

# Exhibit No. 7

<b>Exhibit No:</b>	<u>        </u>
<b>Issue:</b>	<b>ROE</b>
<b>Witness:</b>	<b>Dylan W. D'Ascendis</b>
<b>Type of Exhibit:</b>	<b>Surrebuttal Testimony</b>
<b>Sponsoring Party:</b>	<b>Spire Missouri Inc.</b>
<b>Case No.:</b>	<b>GR-2021-0108</b>
<b>Date Testimony Preped:</b>	<b>July 14, 2021</b>

**SPIRE MISSOURI INC.**

**CASE NO. GR-2021-0108**

**SURREBUTTAL TESTIMONY**

**OF**

**DYLAN W. D'ASCENDIS**

**JULY 14, 2021**

\*\*Denotes Confidential Information\*\*

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Schedule DWD-SR-4:	Portfolio Ranks by Size and Risk Premiums over CAPM Results Compiled by Duff and Phelps 2021 Guide to Cost of Capital
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**SURREBUTAL OF TESTIMONY OF DYLAN W. D’ASCENDIS**

**I. INTRODUCTION AND PURPOSE**

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

A. My name is Dylan W. D’Ascendis. I am employed by ScottMadden, Inc. as a Partner. My business address is 3000 Atrium Way, Suite 241, Mount Laurel, NJ 08054.

**Q. ON WHOSE BEHALF ARE YOU SUBMITTING THIS TESTIMONY?**

A. I am submitting this Surrebuttal Testimony (referred to throughout as my “Surrebuttal Testimony”) before the Missouri Public Service Commission (“Commission”) on behalf of Spire Missouri Inc. (“Spire” or the “Company”).

**Q. DID YOU FILE DIRECT AND REBUTTAL TESTIMONIES IN THIS PROCEEDING?**

A. Yes, I did.

**Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?**

A. The purpose of my Surrebuttal Testimony is to respond to the rebuttal testimonies of Dr. Seoung Joun Won, witness for the Commission Staff, and Mr. David Murray, who testifies on behalf of the Office of the Public Counsel (“OPC”) (collectively, the “Opposing Witnesses”), as they relate to the Company’s return on common equity (“ROE”) on its Missouri jurisdictional rate base.

**Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.**

A. After reviewing the Rebuttal Testimonies of the Opposing Witnesses, I maintain that 9.95% is an appropriate ROE for Spire and that recommended ROEs of 9.37% (Dr. Won) and 9.25% (Mr. Murray), are insufficient.

1 **Q. HAVE YOU PREPARED SCHEDULES IN SUPPORT OF YOUR**  
2 **RECOMMENDATION?**

3 A. Yes. I have prepared DWD Schedule SR-1 through DWD Schedule SR-5, which  
4 were prepared by me or under my direction. Those schedules are attached to my  
5 Surrebuttal Testimony.

**II. RESPONSE TO STAFF WITNESS DR. WON**

6 **Q. PLEASE PROVIDE A SUMMARY OF DR. WON'S REBUTTAL**  
7 **TESTIMONY AS IT PERTAINS TO YOUR TESTIMONY.**

8 A. Dr. Won raises several concerns with my analysis in my Direct Testimony.  
9 Specifically, he discusses the following: 1) that my recommended ROE of 9.95% is  
10 higher than the 2020 authorized return for gas distribution companies of 9.44%; 2)  
11 that my non-price regulated group similar in total risk to my proxy group of natural  
12 gas distribution companies ("Non-Price Regulated Proxy Group") is not comparable  
13 to my proxy group of natural gas distribution companies ("Utility Proxy Group"); 3)  
14 that my discounted cash flow ("DCF") model used unreasonable growth rates; 4) that  
15 the predictive risk premium model ("PRPM") has limitations and should not be relied  
16 on; 5) that I incorrectly used prospective interest rates in my risk premium model  
17 ("RPM") and capital asset pricing model ("CAPM"); 6) that my equity risk premiums  
18 ("ERP") and market risk premiums ("MRP") in general, are too high; 7) that the  
19 empirical CAPM ("ECAPM") is not a credible analysis; 8) that a size adjustment is  
20 not applicable to the Company, as it is the largest gas distribution utility in Missouri  
21 and its business risk (including size) is included in its bond ratings; and 9) flotation

1 costs are applicable to Spire’s parent, Spire, Inc. (“SR” or the “Parent”) and not to  
2 Spire. I will respond to Dr. Won’s concerns in turn.

3 **Q. DR. WON STATES THAT YOUR RECOMMENDED ROE OF 9.95% IS TOO**  
4 **HIGH COMPARED TO THE AVERAGE AUTHORIZED RETURN OF**  
5 **9.44% FOR GAS COMPANIES IN 2020.<sup>1</sup> PLEASE RESPOND.**

6 A. I discussed the appropriate uses of historical authorized ROEs in my Rebuttal  
7 Testimony,<sup>2</sup> but it bears repeating that authorized ROEs are a lagging indicator of  
8 investor-required returns; *i.e.*, authorized ROEs are based on market data presented in  
9 an evidentiary record, which spans a period before the decision, sometimes lasting  
10 over a year. That being said, the average and median authorized ROE for natural gas  
11 distribution companies since the filing of this case are 9.60% and 9.63%,  
12 respectively, which is 16 and 19 basis points higher than the 2020 average,  
13 respectively. Also, my recommended ROE of 9.95% falls within the range of ROEs  
14 authorized during that same period. Conversely, Dr. Won’s (and Mr. Murray’s)  
15 analytical results are far removed from authorized ROEs in the country since at least  
16 1980.<sup>3</sup>

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1 Won Rebuttal Testimony, at 6

2 D’Ascendis Rebuttal Testimony, at 44

3 Dr. Won’s analytical results range from 6.40% to 8.10% and Mr. Murray’s analytical results range from 5.44% to 7.88%

1 **Use of a Non-Price Regulated Proxy Group**

2 **Q. DR. WON CLAIMS THAT YOU ONLY USE BETA COEFFICIENTS**  
3 **(“BETA”) AS A SCREENING CRITERIA FOR YOUR NON-PRICE**  
4 **REGULATED PROXY GROUP.<sup>4</sup> IS HE CORRECT?**

5 A. No, he is not. While I agree with Dr. Won that beta alone cannot explain all business  
6 risks, I screened my Non-Price Regulated Proxy Group using unadjusted beta, which  
7 measures systematic, or market, risk and the residual standard errors of the  
8 regression, which measures company-specific, or diversifiable, risk.<sup>5</sup> Business and  
9 financial risks may vary between companies and proxy groups, but if the collective  
10 average unadjusted betas and standard errors of the regression of the group are  
11 similar, then the total, or aggregate, non-diversifiable market risks and diversifiable  
12 risks are similar, as noted in “Comparable Earnings: New Life for an Old Precept”  
13 provided in DWD Schedule SR-1. Thus, because the non-price regulated companies  
14 are selected based on analyses of market data, they are comparable in total risk (even  
15 though individual risks may vary) to the Utility Proxy Group. This is demonstrated  
16 clearly on page 273 of Jack C. Francis’ *Investments. Analysis and Management*  
17 (DWD Schedule SR-2), which shows that total risk can be “partitioned into its  
18 systematic and unsystematic components.” Essentially, companies that have similar  
19 unadjusted betas and standard errors of regression have similar total investment risk.  
20 Therefore, it is entirely appropriate to consider the results of the application of the

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4 Won Rebuttal Testimony, at 7

5 D’Ascendis Direct Testimony, at 37-38.

1 DCF, RPM, and CAPM to the Non-Price Regulated Proxy Group in determining the  
2 ROE for Spire.

3 **Q. IS THERE A SPECIFIC ADVANTAGE TO USING YOUR SELECTION**  
4 **CRITERIA, WHICH USES MEASURES OF SYSTEMATIC AND**  
5 **UNSYSTEMATIC RISK, INSTEAD OF USING THE COMBINATION OF**  
6 **BUSINESS AND FINANCIAL RISK?**

7 A. Yes. *Value Line Investment Survey* (“*Value Line*”) unadjusted betas, and the  
8 standard error of the regressions giving rise to those betas, are measurable objective  
9 values, whereas total business risk<sup>6</sup> and financial risk measures are more subjective.

10 **Q. DR. WON ARGUES THAT SINCE THE NON-PRICE REGULATED**  
11 **COMPANIES’ EARNINGS PER SHARE (“EPS”) GROWTH RATES AND**  
12 **ERPS ARE HIGHER THAN THE UTILITY PROXY GROUP COMPANIES’,**  
13 **THEIR INDICATED ROE SHOULD NOT BE CONSIDERED.<sup>7</sup> DO YOU**  
14 **AGREE?**

15 A. No, I do not. In my Direct Testimony,<sup>8</sup> I discussed that using a Non-Price Regulated  
16 Proxy Group is consistent with the “Comparable Risk” standard set forth in the *Hope*  
17 and *Bluefield* Supreme Court cases. In my Rebuttal Testimony,<sup>9</sup> I discussed that it is  
18 commonly accepted that regulation is a substitute for competition. Through my  
19 selection criteria, I have shown that the Non-Price Regulated Proxy Group is indeed  
20 similar in total risk to the Utility Proxy Group, and in turn, Spire. Because that is the

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6 Business risk in excess of size risk, which is measurable, as discussed previously  
7 Won Rebuttal Testimony, at 11.  
8 D’Ascendis Direct Testimony, at 36-37  
9 D’Ascendis Rebuttal Testimony, at 24-26.



1 fact of the matter, indicated ROEs from the Non-Price Regulated Proxy Group should  
2 be considered by the Commission.

3 **Application of the DCF Model**

4 **Q. DR. WON CLAIMS THAT THE GROWTH RATES YOU USE IN YOUR DCF**  
5 **MODEL ARE EXCESSIVE.<sup>10</sup> DO YOU AGREE?**

6 A. No, I do not. In my Rebuttal Testimony,<sup>11</sup> I discussed at length the supremacy of  
7 using projected measures of EPS growth in applying the DCF model and will not  
8 repeat that discussion here.

9 **Q. DR. WON ALSO SUGGESTS THAT YOUR PROJECTED EPS GROWTH**  
10 **RATES SHOULD NOT BE USED AS A PERPETUAL GROWTH RATE FOR**  
11 **USE IN THE DCF MODEL.<sup>12</sup> DO YOU AGREE?**

12 A. No, I do not. Dr. Won believes that utility EPS growth rates will converge to the  
13 level of the long-term growth in gross domestic product (“GDP”). He is mistaken.  
14 In my Rebuttal Testimony,<sup>13</sup> I discussed the reasons why projected EPS growth rates  
15 should be used as perpetual growth rates in the DCF model for utilities and that GDP  
16 growth is not a limit on growth for utility companies. I will not repeat those  
17 discussions here. As to Dr. Won’s claim that the projected EPS growth rate in my  
18 DCF model is too high and unrealistic, if one looks to DWD Schedule R-4, which is  
19 attached to my Rebuttal Testimony, the long-term growth rate for utilities from the  
20 period 1947 through 2020 is 6.46%, which is higher than my average projected EPS

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10 Won Rebuttal Testimony, at 11-14  
11 D’Ascendis Rebuttal Testimony, at 28-29  
12 Won Rebuttal Testimony, at 12-13.  
13 D’Ascendis Rebuttal Testimony, at 28-32

1 growth rates in my Direct Testimony (6.16%) and my Rebuttal Testimony (6.02%).  
2 Dr. Won’s concerns regarding my growth rates in the application of the DCF model  
3 should be dismissed.

