

CURRENT POSITION ($MILL.)	2017	2018	6/30/19
Cash Assets	7.4	4.4	5.8
Other	718.1	655.2	644.0
Current Assets	725.5	659.6	649.8
Accts Payable	257.1	290.1	297.6
Debt Due	577.3	729.1	599.0
Other	263.5	302.5	323.0
Current Liab.	1097.9	1321.7	1219.6
Fix. Chg. Cov.	361%	284%	300%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '16-'18 to '22-'24
Revenues	-9.5%	-6.5%	7.0%
"Cash Flow"	5.5%	10.5%	6.0%
Earnings	4.0%	7.5%	5.5%
Dividends	4.0%	5.0%	4.0%
Book Value	7.5%	8.0%	4.5%

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.)A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2016	399.4	609.3	249.3	279.3	1537.3
2017	495.1	663.4	323.5	258.7	1740.7
2018	561.8	813.4	350.6	239.2	1965.0
2019	602.0	803.5	321.3	**253.2**	**1980**
2020	**630**	**840**	**370**	**260**	**2100**

Fiscal Year Ends	EARNINGS PER SHARE A B F Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2016	1.08	2.31	.24	d.31	3.24
2017	.99	2.36	.45	d.28	3.43
2018	2.39	2.03	.52	d.51	4.33
2019	1.32	3.04	d.09	**d.57**	**3.70**
2020	**1.35**	**2.60**	**.50**	**d.55**	**3.90**

Cal-endar	QUARTERLY DIVIDENDS PAID C■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.46	.46	.46	.46	1.84
2016	.49	.49	.49	.49	1.96
2017	.525	.525	.525	.525	2.10
2018	.5625	.5625	.5625	.5625	2.25
2019	.5925	.5925	.5925		

BUSINESS: Spire Inc., formerly known as the Laclede Group, Inc., is a holding company for natural gas utilities, which distributes natural gas across Missouri, including the cities of St. Louis and Kansas City. Has roughly 1.7 million customers. Acquired Missouri Gas 9/13, Alabama Gas Co 9/14. Utility therms sold and transported in fiscal 2018: 3.3 bill. Revenue mix for regulated operations: residential, 66%; commercial and industrial, 24%; transportation, 6%; other, 4%. Has around 3,366 employees. Officers and directors own 2.9% of common shares; BlackRock, 13% (1/19 proxy). Chairman: Edward Glotzbach; CEO: Suzanne Sitherwood. Inc.: Missouri. Address: 700 Market Street, St. Louis, Missouri 63101. Telephone: 314-342-0500. Internet: www.thelacledegroup.com.

Spire Inc. had a difficult fiscal third quarter (years end September 30th). The top line decreased more than 8% year over year, to $321 million. This was due to weaker revenues in the Gas Utility line, which experienced lesser usage volume and cost recoveries, along with lower gross receipts taxes at both Missouri Utilities and Spire Alabama. Meanwhile, the bottom line registered a per-share deficit of $0.09, versus a per-share profit of $0.52 in the year-ago period. This decline was due to higher total operating expenses, especially from the Spire Marketing unit. On the bright side, Spire was able to reduce its Gas Utility operating costs. On an adjusted basis, share net (or net economic earnings) was $0.07, which was still considerably below the $0.31 figure last year.

The company is actively investing to improve its operations. Spire is upgrading its infrastructure and technology to enhance safety and customer service. Its STL Pipeline is nearing completion and is expected to be ready by the end of this fiscal year. Meanwhile, the company continues to invest in the storage business, which ought to bear fruit in the latter half of fiscal 2020. Management increased the current fiscal year's capital budget by $40 million, to $780 million, reflecting higher spend related to Spire STL Pipeline and Storage. Plus, Spire raised its five-year capital spend target to $2.9 billion, indicating further utility infrastructure upgrades.

Near-term profits will likely remain under pressure. Certainly, the upfront costs associated with the aforementioned initiatives will weigh on the bottom line, but ongoing tight cost controls will probably offset some of these challenges. Nevertheless, profits tend to advance at a measured pace for natural gas utilities, such as Spire. The infrastructure projects should boost customer growth, long term. For now, we estimate share earnings for fiscal 2019 at $3.70, and look for 2020 share net to recover at a single-digit pace.

Neutrally ranked shares of Spire Inc. have below-average long-term capital appreciation potential. Still, a healthy dividend yield and an Above Average (2) rank for Safety may interest some risk-averse and income-oriented accounts.

Emma Jalees *August 30, 2019*

(A) Fiscal year ends Sept. 30th. (B) Based on diluted shares outstanding. Excludes nonrecurring loss: '06, 7¢. Excludes gain from discontinued operations: '08, 94¢. Next earnings report due mid-November. (C) Dividends historically paid in early January, April, July, and October. ■ Dividend reinvestment plan available. (D) Incl. deferred charges. In '18: $1171.6 mill., $23.11/sh. (E) In millions. (F) Qtly. egs. may not sum due to rounding or change in shares outstanding.

Company's Financial Strength	B++
Stock's Price Stability	95
Price Growth Persistence	60
Earnings Predictability	65

Atmos Energy Corporation
Summary of Risk Premium Models for the
Proxy Group of Six Natural Gas Distribution Companies

	Proxy Group of Six Natural Gas Distribution Companies
Predictive Risk Premium Model (PRPM) (1)	9.90 %
Risk Premium Using an Adjusted Total Market Approach (2)	9.38 %
Average	9.64 %

Notes:
(1) From page 11 of this Schedule.
(2) From page 12 of this Schedule.

Atmos Energy Corporation
Indicated ROE
Derived by the Predictive Risk Premium Model (1)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Proxy Group of Six Natural Gas Distribution Companies	LT Average Predicted Variance	Spot Predicted Variance	Recommended Variance (2)	GARCH Coefficient	Predicted Risk Premium (3)	Risk-Free Rate (4)	Indicated ROE (5)
Atmos Energy Corporation	0.33%	0.14%	0.28%	2.34813	8.28%	2.64%	10.92%
NW Natural Holdings	0.32%	0.17%	0.28%	1.71043	5.95%	2.64%	8.59%
ONE Gas, Inc.	0.23%	0.20%	0.22%	7.13558	20.52%	2.64%	NMF
South Jersey Industries, Inc.	0.37%	0.34%	0.36%	1.68560	7.63%	2.64%	10.27%
Southwest Gas Holdings, Inc.	0.44%	0.24%	0.39%	1.52375	7.29%	2.64%	9.93%
Spire, Inc.	0.71%	0.19%	0.58%	0.96237	6.93%	2.64%	9.57%
						Average	9.86%
						Median	9.93%
						Average of Mean and Median	9.90%

NMF = Not Meaningful Figure

Notes:
(1) The Predictive Risk Premium Model uses historical data to generate a predicted variance and a GARCH coefficient. The historical data used are the equity risk premiums for the first available trading month as reported by Bloomberg Professional Service.
(2) Average of Columns [1] and [2].
(3) (1+(Column [3] * Column [4])$^{\wedge 12}$) - 1.
(4) From note 2 on page 24 of this Schedule.
(5) Column [5] + Column [6].

Atmos Energy Corporation
Indicated Common Equity Cost Rate
Through Use of a Risk Premium Model
Using an Adjusted Total Market Approach

Line No.		Proxy Group of Six Natural Gas Distribution Companies
1.	Prospective Yield on Aaa Rated Corporate Bonds (1)	3.61 %
2.	Adjustment to Reflect Yield Spread Between Aaa Rated Corporate Bonds and A Rated Public Utility Bonds	0.34 (2)
3.	Adjusted Prospective Yield on A Rated Public Utility Bonds	3.95 %
4.	Equity Risk Premium (3)	5.43
5.	Risk Premium Derived Common Equity Cost Rate	9.38 %

Notes:
(1) Consensus forecast of Moody's Aaa Rated Corporate bonds from Blue Chip Financial Forecasts (see pages 19-20 of this Schedule).
(2) The average yield spread of A rated public utility bonds over Aaa rated corporate bonds of 0.34% from page 13 of this Schedule.
(3) From page 16 of this Schedule.

Atmos Energy Corporation
Interest Rates and Bond Spreads for Moody's Corporate and Public Utility Bonds

Selected Bond Yields

	[1] Aaa Rated Corporate Bond	[2] A Rated Public Utility Bond	[3] Baa Rated Public Utility Bond
Oct-2019	3.01 %	3.39 %	3.72 %
Sep-2019	3.03	3.37	3.71
Aug-2019	2.98	3.29	3.63
Average	3.01 %	3.35 %	3.69 %

Selected Bond Spreads

A Rated Public Utility Bonds Over Aaa Rated Corporate Bonds:
0.34 % (1)

Baa Rated Public Utility Bonds Over A Rated Public Utility Bonds:
0.34 % (2)

Notes:
(1) Column [2] - Column [1].
(2) Column [3] - Column [2].

Source of Information:
Bloomberg Professional Service

Atmos Energy Corporation
Comparison of Long-Term Issuer Ratings for
Proxy Group of Six Natural Gas Distribution Companies

	Moody's Long-Term Issuer Rating October 2019		Standard & Poor's Long-Term Issuer Rating October 2019	
Proxy Group of Six Natural Gas Distribution Companies	Long-Term Issuer Rating	Numerical Weighting (1)	Long-Term Issuer Rating	Numerical Weighting(1)
Atmos Energy Corporation	A2	6.0	A	6.0
NW Natural Holdings (2)	Baa1	8.0	A+	5.0
ONE Gas, Inc.	A2	6.0	A	6.0
South Jersey Industries, Inc. (3)	A3	7.0	BBB	9.0
Southwest Gas Holdings, Inc. (4)	A3	7.0	A-	7.0
Spire, Inc. (5)	A1/A2	5.5	A-	7.0
Average	A3	6.6	A-	6.7

Notes:

(1) From page 15 of this Schedule.
(2) Ratings that of Northwest Natural Gas Company.
(3) Ratings that of South Jersey Gas Company.
(4) Ratings that of Southwest Gas Corporation.
(5) Ratings that of Spire Alabama, Inc. and Spire Missouri, Inc.

Source Information: Moody's Investors Service
Standard & Poor's Global Utilities Rating Service

Numerical Assignment for
Moody's and Standard & Poor's Bond Ratings

Moody's Bond Rating	Numerical Bond Weighting	Standard & Poor's Bond Rating
Aaa	1	AAA
Aa1	2	AA+
Aa2	3	AA
Aa3	4	AA-
A1	5	A+
A2	6	A
A3	7	A-
Baa1	8	BBB+
Baa2	9	BBB
Baa3	10	BBB-
Ba1	11	BB+
Ba2	12	BB
Ba3	13	BB-
B1	14	B+
B2	15	B
B3	16	B-

Atmos Energy Corporation
Judgment of Equity Risk Premium for
Proxy Group of Six Natural Gas Distribution Companies

Line No.		Proxy Group of Six Natural Gas Distribution Companies
1.	Calculated equity risk premium based on the total market using the beta approach (1)	5.40 %
2.	Mean equity risk premium based on a study using the holding period returns of public utilities with A rated bonds (2)	5.27
3.	Predicted Equity Risk Premium Based on Regression Analysis of 777 Fully-Litigated Natural Gas Utility Rate Cases	5.61
4.	Average equity risk premium	5.43 %

Notes: (1) From page 17 of this Schedule.
(2) From page 21 of this Schedule.
(3) From page 22 of this Schedule.

Atmos Energy Corporation
Derivation of Equity Risk Premium Based on the Total Market Approach
Using the Beta for the
Proxy Group of Six Natural Gas Distribution Companies

Line No.	Equity Risk Premium Measure	Proxy Group of Six Natural Gas Distribution Companies	
	Ibbotson-Based Equity Risk Premiums:		
1.	Ibbotson Equity Risk Premium (1)	5.54	%
2.	Regression on Ibbotson Risk Premium Data (2)	8.69	
3.	Ibbotson Equity Risk Premium based on PRPM (3)	8.59	
4.	Equity Risk Premium Based on Value Line Summary and Index (4)	10.22	
5.	Equity Risk Premium Based on Value Line S&P 500 Companies (5)	10.89	
6.	Equity Risk Premium Based on Bloomberg S&P 500 Companies (6)	9.20	
7.	Conclusion of Equity Risk Premium	8.86	%
8.	Adjusted Beta (7)	0.61	
9.	Forecasted Equity Risk Premium	5.40	%

Notes provided on page 9 of this Schedule.

Atmos Energy Corporation
Derivation of Equity Risk Premium Based on the Total Market Approach
Using the Beta for the
Proxy Group of Six Natural Gas Distribution Companies

Notes:

(1) Based on the arithmetic mean historical monthly returns on large company common stocks from Ibbotson® SBBI® 2019 Market Report minus the arithmetic mean monthly yield of Moody's average Aaa and Aa corporate bonds from 1926-2018.

(2) This equity risk premium is based on a regression of the monthly equity risk premiums of large company common stocks relative to Moody's average Aaa and Aa rated corporate bond yields from 1928-2018 referenced in Note 1 above.

(3) The Predictive Risk Premium Model (PRPM) is discussed in the accompanying direct testimony. The Ibbotson equity risk premium based on the PRPM is derived by applying the PRPM to the monthly risk premiums between Ibbotson large company common stock monthly returns and average Aaa and Aa corporate monthly bond yields, from January 1928 through October 2019.

(4) The equity risk premium based on the Value Line Summary and Index is derived by subtracting the average consensus forecast of Aaa corporate bonds of 3.61% (from page 12 of this Schedule) from the projected 3-5 year total annual market return of 13.83% (described fully in note 1 on page 24 of this Schedule).

(5) Using data from Value Line for the S&P 500, an expected total return of 14.50% was derived based upon expected dividend yields and long-term earnings growth estimates as a proxy for capital appreciation. Subtracting the average consensus forecast of Aaa corporate bonds of 3.61% results in an expected equity risk premium of 10.89%.

(6) Using data from the Bloomberg Professional Service for the S&P 500, an expected total return of 12.81% was derived based upon expected dividend yields and long-term earnings growth estimates as a proxy for capital appreciation. Subtracting the average consensus forecast of Aaa corporate bonds of 3.61% results in an expected equity risk premium of 9.20%.

(7) Average of mean and median beta from page 23 of this Schedule.