4 **Q. DR. WON STATES THAT THE PERPETUAL USE OF EPS GROWTH**  
5 **RATES IS INCORRECT BECAUSE IT DOES NOT TAKE INTO ACCOUNT**  
6 **THE DECLINE STAGE OF THE BUSINESS LIFE CYCLE.<sup>14</sup> DO YOU**  
7 **AGREE?**

8 A. No, I do not. Looking to the source cited by Dr. Won, it describes the decline stage  
9 as:

10 In the final stage of the business life cycle, sales, profit, and cash flow  
11 all decline. During this phase, companies accept their failure to  
12 extend their business life cycle by adapting to the changing business  
13 environment. Firms lose their competitive advantage and finally exit  
14 the market.<sup>15</sup>

15 The decline stage is not simply that “company or industry growth will be declined”<sup>16</sup>  
16 as asserted by Dr. Won, but that the company or industry will cease to exist.  
17 Considering Dr. Won noted that the growth rate he used “reflects the long-term  
18 investment horizon assumption implied in the constant-growth DCF model,”<sup>17</sup> it does  
19 not appear that he expects the utility industry to exit the market any time soon.

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14 Won Rebuttal Testimony, at 13

15 <https://corporatefinanceinstitute.com/resources/knowledge/finance/business-life-cycle/>

16 Won Rebuttal Testimony, at 13

17 Commission’s Staff Report – Cost of Service, at 16

1 Q. DR. WON NOTES THAT THE FEDERAL ENERGY REGULATORY  
2 COMMISSION (“FERC”) ACCEPTS DCF MODEL ANALYSES LIKE THE  
3 ONE DR. WON USES IN HIS ANALYSIS.<sup>18</sup> PLEASE RESPOND.

4 A. Dr. Won fails to consider FERC Opinion No. 531<sup>19</sup>, which speaks to the use of  
5 various methods to determine the ROE for electric transmission facilities:

6 We acknowledge that under the DCF analysis, the Commission typically  
7 sets the base ROE with regard to multiple entities at the midpoint of the  
8 zone of reasonableness. However, for the reasons set forth below, we  
9 conclude that a mechanical application of the DCF methodology with the  
10 use of the midpoint here would result in an ROE that does not satisfy the  
11 requirements of *Hope* and *Bluefield*. Therefore, based on the record in  
12 this case, including the unusual capital market conditions present, we  
13 conclude that the just and reasonable base ROE for the NETOs should be  
14 set halfway between the midpoint of the zone of reasonableness and the  
15 top of the zone of reasonableness.

16 \*\*\*

17 We are concerned that capital market conditions in the record are  
18 anomalous, thereby making it more difficult to determine the return  
19 necessary for public utilities to attract capital. In these circumstances, we  
20 have less confidence that the midpoint of the zone of reasonableness  
21 established in this proceeding accurately reflects the equity returns  
22 necessary to meet the *Hope* and *Bluefield* attraction standard.[footnote  
23 omitted] We find it is necessary and reasonable to consider additional  
24 record evidence, including evidence of alternative benchmark  
25 methodologies and state commission-approved ROEs, to gain insight into  
26 the potential impacts of these unusual capital market conditions on the  
27 appropriateness of using the resulting midpoint. [footnote omitted]<sup>20</sup>

28 Opinion No. 531 indicates that under unusual market conditions, such as the current  
29 market conditions, the Two-Step DCF method as applied by Dr. Won may understate

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18 Won Rebuttal Testimony, at 12  
19 Opinion No 531 sets the background for which Opinion No 569 (cited by Dr Won) was issued  
20 Opinion No 531, *Order on Paper Hearing*, 149 FERC ¶ 61,302 (2014), at Paragraphs 142, 145  
(*italics in original*)

1 the investor-required return, and that analysts should look to other benchmarks to  
2 determine the ROE for utility companies.

3 **Q. WAS THE FERC’S POSITION IN OPINION NO. 531 REAFFIRMED IN**  
4 **OPINION NO. 569, WHICH IS CITED BY DR. WON?**

5 A. Yes, it was. The FERC noted that “[i]n any event, the application of the CAPM  
6 model mitigates some of the model risk that the DCF model may perform poorly in  
7 certain circumstances.”<sup>21</sup> More importantly, however, Opinion No. 569 notes that the  
8 FERC reaffirmed the position that “the cost of common equity to a regulated  
9 enterprise depends upon what the market expects not upon precisely what is actually  
10 going to happen.”<sup>22</sup> Given Dr. Won’s approach to determining the recommended  
11 ROE in this proceeding looks specifically to the change between the previous period  
12 and the current period, without giving regard to what the market expects, it is clear  
13 that his approach is not supported by the FERC.

14 **Predictive Risk Premium Model Applied to Utility Companies**

15 **Q. DR. WON STATES THAT YOUR PRPM RESULTS FOR YOUR UTILITY**  
16 **PROXY GROUP VARY WIDELY.<sup>23</sup> IS THAT UNIQUE TO THE PRPM?**

17 A. No, it is not. Generally, the selection of a proxy group does not guarantee that the  
18 results of individual companies will be clustered around a measure of central  
19 tendency. For example, the results of my updated DCF model had a range of results

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21 Opinion No. 569, *Order on Briefs, Rehearing, and Initial Decision*, 169 FERC ¶ 61,129 (2019), at  
Paragraph 171

22 Opinion No. 569, *Order on Briefs, Rehearing, and Initial Decision*, 169 FERC ¶ 61,129 (2019), at  
Paragraph 171

23 Won Rebuttal Testimony, at 16

1 from 8.06% to 11.66%, or 360 basis points, and my updated PRPM results ranged  
2 from 9.05% to 12.87%, or 382 basis points. Variations in individual company results  
3 are common and are reflective of expectations of future risks and growth for each  
4 individual company. Because of this variation, an analyst should attempt to estimate  
5 an ROE from that range, not just eliminate individual results one does not agree with,  
6 like Dr. Won has.

7 **Q. DR. WON STATES THAT YOUR PROJECTED RISK-FREE RATE IS TOO**  
8 **HIGH COMPARED TO THE CURRENT RISK-FREE RATE.<sup>24</sup> IS THAT**  
9 **THE AIM OF USING PROJECTED INTEREST RATES?**

10 A. No, it is not. As discussed in my Rebuttal Testimony<sup>25</sup> (and as noted above), the cost  
11 of capital, including the cost rate of common equity, is expectational in that it reflects  
12 investors' expectations of future capital markets, including an expectation of interest  
13 rate levels, as well as future risks. Ratemaking is also prospective in that the rates set  
14 in this proceeding will be in effect for a period in the future. Because of this, it is not  
15 relevant whether or not the projected interest rate is comparable to the current risk-  
16 free rate, as we are measuring the expected return, which is forward looking.

17 **Q. DR. WON STATES THAT IN ORDER TO USE THE GENERALIZED**  
18 **AUTOREGRESSIVE CONDITIONAL HETEROSKEDASTICITY**  
19 **(“GARCH”) MODEL, ONE NEEDS A SUBSTANTIAL TIME SERIES**  
20 **HISTORY TO DEVELOP STABLE ESTIMATES OF RISK PREMIUM, AND**  
21 **STATES THAT TIME SERIES OF OVER 600 DATA POINTS ARE NOT**

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24 Won Rebuttal Testimony, at 16

25 D'Ascendis Rebuttal Testimony, at 33

1           **SUFFICIENT FOR STABLE RISK PREMIUMS IN THE PRPM. DO YOU**  
2           **AGREE?**

3    A.    While I do agree that securities with a short time series, such as ONE Gas, Inc.  
4           (“OGS”) are less stable than a security with a longer time series, I do not agree that a  
5           security needs a time series of 1,000 data points to be considered stable. As shown  
6           on Table 1 below, the Ng and Lam article shows that datasets containing as low as  
7           300 observations have correlations above 0.90:

8           **Table 1: Correlation of the Conditional Variances of GARCH Model Using**  
9           **the Sample Size Between x and 3000<sup>26</sup>**

<b>Number of Observations</b>	<b>Correlation</b>
200	0.5478
300	0.9391
400	0.9849
500	0.9866
600	0.9805
700	0.9810
800	0.9872
900	0.9830
1,000	0.9845
1,100	0.9815
1,300	0.9813
1,500	0.9859
2,000	0.9987
3,000	1.0000

10           For my PRPM analysis, only OGS has less than 300 observations which I removed  
11           from my PRPM analysis in rebuttal, as it appeared to be unreasonable compared to  
12           the PRPM results of the rest of the Utility Proxy Group. In view of the above, Dr.  
13           Won’s concern should be dismissed.

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26    H.S. Ng and K.P. Lam, *How Does the Sample Size Affect GARCH Model?*, Department of Systems Engineering and Engineering Management, The Chinese University of Hong Kong, Shatin, N T, Hong

1 **Concerns Regarding Equity and Market Risk Premiums**

2 **Q. GENERALLY, DR. WON ARGUES THAT THE ERPS IN YOUR RPM AND**  
3 **THE MRPS IN YOUR CAPM ARE EXCESSIVE BY CITING SEVERAL**  
4 **“BENCHMARK” RISK PREMIUMS. PLEASE RESPOND.**

5 A. Dr. Won’s argument is misplaced. The “benchmark” risk premiums of 4% to 7%  
6 cited by Dr. Won have little to no meaning. As discussed in my Rebuttal  
7 Testimony,<sup>27</sup> ERPs as measured by the difference between authorized ROEs and  
8 utility bond yields have exceeded Dr. Won’s (and Mr. Murray’s) benchmark ERPs  
9 used in their “Rule of Thumb” analyses. Additionally, Dr. Won cites Brigham,  
10 Shome, and Vinson in his rebuttal testimony, and states that the relationship between  
11 risk premium and risk-free rate keeps changing over the time periods of observation,  
12 and the correlations are different dependent upon data characteristics,<sup>28</sup> which  
13 supports my position stated in my Rebuttal Testimony.

14 Because the relationship between risk premiums and interest rates changes  
15 constantly, there would be no way to credibly represent that there is an acceptable  
16 range of risk premiums that would be applicable during all market conditions. As  
17 such, Dr. Won’s claims of my ERPs and MRPs being excessive by using these  
18 benchmarks are misplaced.

19 **Q. HAS THE FERC COMMENTED ON THE INVERSE RELATIONSHIP**  
20 **BETWEEN MRPS AND INTEREST RATES?**

21 A. Yes, it has. In Opinion No. 569, the FERC noted:

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27 Kong (2006)  
28 D’Ascendis Rebuttal Testimony, at 42-43  
Won Rebuttal Testimony, at 30-31

1                    *In Estimating Shareholder Risk Premia Using Analysts' Growth*  
2                    *Forecasts*, Harris and Marston found that the 'market risk premium varies  
3                    over time. In particular, the equity market premium over government  
4                    bonds is higher in low interest rate environments.<sup>29</sup>[footnote omitted]  
5                    Government bond interest rates were significantly lower during 2015 than  
6                    during the 1982 to 1991 period.<sup>[footnote omitted]</sup> Therefore, the fact that we  
7                    have found higher market risk premiums of 9.12 percent and 8.85 percent  
8                    during the first and second halves of 2015, rather than the less than 7.0  
9                    percent risk premiums Harris and Marston found during 1982 to 1991 is  
10                    consistent with the Harris and Marston articles.<sup>29</sup>

11                    Considering the FERC did not find 7.0% to not represent the upper bound of  
12                    acceptable MRPs, especially given its recognition of the inverse relationship between  
13                    MRPs and interest rates, it is unclear why Dr. Won continues to do so.<sup>30</sup>

14                    **Q. DR. WON TAKES ISSUE WITH YOUR LINEAR REGRESSION OF**  
15                    **HISTORICAL ERPS AND MRPS BECAUSE OF ITS LOW R-SQUARED**  
16                    **VALUES.<sup>31</sup> PLEASE RESPOND.**

17                    A. Dr. Won makes a correct observation but does not have a correct conclusion. The  
18                    meaningful measure for these regressions is not its coefficient of determination (*i e* ,  
19                    R-Squared), but its statistical significance. Statistical significance refers to the claim  
20                    that a result from data generated by testing or experimentation is not likely to occur  
21                    randomly but is likely to be attributable to a specific cause. Two measures of  
22                    statistical significance, the t-statistic and P-value, exceed 2.0 and are less than 0.05,  
23                    respectively for each ERP and MRP regression shown on Schedule DWD SR-3.  
24                    These measures mean that both regressions are statistically significant at the 95%  
25                    level or that the result produced by the regression analysis is likely to be attributed to

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29                    Opinion No. 569, *Order on Briefs, Rehearing, and Initial Decision*, 169 FERC ¶ 61,129 (2019), at  
                        Paragraph 269.

30                    Won Rebuttal Testimony, at 26

31                    Won Rebuttal Testimony, at 19-21, 29-31



1 a specific cause, in this case, the level of interest rates. Dr. Won's concern should be  
2 dismissed.

3 **Q. DR. WON QUESTIONS THE STABILITY OF THE PRPM-GENERATED**  
4 **ERP AND MRP BECAUSE OF ITS LACK OF STATISTICAL**  
5 **ROBUSTNESS.<sup>32</sup> PLEASE RESPOND.**

6 A. Dr. Won is mistaken. The authors state below the chart cited by Dr. Won that “[i]t is  
7 clear from the results that the risk premia are more stable over the rolling 24 month  
8 period when calculated using the average predicted variance compared to with using  
9 the spot variance. Secondly, the 20 and 79 year means are substantially more stable  
10 and reasonable in magnitude than the 5 year means.”<sup>33</sup> Consistent with the authors’  
11 conclusions, I applied both the average predicted variance and the longest time frame  
12 possible to calculate my ERPs and MRPs using the PRPM.

13 **Q. DR. WON’S MAIN CONCERN REGARDING YOUR *VALUE LINE***  
14 **SUMMARY & INDEX ERP AND YOUR MARKET DCF ANALYSES USING**  
15 ***VALUE LINE* AND BLOOMBERG DATA IS THAT THE EXPECTED**  
16 **MARKET RETURN IS TOO HIGH TO BE REASONABLE.<sup>34</sup> DO YOU**  
17 **AGREE WITH HIS CONCERN?**

18 A. No, I do not. While Dr. Won criticizes certain of my prospective market returns, the  
19 average implied market return based on my conclusion of my MRP (*i.e.*, MRP plus  
20 projected risk-free rate) is 12.56% (Direct Testimony) and 12.50% (Rebuttal

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32 Won Rebuttal Testimony, at 21-22, 31

33 Pauline M Aheirn, Frank J Hanley and Richard A Michelfelder, Ph D *A New Approach for Estimating the Equity Risk Premium for Public Utilities*, The Journal of Regulatory Economics (December 2011), 40 273.

34 Won Rebuttal Testimony, at 22-25, 32-34.

1           Testimony). Given the 12.20% long-term average market return for the period 1926  
2           to 2020, my implied market returns are not unreasonably high. Furthermore, Dr.  
3           Won notes in “correcting” my *Value Line* market DCF expected return that he “found  
4           a reasonable return of 12.09%.”<sup>35</sup> Given both the historical long-term average market  
5           return, and “corrected” *Value Line* market DCF return supported by Dr. Won, my  
6           implied market returns are reasonable.

7   **Q.   DR. WON CITES SEVERAL SUBSETS OF HISTORICAL DATA TO**  
8   **ATTEMPT TO DISCREDIT YOUR MARKET RETURN CALCULATION.<sup>36</sup>**  
9   **IS IT APPROPRIATE TO USE SUBSETS OF DATA FOR COST OF**  
10 **CAPITAL PURPOSES?**

11 A.   No, it is not. The 2021 SBBI® Yearbook Stocks, Bonds, Bills, and Inflation (“SBBI-  
12 2021”) discusses the appropriate time period one should use when calculating ERPs:

13           The estimate of the equity risk premium depends on the length of the data  
14           series studied. A proper estimate of the equity risk premium requires a  
15           data series long enough to give a reliable average without being unduly  
16           influenced by very good and very poor short-term returns. When  
17           calculated using a long-data series, the historical equity risk premium is  
18           relatively stable. Furthermore, because an average of the realized equity  
19           risk premium is quite volatile when calculated using a short history, using  
20           a long series makes it less likely that the analyst can justify any number  
21           he or she wants. The magnitude of how shorter periods can affect the  
22           result will be explored later in this chapter.

23           Some analysts estimate the expected equity risk premium using a shorter,  
24           more recent period on the basis that recent events are more likely to be  
25           repeated in the near future; furthermore, they believe that the 1920s,  
26           1930s, and 1940s contain too many unusual events. This view is suspect  
27           because all periods contain unusual events. Some of the most unusual  
28           events of the last 100 years took place quite recently, including the

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35       Won Rebuttal Testimony, at 24

36       Won Rebuttal Testimony, at 23

1 inflation of the late 1970s and early 1980s, the October 1987 stock  
2 market crash, the collapse of the high-yield bond market, the major  
3 contraction and consolidation of the thrift industry, the collapse of the  
4 Soviet Union, the development of the European Economic Community,  
5 the attacks of Sept. 11, 2001, and the global financial crisis of 2008-2009,  
6 and most recently, the market crash in the first quarter of 2020 that was  
7 precipitated by the spread of the COVID-19 virus.

8 It is even difficult for economists to predict the economic environment of  
9 the future. For example, if one were analyzing the stock market in 1987  
10 before the crash, it would be statistically improbable to predict the  
11 impending short-term volatility without considering the stock market  
12 crash and market volatility of the 1929-1931 period.

13 Without an appreciation of the 1920s and 1930s, no one would believe  
14 that such events could happen. The 95-year period starting with 1926 is  
15 represents what can happen: It includes high and low returns, volatile and  
16 quiet markets, war and peace, inflation and deflation, and prosperity and  
17 depression. Restricting attention to a shorter historical period  
18 underestimates the amount of change that could occur in a long future  
19 period. Finally, because historical event-types (not specific events) tend  
20 to repeat themselves, *long-run capital market return studies can reveal a*  
21 *great deal about the future* *Investors probably expect* “unusual” events  
22 to occur from time to time, and their return expectations reflect this.  
23 (emphasis added)<sup>37</sup>

24 The fact that Dr. Won relies on the same time period and data source in his analysis  
25 that I rely on in my analysis and given the above as noted in SBBI-2021 (which both  
26 Dr. Won<sup>38</sup> and I rely on), Dr. Won’s use of subsets of historical data is inappropriate.

27 **Q. DR. WON ATTEMPTS TO SHOW THAT FUTURE STOCK MARKET**  
28 **RETURNS WILL BE LOWER THAN HISTORICAL RETURNS GIVEN**  
29 **SLOWER ECONOMIC GROWTH.<sup>39</sup> HAVE YOU ANALYZED THE**

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37 SBBI-2021, at 10-23 – 10-24

38 Dr. Won relies on SBBI-2020, however, SBBI-2021 was available as of the date of his Rebuttal  
Testimony

39 Won Rebuttal Testimony, at 32.

1           **HISTORICAL RELATIONSHIP BETWEEN GDP AND MARKET**  
2           **RETURNS?**

3    A.    Yes, I have. I calculated the correlation coefficient between year-over-year GDP  
4           growth and Large-Capitalization Stock returns since 1929 and found a correlation of  
5           0.13, meaning there is little-to-no link between GDP. In addition, the relationship  
6           between the two was not statistically significant.

7    **Q.    DR. WON ATTEMPTS TO “CORRECT” YOUR MARKET DCF BY**  
8           **ELIMINATING COMPANIES THAT HAVE NEGATIVE EXPECTED EPS**  
9           **GROWTH RATES OR GROWTH RATES IN EXCESS OF 20%.<sup>40</sup> DOES**  
10          **THE ELIMINATION OF THESE COMPANIES REFLECT AN ACCURATE**  
11          **DEPICTION OF THE MARKET PORTFOLIO?**

12   A.    No, it does not. First, the expected market return is meant to reflect just that – all  
13          companies in the market. At any given time, there are companies that have both high  
14          and low growth rates. Excluding companies with growth rates outside a certain band  
15          causes the estimate of the market return to no longer reflect the overall market, but  
16          rather an arbitrary subset of companies within the market.

17          For example, Dr. Won recalculated an expected market return of 12.09% based on  
18          my application of the constant growth DCF to the S&P 500 using *Value Line’s*  
19          projected EPS growth rates. Based on my replication of the 12.09% calculated by Dr.  
20          Won, he excluded 41 companies from the market return calculation, which comprise  
21          10.59% of the entire S&P 500 market capitalization. Excluding those companies has  
22          an effect on the calculated expected market return and subsequently the MRP More

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40          Won Rebuttal Testimony, at 23-24.

1 important, the resulting estimate does not represent an estimate of the market as a  
2 whole.

3 Beyond that, my methodological concern is with internal consistency in the model's  
4 application. A fundamental assumption of the CAPM is that the required return is  
5 proportional to the risk of the investment. Under the CAPM, the beta is the measure  
6 of risk, and is calculated by comparing the subject security's returns to the overall  
7 market returns. Because the beta is calculated relative to the overall market, which  
8 includes companies regardless of their growth rates, it is important that the expected  
9 market return also reflect the overall market. As such, I do not believe it is  
10 appropriate to combine betas calculated relative to the entire market with a MRP  
11 calculated using only a subset of the market (i.e., companies with growth rates within  
12 a range of 0% to 20%).

13 If Dr. Won chooses to remove companies with growth rates below 0% and above  
14 20% from the expected market return, he likewise should remove them from the  
15 index used to calculate the beta. Because betas are a positive function of the  
16 correlation of returns between the subject company and the index, removing those  
17 companies may increase the correlation, thereby increasing the beta.