Sources of Information:

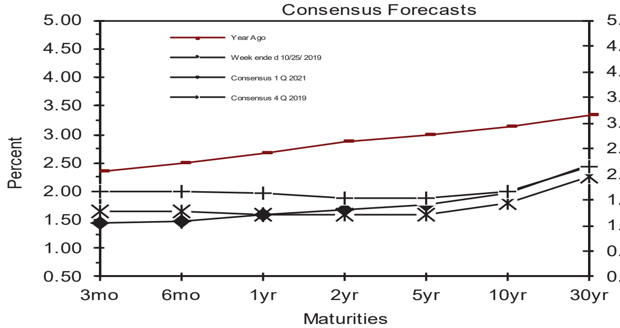
Stocks, Bonds, Bills, and Inflation - 2019 SBBI Yearbook, John Wiley & Sons, Inc.
Industrial Manual and Mergent Bond Record Monthly Update.
Value Line Summary and Index
Blue Chip Financial Forecasts, November 1, 2019 and June 1, 2019
Bloomberg Professional Service

Consensus Forecasts of U.S. Interest Rates and Key Assumptions

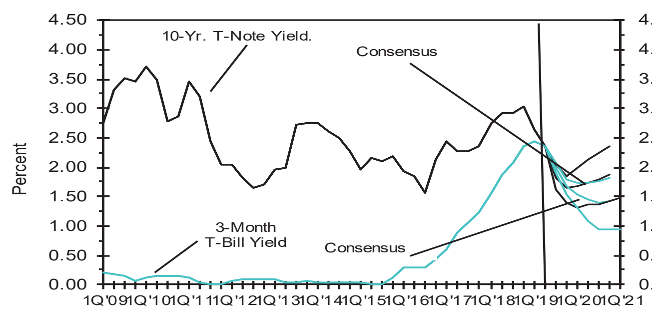
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*						
Interest Rates	Oct 25	Oct 18	Oct 11	Oct 4	Sep	Aug	Jul	3Q 2019	**4Q 2019**	**1Q 2020**	**2Q 2020**	**3Q 2020**	**4Q 2020**	**1Q 2021**
Federal Funds Rate	1.85	1.84	1.82	1.85	2.04	2.13	2.40	2.19	**1.7**	**1.5**	**1.5**	**1.4**	**1.4**	**1.4**
Prime Rate	5.00	5.00	5.00	5.00	5.15	5.25	5.50	5.30	**4.8**	**4.7**	**4.6**	**4.5**	**4.5**	**4.5**
LIBOR, 3-mo.	1.93	1.99	2.00	2.06	2.13	2.16	2.29	2.19	**1.9**	**1.8**	**1.7**	**1.7**	**1.7**	**1.7**
Commercial Paper, 1-mo.	1.86	1.88	1.88	1.93	2.01	2.08	2.25	2.11	**1.8**	**1.7**	**1.6**	**1.5**	**1.6**	**1.6**
Treasury bill, 3-mo.	1.66	1.66	1.70	1.78	1.93	1.99	2.15	2.02	**1.7**	**1.5**	**1.4**	**1.4**	**1.4**	**1.4**
Treasury bill, 6-mo.	1.65	1.64	1.69	1.74	1.89	1.93	2.08	1.97	**1.7**	**1.6**	**1.5**	**1.4**	**1.4**	**1.5**
Treasury bill, 1 yr.	1.59	1.60	1.63	1.66	1.80	1.77	1.96	1.84	**1.6**	**1.6**	**1.5**	**1.5**	**1.5**	**1.6**
Treasury note, 2 yr.	1.60	1.59	1.50	1.49	1.65	1.57	1.84	1.69	**1.5**	**1.5**	**1.5**	**1.5**	**1.6**	**1.7**
Treasury note, 5 yr.	1.60	1.57	1.44	1.43	1.57	1.49	1.83	1.63	**1.5**	**1.5**	**1.6**	**1.6**	**1.7**	**1.8**
Treasury note, 10 yr.	1.78	1.76	1.62	1.60	1.70	1.63	2.06	1.80	**1.7**	**1.7**	**1.7**	**1.8**	**1.9**	**2.0**
Treasury note, 30 yr.	2.27	2.24	2.11	2.07	2.16	2.12	2.57	2.28	**2.1**	**2.2**	**2.2**	**2.3**	**2.4**	**2.5**
Corporate Aaa bond	3.14	3.15	3.07	3.04	3.10	3.06	3.43	3.20	**3.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.4**
Corporate Baa bond	3.88	3.90	3.84	3.80	3.84	3.82	4.16	3.94	**4.0**	**4.0**	**4.1**	**4.2**	**4.3**	**4.4**
State & Local bonds	3.17	3.14	3.10	3.14	3.15	3.08	3.24	3.15	**2.9**	**2.9**	**3.0**	**3.0**	**3.1**	**3.2**
Home mortgage rate	3.75	3.69	3.57	3.65	3.61	3.62	3.77	3.67	**3.6**	**3.6**	**3.7**	**3.7**	**3.8**	**3.8**
	History								**Consensus Forecasts-Quarterly**					
Key Assumptions	4Q 2017	1Q 2018	2Q 2018	3Q 2018	4Q 2018	1Q 2019	*2Q 2019*	*3Q 2019*	**4Q 2019**	**1Q 2020**	**2Q 2020**	**3Q 2020**	**4Q 2020**	**1Q 2021**
Fed's AFE $ Index	106.2	102.9	105.5	107.8	109.4	109.4	110.2	110.4	**110.0**	**109.9**	**109.2**	**108.7**	**108.4**	**108.2**
Real GDP	3.5	2.5	3.5	2.9	1.1	3.1	2.0	1.9	**1.8**	**1.6**	**1.7**	**1.6**	**1.8**	**1.9**
GDP Price Index	2.6	2.3	3.2	2.0	1.6	1.1	2.4	1.7	**2.0**	**2.0**	**2.0**	**2.1**	**2.0**	**2.0**
Consumer Price Index	3.1	3.2	2.1	2.0	1.5	0.9	2.9	1.8	**2.0**	**2.1**	**2.1**	**2.0**	**2.0**	**2.0**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

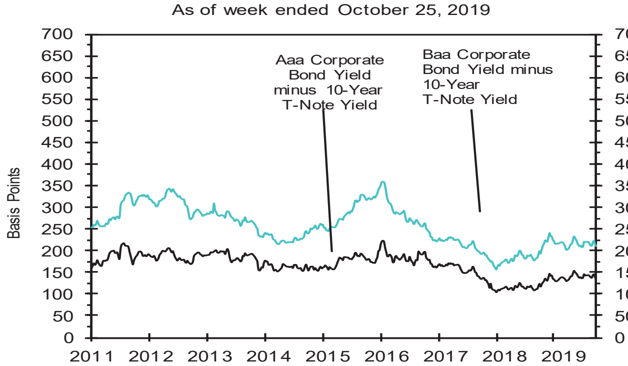
U.S. Treasury Yield Curve
Week ended October 25, 2019 & Year Ago vs.
4Q 2019 & 1Q 2021
Consensus Forecasts



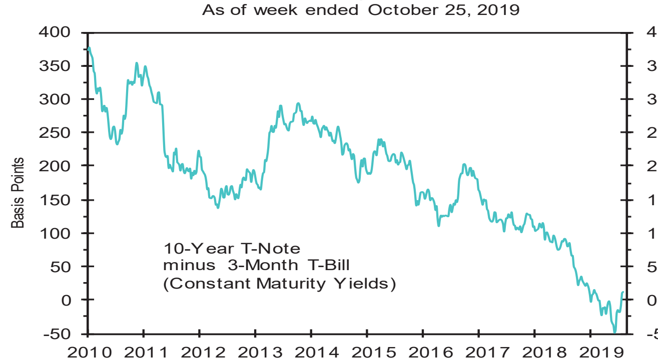
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended October 25, 2019



U.S. Treasury Yield Curve
As of week ended October 25, 2019



Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2021 through 2025 and averages for the five-year periods 2021-2025 and 2026-2030. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		-------------------- Average For The Year --------------------					Five-Year Averages	
		2021	2022	2023	2024	2025	2021-2025	2026-2030
1. Federal Funds Rate	**CONSENSUS**	**2.4**	**2.4**	**2.6**	**2.7**	**2.8**	**2.6**	**2.8**
	Top 10 Average	3.1	3.2	3.4	3.4	3.4	3.3	3.4
	Bottom 10 Average	1.5	1.6	1.7	2.1	2.2	1.8	2.1
2. Prime Rate	**CONSENSUS**	**5.4**	**5.5**	**5.6**	**5.8**	**5.8**	**5.6**	**5.7**
	Top 10 Average	6.1	6.2	6.4	6.4	6.4	6.3	6.2
	Bottom 10 Average	4.6	4.7	4.8	5.1	5.3	4.9	5.1
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.7**	**2.8**	**2.8**	**3.0**	**3.0**	**2.9**	**3.0**
	Top 10 Average	3.3	3.4	3.6	3.6	3.6	3.5	3.6
	Bottom 10 Average	2.1	2.1	2.0	2.4	2.5	2.2	2.5
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.5**	**2.6**	**2.7**	**2.9**	**2.9**	**2.7**	**2.9**
	Top 10 Average	3.1	3.2	3.4	3.4	3.5	3.3	3.4
	Bottom 10 Average	2.0	2.0	2.0	2.4	2.4	2.2	2.4
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.4**	**2.4**	**2.5**	**2.7**	**2.8**	**2.6**	**2.8**
	Top 10 Average	3.1	3.2	3.4	3.4	3.4	3.3	3.4
	Bottom 10 Average	1.5	1.6	1.7	2.0	2.2	1.8	2.1
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.4**	**2.5**	**2.7**	**2.9**	**2.9**	**2.7**	**2.9**
	Top 10 Average	3.1	3.3	3.5	3.5	3.5	3.4	3.5
	Bottom 10 Average	1.7	1.7	1.8	2.2	2.4	2.0	2.3
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.5**	**2.6**	**2.8**	**3.0**	**3.0**	**2.8**	**3.0**
	Top 10 Average	3.3	3.4	3.6	3.6	3.7	3.5	3.7
	Bottom 10 Average	1.8	1.8	2.0	2.3	2.4	2.0	2.3
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.6**	**2.7**	**2.9**	**3.0**	**3.1**	**2.9**	**3.1**
	Top 10 Average	3.3	3.5	3.7	3.8	3.8	3.6	3.8
	Bottom 10 Average	1.8	1.9	2.0	2.3	2.4	2.1	2.3
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**2.8**	**2.9**	**3.1**	**3.2**	**3.3**	**3.0**	**3.3**
	Top 10 Average	3.5	3.7	4.0	4.0	4.0	3.8	4.1
	Bottom 10 Average	2.0	2.1	2.2	2.3	2.5	2.2	2.4
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.0**	**3.1**	**3.3**	**3.3**	**3.4**	**3.2**	**3.4**
	Top 10 Average	3.6	3.9	4.2	4.2	4.2	4.0	4.4
	Bottom 10 Average	2.3	2.4	2.4	2.5	2.6	2.4	2.6
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.3**	**3.5**	**3.6**	**3.7**	**3.8**	**3.6**	**3.8**
	Top 10 Average	4.0	4.3	4.5	4.6	4.6	4.4	4.8
	Bottom 10 Average	2.7	2.7	2.8	2.9	2.9	2.8	2.9
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.4**	**4.6**	**4.7**	**4.7**	**4.8**	**4.6**	**4.8**
	Top 10 Average	5.0	5.2	5.5	5.5	5.5	5.3	5.6
	Bottom 10 Average	3.8	3.9	3.9	4.0	4.0	3.9	4.0
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.3**	**5.6**	**5.7**	**5.7**	**5.7**	**5.6**	**5.8**
	Top 10 Average	6.0	6.3	6.6	6.6	6.7	6.5	6.8
	Bottom 10 Average	4.7	4.8	4.7	4.8	4.8	4.7	4.8
14. State & Local Bonds Yield	**CONSENSUS**	**4.1**	**4.2**	**4.3**	**4.3**	**4.3**	**4.2**	**4.4**
	Top 10 Average	4.6	4.9	5.0	5.0	5.0	4.9	5.1
	Bottom 10 Average	3.5	3.6	3.6	3.6	3.6	3.6	3.6
15. Home Mortgage Rate	**CONSENSUS**	**4.7**	**4.8**	**4.9**	**5.0**	**5.0**	**4.9**	**5.0**
	Top 10 Average	5.3	5.5	5.8	5.8	5.8	5.6	5.9
	Bottom 10 Average	4.0	4.0	4.0	4.2	4.2	4.1	4.2
A. Fed's AFE Nominal $ Index	**CONSENSUS**	**108.5**	**108.2**	**108.0**	**107.6**	**106.9**	**107.8**	**106.7**
	Top 10 Average	110.8	110.5	110.9	110.8	110.6	110.7	111.2
	Bottom 10 Average	106.6	105.8	104.9	104.6	103.6	105.1	102.9
		-------------------- Year-Over-Year, % Change --------------------					Five-Year Averages	
		2021	2022	2023	2024	2025	2021-2025	2026-2030
B. Real GDP	**CONSENSUS**	**1.9**	**1.9**	**2.0**	**2.1**	**2.1**	**2.0**	**2.1**
	Top 10 Average	2.3	2.4	2.4	2.5	2.5	2.4	2.6
	Bottom 10 Average	1.5	1.4	1.6	1.8	1.8	1.6	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.0**	**2.0**	**2.0**	**2.1**	**2.0**
	Top 10 Average	2.4	2.4	2.2	2.2	2.2	2.3	2.2
	Bottom 10 Average	1.8	1.8	1.8	1.9	1.9	1.9	1.8
D. Consumer Price Index	**CONSENSUS**	**2.1**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.5	2.4	2.4	2.4	2.4	2.4	2.4
	Bottom 10 Average	1.7	1.8	1.9	1.9	1.9	1.8	1.8

Atmos Energy Corporation
Derivation of Mean Equity Risk Premium Based Studies
Using Holding Period Returns and
Projected Market Appreciation of the S&P Utility Index

Line No.		Implied Equity Risk Premium
	Equity Risk Premium based on S&P Utility Index Holding Period Returns (1):	
1.	Historical Equity Risk Premium	4.00 %
2.	Regression of Historical Equity Risk Premium (2)	6.30
3.	Forecasted Equity Risk Premium Based on PRPM (3)	4.81
4.	Forecasted Equity Risk Premium based on Projected Total Return on the S&P Utilities Index (Value Line Data) (4)	6.28
5.	Forecasted Equity Risk Premium based on Projected Total Return on the S&P Utilities Index (Bloomberg Data) (5)	4.94
6.	Average Equity Risk Premium (6)	5.27 %

Notes: (1) Based on S&P Public Utility Index monthly total returns and Moody's Public Utility Bond average monthly yields from 1928-2018. Holding period returns are calculated based upon income received (dividends and interest) plus the relative change in the market value of a security over a one-year holding period.

(2) This equity risk premium is based on a regression of the monthly equity risk premiums of the S&P Utility Index relative to Moody's A rated public utility bond yields from 1928 - 2018 referenced in note 1 above.

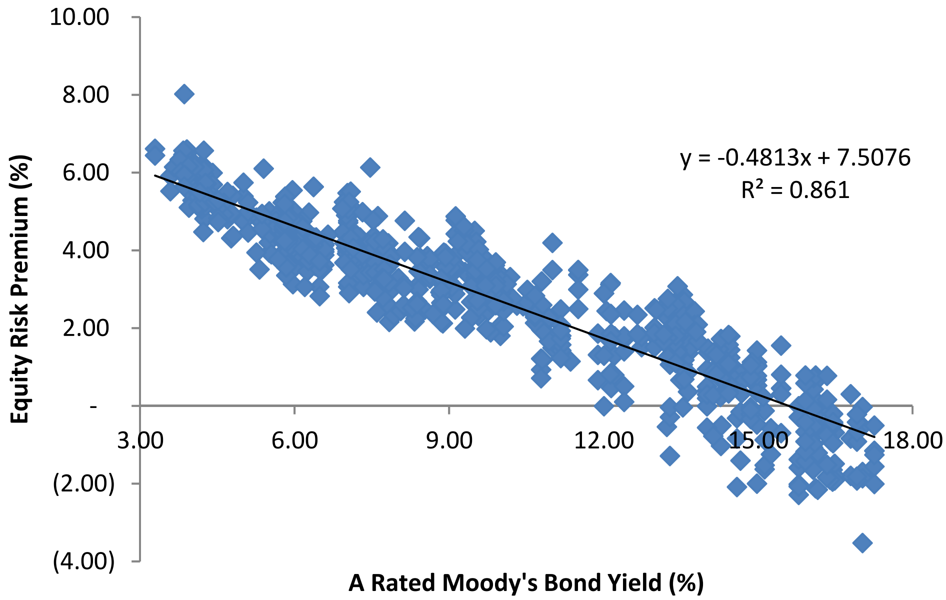
(3) The Predictive Risk Premium Model (PRPM) is applied to the risk premium of the monthly total returns of the S&P Utility Index and the monthly yields on Moody's A rated public utility bonds from January 1928 - October 2019.