18 In addition, companies with growth rates within a range of 0% to 20% may have  
19 lower volatility than companies outside the range. Because the beta also reflects  
20 relative volatility (i.e., subject company relative to the index), if the volatility of the  
21 index falls, the relative volatility will increase, again increasing the beta. Dr. Won's  
22 position inherently assumes the proxy companies' correlation coefficients and  
23 relative volatility would remain constant, and their betas would remain unchanged if

1 companies with growth rates outside the band of 0% to 20% are removed from the  
2 market index. He has not shown that to be the case.

3 **Q. DR. WON STATES THAT YOUR MRP AND CORRESPONDING ROE**  
4 **USING THE CAPM ARE HIGH COMPARED TO THE MRPS HE USED IN**  
5 **HIS DIRECT ANALYSIS AND VARIOUS SURVEYS.<sup>41</sup> ARE DR. WON'S**  
6 **MRPS OR SURVEYS REASONABLE MEASURES OF THE ESTIMATED**  
7 **MRP?**

8 A. No, they are not. In my Rebuttal Testimony,<sup>42</sup> I discussed why Dr. Won's MRPs and  
9 various surveys of market returns or MRPs are not credible measures of the expected  
10 MRP, and will not repeat those discussions here.

11 **Q. DR. WON SAYS YOU SHOULD HAVE USED SPIRE'S BOND YIELD IN**  
12 **APPLYING THE RPM.<sup>43</sup> IS HE CORRECT?**

13 A. No, he is not. The RPM is designed to generate an indicated ROE for the Utility  
14 Proxy Group, not Spire. After one obtains the indicated ROE from the model, one  
15 would then adjust for relative risk, which I did.

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41 Won Rebuttal Testimony, at 26-27

42 D'Ascendis Rebuttal Testimony, at 36-41, 53-55

43 Won Rebuttal Testimony, at 25

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**Application of the ECAPM**

**Q. DR. WON ARGUES THAT DR. MORIN’S 25% ADJUSTMENT USED IN THE ECAPM HAS NOT BEEN PROVEN TO HOLD AFTER 1984.<sup>44</sup> PLEASE RESPOND.**

A. The empirical issues with the CAPM have been present since the presentation of the model, as noted by Dianna R. Harrington in her text Modern Portfolio Theory & the Capital Asset Pricing Model:

So far we have learned some very interesting things about the CAPM and reality. Some of the earliest work tested realized data (history) against data generated by simulated portfolios. Early studies by Douglas (1969) and Lintner (Douglas [1969]) showed discrepancies between what was expected on the basis of the CAPM and the actual relationships that were apparent in the capital markets. Theoretically, the minimal rate of return from the portfolios (the intercept) and the actual risk-free rate for the period should have been equal. They were not.

\* \* \*

Another study, now more famous than Lintner’s was done by Black, Jensen, and Scholes (1972). Lintner had used what is called a cross-sectional method (looking at a number of stock returns during one time period), whereas Black, Jensen, and Scholes used a time-series method (using returns for a number of stocks over several time periods). To make their test, Black, Jensen, and Scholes assumed that what had happened in the past was a good proxy for the investor expectations (a frequent assumption in CAPM tests). Using historical data, they generated estimates using what we call the market model:

$$R_{jt} = \alpha_j + \beta_j (R_{mt}) + \epsilon_j$$

Where:  
R = total returns

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44 Won Rebuttal Testimony, at 34

- 1  $\beta$  = the slope of the line (the incremental return for risk)
- 2  $\alpha$  = the intercept or a constant (expected to be 0 over time and across all
- 3 firms)
- 4  $\varepsilon$  = an error term (expected to be random, without information)
- 5  $m$  = the market proxy
- 6  $j$  = the firm or portfolio
- 7  $t$  = the time period

8 Instead of using single stocks, they formed portfolios in an effort to wash  
9 out one source of error; because betas of single firms are quite unstable.  
10 On the basis of the CAPM, they expected to find

- 11 1. That the intercept was equal to the risk-free rate (their proxy was the  
12 Treasury bill rate)
- 13 2. That the capital market line had a positive slope and that riskier  
14 (higher beta) securities provided higher return

15 Instead they found

- 16 1. That the intercept was different from the risk-free rate
- 17 2. That high-risk securities earned less and low-risk securities earned  
18 more than predicted by the model
- 19 3. That the intercept seemed to depend on the beta of any asset: high-  
20 beta stocks had a different intercept than low-beta stocks

21 \* \* \*

22 Fama and MacBeth (1974) criticized the Black, Jensen, and Scholes study  
23 (hereafter called BJS). In a reformulation of the study, they supported the  
24 first of the BJS findings. They found that the intercept exceeded the risk-  
25 free proxy, but did not find the evidence to support the other BJS  
26 conclusions.<sup>45</sup>

27 Harrington discusses Black's potential solution to this phenomenon:

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45 Dianna R Harrington, Modern Portfolio Theory & the Capital Asset Pricing Model – A User's Guide,  
Prentice-Hall, Inc 1983, at 43-45



1 Black's replacement for the risk-free asset was a portfolio that had no  
2 covariability with the market portfolio. Because the relevant risk in the  
3 CAPM is systematic risk, a risk-free asset would be the one with no  
4 volatility relative to the market – that is, a portfolio with a beta of zero.  
5 All investor-perceived levels of risk could be obtained from various linear  
6 combinations of Black's zero-beta portfolio and the market portfolio...  
7 Since  $R_z$  (the rate of return of the zero-beta asset) and  $R_m$  are uncorrelated  
8 (as  $R_f$  and  $R_m$  were assumed to be in the simple CAPM), the investor can  
9 choose from various combinations of  $R_z$  and  $R_m$ . On segment  $R_m Y$ ,  $R_z$  is  
10 sold short and proceeds are invested in  $R_m$ . On segment  $R_z R_m$ , portions  
11 of the zero-beta portfolio are purchased. At  $R_m$ , the investor is fully  
12 invested in the market portfolio. The equilibrium CAPM was rewritten by  
13 Black as follows:

$$14 \quad E(R_i) = (1 - \beta_i) E(R_z) + \beta_i E(R_m)$$

15 Where:

16  $E$  indicates expected,

17  $E(R_z)$  is less than  $E(R_m)$ , and

18  $R_z$  holdings over the whole market must be in equilibrium. That is, the  
19 number of short sellers and lenders of securities must be equal.

20 Black's adaptation is intriguing. The result of using this model is a  
21 capital market line that has a less steep slope and a higher intercept than  
22 those of the simple CAPM. If Black's model is more correct in its  
23 description of investor behavior in the marketplace, then the use of the  
24 simple model would produce equity return predictions that would be too  
25 low for stocks with betas greater than one and too high for stocks with  
26 betas of less than one.<sup>46</sup>

27 As such, it is reasonable to assume that the Morin adjustments still hold.

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46 Dianna R. Harrington, Modern Portfolio Theory & the Capital Asset Pricing Model – A User's Guide,  
Prentice-Hall, Inc 1983, at 30-31

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**Size Adjustment**

**Q. IT IS DR. WON’S OPINION THAT SPIRE SHOULD NOT BE AWARDED A SIZE ADJUSTMENT BECAUSE IT IS THE LARGEST NATURAL GAS DISTRIBUTION UTILITY IN MISSOURI.<sup>47</sup> DO YOU AGREE?**

A. No, I do not. As discussed in my Rebuttal Testimony,<sup>48</sup> the cost of capital is a comparative exercise. Even though Spire is the largest gas distribution utility in Missouri, one must compare Spire to the Utility Proxy Group, which is larger.

**Q. DR. WON STATES THAT SPIRE’S BUSINESS RISK (INCLUDING SIZE) IS REFLECTED IN ITS BOND RATING.<sup>49</sup> DO YOU AGREE?**

A. No, I do not. As mentioned in my Direct Testimony,<sup>50</sup> ratings agencies do not account for size in their rating criteria. Specifically, Moody’s states:

[t]he size and scale of a regulated utility has generally not been a major determinant of its credit strength in the same way that it has been for most other industrial sectors.<sup>51</sup>

Similarly S&P states:

There is no minimum size criterion, although size often provides a measure of diversification. Size and scope of operations is important relative to those of industry peers, though not in absolute terms. While relatively smaller companies can enjoy a high degree of diversification, they will likely be, almost by definition, more concentrated in terms of product, number of customers, or geography than their larger peers in the same industry.<sup>52</sup>

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47 Won Rebuttal Testimony, at 36  
48 D’Ascendis Rebuttal Testimony, at 24-26.  
49 Won Rebuttal Testimony, at 36  
50 D’Ascendis Direct Testimony, at 12.  
51 Moody’s Investors Service, *Rating Methodology Regulated Electric and Gas Utilities*, June 23, 2017, at 26  
52 Standard & Poor’s Rating Services, *RatingsDirect, Corporate Methodology*, November 19, 2013, at 60

1 As such, it is clear that Spire’s bond rating does not reflect the Company’s risk due to  
2 its smaller size relative to that of the proxy group.

3 **Q. DR. WON CLAIMS YOU HAVE NOT PROVIDED ANY EVIDENCE TO**  
4 **SUPPORT YOUR SIZE ADJUSTMENT.<sup>53</sup> HAVE YOU PERFORMED A**  
5 **STUDY FOR UTILITY COMPANIES THAT LINKS SIZE AND RISK?**

6 A. Yes, I have. The study included the universe of electric, gas, and water companies  
7 included in *Value Line* Standard Edition. From each of the utilities’ *Value Line*  
8 Ratings & Reports, I calculated the ten-year Coefficient of Variation (“CoV”)<sup>54</sup> of net  
9 profit (a measure of risk) and current market capitalization (a measure of size) for  
10 each company. After ranking the companies by size (largest to smallest) and risk  
11 (least risky to most risky), I made a scatter plot of the data, as shown on Chart 1,  
12 below:

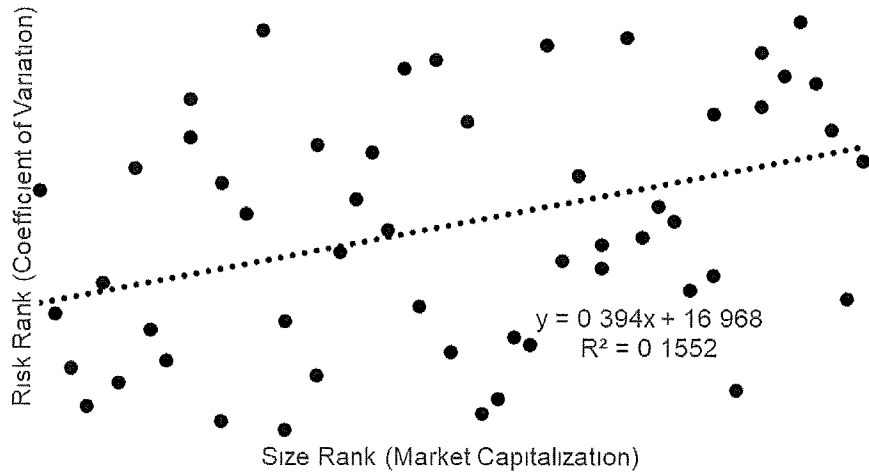
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53 Won Rebuttal Testimony, at 36

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

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**Chart 1: Relationship Between Size and Risk  
for the *Value Line* Universe of Utility Companies<sup>55</sup>**



3

4 As shown in Chart 1 above, as company size decreases (increasing size rank), the  
5 CoV increases, linking size and risk for utilities, which is significant at 95.0%  
6 confidence level.