(4) Using data from Value Line for the S&P Utilities Index, an expected return of 10.23% was derived based on expected dividend yields and long-term growth estimates as a proxy for market appreciation. Subtracting the expected A rated public utility bond yield of 3.95%, calculated on line 3 of page 3 of this Schedule results in an equity risk premium of 6.28%. (10.23% - 3.95% = 6.28%)

(5) Using data from Bloomberg Professional Service for the S&P Utilities Index, an expected return of 8.89% was derived based on expected dividend yields and long-term growth estimates as a proxy for market appreciation. Subtracting the expected A rated public utility bond yield of 3.95%, calculated on line 3 of page 3 of this Schedule results in an equity risk premium of 4.94%. (8.89% - 3.95% = 4.94%)

(6) Average of lines 1 through 5.

Atmos Energy Corporation
Prediction of Equity Risk Premiums Relative to
Moody's A Rated Utility Bond Yields



Constant		Slope	Prospective A Rated Utility Bond (1)		Prospective Equity Risk Premium	
7.50761	%	-0.48127	3.95	%	5.61	%

Notes:
(1) From line 3 of page 12 of this Schedule.

Source of Information: Regulatory Research Associates

Atmos Energy Corporation
Indicated Common Equity Cost Rate Through Use
of the Traditional Capital Asset Pricing Model (CAPM) and Empirical Capital Asset Pricing Model (ECAPM)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Proxy Group of Six Natural Gas Distribution Companies	Value Line Adjusted Beta	Bloomberg Adjusted Beta	Average Beta	Market Risk Premium (1)	Risk-Free Rate (2)	Traditional CAPM Cost Rate	ECAPM Cost Rate	Indicated Common Equity Cost Rate (3)
Atmos Energy Corporation	0.60	0.49	0.54	9.89 %	2.64 %	7.98 %	9.12 %	8.55 %
NW Natural Holdings	0.60	0.56	0.58	9.89	2.64	8.37	9.41	8.89
ONE Gas, Inc.	0.65	0.53	0.59	9.89	2.64	8.47	9.49	8.98
South Jersey Industries, Inc.	0.80	0.73	0.76	9.89	2.64	10.15	10.75	10.45
Southwest Gas Holdings, Inc.	0.70	0.59	0.64	9.89	2.64	8.97	9.86	9.41
Spire, Inc.	0.65	0.53	0.59	9.89	2.64	8.47	9.49	8.98
Mean			0.62			8.74 %	9.68 %	9.21 %
Median			0.59			8.47 %	9.49 %	8.98 %
Average of Mean and Median			0.61			8.61	9.59	9.10 %

Notes on page 24 of this Schedule.

Atmos Energy Corporation
Notes to Accompany the Application of the CAPM and ECAPM

Notes:

(1) The market risk premium (MRP) is derived by using six different measures from three sources: Ibbotson, Value Line, and Bloomberg as illustrated below:

Historical Data MRP Estimates:

Measure 1: Ibbotson Arithmetic Mean MRP (1926-2018)

Arithmetic Mean Monthly Returns for Large Stocks 1926-2018:	11.89	%
Arithmetic Mean Income Returns on Long-Term Government Bonds:	5.12	
MRP based on Ibbotson Historical Data:	6.77	%

Measure 2: Application of a Regression Analysis to Ibbotson Historical Data (1926-2018)	9.69	%
Measure 3: Application of the PRPM to Ibbotson Historical Data: (January 1926 - October 2019)	9.64	%

Value Line MRP Estimates:

Measure 4: Value Line Projected MRP (Thirteen weeks ending November 01, 2019)

Total projected return on the market 3-5 years hence*:	13.83	%
Projected Risk-Free Rate (see note 2):	2.64	
MRP based on Value Line Summary & Index:	11.19	%

*Forcasted 3-5 year capital appreciation plus expected dividend yield

Measure 5: Value Line Projected Return on the Market based on the S&P 500

Total return on the Market based on the S&P 500:	14.50	%
Projected Risk-Free Rate (see note 2):	2.64	
MRP based on Value Line data	11.86	%

Measure 6: Bloomberg Projected MRP

Total return on the Market based on the S&P 500:	12.81	%
Projected Risk-Free Rate (see note 2):	2.64	
MRP based on Bloomberg data	10.17	%
Average of Value Line, Ibbotson, and Bloomberg MRP:	9.89	%

(2) For reasons explained in the direct testimony, the appropriate risk-free rate for cost of capital purposes is the average forecast of 30 year Treasury Bonds per the consensus of nearly 50 economists reported in Blue Chip Financial Forecasts. (See pages 19-20 of this Schedule.) The projection of the risk-free rate is illustrated below:

Fourth Quarter 2019	2.10	%
First Quarter 2020	2.20	
Second Quarter 2020	2.20	
Third Quarter 2020	2.30	
Fourth Quarter 2020	2.40	
First Quarter 2021	2.50	
2021-2025	3.60	
2026-2030	3.80	
	2.64	%

(3) Average of Column 6 and Column 7.

Sources of Information:

Value Line Summary and Index
Blue Chip Financial Forecasts, November 1, 2019 and June 1, 2019
Stocks, Bonds, Bills, and Inflation - 2019 SBBI Yearbook, John Wiley & Sons, Inc.
Bloomberg Professional Services

Atmos Energy Corporation
Basis of Selection of the Group of Non-Price Regulated Companies
Comparable in Total Risk to the Utility Proxy Group

The criteria for selection of the Non-Price Regulated Proxy Group companies was that the non-price regulated companies be domestic and reported in Value Line Investment Survey (Standard Edition).

The Non-Price Regulated Proxy Group companies were then selected based on the unadjusted beta range of 0.27 – 0.63 and residual standard error of the regression range of 2.2534 – 2.6878 of the Utility Proxy Group.

These ranges are based upon plus or minus two standard deviations of the unadjusted beta and standard error of the regression. Plus or minus two standard deviations captures 95.50% of the distribution of unadjusted betas and residual standard errors of the regression.

The standard deviation of the Gas Utility Proxy Group's residual standard error of the regression is 0.1086. The standard deviation of the standard error of the regression is calculated as follows:

$$\text{Standard Deviation of the Std. Err. of the Regr.} = \frac{\text{Standard Error of the Regression}}{\sqrt{2N}}$$

where: N = number of observations. Since Value Line betas are derived from weekly price change observations over a period of five years, N = 259

$$\text{Thus, } 0.1086 = \frac{2.4706}{\sqrt{518}} = \frac{2.4706}{22.7596}$$

Source of Information: Value Line, Inc., September 2019
Value Line Investment Survey (Standard Edition)

Atmos Energy Corporation
Basis of Selection of Comparable Risk
Domestic Non-Price Regulated Companies

Proxy Group of Six Natural Gas Distribution Companies	[1] Value Line Adjusted Beta	[2] Unadjusted Beta	[3] Residual Standard Error of the Regression	[4] Standard Deviation of Beta
Atmos Energy Corporation	0.60	0.38	2.0435	0.0735
NW Natural Holdings	0.60	0.32	2.4392	0.0878
ONE Gas, Inc.	0.65	0.42	2.4365	0.0877
South Jersey Industries, Inc.	0.80	0.67	2.8430	0.1023
Southwest Gas Holdings, Inc.	0.70	0.48	2.7873	0.1003
Spire, Inc.	0.65	0.42	2.2742	0.0818
Average	0.67	0.45	2.4706	0.0889

Beta Range (+/- 2 std. Devs. of Beta)	0.27	0.63
2 std. Devs. of Beta	0.18	
Residual Std. Err. Range (+/- 2 std. Devs. of the Residual Std. Err.)	2.2534	2.6878
Std. dev. of the Res. Std. Err.	0.1086	
2 std. devs. of the Res. Std. Err.	0.2172	

Source of Information: Valueline Proprietary Database, September 2019

Atmos Energy Corporation
Proxy Group of Non-Price Regulated Companies
Comparable in Total Risk to the
Proxy Group of Six Natural Gas Distribution Companies

	[1]	[2]	[3]	[4]
Proxy Group of Twenty Non-Price Regulated Companies	VL Adjusted Beta	Unadjusted Beta	Residual Standard Error of the Regression	Standard Deviation of Beta
Cboe Global Markets, Inc.	0.70	0.51	2.6739	0.0962
Crown Castle International Corporatio	0.75	0.59	2.3209	0.0835
Church & Dwight Co., Inc.	0.75	0.54	2.2818	0.0821
CME Group Inc.	0.70	0.53	2.3145	0.0833
Forrester Research	0.75	0.57	2.6277	0.0946
Cedar Fair, L.P.	0.75	0.60	2.6331	0.0948
Gen'l Mills	0.75	0.55	2.4420	0.0879
Hormel Foods	0.65	0.44	2.6587	0.0957
Hershey Co.	0.70	0.50	2.4075	0.0866
J&J Snack Foods	0.70	0.53	2.4206	0.0871
Kellogg	0.65	0.44	2.3506	0.0846
Lancaster Colony	0.70	0.51	2.5200	0.0907
Lilly (Eli)	0.70	0.54	2.6089	0.0939
McCormic & Co.	0.75	0.56	2.3116	0.0832
Altria Group	0.70	0.48	2.5773	0.0927
Smucker (J.M.)	0.70	0.47	2.5680	0.0924
Sysco Corporation	0.70	0.50	2.3813	0.0857
Tootsie Roll	0.70	0.52	2.3631	0.0850
WD-40 Co.	0.75	0.56	2.3548	0.0847
Walmart Inc.	0.75	0.57	2.2786	0.0820
Average	0.72	0.53	2.4500	0.0900
Proxy Group of Six Natural Gas Distribution Companies	0.67	0.45	2.4706	0.0889

Source of Information: Valueline Proprietary Database, September 2019

Atmos Energy Corporation
Summary of Cost of Equity Models Applied to
Proxy Group of Twenty Non-Price Regulated Companies
Comparable in Total Risk to the
Proxy Group of Six Natural Gas Distribution Companies

Principal Methods	Proxy Group of Twenty Non-Price Regulated Companies	
Discounted Cash Flow Model (DCF) (1)	10.22	%
Risk Premium Model (RPM) (2)	10.47	
Capital Asset Pricing Model (CAPM) (3)	10.03	
Mean	10.24	%
Median	10.22	%
Average of Mean and Median	10.23	%

Notes:
(1) From page 29 of this Schedule.
(2) From page 30 of this Schedule.
(3) From page 33 of this Schedule.

Atmos Energy Corporation
DCF Results for the Proxy Group of Non-Price-Regulated Companies Comparable in Total Risk to the
Proxy Group of Six Natural Gas Distribution Companies

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Proxy Group of Twenty Non-Price Regulated Companies	Average Dividend Yield	Value Line Projected Five Year Growth in EPS	Zack's Five Year Projected Growth Rate in EPS	Yahoo! Finance Projected Five Year Growth in EPS	Average Projected Five Year Growth Rate in EPS	Adjusted Dividend Yield	Indicated Common Equity Cost Rate (1)
Cboe Global Markets, Inc.	1.23 %	14.50 %	9.00 %	2.75 %	8.75 %	1.28 %	10.03 %
Crown Castle International Corp	3.40	12.00	15.50	21.00	16.17	3.67	19.84
Church & Dwight Co., Inc.	1.20	9.00	8.80	8.31	8.70	1.25	9.95
CME Group Inc.	1.42	3.00	7.00	5.68	5.23	1.46	6.69
Forrester Research	-	8.50	12.00	12.00	10.83	-	NA
Cedar Fair, L.P.	6.62	10.50	7.00	6.00	7.83	6.88	14.71
Gen'l Mills	3.65	4.00	7.00	6.87	5.96	3.76	9.72
Hormel Foods	1.99	9.00	8.50	2.90	6.80	2.06	8.86
Hershey Co.	2.01	6.50	7.30	8.75	7.52	2.09	9.61
J&J Snack Foods	1.04	7.50	NA	6.00	6.75	1.08	7.83
Kellogg	3.62	4.00	4.50	(0.80)	4.25	3.70	7.95
Lancaster Colony	1.80	7.50	NA	3.00	5.25	1.85	7.10
Lilly (Eli)	2.32	11.50	10.60	10.55	10.88	2.45	13.33
McCormic & Co.	1.40	8.00	8.00	8.45	8.15	1.46	9.61
Altria Group	7.65	8.50	6.40	6.59	7.16	7.92	15.08
Smucker (J.M.)	3.25	5.00	3.70	3.30	4.00	3.32	7.32
Sysco Corporation	3.25	10.50	9.50	10.55	10.18	3.42	13.60
Tootsie Roll	3.25	5.50	NA	9.00	7.25	3.37	10.62
WD-40 Co.	3.25	8.50	NA	10.00	9.25	3.40	12.65
Walmart Inc.	3.25	7.50	4.70	4.56	5.59	3.34	8.93
						Mean	10.71 %
						Median	9.72 %
						Average of Mean and Median	10.22 %

NA= Not Available
NMF= Not Meaningful Figure

(1) The application of the DCF model to the domestic, non-price regluated comparable risk companies is identical to the application of the DCF to the utility proxy group. The dividend yield is derived by using the 60 day average price and the spot indicated dividend as of October 31, 2019. The dividend yield is then adjusted by 1/2 the average projected growth rate in EPS, which is calculated by averaging the 5 year projected growth in EPS provided by Value Line, www.zacks.com, and www.yahoo.com (excluding any negative growth rates) and then adding that growth rate to the adjusted dividend yield.

Source of Information: Value Line Investment Survey
www.zacks.com Downloaded on 10/31/2019
www.yahoo.com Downloaded on 10/31/2019

Atmos Energy Corporation
Indicated Common Equity Cost Rate
Through Use of a Risk Premium Model
Using an Adjusted Total Market Approach

Line No.		Proxy Group of Twenty Non-Price Regulated Companies
1.	Prospective Yield on Baa Rated Corporate Bonds (1)	4.55 %
2.	Adjustment to Reflect Bond rating Difference of Non-Price Regulated Companies	(0.37) (2)
3.	Adjusted Prospective Bond Yield	4.18
4.	Equity Risk Premium (3)	6.29
5.	Risk Premium Derived Common Equity Cost Rate	10.47 %

Notes: (1) Average forecast of Baa corporate bonds based upon the consensus of nearly 50 economists reported in Blue Chip Financial Forecasts dated November 1, 2019 and June 1, 2019 (see pages 19-20 of this Schedule). The estimates are detailed below.

Fourth Quarter 2019	4.00 %
First Quarter 2020	4.00
Second Quarter 2020	4.10
Third Quarter 2020	4.20
Fourth Quarter 2020	4.30
First Quarter 2021	4.40
2021-2025	5.60
2026-2030	5.80
Average	4.55 %

(2) To reflect the A3 average rating of the non-utility proxy group, the prosepctive yield on Baa corporate bonds must be adjusted downward by 1/3 of the spread between A and Baa corporate bond yields as shown below:

	A Corp. Bond Yield	Baa Corp. Bond Yield	Spread
Oct-2019	3.37 %	3.93 %	0.56 %
Sep-2019	3.37	3.91	0.54
Aug-2019	3.32	3.87	0.55
		Average yield spread	0.55 %
		2/3 of spread	0.37 %

(3) From page 32 of this Schedule.

Atmos Energy Corporation
Comparison of Long-Term Issuer Ratings for the
Proxy Group of Twenty Non-Price Regulated Companies of Comparable risk to the
Proxy Group of Six Natural Gas Distribution Companies

	Moody's Long-Term Issuer Rating October 2019		Standard & Poor's Long-Term Issuer Rating October 2019	
Proxy Group of Twenty Non-Price Regulated Companies	Long-Term Issuer Rating	Numerical Weighting (1)	Long-Term Issuer Rating	Numerical Weighting (1)
Cboe Global Markets, Inc.	A3	7.0	A-	7.0
Crown Castle International Corporation	Baa3	10.0	BBB-	10.0
Church & Dwight Co., Inc.	A3	7.0	BBB+	8.0
CME Group Inc.	Aa3	4.0	AA-	4.0
Forrester Research	NR	--	NR	--
Cedar Fair, L.P.	B1	14.0	BB	12.0
Gen'l Mills	Baa2	9.0	BBB	9.0
Hormel Foods	A1	5.0	A	6.0
Hershey Co.	A1	5.0	A	6.0
J&J Snack Foods	NR	--	NR	--
Kellogg	Baa2	9.0	BBB	9.0
Lancaster Colony	NR	--	NR	--
Lilly (Eli)	A2	6.0	A+	5.0
McCormic & Co.	Baa2	9.0	BBB	9.0
Altria Group	A3	7.0	BBB	9.0
Smucker (J.M.)	Baa2	9.0	BBB	9.0
Sysco Corporation	A3	7.0	BBB+	8.0
Tootsie Roll	NR	--	NR	--
WD-40 Co.	NR	--	NR	--
Walmart Inc.	Aa2	3.0	AA	3.0
Average	A3	7.4	BBB+	7.6

Notes:
(1) From page 15 of this Schedule.

Source of Information:
Bloomberg Professional Services

Atmos Energy Corporation
Derivation of Equity Risk Premium Based on the Total Market Approach
Using the Beta for
Proxy Group of Twenty Non-Price Regulated Companies of Comparable risk to the
Proxy Group of Six Natural Gas Distribution Companies

Line No.	Equity Risk Premium Measure	Proxy Group of Twenty Non-Price Regulated Companies
	Ibbotson-Based Equity Risk Premiums:	
1.	Ibbotson Equity Risk Premium (1)	5.54 %
2.	Regression on Ibbotson Risk Premium Data (2)	8.69
3.	Ibbotson Equity Risk Premium based on PRPM (3)	8.59
5.	Equity Risk Premium Based on Value Line Summary and Index (4)	10.22
6.	Equity Risk Premium Based on Value Line S&P 500 Companies (5)	10.89
8.	Equity Risk Premium Based on Bloomberg S&P 500 Companies (6)	9.20
9.	Conclusion of Equity Risk Premium	8.86 %
10.	Adjusted Beta (7)	0.71
11.	Forecasted Equity Risk Premium	6.29 %

Notes:
(1) From note 1 of page 18 of this Schedule.
(2) From note 2 of page 18 of this Schedule.
(3) From note 3 of page 18 of this Schedule.
(4) From note 4 of page 18 of this Schedule.
(5) From note 5 of page 18 of this Schedule.
(6) From note 6 of page 18 of this Schedule.
(7) Average of mean and median beta from page 33 of this Schedule.

Sources of Information:
Stocks, Bonds, Bills, and Inflation - 2019 SBBI Yearbook, John Wiley & Sons, Inc.
Value Line Summary and Index
Blue Chip Financial Forecasts, November 1, 2019 and June 1, 2019
Bloomberg Professional Services

Atmos Energy Corporation
Traditional CAPM and ECAPM Results for the Proxy Group of Non-Price-Regulated Companies Comparable in Total Risk to the
Proxy Group of Six Natural Gas Distribution Companies

Proxy Group of Twenty Non-Price Regulated Companies	[1] Value Line Adjusted Beta	[2] Bloomberg Beta	[3] Average Beta	[4] Market Risk Premium (1)	[5] Risk-Free Rate (2)	[6] Traditional CAPM Cost Rate	[7] ECAPM Cost Rate	[8] Indicated Common Equity Cost Rate (3)
Cboe Global Markets, Inc.	0.70	0.75	0.72	9.89 %	2.64 %	9.76 %	10.45 %	10.10 %
Crown Castle International Corporation	0.75	0.69	0.72	9.89	2.64	9.76	10.45	10.10
Church & Dwight Co., Inc.	0.75	0.65	0.70	9.89	2.64	9.56	10.30	9.93
CME Group Inc.	0.70	0.60	0.65	9.89	2.64	9.07	9.93	9.50
Forrester Research	0.75	1.14	0.95	9.89	2.64	12.03	12.16	12.09
Cedar Fair, L.P.	0.80	0.66	0.73	9.89	2.64	9.86	10.52	10.19
Gen'l Mills	0.75	0.75	0.75	9.89	2.64	10.05	10.67	10.36
Hormel Foods	0.65	0.58	0.62	9.89	2.64	8.77	9.71	9.24
Hershey Co.	0.70	0.58	0.64	9.89	2.64	8.97	9.86	9.41
J&J Snack Foods	0.70	0.59	0.65	9.89	2.64	9.07	9.93	9.50
Kellogg	0.65	0.63	0.64	9.89	2.64	8.97	9.86	9.41
Lancaster Colony	0.70	0.46	0.58	9.89	2.64	8.37	9.41	8.89
Lilly (Eli)	0.70	0.84	0.77	9.89	2.64	10.25	10.82	10.54
McCormic & Co.	0.75	0.69	0.72	9.89	2.64	9.76	10.45	10.10
Altria Group	0.70	0.77	0.74	9.89	2.64	9.96	10.60	10.28
Smucker (J.M.)	0.70	0.64	0.67	9.89	2.64	9.26	10.08	9.67
Sysco Corporation	0.70	0.75	0.73	9.89	2.64	9.86	10.52	10.19
Tootsie Roll	0.70	0.45	0.58	9.89	2.64	8.37	9.41	8.89
WD-40 Co.	0.75	0.76	0.75	9.89	2.64	10.05	10.67	10.36
Walmart Inc.	0.75	0.77	0.76	9.89	2.64	10.15	10.75	10.45
Mean			0.70			9.60 %	10.33 %	9.96 %
Median			0.72			9.76 %	10.45 %	10.10 %
Average of Mean and Median			0.71			9.68 %	10.39 %	10.03 %

Notes:
(1) From note 1 of page 24 of this Schedule.
(2) From note 2 of page 24 of this Schedule.
(3) Average of CAPM and ECAPM cost rates.

Atmos Energy Corporation
Derivation of the Flotation Cost Adjustment to the Cost of Common Equity

Equity Issuances and Flotation Costs for FY 2018, 2017, and 2016

Fiscal Year	Transaction (1)	[Column 1] Shares Issued	[Column 2] Average Offering Price per Share	[Column 3] Net Proceeds per Share (2)	[Column 4] Gross Equity Issue before Costs	[Column 5] Total Net Proceeds	[Column 6] Total Flotation Costs (3)	[Column 7] Flotation Cost Percentage (4)
2018	At the Market Equity Offering	4,558,404	$ 87.7500	$ 86.6751	$ 400,000,000	$ 395,100,000	$ 4,900,000	1.23%
2017	At the Market Equity Offering	1,303,494	$ 76.7169	$ 75.7963	$ 100,000,000	$ 98,800,000	$ 1,200,000	1.20%
2016	At the Market Equity Offering	1,360,756	$ 73.4886	$ 72.4597	$ 100,000,000	$ 98,600,000	$ 1,400,000	1.40%
					$ 600,000,000	$ 592,500,000	$ 7,500,000	1.25%

Flotation Cost Adjustment

	Average Dividend Yield	Average Projected EPS Growth Rate	Adjusted Dividend Yield	Average DCF Cost Rate Unadjusted for Flotation (5)	DCF Cost Rate Adjusted for Flotation (6)	Flotation Cost Adjustment (7)
Proxy Group of Six Natural Gas Distribution Companies	2.60 %	6.47 %	2.68 %	9.15 %	9.18 %	0.03 %

See page 35 of this Schedule for notes.

Source of Information: Atmos Energy Corporation 2018 SEC Form 10-K

Atmos Energy Corporation
Notes to Accompany the
Derivation of the Flotation Cost Adjustment to the Cost of Common Equity

(1) Company-provided.

(2) Column 5 / Column 1.

(3) Column 4 - Column 5.

(4) Column 6 / Column 4.

(5) Using the average growth rate from page 3 of this Schedule.

(6) Adjustment for flotation costs based on adjusting the average DCF constant growth cost rate in accordance with the following:

$$K = \frac{D(1+0.5g)}{P(1-F)} + g,$$

where g is the growth factor and F is the percentage of flotation costs.

(7) Flotation cost adjustment of 0.03% equals the difference between the flotation adjusted average DCF cost rate of 9.18% and the unadjusted average DCF cost rate of 9.15% of the Utility Proxy Group.

Source of Information:

Company 2017 and 2018 SEC Form 10-K

Atmos Energy Corporation
Value Added by Industry (Billions of dollars) 1947-2018

Line		1947	1948	1949	1950	1951	2014	2015	2016	2017	2018	1947-2018	1947	2018	Change
1	**Gross domestic product**	249.6	274.5	272.5	299.8	346.9	17527.3	18224.8	18715	19519.4	20580.2	6.41%	100.00%	100.00%	
2	**Private industries**	216.1	241.3	237.7	264.1	302.4	15255.9	15883.9	16326.1	17065.8	18035.6	**6.43%**	86.58%	87.64%	1.06%
3	**Agriculture, forestry, fishing, and hunting**	19.9	23.2	18.6	19.9	23	201	180.7	164.3	174.6	166.5	3.04%	7.97%	0.81%	-7.16%
4	**Mining**	5.8	7.7	6.6	7.6	8.4	416.4	259.9	215.6	287.3	346.6	5.93%	2.32%	1.68%	-0.64%
5	**Utilities**	3.5	3.9	4.4	4.9	5.6	298.1	299.2	302.4	315.1	325.9	**6.59%**	1.40%	1.58%	0.18%
6	**Construction**	8.9	11.1	11.2	12.8	15.2	636.9	695.6	745.5	790.4	839.1	**6.61%**	3.57%	4.08%	0.51%
7	**Manufacturing**	63.4	71	69	80.3	95.8	2050.2	2126.5	2101.2	2185.1	2321.2	5.20%	25.40%	11.28%	-14.12%
8	**Wholesale trade**	15.6	17.1	16.6	18.7	21.3	1088.2	1142.5	1133.8	1164.6	1212.2	6.32%	6.25%	5.89%	-0.36%
9	**Retail trade**	23.2	24.5	24.9	26	28.4	974.5	1024.7	1056.5	1084.3	1126.9	5.62%	9.29%	5.48%	-3.82%
10	**Transportation and warehousing**	14.1	15.5	15.1	16.7	19	521.8	564.4	580.8	612.4	658.1	5.56%	5.65%	3.20%	-2.45%
11	**Information**	7.7	8.4	9.1	9.7	10.5	842.4	898	959.3	997.6	1067.7	**7.19%**	3.08%	5.19%	2.10%
12	**Finance, insurance, real estate, rental, and leasing**	25.8	28.4	30.8	33.8	37.7	3548	3753.5	3930.2	4088.5	4301.6	**7.47%**	10.34%	20.90%	10.57%
13	**Professional and business services**	8.2	9	9.3	10.4	12	2118.4	2234.9	2302.5	2427.6	2579.4	**8.44%**	3.29%	12.53%	9.25%
14	**Educational services, health care, and social assistance**	4.6	5.2	5.5	5.9	6.5	1491.9	1571.9	1650.7	1708.9	1792.5	**8.76%**	1.84%	8.71%	6.87%
15	**Arts, entertainment, recreation, accommodation, and food services**	8	8.5	8.6	8.9	9.7	691.4	739.7	781.3	815.4	860.6	**6.81%**	3.21%	4.18%	0.98%
16	**Other services, except government**	7.5	7.8	8	8.6	9.3	376.6	392.4	402.1	414.1	437.2	5.89%	3.00%	2.12%	-0.88%
17	**Government**	33.5	33.2	34.8	35.7	44.5	2271.4	2340.8	2388.9	2453.6	2544.6	6.29%	13.42%	12.36%	-1.06%

Note. Detail may not add to total due to rounding.

Source of Information: Bureau of Economic Analysis, Release Date: October 29, 2019

Atmos Energy Corporation
Correction of Mr. Gatewood's DCF Analysis

	Dividend Yields						DCF	DCF Estimated Required Return	
	Min	Max	Value Line EPS	IBES EPS	FactSet EPS	Zacks	Growth Rate	Min	Max
Atmos Energy, Corp.	1.98%	2.55%	7.50%	6.50%	5.50%	6.70%	6.55%	8.53%	9.10%
Northwest Natural Gas, Co.	2.68%	3.44%	7.80%	4.00%	4.50%	4.50%	5.20%	7.88%	8.64%
One Gas, Inc.	2.28%	2.86%	8.00%	5.00%	5.67%	5.90%	6.14%	8.42%	9.00%
South Jersey Industries, Inc.	3.40%	4.80%	10.50%	4.60%	6.38%	6.60%	7.02%	10.42%	11.82%
Spire, Inc.	2.80%	3.49%	5.50%	2.71%	4.11%	4.40%	4.18%	6.98%	7.67%
Southwest Gas Holdings, Inc.	2.47%	3.16%	9.00%	6.10%	5.67%	6.20%	6.74%	9.22%	9.91%
							Mean	8.57%	9.36%
								8.97%	

Source of information: Gatewood workpapers

Atmos Energy Corporation
Correction of Mr. Gatewood's CAPM Analysis

		CAPM Result
Projected CAPM Analyses:		
MRP using Value Line Summary & Index Projected Market Returns (1):		9.94%
MRP using Market DCF (Value Line Data) (2):		11.13%
MRP using Market DCF (Bloomberg Data) (3):		10.99%
	Average Projected CAPM Result	10.69%
Historical CAPM Analysis (4)		9.50%
	Indicated CAPM Result	10.10%

Notes:
(1) From page 2 of this Schedule.
(2) From page 3 of this Schedule.
(3) From page 4 of this Schedule.
(4) From page 5 of this Schedule.