7 **Q. HAVE YOU CONDUCTED AN ADDITIONAL STUDY COMPARING THE**  
8 **SIZE OF SPIRE WITH THE UTILITY PROXY GROUP?**

9 A. Yes, I have. Duff & Phelps' ("D&P") 2020 Cost of Capital: Annual U.S. Guidance  
10 and Examples Market Results Through 2019 ("D&P 2020") presents a Size Study  
11 based on the relationship of various measures of size and return. Relative to the  
12 relationship between average annual return and the various measures of size, D&P  
13 state:

14 **The size of a company is one of the most important risk elements to**  
15 **consider when developing cost of equity estimates for use in valuing a**  
16 **firm.** Traditionally, researchers have used market value of equity (*i e*,

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55 Source. *Value Line*

1 “market capitalization” or simply “market cap”) as a measure of size in  
2 conducting historical rate of return research. For example, the Center for  
3 Research in Security Prices (CRSP) “deciles” are developed by sorting  
4 U.S. companies by market capitalization. Another example is the Fama-  
5 French “Small minus Big” (SMB) series, which is the difference in return  
6 of “small” stocks minus “big” (*i e*, large) stocks, as defined by market  
7 capitalization. (emphasis added)<sup>56</sup>

8 DWD Schedule SR-4 contains indicated small size risk premiums using various  
9 measures of size as described by D&P 2020.<sup>57</sup> The measures are listed below:

- 10 • Market Value of Common Equity;
- 11 • Book Value of Common Equity;
- 12 • Five-Year Average Net Income;
- 13 • Market Value of Invested Capital;
- 14 • Total Assets;
- 15 • Five Year Average EBITDA<sup>58</sup>;
- 16 • Total Sales; and
- 17 • Number of Employees.

18 As shown on DWD Schedule SR-4, in all measures, Spire is smaller than the average  
19 proxy company, with associated size premiums ranging from 0.27% to 0.59%. In  
20 view of these indicated size premiums, my size adjustment of 0.10% is reasonable, if  
21 not conservative.

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56 D&P-2020, Chapter 10 at 2

57 D&P-2020, Chapter 10 at 5.

58 EBITDA = Earnings before Interest Expense, Taxes, and Depreciation and Amortization

1 **Flotation Costs**

2 **Q. DR. WON BELIEVES THAT FLOTATION COSTS SHOULD BE**  
3 **ATTRIBUTABLE TO THE PARENT AND NOT SPIRE.<sup>59</sup> PLEASE**  
4 **RESPOND.**

5 A. Dr. Won is incorrect. It is appropriate to consider flotation costs because even  
6 indirectly owned subsidiaries receive equity capital from parents and provide returns  
7 on the capital that roll up to the parent. To deny recovery of issuance costs associated  
8 with the capital that is in the subsidiaries, it ultimately would penalize the investors  
9 that fund the utility operations and would inhibit the utility's ability to obtain new  
10 equity capital at a reasonable cost.

**III. RESPONSE TO OPC WITNESS MURRAY**

11 **Q. PLEASE PROVIDE A SUMMARY OF MR. MURRAY'S REBUTTAL**  
12 **TESTIMONY AS IT PERTAINS TO YOUR DIRECT TESTIMONY.**

13 A. Mr. Murray raises several concerns with my Direct Testimony. Specifically, he  
14 discusses the following: 1) that my recommended ROE is inconsistent with the ROE  
15 associated with the issuance of SR equity units; 2) my recommended ROE is  
16 inconsistent with a report authored by PricewaterhouseCoopers ("PWC") to assess  
17 the impairment of Spire, Inc.'s goodwill ("PWC Report"); 3) my DCF is based on  
18 unreasonable and illogical assumptions; 4) my risk premium is inconsistent with the  
19 PWC Report and his calculated MRPs; 5) that the use of a Non-Price Regulated  
20 Proxy Group is inappropriate; 6) that it is inappropriate to include flotation costs

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59 Won Rebuttal Testimony, at 36-37

1 associated with funds raised for the purposes of an acquisition; 7) that my size  
2 adjustment is not justified; 8) that my credit risk adjustment is not justified; and 9)  
3 that I should have considered the Company's proposed decoupled rate design in my  
4 recommended ROE.

5 **ROE Associated with the Issuance of Spire Inc. Equity Units**

6 **Q. MR. MURRAY ASSERTS THAT THE "CURRENT MARKET COST OF**  
7 **SPIRE INC'S EQUITY UNITS [SHOULD BE] USED AS A TEST OF**  
8 **REASONABLENESS OF THE VARIOUS COST OF EQUITY ESTIMATES**  
9 **IN THIS CASE."**<sup>60</sup> **DO YOU AGREE?**

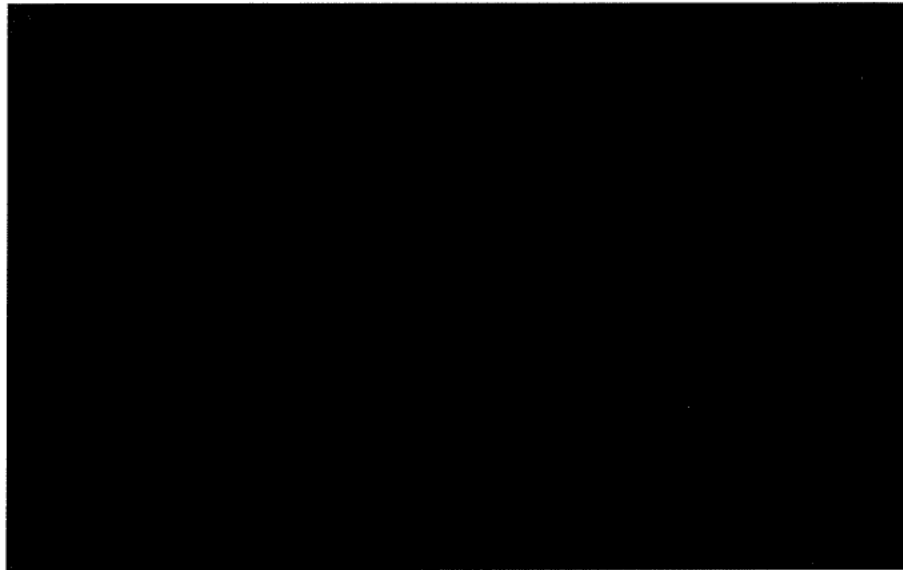
10 A. No, I do not. Mr. Murray has not shown that the risk profile for SR equity units is  
11 comparable to the risk profile for Spire common equity. This is readily apparent in  
12 the Bank of America presentation Mr. Murray cites, as shown in Chart 2, below:

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60 Murray Rebuttal Testimony, at 10

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\*\* [REDACTED] \*\*61



3

4 As shown on Chart 2, it is clear that the costs (*i.e.* risk) are not the same for SR  
5 common stock and SR equity units. Intuitively this makes sense, as the equity unit  
6 holders receive a higher yield than common equity stockholders in the first three  
7 years in exchange for the lack of participation in the Company's stock appreciation,  
8 as noted by Mr. Murray.<sup>62</sup> Those circumstances are not the same, and they should not  
9 be viewed as equivalent.

10 **ROE Applied in Determining the Fair Value of Spire Inc's Regulated Assets**

11 **Q. PLEASE SUMMARIZE MR. MURRAY'S POSITION REGARDING THE**  
12 **PWC REPORT.**

13 A. Mr. Murray notes that \*\* [REDACTED]  
14 [REDACTED]

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61 \*\* [REDACTED] \*\*  
62 Murray Rebuttal Testimony, at 9



1 [REDACTED] \*\* He notes that \*\* [REDACTED] \*\* is consistent with  
2 several other ROE measures.

3 **Q. PLEASE COMMENT ON THE APPLICABILITY OF THE PWC REPORT**  
4 **TO THE AUTHORIZED ROE IN THIS CASE.**

5 A. The PWC Report referenced by Mr. Murray was calculated for the purpose of  
6 estimating the fair value of SR's business units as discrete assets to an individual  
7 hypothetical buyer. Meanwhile, the objective of the ROE proposed within this docket  
8 is to infer the market required return on equity for Spire based on market data  
9 reflecting the investment decisions of multiple investors valuing a minority interest in  
10 the Company's equity. In that fundamental respect, the intent and premise of the  
11 analyses are substantially different. As much is noted in the limiting conditions:

12 \*\* [REDACTED]  
13 [REDACTED]  
14 [REDACTED]  
15 [REDACTED]  
16 [REDACTED]  
17 [REDACTED]  
18 [REDACTED]

19 \*\*\*

20 [REDACTED]  
21 [REDACTED]  
22 [REDACTED]  
23 [REDACTED]  
24 [REDACTED]  
25 [REDACTED]  
26 [REDACTED]  
27 [REDACTED]  
28 [REDACTED]  
29 [REDACTED] 63\*\*

1 In addition, in accordance with the Financial Accounting Standards Board, SR is  
2 required to perform periodic goodwill impairment tests. One step of that process is a  
3 market reconciliation, which compares SR's estimated fair value, as an asset  
4 discounted by a weighted average cost of capital ("WACC"), to the actual market  
5 value of its outstanding capital. The Statement of Financial Accounting Standards  
6 No. 157 (later reclassified as Accounting Standards Codification 820) notes:

7 The definition of fair value retains the exchange price notion in earlier  
8 definitions of fair value. This Statement clarifies that the exchange price  
9 is the price in an orderly transaction between market participants to sell  
10 the asset or transfer the liability in the market in which the reporting  
11 entity would transact for the asset or liability, that is, the principal or most  
12 advantageous market for the asset or liability. The transaction to sell the  
13 asset or transfer the liability is a hypothetical transaction at the  
14 measurement date, considered from the perspective of a market  
15 participant that holds the asset or owes the liability. Therefore, the  
16 definition focuses on the price that would be received to sell the asset or  
17 paid to transfer the liability (an exit price), not the price that would be  
18 paid to acquire the asset or received to assume the liability (an entry  
19 price).<sup>64</sup>

20 Thus, FAS 157 indicates that fair value is not linked directly to the current market  
21 value of a company's outstanding securities, but rather to an estimate of the subject  
22 entity's worth to a prospective buyer. Fair value reflects the value of SR's various  
23 operations to a prospective buyer through the purchase of the entire company as an  
24 asset, while the market value reflects the views of minority investors currently  
25 holding SR common equity. The circumstances of these distinct calculations are  
26 fundamentally different in nature and ultimately cannot be treated as equivalent.