Atmos Energy Corporation
Correction of Mr. Gatewood's CAPM Analysis

Capital Asset Pricing Model -- Forecasted Risk Premium
Using Forecasted Market Returns & Treasury Bond Yields
from Value Line Summary & Index and Blue Chip Financial Forecasts
19-ATMG-525-RTS

			Low Beta	High Beta	Avg Beta
1)	Forecasted Returns 3-5 Capital Appreciation on Common Stocks		10.67%	10.67%	10.67%
2)	Forecasted Dividend Yield	+	2.20%	2.20%	2.20%
3)	Forecasted Total Return on 30-Year T-Bonds	-	2.71%	2.71%	2.71%
4)	Equity Risk Premium		10.16%	10.16%	10.16%
5)	Beta Coefficient	X	0.60	0.80	0.67
6)	Beta Adjusted Risk Premium		6.09%	8.13%	6.81%
7)	Forecasted Total Return on 30-Year T-Bonds	+	2.71%	2.71%	2.71%
8)	CAPM Cost of Equity		8.81%	10.84%	9.52%
9)	ECAPM Cost of Equity		9.82%	11.35%	10.36%
10)	Average CAPM Cost of Equity		9.31%	11.09%	9.94%

1) Value Line Summary & Index, September 20, 2019
2) Value Line Summary & Index, September 20, 2019
3) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
4) Resulting risk premium (sum of Rows 1-2 less Row 3).
5) Beta coefficient range of proxy group reported by Value-Line.
6) Row 4 x Row 5 = asset specific risk premium.
7) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
8) Forecasted cost of equity capital row 5 + row 6.
9) (Row 6 x .75 + Row 4 x .25) + Row 7

Sources:
Value Line Summary & Index, September 20, 2019
Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
Gatewood electronic workpapers

Atmos Energy Corporation
Correction of Mr. Gatewood's CAPM Analysis

Capital Asset Pricing Model -- Forecasted Risk Premium
Forecasted Market Returns & Treasury Bond Yields
using a Market Capitalization Weighted DCF on the S&P 500 using Value Line Data
19-ATMG-525-RTS

		Low Beta	High Beta	Avg Beta
1) Forecasted Returns on Common Stocks		14.55%	14.55%	14.55%
2) Forecasted Total Return on 30 Year U.S. T-Bonds	-	2.71%	2.71%	2.71%
3) Equity Risk Premium		11.84%	11.84%	11.84%
4) Beta Coefficients of Proxy Group	x	0.60	0.80	0.67
5) Beta Adjusted Risk Premium		7.10%	9.47%	7.93%
6) Forecasted Yield on 30-Year T-Bonds	+	2.71%	2.71%	2.71%
7) Cost of Equity - Traditional CAPM		9.82%	12.18%	10.64%
8) Cost of Equity - Empirical CAPM		11.00%	12.77%	11.62%
9) Average CAPM Cost of Equity		10.41%	12.48%	11.13%

1) Market capitalization weighted DCF of the members of the S&P 500 using Value Line data
2) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
3) Resulting risk premium (1-2)
4) Beta coefficient range of proxy group reported by Value-Line.
5) Proxy Group risk premium
6) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
7) Forecasted cost of equity capital row 5 + row 6.

Sources:
Value Line Investment Analyzer, as of September 13, 2019
Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
Gatewood electronic workpapers

Atmos Energy Corporation
Correction of Mr. Gatewood's CAPM Analysis

Capital Asset Pricing Model -- Forecasted Risk Premium
Forecasted Market Returns & Treasury Bond Yields
using a Market Capitalization Weighted DCF on the S&P 500 using Bloomberg Data
19-ATMG-525-RTS

		Low Beta	High Beta	Avg Beta
1) Forecasted Returns on Common Stocks		14.35%	14.35%	14.35%
2) Forecasted Total Return on 30 Year U.S. T-Bonds	-	2.71%	2.71%	2.71%
3) Equity Risk Premium		11.64%	11.64%	11.64%
4) Beta Coefficients of Proxy Group	x	0.60	0.80	0.67
5) Beta Adjusted Risk Premium		6.98%	9.31%	7.80%
6) Forecasted Total Return on 30 Year U.S. T-Bonds	+	2.71%	2.71%	2.71%
7) Cost of Equity - Traditional CAPM		9.70%	12.02%	10.51%
8) Cost of Equity - Empirical CAPM		10.86%	12.60%	11.47%
9) Average CAPM Cost of Equity		10.28%	12.31%	10.99%

1) Market capitalization weighted DCF of the members of the S&P 500 using Bloomberg data
2) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
3) Resulting risk premium (1-2)
4) Beta coefficient range of proxy group reported by Value-Line.
5) Proxy Group risk premium
6) Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
7) Forecasted cost of equity capital row 5 + row 6.

Sources:
Bloomberg professional services
Blue Chip Financial Forecasts, September 1, 2019 and June 1, 2019
Gatewood electronic workpapers

Atmos Energy Corporation
Correction of Mr. Gatewood's CAPM Analysis

Capital Asset Pricing Model -- Historic Risk Premium
Based on Historic Arithmetic Risk Premiums
from 1928 to 2018

			Low Beta	High Beta	Avg Beta
1)	Total Returns on Common Stocks		11.36%	11.36%	11.36%
2)	Historic Yield on Government Bonds	-	5.00%	5.00%	5.00%
3)	Resulting Risk Premium		6.36%	6.36%	6.36%
4)	Beta Coefficient	x	0.60	0.80	0.67
5)	Risk Premium		3.82%	5.09%	4.24%
6)	Historic Yield on Government Bonds	+	5.00%	5.00%	5.00%
7)	Traditional CAPM Result		8.82%	10.09%	9.24%
8)	ECAPM Result		9.45%	10.41%	9.77%
9)	Average CAPM Result		9.13%	10.25%	9.50%

1) Historic returns on common stocks 1928-2018
2) Historic income returns on long-term government bonds 1928-2018 from SBBI-2019
3) Resulting risk premium (1-2)
4) Beta coefficient of the proxy group (Reported by Value-Line)
5) Row 3 x Row 4 = Asset Specific Risk Premium
6) Historic income returns on long-term government bonds 1928-2018 from SBBI-2019
7) Forecasted cost of equity capital, row 5 + row 6
8) (Row 5 x .75 + Row 3 x .25) +Row 6
9) Average of Rows 7 and 8

Sources: Damodaran Online
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html
Stocks, Bonds, Bills, and Inflation - 2019 SBBI Yearbook, John Wiley & Sons, Inc.
& Value-Line Investment Survey.
Gatewood workpapers

Atmos Energy Corporation
Portfolio Ranks by Size and Risk Premiums over CAPM Results
as Compiled by Duff and Phelps 2019 Guide to Cost of Capital

	B-1		B-2		B-3		B-5		B-6		B-7		B-8	
Portfolio Rank by Size	Market Val. of Equity (in $millions)	Smoothed Premium over CAPM	Average Book Val. (in $millions)	Smoothed Premium over CAPM	5-yr Net Income (in $millions)	Smoothed Premium over CAPM	Total Assets (in $millions)	Smoothed Premium over CAPM	5-yr EBITDA (in $millions)	Smoothed Premium over CAPM	Sales (in $millions)	Smoothed Premium over CAPM	Average Number of Employees	Smoothed Premium over CAPM
1	$183,530 and Up	-1.58%	$39,064 and Up	0.70%	$6,979.75 and Up	0.55%	$118,454 and Up	0.42%	$14,966 and Up	0.77%	$83,836 and Up	0.66%	224,700 and Up	0.32%
2	$58,770 - $183,530	-0.17%	$14,329 - $39,064	1.38%	$2,414 - $6,979	1.31%	$49,025 - $118,454	1.13%	$5,581 - $14,966	1.45%	$30,694 - $83,836	1.41%	87,395 - 224,700	1.17%
3	$36,102 - $58,770	0.39%	$9,398 - $14,329	1.63%	$1,520 - $2,414	1.57%	$32,779 - $49,025	1.40%	$3,721 - $5,581	1.69%	$18,880 - $30,694	1.81%	58,282 - 87,395	1.52%
4	$25,511 - $36,102	0.79%	$6,536 - $9,398	1.83%	$1,002 - $1,520	1.85%	$22,606 - $32,779	1.65%	$2,662 - $3,721	1.89%	$14,299 - $18,880	1.99%	44,136 - 58,282	1.75%
5	$19,083 - $25,511	1.08%	$4,972 - $6,536	2.02%	$740 - $1,002	2.04%	$16,793 - $22,606	1.87%	$1,961 - $2,662	2.06%	$11,160 - $14,299	2.17%	34,651 - 44,136	1.92%
6	$14,850 - $19,083	1.39%	$4,216 - $4,972	2.12%	$574 - $740	2.19%	$13,244 - $16,793	2.02%	$1,512 - $1,961	2.22%	$9,136 - $11,160	2.31%	27,046 - 34,651	2.10%
7	$12,298 - $14,850	1.58%	$3,539 - $4,216	2.20%	$457 - $574	2.32%	$10,530 - $13,244	2.18%	$1,250 - $1,512	2.34%	$7,727 - $9,136	2.43%	21,476 - 27,046	2.29%
8	$10,226 - $12,298	1.78%	$2,887 - $3,539	2.32%	$372 - $457	2.46%	$8,750 - $10,530	2.31%	$1,028 - $1,250	2.43%	$6,699 - $7,727	2.52%	17,789 - 21,476	2.44%
9	$8,627 - $10,226	1.96%	$2,403 - $2,887	2.42%	$312 - $372	2.56%	$7,383 - $8,750	2.42%	$825 - $1,028	2.56%	$5,696 - $6,699	2.61%	15,100 - 17,789	2.57%
10	$7,351 - $8,627	2.12%	$2,055 - $2,403	2.52%	$264 - $312	2.66%	$6,290 - $7,383	2.53%	$697 - $825	2.67%	$4,671 - $5,696	2.73%	13,149 - 15,100	2.68%
11	$6,241 - $7,351	2.29%	$1,799 - $2,055	2.59%	$230 - $264	2.75%	$5,360 - $6,290	2.62%	$619 - $697	2.74%	$3,861 - $4,671	2.87%	11,535 - 13,149	2.77%
12	$5,361 - $6,241	2.46%	$1,588 - $1,799	2.66%	$204 - $230	2.82%	$4,546 - $5,360	2.73%	$543 - $619	2.80%	$3,312 - $3,861	2.97%	10,137 - 11,535	2.87%
13	$4,586 - $5,361	2.60%	$1,400 - $1,588	2.73%	$179 - $204	2.89%	$3,885 - $4,546	2.83%	$466 - $543	2.89%	$2,867 - $3,312	3.07%	8,921 - 10,137	2.96%
14	$3,853 - $4,586	2.79%	$1,230 - $1,400	2.80%	$150 - $179	2.97%	$3,273 - $3,885	2.93%	$404 - $466	2.97%	$2,506 - $2,867	3.16%	7,763 - 8,921	3.06%
15	$3,319 - $3,853	2.95%	$1,069 - $1,230	2.87%	$124 - $150	3.09%	$2,780 - $3,273	3.05%	$357 - $404	3.04%	$2,209 - $2,506	3.24%	6,656 - 7,763	3.16%
16	$2,915 - $3,319	3.09%	$930 - $1,069	2.95%	$104 - $124	3.19%	$2,423 - $2,780	3.14%	$311 - $357	3.11%	$1,944 - $2,209	3.32%	5,574 - 6,656	3.29%
17	$2,530 - $2,915	3.22%	$811 - $930	3.02%	$89 - $104	3.28%	$2,092 - $2,423	3.23%	$266 - $311	3.20%	$1,723 - $1,944	3.41%	4,653 - 5,574	3.42%
18	$2,120 - $2,530	3.38%	$686 - $811	3.10%	$74 - $89	3.37%	$1,750 - $2,092	3.33%	$222 - $266	3.28%	$1,526 - $1,723	3.48%	3,852 - 4,653	3.56%
19	$1,713 - $2,120	3.59%	$574 - $686	3.20%	$60 - $74	3.49%	$1,441 - $1,750	3.46%	$178 - $222	3.40%	$1,278 - $1,526	3.56%	3,145 - 3,852	3.70%
20	$1,379 - $1,713	3.82%	$483 - $574	3.30%	$47 - $60	3.62%	$1,184 - $1,441	3.58%	$142 - $178	3.52%	$1,007 - $1,278	3.71%	2,529 - 3,145	3.86%
21	$1,112 - $1,379	4.03%	$404 - $483	3.39%	$36 - $47	3.77%	$934 - $1,184	3.72%	$112 - $142	3.65%	$797 - $1,007	3.87%	1,986 - 2,529	4.02%
22	$867 - $1,112	4.27%	$331 - $404	3.49%	$27 - $36	3.92%	$708 - $934	3.89%	$88 - $112	3.79%	$626 - $797	4.01%	1,495 - 1,986	4.21%
23	$633 - $867	4.54%	$256 - $331	3.61%	$19 - $27	4.09%	$512 - $708	4.07%	$65 - $88	3.92%	$460 - $626	4.19%	1,079 - 1,495	4.45%
24	$334 - $633	4.94%	$150 - $256	3.78%	$10 - $19	4.32%	$287 - $512	4.31%	$35 - $65	4.13%	$247 - $460	4.42%	595 - 1,079	4.69%
25	Up to $334	6.15%	Up to $150	4.31%	Up to $10	4.90%	Up to $287	4.94%	Up to $35	4.75%	Up to $247	5.17%	Up to 595	5.53%

	B-1 Value	Portfolio Ranking		B-2 Value	Portfolio Ranking	B-3 Value	Portfolio Ranking	B-5 Value	Portfolio Ranking	B-6 Value	Portfolio Ranking	B-7 Value	Portfolio Ranking	B-8 Value	Portfolio Ranking
Gatewood Proxy Group	$ 4,421	14		$ 2,225	10	$ 157	14	$ 6,791	10	$ 466	13	$ 1,989	16	2,612	20
Woolridge Proxy Group	$ 4,595	13		$ 2,338	10	$ 156	14	$ 7,598	9	$ 491	13	$ 2,306	15	2,854	20
Atmos Kansas	$ 300	25	(1)	$ 132.86	25	$ 14.39	24	$ 221.00	25	$ 26.23	25	$ 132.37	25	150	25
ATO KS' Indicated Risk Premium Relative to Gatewood Group	**3.36%**			**1.79%**		**1.35%**		**2.41%**		**1.86%**		**1.85%**		**1.67%**	
ATO KS' Indicated Risk Premium Relative to Woolridge Group	**3.55%**			**1.79%**		**1.35%**		**2.52%**		**1.86%**		**1.93%**		**1.67%**	

Sources of Information:

Duff & Phelps 2019 Cost of Capital Navigator
SNL Financial
Company Form 10-K
Bloomberg Professional Services
(1) Book value of common equity was calculated by multiplying ATO KS' rate base by the proposed equity ratio .

Atmos Energy Corporation
Authorized Returns for Natural Gas Distribution Utilties
2018 to Present

State	Company	Docket	Date	Decision Type	Return on Equity (%)
Illinois	Northern Illinois Gas Co.	D-17-0124	1/31/2018	Fully Litigated	9.80
Missouri	Missouri Gas Energy	C-GR-2017-0216	2/21/2018	Fully Litigated	9.80
Missouri	Spire Missouri Inc.	C-GR-2017-0215	2/21/2018	Fully Litigated	9.80
Maine	Northern Utilities Inc.	D-2017-00065	2/28/2018	Fully Litigated	9.50
New York	Niagara Mohawk Power Corp.	C-17-G-0239	3/15/2018	Settled	9.00
Florida	Pivotal Utility Holdings Inc.	20170179-GU	3/26/2018	Settled	10.19
Washington	Avista Corp.	D-UG-170486	4/26/2018	Fully Litigated	9.50
New Hampshire	Liberty Utilities EnergyNorth	D-DG-17-048	4/27/2018	Fully Litigated	9.30
New Hampshire	Northern Utilities Inc.	D-DG-17-070	5/2/2018	Settled	9.50
Kentucky	Atmos Energy Corp.	C-2017-00349	5/3/2018	Fully Litigated	9.70
Montana	MDU Resources Group Inc.	D2017.9.79	5/29/2018	Settled	9.40
Missouri	Liberty Utilities (Midstates)	C-GR-2018-0013	6/6/2018	Settled	9.80
New York	Central Hudson Gas & Electric	C-17-G-0460	6/14/2018	Settled	8.80
Wyoming	Black Hills Northwest Wyoming	D-30011-97-GR-17	7/16/2018	Settled	9.60
Washington	Cascade Natural Gas Corp.	D-UG-170929	7/20/2018	Settled	9.40
Rhode Island	Narragansett Electric Co.	D-4770 (gas)	8/24/2018	Settled	9.28
Michigan	Consumers Energy Co.	C-U-18424	8/28/2018	Settled	10.00
Michigan	DTE Gas Co.	C-U-18999	9/13/2018	Fully Litigated	10.00
Wisconsin	Wisconsin Power and Light Co	D-6680-UR-121 (Gas)	9/14/2018	Settled	10.00
Indiana	Northern IN Public Svc Co.	Ca-44988	9/19/2018	Settled	9.85
Wisconsin	Madison Gas and Electric Co.	D-3270-UR-122 (Gas)	9/20/2018	Settled	9.80
North Dakota	MDU Resources Group Inc.	C-PU-17-295	9/26/2018	Settled	9.40
South Carolina	Piedmont Natural Gas Co.	D-2018-7-G	9/26/2018	Settled	10.20
Massachusetts	Boston Gas Co.	DPU-17-170 (Boston Gas)	9/28/2018	Fully Litigated	9.50
Massachusetts	Colonial Gas Co.	DPU-17-170 (Colonial Gas)	9/28/2018	Fully Litigated	9.50
Arkansas	Black Hills Energy Arkansas	D-17-071-U	10/5/2018	Settled	9.61
Tennessee	Chattanooga Gas Co.	D-18-00017	10/15/2018	Settled	9.80
Oregon	Northwest Natural Gas Co.	D-UG-344	10/26/2018	Settled	9.40
New Jersey	Public Service Electric Gas	D-GR18010030	10/29/2018	Settled	9.60
Illinois	Ameren Illinois	D-18-0463	11/1/2018	Settled	9.87
Delaware	Delmarva Power & Light Co.	D-17-0978	11/8/2018	Settled	9.70
Minnesota	Minnesota Energy Resources	D-G-011/GR-17-563	11/8/2018	Fully Litigated	9.70
Maryland	Washington Gas Light Co.	C-9481	12/11/2018	Fully Litigated	9.70
Connecticut	Yankee Gas Services Co.	D-18-05-10	12/12/2018	Settled	9.30
Iowa	Interstate Power & Light Co.	D-RPU-2018-0002	12/13/2018	Settled	9.60
Connecticut	CT Natural Gas Corp.	D-18-05-16	12/19/2018	Settled	9.30
Colorado	Public Service Co. of CO	D-17AL-0363G	12/21/2018	Fully Litigated	9.35
Nevada	Southwest Gas Corp.	D-18-05031 (Southern)	12/24/2018	Fully Litigated	9.25
Nevada	Southwest Gas Corp.	D-18-05031 (Northern)	12/24/2018	Fully Litigated	9.25
Maryland	Baltimore Gas and Electric Co.	C-9484	1/4/2019	Fully Litigated	9.80
Massachusetts	Berkshire Gas Co.	DPU 18-40	1/18/2019	Settled	9.70
New York	Orange & Rockland Utlts Inc.	C-18-G-0068	3/14/2019	Settled	9.00
Kentucky	Duke Energy Kentucky Inc.	C-2018-00261	3/27/2019	Settled	9.70
Kentucky	Louisville Gas & Electric Co.	C-2018-00295 (gas)	4/30/2019	Settled	9.73
Kentucky	Atmos Energy Corp.	C-2018-00281	5/7/2019	Fully Litigated	9.65
Texas	Atmos Energy Corp.	D-GUD-10779 (Mid-Tex Division)	5/21/2019	Settled	9.80
Wisconsin	Northern States Power Co - WI	D-4220-UR-124 (Gas)	9/4/2019	Settled	10.00
Michigan	Consumers Energy Co.	C-U-20322	9/26/2019	Fully Litigated	9.90
Illinois	Northern Illinois Gas Co.	D-18-1775	10/2/2019	Fully Litigated	9.73
Oregon	Avista Corp.	D-UG 366	10/8/2019	Settled	9.40
Maryland	Washington Gas Light Co.	C-9605	10/15/2019	Settled	9.70
Washington	Northwest Natural Gas Co.	D-UG-181053	10/21/2019	Settled	9.40
North Carolina	Piedmont Natural Gas Co.	G-9, Sub 743	10/31/2019	Fully Litigated	9.70
Wisconsin	Wisconsin Electric Power Co.	D-05-UR-109 (WEP-Gas)	10/31/2019	Partially Settled	10.00
Wisconsin	Wisconsin Public Service Corp.	D-6690-UR-126 (Gas)	10/31/2019	Partially Settled	10.00
Wisconsin	Wisconsin Gas LLC	D-05-UR-109	10/31/2019	Partially Settled	10.20
				Average (2018-Present)	9.63
				Median (2018-Present)	9.70
				Average (2019 to date)	9.73
				Median (2019 to date)	9.73

Source of Information: Regulatory Research Associates

Atmos Energy Corporation
Demonstration of the Inadequacy of a DCF Return Rate Related to Book Value When Market Value is Greater than Book Value

		[A]	[B]
		Based on Mr. Woolridge's Proxy Group	
Line No.		Market Value	Book Value
1.	Per Share	$ 71.84 (1)	$ 30.37 (2)
2.	DCF Cost Rate (3)	8.70%	8.70%
3.	Return in Dollars (4)	$ 6.250	$ 2.642
4.	Dividends (5)	$ 1.868	$ 1.868
5.	Growth in Dollars (6)	$ 4.382	$ 0.774
6.	Return on Market Value (7)	8.70%	3.68%
7.	Rate of Growth on Market Value (8)	6.10%	1.08%

Notes:
(1) Average of market prices for each Witnesses's proxy group. Dr. Woolridge's average market price is calculated using the 2.6% dividend yield and annual dividend as shown on Exhibit JRW-7.
(2) Average book value dividing total common equity at year-end 2018 by common shares outstanding at year-end 2018 for each proxy group company. Source SNL Financial
(3) Recommended DCF cost rate.
(4) Line 1 x Line 2.
(5) Dividends are based on a 2.6% dividend yield from Exhibit JRW-7
(6) Line 3 - Line 4.
(7) Line 3 / Line 1.
(8) Line 5 / Line 1.

Atmos Energy Corporation
Calculation of Indicated DCF Applied to Book Value Capital Structure
of Mr. Woolridge's Gas Proxy Group

Un-lever Indicated Market Capital Structure DCF

Ku = Ke - (((Ku - i) 1 - t) D / E) - (Ku - d) P / E

Ku = 8.70% - (((Ku - 4.31%) 1 - 21%) 30.93% / 69.07%) - (Ku - 0.00%) 0.00% / 69.07%

Ku = 8.70% - (((Ku - 4.31%) 79.00%) 44.79%) - (Ku - 0.00%) 0.00%

Ku = 8.70% - ((79.00% * Ku - 3.4062%) 44.79%) - (0.00% * Ku - 0.00%)

Ku = 8.70% - (35.38% * Ku - 1.53%) 0.00% * Ku + 0.00%

Ku = 8.70% -35.38% * Ku + 1.53% 0.00% * Ku + 0.00%

Ku = 10.23% -35.38% * Ku

135.38% * Ku = 10.23%

Ku = **7.55%**

Re-lever to Indicated Book Value Capital Structure DCF

Ke = Ku + (((Ku - i) 1 - t) D / E) + (Ku - d) P / E

Ke = 7.55% + (((7.55% - 4.31%) 1 - 21%) 48.31% / 51.69%) + (7.55% - 0.00%) 0.00% / 51.69%

Ke = 7.55% + (((3.24%) 79%) 93.46%) + (7.55%) 0.00%

Ke = 7.55% + ((2.56%) 93.46%) + (0.00%)

Ke = 7.55% + (2.39%) + 0.00%

Ke = **9.95%**

Where:
Ku = Un-levered (i.e., 100% equity) cost of common equity
Ke = Market determined cost of common equity
i = Cost of debt
t = Income tax rate
D = Debt ratio
E = Equity ratio
d = Cost of preferred stock
P = Preferred equity ratio

Atmos Energy Corporation
Growth Rate Regression Analysis

Company	Median P/E Ratio	Proj. Earnings Growth Rate	Proj. Dividend Growth Rate	Proj. Book Value Growth Rate
Atmos Energy Corporation	16.0	7.50%	7.00%	7.00%
Chesapeake Utilities Corporation	17.0	9.00%	9.00%	9.00%
New Jersey Resources	16.0	3.50%	4.00%	6.50%
NiSource Inc.	20.0	12.50%	9.00%	7.50%
Northwest Natural Holding Co.	21.0	27.00%	2.50%	1.00%
ONE Gas, Inc.	NMF	8.00%	8.50%	4.50%
South Jersey Industries, Inc.	18.0	10.50%	4.00%	4.50%
Southwest Gas Holdings, Inc.	17.0	9.00%	5.00%	7.50%
Spire, Inc.	17.0	5.50%	4.00%	4.50%

Source of Information: Value Line Investment Survey - Standard Edition

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.8829
R Square	0.7795
Adjusted R Square	0.7427
Standard Error	0.9293
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	18.3181	18.3181	21.2102	0.0037
Residual	6	5.1819	0.8636		
Total	7	23.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	15.380	0.611	25.186	0.000	13.885	16.874	13.885	16.874
Proj.EarningsGrowth Rate	22.442	4.873	4.605	0.004	10.518	34.365	10.518	34.365

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1065
R Square	0.0113
Adjusted R Square	-0.1534
Standard Error	1.9678
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.2666	0.2666	0.0689	0.8018
Residual	6	23.2334	3.8722		
Total	7	23.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	18.1895	1.8135	10.0302	0.0001	13.7520	22.6269	13.7520	22.6269
Proj.Dividend Growth Rate	-7.9005	30.1073	-0.2624	0.8018	-81.5703	65.7693	-81.5703	65.7693

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5623
R Square	0.3161
Adjusted R Square	0.2022
Standard Error	1.6366
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7.4293	7.4293	2.7737	0.1469
Residual	6	16.0707	2.6784		
Total	7	23.5			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	20.1837	1.5717	12.8420	0.0000	16.3379	24.0295	16.3379	24.0295
Proj. Book Value Growth Rate	-40.9894	24.6115	-1.6655	0.1469	-101.2116	19.2328	-101.2116	19.2328

Atmos Energy Corporation
R-Squared Values for Dr. Woolridge's
Gas Proxy Group

Mr. Woolridge's Proxy Group	R-Squared
Atmos Energy Corporation	0.0939
Chesapeake Utilities Corporation	0.0495
New Jersey Resources	0.0806
NiSource Inc.	0.0356
Northwest Natural Holding Co.	0.0502
ONE Gas, Inc.	0.0817
South Jersey Industries, Inc.	0.1424
Southwest Gas Holdings, Inc.	0.0829
Spire, Inc.	0.0923
Average	0.0788

Source of Information: Value Line Proprietary Database - September 2019

FINANCIAL QUARTERLY
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Comparable Earnings: New Life for an Old Precept

by
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Pauline M. Ahern

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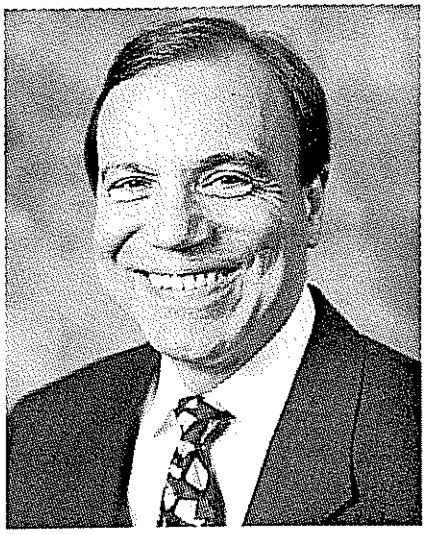
Comparable Earnings: New Life for an Old Precept

Accelerating deregulation has greatly increased the investment risk of natural gas utilities. As a result, the authors believe it more appropriate than ever to employ the comparable earnings model. We believe our application of the model overcomes the greatest traditional objection to it — lack of comparability of the selected non-utility proxy firms. Our illustration focuses on a target gas pipeline company with a beta of 0.96 — almost equal to the market's beta of 1.00.



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Introduction

The comparable earnings model used to determine a common equity cost rate is deeply rooted in the standard of "corresponding risk" enunciated in the landmark *Bluefield* and *Hope* decisions of the U.S. Supreme Court.[1] With such solid grounding in the foundations of rate of return regulation, comparable earnings should be accepted as a principal model, along with the currently popular market-based models, provided that its most common criticism, non-comparability of the proxy companies, is overcome.

Our comparable earnings model overcomes the non-comparability issue of the non-utility firms selected as a proxy for the target utility, in this example, a gas pipeline company. We should note that in the absence of common stock prices for the target utility (as with a wholly-owned subsidiary), it is appropriate to use the average of a proxy group of similar risk gas pipeline companies whose common stocks are actively traded. As we will demonstrate, our selection process results in a group of domestic, non-utility firms that is comparable in total risk, the sum of business and financial risk, which reflects both non-diversifiable systematic, or market, risk as well as diversifiable unsystematic, or firm-specific, risk.

Embedded in the Landmark Decisions

As stated in *Bluefield* in 1922: "A public utility is entitled to such rates as will permit it to earn a return ... on investments in other business undertakings which are attended by corresponding risks and uncertainties ..."

In addition, the court stated in *Hope* in 1944: "By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks."

Thus, the "corresponding risk" precept of *Bluefield* and *Hope* predates the use of such market-based cost-of-equity models as the Discounted Cash Flow (DCF) and Capital Asset Pricing (CAPM), which were developed later and are currently popular in rate-base/rate-of-return regulation. Consequently, the comparable earnings model has a longer regulatory and judicial history. However, it has far greater relevance now than ever before in its history because significant deregulation has substantially increased natural gas utilities' investment risk to a level similar to that of non-utility firms. As a result, it is

Comparable Earnings *from page 4*

more important than ever to look to similar-risk non-utility firms for insight into common equity cost rate, especially in view of the deficiencies inherent in the currently popular market-based cost of common equity models, particularly the DCF model.