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64 Statement of Financial Accounting Standards No. 157, at 2

1 Q. DO YOU HAVE ANY ADDITIONAL CONCERNS ABOUT MR. MURRAY'S  
2 RELIANCE ON THE PWC REPORTS FOR HIS REBUTTAL TESTIMONY?

3 A. Yes, I do. First, the PWC Report, which is dated July 1, 2020, is based on market  
4 values derived for an earlier report, which was dated July 1, 2018, or over three years  
5 ago. While we have our differences in opinion regarding some issues in this case,  
6 there is no doubt Dr. Won, Mr. Murray, and I would agree market conditions have  
7 significantly changed over the three years since the basis of the values stated in the  
8 PWC Report were derived. Second, the ROE is applied to an equity ratio of  
9 \*\* [REDACTED] \*\*<sup>65</sup>, which is significantly different than the common equity ratio requested  
10 by the Company in this case. Third and finally, the PWC Report determines the  
11 terminal value based on \*\* [REDACTED]  
12 [REDACTED] \*\*<sup>66</sup> The PWC Report's \*\* [REDACTED]  
13 [REDACTED] \*\*<sup>67</sup> which is similar  
14 to the Company's request in this case. In view of all of the above, two things are  
15 clear: 1) the PWC Report is not applicable to the determination of the ROE in this  
16 case; and 2) even if it were applicable to this case, the PWC Report's assumptions  
17 would support the Company's recommendations regarding ROE. Mr. Murray's  
18 introduction of the PWC Report in this case should be given no weight by the  
19 Commission.

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65 \*\* [REDACTED] \*\*  
66 \*\* [REDACTED] \*\*  
67 \*\* [REDACTED] \*\*

1 **Application of the DCF Model**

2 **Q. MR. MURRAY CLAIMS THAT YOUR DCF MODEL IS BASED ON**  
3 **“IRRATIONAL ASSUMPTIONS” BECAUSE IT PRODUCES A WIDE**  
4 **RANGE OF INDICATED RESULTS FOR YOUR PROXY GROUP.<sup>68</sup> DO**  
5 **YOU AGREE?**

6 A. No, I do not. I have already discussed why a proxy group’s indicated results may  
7 vary and why projected EPS growth rates are the preferred growth rate to use in the  
8 application of the DCF model. I will not repeat those discussions here.

9 **Q. MR. MURRAY CLAIMS THAT HE HAS NOT OBSERVED A DCF**  
10 **ANALYSIS THAT ASSUMES DIVIDENDS PER SHARE (“DPS”) GROWING**  
11 **IN PERPETUITY AT THE SAME RATE AS PROJECTED EPS GROWTH**  
12 **RATES.<sup>69</sup> PLEASE RESPOND.**

13 A. As the name of the model implies, the discounted cash flow model discounts cash  
14 flows (*i.e.*, dividends) into perpetuity to derive the value of the stock. Also, as  
15 commonly accepted, EPS, DPS, and book value per share growth rates are assumed  
16 to be equal over the long term. Finally, as I discuss previously, projected EPS growth  
17 rates are supported in the financial literature as the superior measure for growth in a  
18 DCF model. Given this, I find it likely that Mr. Murray has, in fact, seen a DCF  
19 analysis using projected EPS growth rates as the growth term.

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68 Murray Rebuttal Testimony, at 19

69 Murray Rebuttal Testimony, at 21

**Application of the CAPM and RPM**

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**Q. MR. MURRAY CLAIMS THAT YOUR “RISK PREMIUM ESTIMATES ARE UNREASONABLE.”<sup>70</sup> IS HE CORRECT?**

A. No, he is not. In his analysis, Mr. Murray compares my estimates of MRP to the PWC Report MRP of **\*\* [REDACTED] \*\*** and to his estimates of the MRP.<sup>71</sup> Previously in this testimony, I have discussed the inapplicability of the PWC report to the Company’s ROE in this proceeding, and in my Rebuttal Testimony, I have discussed the unreasonableness of Mr. Murray’s MRP measures,<sup>72</sup> and I will not repeat those discussions here. In view of these reasons, Mr. Murray’s comparisons of my MRPs should be afforded little weight by the Commission.

**Q. MR. MURRAY CRITIQUES YOUR EQUAL WEIGHTING OF YOUR MRPS AND ERPS IN YOUR CAPM AND RPM, RESPECTIVELY.<sup>73</sup> PLEASE COMMENT.**

A. Mr. Murray states that by giving equal weight to my MRP and ERP estimates, I do not scrutinize whether some measures are logical considering current capital market conditions.<sup>74</sup> I respectfully disagree. Because all of my MRPs and ERPs are based on market data, they inherently reflect current capital market conditions. Giving equal weight to each measure ensures a more robust analysis and is consistent with the Efficient Market Hypothesis as described in my Rebuttal Testimony.<sup>75</sup>

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70 Murray Rebuttal Testimony, at 23  
71 Murray Rebuttal Testimony, at 24  
72 D’Ascendis Rebuttal Testimony, at 36-41, 53-55  
73 Murray Rebuttal Testimony, at 26-27  
74 Murray Rebuttal Testimony, at 26-27  
75 D’Ascendis Rebuttal Testimony, at 34-35.

1 **Q. MR. MURRAY STATES YOUR USE OF PROJECTED INTEREST RATES IS**  
2 **INCORRECT BECAUSE ANY PROJECTIONS WOULD BE**  
3 **INCORPORATED IN CURRENT PRICES.<sup>76</sup> IS HE CORRECT?**

4 A. No, he is not. As noted in response to Dr. Won, both the cost of capital and  
5 ratemaking are prospective in nature, which necessitates projected measures,  
6 including interest rates.

7 **Non-Price Regulated Proxy Group**

8 **Q. MR. MURRAY DOES NOT BELIEVE YOUR NON-PRICE REGULATED**  
9 **PROXY GROUP IS COMPARABLE IN RISK TO THE REGULATED**  
10 **UTILITY INDUSTRY.<sup>77</sup> PLEASE RESPOND.**

11 A. For all of the reasons discussed above while responding to Dr. Won, I disagree with  
12 Mr. Murray. In addition, I have two observations specific to Mr. Murray's testimony  
13 that I would like to address. First, on page 27 of his Rebuttal Testimony, Mr. Murray  
14 notes the goal of selecting a proxy group is:

15 ...to select companies that are considered 'pure-play' (100% confined to  
16 the segment being evaluated) publicly traded-companies or at least  
17 predominantly 'pure-play' publicly-traded companies in order to ensure  
18 the financials and market data are representative of risk and value of the  
19 assets analyzed.

20 In my opinion, Mr. Murray contradicts his own direct analysis in which he  
21 determines his recommended ROE based on the authorized ROE for a vertically-  
22 integrated electric company, which is decidedly not a pure-play natural gas  
23 distribution company.

---

76 Murray Rebuttal Testimony, at 27.

77 Murray Rebuttal Testimony, at 27-28

1 Second, Mr. Murray states that I am attempting to select a Non-Price Regulated  
2 Proxy Group to mimic regulation,<sup>78</sup> but that is not the case. As stated previously,  
3 regulation is supposed to mimic competition, so using competitive companies is a  
4 good measure of the investor-required return for utility companies as long as they are  
5 of similar total risk. Through my selection criteria discussed above, I have shown  
6 that the Non-Price Regulated Proxy Group is indeed of similar total risk to the Utility  
7 Proxy Group, and therefore, Spire. Because of this, the indicated ROEs produced by  
8 the Non-Price Regulated Proxy Group are relevant benchmarks for the investor-  
9 required return for Spire and should be considered by the Commission in this case.

10

#### **Flotation Costs**

11 **Q. MR. MURRAY FINDS THAT EQUITY ISSUANCE COSTS INCURRED FOR**  
12 **THE PURPOSES OF AN ACQUISITION SHOULD NOT BE RECOVERED.<sup>79</sup>**  
13 **DO YOU AGREE?**

14 A. No, I do not. As Mr. Murray notes on page 30 of his Rebuttal Testimony, “it  
15 becomes somewhat futile to attempt to determine the exact amount of proceeds from  
16 the equity issuance that supported Spire Missouri’s capital needs.” He is referring to  
17 the fungibility of cash, the inability to trace cash from its source to its use. The same  
18 is true regarding Mr. Murray’s statements that the proceeds raised in 2013 and 2014  
19 were explicitly for the purposes of acquiring MGE, Algasco and EnergySouth.<sup>80</sup>

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78 Murray Rebuttal Testimony, at 27.

79 Murray Rebuttal Testimony, at 29

80 Murray Rebuttal Testimony, at 29

1           Regardless of the reasons for Spire’s issuance of common stock, as discussed in  
2 previous detail,<sup>81</sup> the fact remains Spire’s shareholders are entitled to receive  
3 recovery of its flotation costs just as the Company is entitled to receive recovery of  
4 debt issuance expenses. It is also clear that flotation costs are not reflected in the  
5 market prices paid by investors and therefore are not reflected in the cost of common  
6 equity models used by the rate of return witnesses in this proceeding.<sup>82</sup> As such, it is  
7 appropriate for the Commission to consider the impact of flotation costs on Spire’s  
8 cost of common equity.

9

**Size Adjustment**

10 **Q. MR. MURRAY CLAIMS THAT A SIZE ADJUSTMENT IS NOT APPLIED IN**  
11 **PRACTICE.<sup>83</sup> DO YOU AGREE?**

12 A. No, I do not. Once again, Mr. Murray refers to the PWC Report for support, but my  
13 review of the PWC Report leads me to believe he may be mistaken. In the July 1,  
14 2018 PWC Report, which is the basis of subsequent reports as cited to by Mr.  
15 Murray, the peer group was selected based on comparable size and business  
16 composition. If the size of a company was not relevant to PWC’s analysis, they  
17 would not have used it for one of their selection criteria for their peer group. Mr.  
18 Murray’s comments on size as it relates to the PWC Report should be dismissed by  
19 the Commission.

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81 D’Ascendis Direct Testimony, at 46

82 D’Ascendis Direct Testimony, at 47-48

83 Murray Rebuttal Testimony, at 31-32



1           Regarding Mr. Murray’s broader claim that a size study is not used in practice, I note  
2           his statement is inconsistent with the academic literature on the subject. For  
3           example, an article by Michael A. Paschall, ASA, CFA, and George B. Hawkins  
4           ASA, CFA, *Do Smaller Companies Warrant a Higher Discount Rate for Risk?* also  
5           supports the applicability of a size premium. As the article makes clear, all else equal,  
6           size is a risk factor which must be taken into account when setting the cost of capital  
7           or capitalization (discount) rate. Paschall and Hawkins state in their conclusion as  
8           follows:

9                     The current challenge to traditional thinking about a small stock premium  
10                    is a very real and potentially troublesome issue. The challenge comes  
11                    from bright and articulate people and has already been incorporated into  
12                    some court cases, providing further ammunition for the IRS. Failing to  
13                    consider the additional risk associated with most smaller companies,  
14                    however, is to fail to acknowledge reality. Measured properly, small  
15                    company stocks have proven to be more risky over a long period of time  
16                    than have larger company stocks. This makes sense due to the various  
17                    advantages that larger companies have over smaller companies. Investors  
18                    looking to purchase a riskier company will require a greater return on  
19                    investment to compensate for that risk. There are numerous other risks  
20                    affecting a particular company, yet the use of a size premium is one way  
21                    to quantify the risk associated with smaller companies.<sup>84</sup>

22           Hence, Paschall and Hawkins corroborate the need for a small size adjustment, all  
23           else equal. Consistent with the financial principle of risk and return discussed  
24           previously, an upward adjustment must be applied to the indicated cost of common  
25           equity derived from the cost of equity models of the proxy groups used in this  
26           proceeding.

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84           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

1

### Credit Adjustment

2 **Q. MR. MURRAY DOES NOT DEEM IT NECESSARY TO MAKE A CREDIT**  
3 **RISK ADJUSTMENT IN THIS CASE.<sup>85</sup> DO YOU AGREE?**

4 A. No, I do not. As noted in my Direct Testimony,<sup>86</sup> it is my opinion that Spire's  
5 Moody's credit rating is less risky than the Utility Proxy Group and that the indicated  
6 ROE based on that group should be adjusted downward to reflect that.

7

### Proposed Decoupled Rate Design

8 **Q. MR. MURRAY STATES THAT THE COMPANY'S PROPOSED**  
9 **DECOUPLED RATE DESIGN IS ASSOCIATED WITH LOWER BUSINESS**  
10 **RISK.<sup>87</sup> DID HE CONDUCT A RELATIVE RISK ANALYSIS TO**  
11 **DETERMINE IF MEMBERS OF HIS PROXY GROUP HAVE SIMILAR**  
12 **DECOUPLED RATE DESIGNS?**

13 A. Not to my knowledge. Because the cost of common equity is a comparative exercise,  
14 as noted above, if the proxy group has similar mechanisms in their tariffs, any  
15 perceived risk would be reflected in the proxy group's market data, and hence, ROE  
16 model results. To that end, as shown on DWD Schedule SR-5, every company in my  
17 updated Utility Proxy Group has a decoupling mechanism similar to that proposed by  
18 the Company. As such, any perceived risk would already be reflected in market data.

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85 Murray Rebuttal Testimony, at 33

86 D'Ascendis Direct Testimony, at 44-45

87 Murray Rebuttal Testimony, at 33-34.

1 **Q. DID MR. MURRAY RECOMMEND A DOWNWARD ADJUSTMENT TO**  
2 **THE ROE BASED ON SPIRE'S DECOUPLING MECHANISM IN HIS**  
3 **DIRECT TESTIMONY?**

4 A. No, he did not even mention Spire's decoupling mechanism in his direct testimony.

#### **IV. CONCLUSION AND RECOMMENDATION**

5 **Q. PLEASE SUMMARIZE YOUR SURREBUTTAL TESTIMONY.**

6 A. In this Surrebuttal Testimony, I respond to the Rebuttal Testimonies of the Opposing  
7 Witnesses. I specifically respond to their critiques of my Direct Testimony. In doing  
8 so, I show that neither Dr. Won or Mr. Murray's critiques bear merit or are supported  
9 by academic or empirical evidence. In addition, both Dr. Won and Mr. Murray  
10 contradict their own positions on multiple occasions.

11 **Q. SHOULD ANY OR ALL OF THE ARGUMENTS MADE BY THE OPPOSING**  
12 **WITNESSES PERSUADE THE COMMISSION TO LOWER THE RETURN**  
13 **ON COMMON EQUITY IT APPROVES FOR SPIRE BELOW YOUR**  
14 **RECOMMENDATION?**

15 A. No, they should not. I continue to find my recommended cost of common equity of  
16 9.95% to be both reasonable and conservative. It will provide the Company with  
17 sufficient earnings to enable it to attract necessary new capital efficiently and at a  
18 reasonable cost, to the benefit of both customers and investors.

19 **Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?**

20 A. Yes, it does.

**BEFORE THE PUBLIC SERVICE COMMISSION**  
**OF THE STATE OF MISSOURI**


In the Matter of Spire Missouri Inc.'s     )  
Request for Authority to Implement a     )  
General Rate Increase for Natural Gas     ) File No. GR-2021-0108  
Service Provided in the Company's     )  
Missouri Service Areas                     )

**AFFIDAVIT**

STATE OF NEW JERSEY                     )  
   )         SS.  
COUNTY OF BURLINGTON                 )

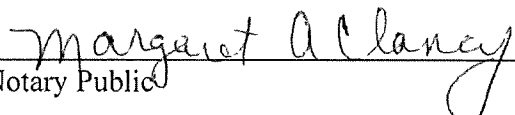
Dylan W. D'Ascendis, of lawful age, being first duly sworn, deposes and states:

1. My name is Dylan W. D'Ascendis. I am employed as Partner for ScottMadden, Inc. My business address is 3000 Atrium Way, Suite 241, Mount Laurel, NJ 08054.
2. Attached hereto and made a part hereof for all purposes is my rebuttal testimony on behalf of Spire Missouri, Inc.
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

  
\_\_\_\_\_  
Dylan W. D'Ascendis

Subscribed and sworn to before me this 12 day of July 2021.

**Margaret A Clancy**  
Notary Public of New Jersey  
My Commission Expires 6/9/2024

  
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Notary Public

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**FINANCIAL** **Q** **QUARTERLY**  
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**Comparable Earnings:  
New Life for an Old Precept**

by  
**Frank J. Hanley**  
**Pauline M. Ahern**

# Comparable Earnings: New Life for an Old Precept

**A**ccelerating 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.



## 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.<sup>1</sup> 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.

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*Pauline M. Ahearn is a senior financial analyst with AUS Consultants — Utility Services Group. She has participated in many cost-of-capital studies. A former employee of the U.S. Department of the Treasury and the Federal Reserve Bank of Boston, she holds an MBA degree from Rutgers University and is a Certified Rate of Return Analyst.*

## 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" pre-

cept 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<sup>2</sup> as well as by Bonbright, Danielsen and Kamerschen.<sup>3</sup> 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. How-

ever, 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:

- $r_{it}$  =  $t$ th observation of the  $t$ th utility's rate of return
- $r_{mt}$  =  $t$ th observation of the market's rate of return
- $e_{it}$  =  $t$ th random error term
- $a_i$  = constant least-squares regression coefficient
- $b_i$  = least-squares regression slope coefficient, the unadjusted beta

As shown by Francis,<sup>4</sup> the total variation or risk of a firm's return,  $\text{Var}(r_i)$ , comes from two sources:

$$\text{Var}(r_i) = \text{total risk of } i\text{th asset}$$

$$\begin{aligned} &= \text{var}(a_i + b_i r_m + e) \\ &\quad \text{substituting } (a_i + b_i r_m + e) \\ &\quad \text{for } r_i \\ &= \text{var}(b_i r_m) + \text{var}(e) \text{ since} \\ &\quad \text{var}(a_i) = 0 \\ &= b_i^2 \text{var}(r_m) + \text{var}(e) \\ &\quad \text{since } \text{var}(b_i r_m) = b_i^2 \\ &\quad \text{var}(r_m) \\ &= \text{systematic} + \\ &\quad \text{unsystematic risk} \end{aligned}$$

Francis<sup>5</sup> 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.  $\sigma^2(r_i|r_m) = \text{var}(e)$ . 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 ( $0.1250 \times 3 = 0.3750$ , 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 ( $0.1664 \times 3 = 0.4992$ ). 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<sup>1</sup>

	1	2	3	4	5	6	7	8
	adj. beta	unadj. beta	residual standard error	rate of return on net worth				
				3-year average <sup>2</sup>	4-year average <sup>2</sup>	5-year average <sup>2</sup>	5-year projected <sup>3</sup>	
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 <sup>4</sup>	3.7867					
median				11.7%	12.0%	12.6%	15.5%	
average of the median historical returns					12.1%			
conclusion <sup>5</sup>								13.8%

<sup>1</sup>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.

<sup>2</sup>Ending 1992.

<sup>3</sup>1996-1998/1997-1999.

<sup>4</sup>The average standard deviation of the target gas pipeline company's unadjusted beta is 0.1250.

<sup>5</sup>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.

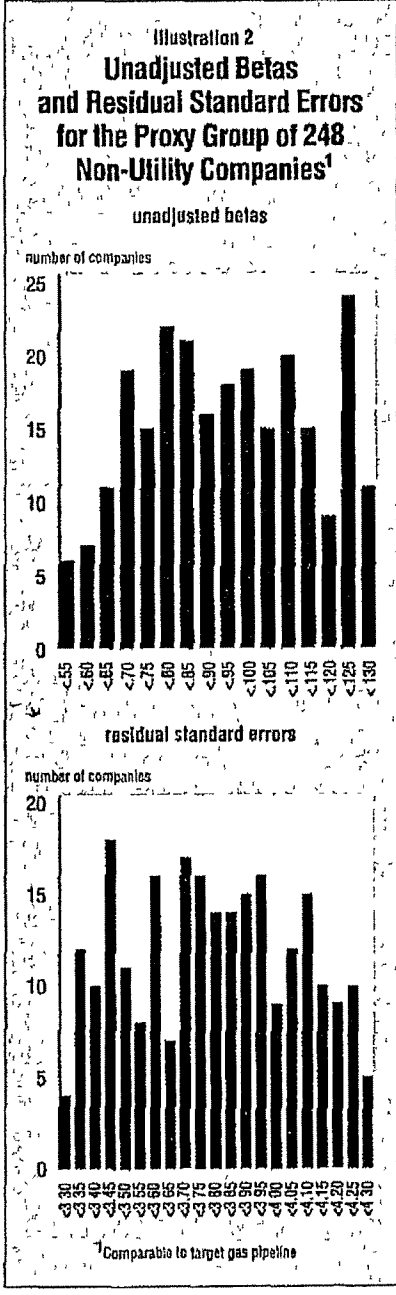
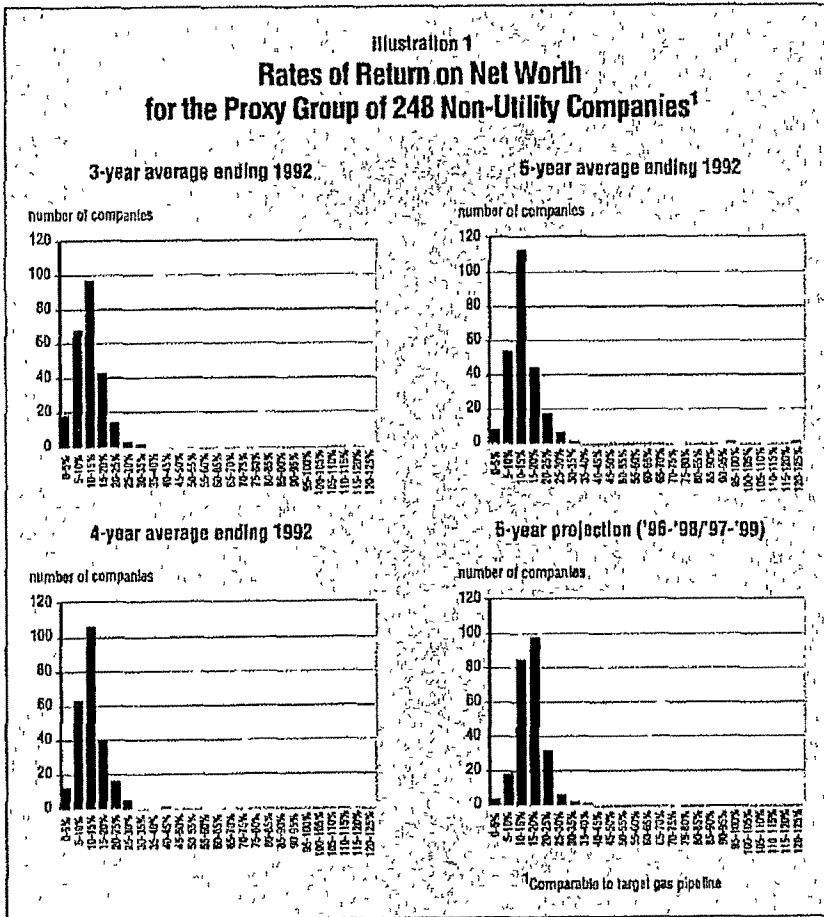
**Step Four:** We then eliminated those firms for which Value Line does not publish a "Ratings & Report" in *Value Line Investment Survey* so that the historical and projected returns on net worth<sup>6</sup> are from a consistent source. We use historical returns on net worth for the most recent five 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 ser-

vices, 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 *continued on page 8*