Despite the fact that the landmark decisions are still regarded as having set the standards for determining a fair rate of return, the comparable earnings model has experienced decreased usage by expert witnesses, as well as less regulatory acceptance over the years. We believe the decline in the popularity of the comparable earnings model, in large measure, is attributable to the difficulty of selecting non-utility proxy firms that regulators will accept as comparable to the target utility. Regulatory acceptance is difficult to gain when the selection process is arbitrary. Our application of the model is objective and consistent with fundamental financial tenets.

Principles of Comparable Earnings

Regulation is a substitute for the competition of the marketplace. Moreover, regulated public utilities compete in the capital markets with all firms, including unregulated non-utilities. The comparable earnings model is based upon the opportunity cost principle; i.e., that the true cost of an investment is the return that could have been earned on the next best available alternative investment of similar risk. Consequently, the comparable earnings model is consistent with regulatory and financial principles, as it is a surrogate for the competition of the marketplace, and investors seek the greatest available rate of return for bearing similar risk.

The selection of comparable firms is the most difficult step in applying the comparable earnings model, as noted by Phillips[2] as well as by Bonbright, Danielsen and Kamerschen.[3] The selection of non-utility proxy firms should result in a sufficiently broad-based group in order to minimize the effect of company-specific aberrations. However, if the selection process is arbitrary, it likely would result in a proxy group that is too broad-based, such as the Standard & Poor's 500 Composite Index or the Value Line Industrial Composite. The use of such groups would require subjective adjustments to the comparable earnings results to reflect risk differences between the group(s) and the target utility, a gas pipeline company in this example.

Authors' Selection Criteria

We base the selection of comparable non-utility firms on market-based, objective, quantitative measures of risk resulting from market prices that subsume investors' assessments of all elements of risk. Thus, our approach is based upon the principle of risk and return; namely, that firms of comparable risk should be expected to earn comparable returns. It is also consistent with the "corresponding risk" standard established in *Bluefield* and *Hope*. We measure total investment risk as the sum of non-diversifiable systematic and diversifiable unsystematic risk. We use the unadjusted beta as a measure of systematic risk and the standard error of the estimate (residual standard error) as a measure of unsystematic risk. Both the unadjusted beta and the residual standard error are derived from a regression of the target utility's security returns relative to the market's returns, which takes the general form:

$$r_{it} = a_i + b_i\, r_{mt} + e_{it}$$

where:

r_{it} = tth observation of the ith utility's rate of return

r_{mt} = tth observation of the market's rate of return

e_{it} = tth random error term

a_i = constant least-squares regression coefficient

b_i = least-squares regression slope coefficient, the unadjusted beta.

As shown by Francis,[4] the total variation or risk of a firm's return, Var (r_i), comes from two sources:

Var (r_i) = total risk of ith asset

= var$(a_i + b_i r_m + e)$ substituting $(a_i + b_i r_m + e)$ for r_i

= var$(b_i r_m)$ + var (e) since var$(a_i) = 0$

= b_i^2 var(r_m) + var (e) since var$(b_i r_m) = b_i^2$ var(r_m)

= systematic + unsystematic risk

Francis[5] also notes: "The term $\sigma^2(r_i|r_m)$ is called the *residual variance around the regression line* in statistical terms or *unsystematic risk* in capital market theory language. $\sigma^2 (r_i|r_m)$ = ... = var (e). The residual variance is the squared standard error in regression language, a measure of unsystematic risk." Application of these criteria results in a group of non-utility firms whose average total investment risk is indeed comparable to that of the target gas pipeline.

As a measure of systematic risk, we use the Value Line unadjusted beta. Beta measures the extent to which market-wide or macro-economic events affect a firm's stock price. We use the unadjusted beta of the target utility as a starting point because it results from the regression of the target utility's security returns relative to the market's returns. Thus, the resulting standard deviation of beta relates to the unadjusted beta. We use the standard deviation of the unadjusted beta to determine the range around it as the selection criterion based on systematic risk.

We use the residual standard error of the regression as a measure of unsystematic risk. The residual standard error reflects the extent to which events specific to the firm's operations affect a firm's stock price. Thus, it is a measure of diversifiable, unsystematic, firm-specific risk.

An Illustration of Authors' Approach

Step One: We begin our approach by establishing the selection criteria as a range of both unadjusted beta and residual standard error of the target gas

continued on page 6

Comparable Earnings *from page 5*

pipeline company.

As shown in table 1, our target gas pipeline company has a Value Line unadjusted beta of 0.90, whose standard deviation is 0.1250. The selection criterion range of unadjusted beta is the unadjusted beta plus (+) and minus (-) three of its standard deviations. By using three standard deviations, 99.73 percent of the comparable unadjusted betas is captured.

Three standard deviations of the target utility's unadjusted beta equals 0.38 (0.1250 x 3 = 0.3750, rounded to 0.38). Consequently, the range of unadjusted betas to be used as a selection criteria is 0.52 - 1.28 (0.52 = 0.90 - 0.38) and (1.28 = 0.90 + 0.38).

Likewise, the selection criterion range of residual standard error equals the residual standard error plus (+) and minus (-) three of its standard deviations. The standard deviation of the residual standard error is defined as: $\sigma/\sqrt{2N}$.

As also shown in table 1, the target gas pipeline company has a residual standard error of 3.7867. According to the above formula, the standard deviation of the residual standard error would be 0.1664 ($0.1664 = 3.7867/\sqrt{2(259)} = 3.7867/22.7596$, where 259 = N, the number of weekly price change observations over a period of five years). Three standard deviations of the target utility's residual standard error would be 0.4992 (0.1664 x 3 = .4992). Consequently, the range of residual standard errors to be used as a selection criterion is 3.2875 - 4.2859 (3.2875 = 3.7867 - 0.4992) and (4.2859 = 3.7867 + 0.4992).

Step Two: The step one criteria are applied to Value Line's data base of nearly 4,000 firms for which Value Line derives unadjusted betas and residual standard errors on a weekly basis. All firms with unadjusted betas and residual standard errors within the criteria ranges are then selected.

Step Three: In the regulatory ratemaking environment, authorized common equity return rates are applied to a book-value rate base. Thus, the earnings rates on book common equity, or net worth, of competitive, non-utility firms are highly relevant provided those firms are indeed comparable in total risk to the target gas pipeline. The use of the return rates of other utilities has no relevance because their allowed, and hence subsequently achieved, earnings rates are dependent upon the regulatory

table 1

Summary of the Comparable Earnings Analysis for the Proxy Group of 248 Non-Utility Companies Comparable in Total Risk to the Target Gas Pipeline Company[1]

	1	2	3	4	5	6	7	8
			residual	rate of return on net worth				
	adj. beta	unadj. beta	standard error	3-year average[2]	4-year average[2]	5-year average[2]	5-year projected[3]	
average for the proxy group of 248 non-utility companies comparable in total risk to the target gas pipeline company	0.97	0.92	3.7705					
target gas pipeline company	0.96	0.90[4]	3.7867					
median				11.7%	12.0%	12.6%	15.5%	
average of the median historical returns					12.1%			
conclusion[5]								13.8%

[1]The criteria for selection of the non-utility group was that the non-utility companies be domestic and included in *Value Line Investment Survey*. The non-utility group was selected based on an unadjusted beta range of 0.52 to 1.28 and a residual standard error range of 3.2875 to 4.2859.
[2]Ending 1992.
[3]1996-1998/1997-1999.
[4]The average standard deviation of the target gas pipeline company's unadjusted beta is 0.1250.
[5]Equal weight given to both the average of the 3-, 4- and 5-year historical medians (12.1%) and 5-year projected median rate of return on net worth (15.5%). Thus, 13.8% = (12.1% + 15.5% / 2).
Source: Value Line Inc., March 15, 1994
Value Line Investment Survey

Comparable Earnings *from page 6*

process. Consequently, we believe all utilities must be eliminated to avoid circularity. Moreover, we believe non-domestic firms must be eliminated because their reporting methods differ significantly from U.S. firms.

Step Four: We then eliminated those firms for which Value Line does not publish a "Ratings & Report" in *Value Line Investment Survey* so that the historical and projected returns on net worth[6] are from a consistent source. We use historical returns on net worth for the most recent five years, as well as those projected three to five years into the future. We believe it is logical to evaluate both historical and projected return rates because it is reasonable to assume that investors avail themselves of both when they are available from widely disseminated information services, such as Value Line Inc. The use of Value Line's return rates on net worth understates the common equity return rates for two reasons. First, preferred stock is included in net worth. Second, the net worth return rates are as of the end of each period. Thus, the use of average common equity return rates would yield higher results.

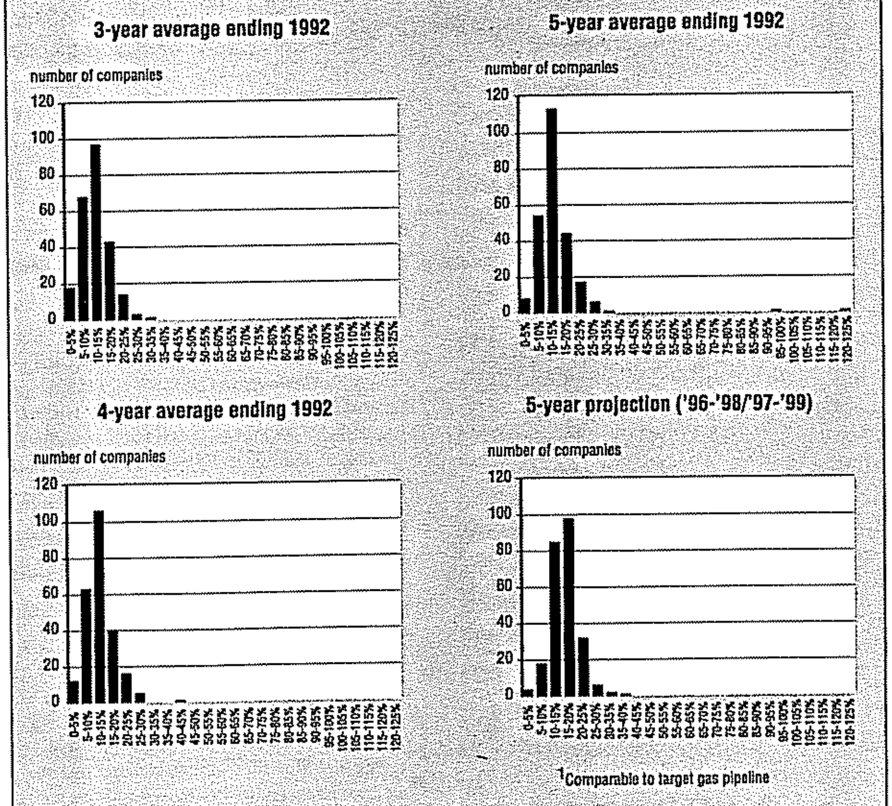
Step Five: Median returns based on the historical average three, four and five years ending 1992 and projected 1996-1998 or 1997-1999 rates of return on net worth are then determined as shown in columns 4 through 7 of table 1. The median is used due to the wide variations and skewness in rates of return on net worth for the non-utility firms as evidenced by the frequency distributions of those returns as shown in illustration 1.

However, we show the average unadjusted beta, 0.92, and residual standard error, 3.7705, for the proxy group in columns 2 and 3 of table 1 because their frequency distributions are not significantly skewed, as shown in illustration 2.

Step Six: Our conclusion of a com-

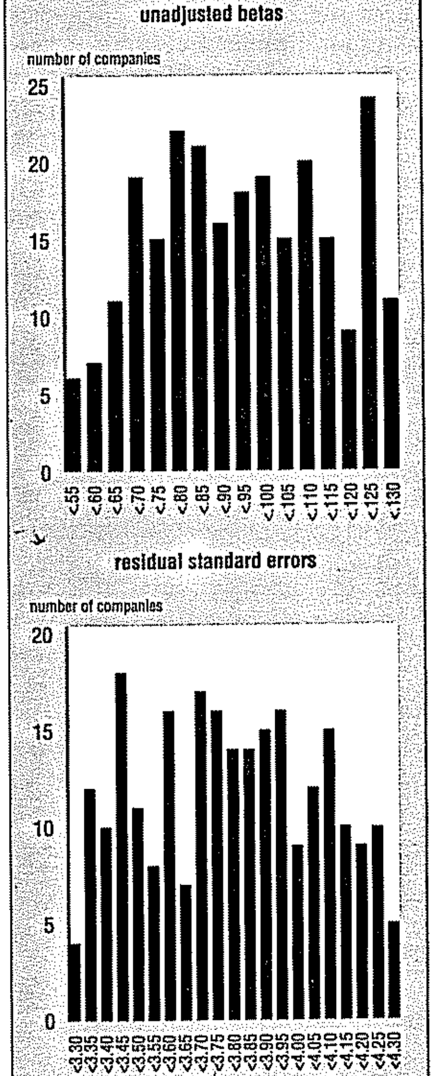
continued on page 8

Illustration 1
Rates of Return on Net Worth for the Proxy Group of 248 Non-Utility Companies[1]



[1]Comparable to target gas pipeline

Illustration 2
Unadjusted Betas and Residual Standard Errors for the Proxy Group of 248 Non-Utility Companies[1]



[1]Comparable to target gas pipeline

Comparable Earnings *from page 7*

parable earnings cost rate is based upon the mid-point of the average of the median three-, four- and five-year historical rates of return on net worth of 12.1 percent as shown in column 5 and the median projected 1996-1998/1997-1999 rate of return on net worth of 15.5 percent as shown in column 7 of table 1. As shown in column 8, it is 13.8 percent.

Summary

Our comparable earnings approach demonstrates that it is possible to select a proxy group of non-utility firms that is comparable in total risk to a target utility. In our example, the 13.8 percent comparable earnings cost rate is very conservative as it is an expected achieved rate on book common equity (a regulatory allowed rate should be greater) and because it is based on end-of-period net worth. A similar rate on average net worth would be about 20 to 40 basis points higher (i.e., 14.0 to 14.2 percent) and still understate the appropriate regulatory allowed rate of return on book common equity.

Our selection criteria are based upon measures of systematic and unsystematic risk, specifically unadjusted beta and residual standard error. They provide the basis for the objective selection of comparable non-utility firms. Our selection criteria rely on changes in market prices over approximately five years. We compare the aggregate total risk, or the sum of systematic and unsystematic risk, which reflects investors' aggregate assessment of both business and financial risk. Thus, no adjustments are necessary to the proxy group results to compensate for the differences in business risk and financial risk, such as accounting practices and debt/equity ratios. Moreover, it is inappropriate to attempt a comparison of the target utility with any individual firm, or subset of firms, in the proxy group because only the average firm of the group is relevant.

Because the comparable earnings model is firmly anchored in the "corresponding risk" precept established in the landmark court decisions, it is worthy of consideration as a principal model for use in estimating the cost rate of common equity capital of a regulated utility. Our approach to the comparable earnings model produces a proxy group that is indeed comparable in total risk because the selection process is objective and quantitative. It therefore overcomes criticism linked to arbitrary selection processes.

All cost-of-common-equity models, including the DCF and CAPM, are fraught with deficiencies, usually stemming from the many necessary but unrealistic assumptions that underlie them. The effects of the deficiencies of individual models can be mitigated by using more than one model when estimating a utility's common equity cost rate. Therefore, when the non-comparability issue is overcome, the comparable earnings model deserves to receive the same consideration as a primary model, as do the currently popular market-based models. ■

[1]*Bluefield Water Works Improvement Co. v. Public Service Commission*. 262 U.S. 679 (1922) and *Federal Power Commission v. Hope Natural Gas Co*. 320 U.S. 519 (1944).
[2]Charles F. Phillips Jr., The Regulation of Public Utilities: Theory and Practice. Public Utilities Reports Inc., 1988. p. 379
[3]James C. Bonbright. Albert L. Danielsen and David R. Kamerschen. Principles of Public Utilities Rates. 2nd edition. Public Utilities Reports Inc. 1988, p. 329.
[4]Jack Clark Francis, Investments: Analysis and Management. 3rd edition. McGraw-Hill Book Co., 1980, p. 363.
[5]Id., p. 548.
[6]Returns on net worth must be used when relying on Value Line data because returns on book common equity for non-utility firms are not available from Value Line

Report Lists Pipeline, Storage Projects

More than $9 billion worth of projects to expand the nation's natural gas pipeline network are in various stages of development, according to an A.G.A. report. These projects involve nearly 8,000 miles of new pipelines and capacity additions to existing lines and represent 15.3 billion cubic feet (Bcf) per day of new pipeline capacity.

During 1993 and early 1994, construction on 3,100 miles of pipeline was completed or under way, at a cost of nearly $4 billion, says A.G.A. These projects are adding 5.4 Bcf in daily delivery capacity nationwide.

Among the projects completed in 1993 were Pacific Gas Transmission Co.'s 805 miles of looping that allows increased deliveries of Canadian gas to the West Coast; Northwest Pipeline Corp.'s addition of 433 million cubic feet of daily capacity for customers in the Pacific Northwest and Rocky Mountain areas; and the 156-mile Empire State Pipeline in New York.

In addition, major construction projects were started on the systems of Texas Eastern Transmission Corp. and Algonquin Gas Transmission Co. — both subsidiaries of Panhandle Eastern Corp. — and along Florida Gas Transmission Co.'s pipeline.

The report goes on to discuss another $5 billion in proposed projects, which, if completed, will add nearly 5,000 miles of pipeline and 9.8 Bcf per day in capacity, much of it serving Florida and West Coast markets.

A.G.A. also identifies 47 storage projects and says that if all of them are built, existing storage capacity will increase by more than 500 Bcf, or 15 percent.

For a copy of *New Pipeline Construction: Status Report 1993-94* (#F00103), call A.G.A. at (703) 841-8490. Price per copy is $6 for employees of member companies and associates and $12 for other customers.

Investments: Analysis and Management

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Beta Measurements The beta coefficient is an *index of systematic risk.* Beta coefficients may be used for ranking the systematic risk of different assets. If the beta is larger than 1, $b > 1.0$, then the asset is more volatile than the market and is called an **aggressive asset.** If the beta is less than 1, $b < 1.0$, the asset is a **defensive asset;** its price fluctuations are less volatile than the market's. Figure 10-1 illustrates the characteristic lines for three different assets that have low, medium, and high levels of beta (or undiversifiable risk).

Figure 10-2 shows that IBM is a stock with an average amount of systematic risk. IBM's beta of 1.02 indicates that its return tends to increase 2 percent more than the return on the market average when the market is rising. When the market falls, IBM's return tends to fall 2 percent more than the market's. The characteristic line for IBM has an above average correlation coefficient of $\rho = .7495$, indicating that the returns on this security follow its particular characteristic line slightly more closely than those of the average stock.

Partitioning Risk

Total risk can be measured by the variance of returns, denoted Var(r). This measure of *total risk is partitioned into its systematic and unsystematic components in Equation (10-8).*[7]

$$\begin{aligned} \text{Var}(r_i) &= \text{total risk of } i\text{th asset} \\ &= \text{Var}(a_i + b_i r_{m,t} + e_{i,t}) \\ &\quad \text{by substituting } (a_i + b_i r_{m,t} + e_{i,t}) \text{ for } r_{i,t} \\ &= 0 + \text{Var}(b_i r_{m,t}) + \text{Var}(e_{i,t}) \\ &\quad \text{since Var}(a_i) = 0 \end{aligned} \tag{10-8}$$

$$\begin{aligned} \text{Var}(r_i) &= b_i^2\,\text{Var}(r_m) + \text{Var}(e) \qquad \text{since Var}(b_i r_m) = b_i^2\,\text{Var}(r_m) \\ &= \text{systematic} + \text{unsystematic risk} \end{aligned} \tag{10-8a}$$

$$.01389 = .00780 + .00609 \qquad \text{for IBM}$$

The unsystematic risk measure Var(e) is called in regression language the *residual variance* or, synonymously, the *standard error squared.*

Undiversifiable Proportion The percentage of total risk that is systematic can be measured by the coefficient of determination ρ^2 (that is, the characteristic line's squared correlation coefficient).

[7]In this context, **partition** is a technical statistical term that means to divide the total variance into *mutually exclusive* and *exhaustive* pieces. This partition is only possible if the returns from the market are statistically independent from the residual error terms that occur simultaneously, $\text{Cov}(r_{m,t}, e_{i,t}) = 0$. The mathematics of regression analysis will orthogonalize the residuals and thus ensure that the needed statistical independence exists.

$$\frac{\text{Systematic risk}}{\text{Total risk}} = \frac{b_i^2 \,\text{Var}(r_m)}{\text{Var}(r_m)} = \rho^2 \tag{10-9}$$

$$\frac{.007802}{.01389} = \frac{(1.021)^2\,(.00749)}{.00749} = .5617 \times 100 = 56.17\% \qquad \text{for IBM}$$

Diversifiable Proportion The percentage of unsystematic risk equals $(1.0 - \rho^2)$.

$$\frac{\text{Unsystematic risk}}{\text{Total risk}} = \frac{\text{Var}(e)}{\text{Var}(r_i)} = (1.0 - \rho^2)$$

$$\frac{.00609}{.01389} = (1.0 - .5617) = .438 \times 100 \tag{10-10}$$

$$= 43.8\% \text{ unsystematic} \qquad \text{for IBM}$$

Studies of the characteristic lines of hundreds of stocks listed on the NYSE indicate that the average correlation coefficient is approximately $\rho = .5$.[8] This means that about $\rho^2 = 25$ percent of the total variability of return in most NYSE securities is explained by movements in the market.

	NYSE average	IBM
Systematic risk: ρ^2	.25	.5617
Unsystematic risk: $(1.0 - \rho^2)$	.75	.4383
Total risk: 100%	1.00	1.0000

As explained above, systematic changes are common to all stocks and are therefore undiversifiable.

A primary use of the characteristic line (or *market model*, or the *single-index model*, as it is also called) is to assess the risk characteristics of one asset.[9] The statistics in Table 10-2, for instance, indicate that IBM's common stock is slightly more risky than the average common stock in terms of total risk and

[8]The average ρ was found to be about .5, as reported in Marshall Blume, "On the Assessment of Risk," *Journal of Finance*, March 1971, p. 4. For similar estimates, see J. C. Francis, "Statistical Analysis of Risk Surrogates for NYSE Stocks," *Journal of Financial and Quantitative Analysis*, Dec. 1979.

[9]Professor Jensen reformulated the characteristic line in a risk-premium form. See M. C. Jensen, "The Performance of Mutual Funds in the Period 1945 through 1964," *Journal of Finance*, May 1968, pp. 389–416. See also M. C. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," *Journal of Business*, vol. XLII, 1969. Jensen interprets the alpha intercept term of the characteristic line, as he formulates it, as an investment performance measure. It has been suggested that Jensen's performance measure is biased. See Keith V. Smith and Dennis A. Tito, "Risk-Return Measures of Ex-Post Portfolio Performance," *Journal of Financial and Quantitative Analysis*, Dec. 1969, vol. IV, no. 4, p. 466.

systematic risk.[10] New risk measurements must be made periodically, however, because the risk and return of an asset may change with the passage of time.[11]

10-3 CAPITAL ASSET PRICING MODEL (CAPM)

An old axiom states "there is no such thing as a free lunch." This means that you cannot expect to get something for nothing—a rule that certainly applies to investment returns. Investors who want to earn high average rates of return must take high risks and endure the associated loss of sleep, the possibility of ulcers, and the chance of bankruptcy. The question to which we now turn is: Should investors worry about total risk, undiversifiable risk, diversifiable risk, or all three?

In Chapter 1 it was suggested that *investors should seek investments that have the maximum expected return in their risk class*. Their happiness from investing is presumed to be derived as indicated in the expected utility $E(U)$ function below.

$$E(U) = f[E(r), \sigma]$$

The investment preferences of wealth-seeking risk-averse investors represented by the function above cause them to maximize their expected utility (or, equivalently, happiness) by (1) maximizing their expected return in any given risk class, $\partial E(U)/\partial E(r) > 0$, or, conversely, (2) minimizing their total risk at any given rate of expected return, $\partial E(U)/\partial \sigma < 0$. However, in selecting individual assets, investors will not be particularly concerned with the asset's total risk σ. Figure 9-1 showed that the unsystematic portion of total risk can be easily diversified by holding a portfolio of different securities. But, systematic risk affects all stocks in the market because it is undiversifiable. Portfolio theory therefore suggests that only the undiversifiable (or systematic) risk is worth avoiding.[12]

[10]Statements about the relative degree of total risk are made in the context of a long-run horizon—that is, over at least one *complete business cycle*. Obviously, an accurate short-run forecast which says that some particular company will go bankrupt next quarter makes it more risky than IBM, although IBM may have had more historical variability of return.

[11]Empirical studies documenting the intertemporal instability of betas have been published. Marshall Blume, "Betas and Their Regression Tendencies," *Journal of Finance*, June 1975, pp. 785–795. See also J. C. Francis, "Statistical Analysis of Risk Coefficients for NYSE Stocks," *Journal of Financial and Quantitative Analysis*, Dec. 1979, vol. XIV, no. 5, pp. 981–997. An appendix at the end of this chapter reviews some evidence about shifting betas, standard deviations, and correlations.

[12]Both the systematic and unsystematic portions of total risk must be considered by **undiversified investors.** Entrepreneurs who have their entire net worth invested in one business, for example, can be bankrupted by a piece of bad luck that could be easily averaged away to zero in a diversified portfolio. Poorly diversified investors should not treat diversifiable risk lightly. Only well-diversified investors can afford to ignore diversifiable risk.

Atmos Energy Corporation
Coefficients of Variation of the
Electric and Gas Proxy Groups
and the Non-Price Regulated Companies

Net Profit (millions)

Proxy Group of Six Natural Gas Distribution Companies	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Standard Deviation	Mean	Coefficient of Variation
Atmos Energy Corporation	$ 179.7	$ 201.2	$ 199.3	$ 192.2	$ 230.7	$ 289.8	$ 315.1	$ 350.1	$ 382.7	$ 444.3	$ 87.6	$ 278.5	0.3144
NW Natural Holdings	75.1	72.7	63.9	59.9	60.5	58.7	53.7	58.9	(55.6)	67.3	36.3	51.5	0.7038
ONE Gas, Inc.	NA	NA	NA	NA	NA	109.8	119.0	140.1	159.9	172.2	23.6	140.2	0.1684
South Jersey Industries, Inc.	71.3	81.0	87.0	93.3	97.1	104.0	99.0	102.8	98.1	116.2	12.0	95.0	0.1266
Southwest Gas Holdings, Inc.	87.5	103.9	112.3	133.3	145.3	141.1	138.3	152.0	173.8	182.3	28.1	137.0	0.2050
Spire, Inc.	64.3	54.0	63.8	62.6	52.8	84.6	136.9	144.2	161.6	214.2	53.4	103.9	0.5144
												Mean	0.3388
												Median	0.2597

Net Profit (millions)

Proxy Group of Twenty Non-Price Regulated Companies	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Standard Deviation	Mean	Coefficient of Variation
Cboe Global Markets, Inc.	107.8	99.4	139.4	157.4	176.0	189.7	205.0	185.7	400.6	425.2	$ 107.3	$ 208.6	0.5146
Crown Castle International Corporati	(9.4)	89.0	127.5	171.1	188.6	90.1	390.5	1,521.0	444.6	671.0	430.6	368.4	1.1688
Church & Dwight Co., Inc.	248.7	285.9	324.2	349.8	394.4	413.9	432.3	463.9	497.9	568.6	93.5	398.0	0.2350
CME Group Inc.	884.5	1,028.4	1,137.6	1,006.3	976.8	1,127.1	1,247.0	1,534.1	4,063.4	1,962.2	907.7	1,496.7	0.6064
Forrester Research	29.2	24.7	29.4	25.5	19.9	18.7	20.5	24.8	22.3	25.1	3.5	24.0	0.1448
Cedar Fair, L.P.	38.7	8.4	72.2	101.7	108.2	109.2	112.2	177.7	215.5	126.7	57.3	107.1	0.5351
Gen'l Mills	1,366.9	1,571.5	1,652.0	1,707.3	1,788.7	1,824.4	1,765.2	1,787.4	1,842.9	1,820.6	140.9	1,712.7	0.0822
Hormel Foods	342.8	409.0	474.2	500.1	526.2	602.7	713.8	890.1	846.7	1,012.1	212.5	631.8	0.3364
Hershey Co.	499.4	587.7	648.7	740.0	844.0	895.9	909.7	948.5	1,016.9	1,130.1	189.3	822.1	0.2302
J&J Snack Foods	41.3	48.4	48.5	54.1	64.4	71.8	70.2	76.0	79.2	83.9	14.0	63.8	0.2199
Kellogg	1,212.0	1,247.0	1,231.0	1,297.2	1,379.7	1,397.3	1,258.0	1,317.0	1,416.0	1,510.0	91.5	1,326.5	0.0690
Lancaster Colony	89.1	115.0	106.4	95.8	109.2	101.0	101.7	121.8	115.3	135.3	12.7	109.1	0.1169
Lilly (Eli)	4,851.0	5,239.5	4,913.5	3,784.0	4,502.6	2,987.6	3,656.3	3,735.6	4,530.4	5,734.6	796.8	4,393.5	0.1814
McCormic & Co.	309.5	356.3	374.2	407.8	418.2	441.6	449.5	483.4	546.7	663.0	96.3	445.0	0.2164
Altria Group	3,641.0	3,905.0	3,390.0	4,180.0	4,535.0	5,070.0	5,243.0	5,305.0	6,531.0	7,539.0	1,242.2	4,933.9	0.2518
Smucker (J.M.)	520.3	566.5	535.6	584.5	588.0	552.9	704.2	752.5	795.1	756.6	99.1	635.6	0.1559
Sysco Corporation	1,055.9	1,181.6	1,152.0	1,121.6	992.4	931.5	1,100.2	1,214.1	1,359.1	1,595.1	181.0	1,170.4	0.1546
Tootsie Roll	53.5	53.7	43.9	52.0	60.8	63.3	66.1	67.5	60.5	56.9	6.9	57.8	0.1189
WD-40 Co.	26.3	36.1	36.4	35.5	39.8	43.7	44.8	52.6	51.6	65.2	10.5	43.2	0.2427
Walmart Inc.	14,204.0	14,921.0	15,523.0	16,999.0	16,728.0	16,426.0	14,694.0	13,452.0	13,283.0	14,460.0	1,249.4	15,069.0	0.0829
												Mean	0.2832
												Median	0.2181

NA = Not Availabile
Bold figures indicate estimates

Source of Information:
Value Line Investment Survey