## Comparable Earnings from page 7

comparable 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. ■

## 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.

<sup>1</sup>*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)


<sup>2</sup>Charles F. Phillips Jr., *The Regulation of Public Utilities: Theory and Practice*, Public Utilities Reports Inc. 1988, p. 379

<sup>3</sup>James C. Bonbright, Albert L. Danielsen and David R. Kamerschen, *Principles of Public Utilities Rates*, 2nd edition, Public Utilities Reports Inc. 1988, p. 329

<sup>4</sup>Jack Clark Francis, *Investments: Analysis and Management*, 3rd edition, McGraw-Hill Book Co., 1980, p. 363

<sup>5</sup>*Id.*, p. 548

<sup>6</sup>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.



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Investments:  
Analysis and  
Management

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Fifth Edition

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Jack Clark Francis

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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  $\text{Var}(r)$ . This measure of *total risk is partitioned into its systematic and unsystematic components in Equation (10-8)*<sup>7</sup>

$$\begin{aligned}\text{Var}(r_i) &= \text{total risk of } i\text{th asset} \\ &= \text{Var}(a_i + b_i r_{m,t} + e_{i,t}) \\ &\quad \text{by substituting } (a_i + b_i r_{m,t} + e_{i,t}) \text{ for } r_{i,t} \\ &= 0 + \text{Var}(b_i r_{m,t}) + \text{Var}(e_{i,t}) \\ &\quad \text{since } \text{Var}(a_i) = 0\end{aligned}\tag{10-8}$$

$$\begin{aligned}\text{Var}(r_i) &= b_i^2 \text{Var}(r_m) + \text{Var}(e) \quad \text{since } \text{Var}(b_i r_m) = b_i^2 \text{Var}(r_m) \\ &= \text{systematic} + \text{unsystematic risk}\end{aligned}\tag{10-8a}$$

$$.01389 = .00780 + .00609 \quad \text{for IBM}$$

The unsystematic risk measure  $\text{Var}(e)$  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  $\rho^2$  (that is, the characteristic line's squared correlation coefficient).

<sup>7</sup>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.

$$\frac{\text{Systematic risk}}{\text{Total risk}} = \frac{b_i^2 \text{Var}(r_m)}{\text{Var}(r_i)} = \rho^2 \quad (10-9)$$

$$\frac{.007802}{.01389} = \frac{(1.021)^2 (.00749)}{.00749} = 56.17 \times 100 = 56.17\% \quad \text{for IBM}$$

**Diversifiable Proportion** The percentage of unsystematic risk equals  $(1.0 - \rho^2)$

$$\frac{\text{Unsystematic risk}}{\text{Total risk}} = \frac{\text{Var}(e)}{\text{Var}(r_i)} = (1.0 - \rho^2)$$

$$\frac{.00609}{.01389} = (1.0 - .5617) = .438 \times 100 \quad (10-10)$$

$$= 43.8\% \text{ unsystematic} \quad \text{for IBM}$$

Studies of the characteristic lines of hundreds of stocks listed on the NYSE indicate that the average correlation coefficient is approximately  $\rho = .5$ .<sup>8</sup> 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: $\rho^2$	.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.<sup>9</sup> 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

<sup>8</sup>The average  $\rho$  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

<sup>9</sup>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 <sup>10</sup> New risk measurements must be made periodically, however, because the risk and return of an asset may change with the passage of time.<sup>11</sup>

**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  $\sigma$ . 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.<sup>12</sup>

<sup>10</sup>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.

<sup>11</sup>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.

<sup>12</sup>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.

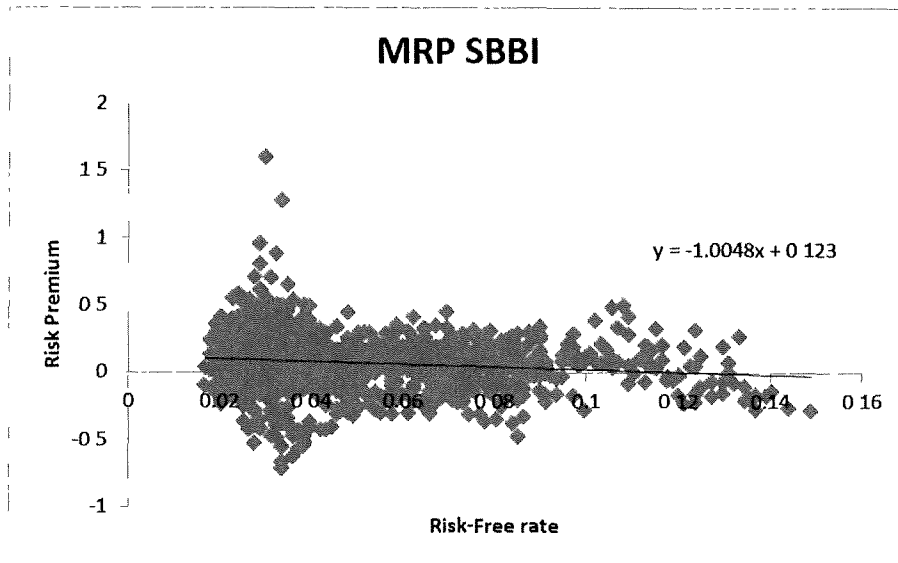
Regression Statistics for Market Risk Premium Relative to Long-Term U.S. Risk-Free Rate

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.1283466
R Square	0.0164728
Adjusted R Squ	0.0155908
Standard Error	0.2106203
Observations	1117

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.828433217	0.8284332	18.67484764	1.68848E-05
Residual	1115	49.46241351	0.0443609		
Total	1116	50.29084673			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.1230087	0.013206047	9.3145702	6.3269E-20	0.097097147	0.1489202
Risk-Free rate	-1.0047825	0.23251102	-4.3214405	1.68848E-05	-1.460990971	-0.5485741



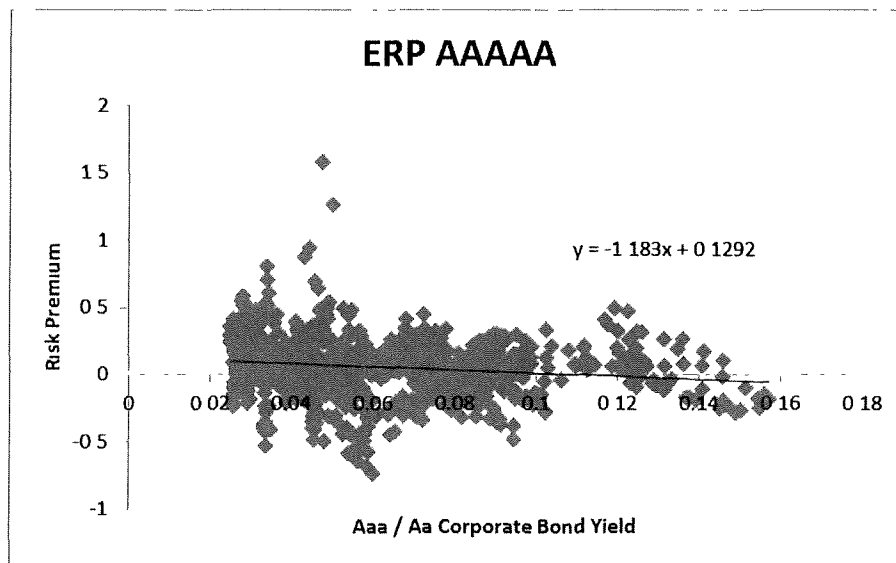
Regression Statistics for Equity Risk Premium Relative to Aaa/Aa Corporate Bond Yields

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.1579858
R Square	0.0249595
Adjusted R Square	0.0240658
Standard Error	0.2103241
Observations	1093

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1.2354248	1.2354248	27.92790078	1.51995E-07
Residual	1091	48.261718	0.0442362		
Total	1092	49.497143			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.1291992	0.0146702	8.8069203	4.96487E-18	0.100414231	0.1579842
Aaa/Aa Corp Bond Yield	-1.182957	0.2238462	-5.2846855	1.51995E-07	-1.622174848	-0.7437392





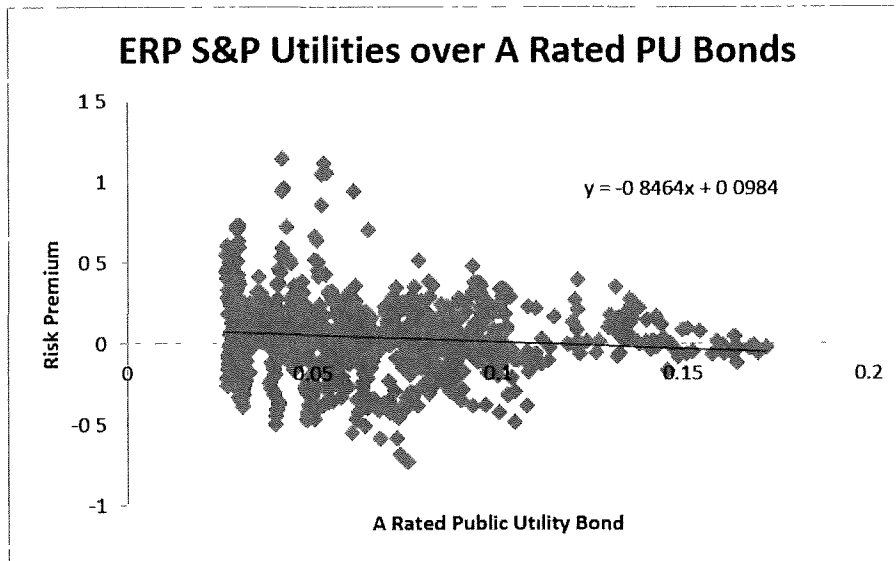
Regression Statistics for S&P Utilities Equity Risk Premium Relative to A Rated Public Utility Bond Yields

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.1175995
R Square	0.0138296
Adjusted R Square	0.0129257
Standard Error	0.2201005
Observations	1093

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.7411834	0.7411834	15.29972299	9.73981E-05
Residual	1091	52.852659	0.0484442		
Total	1092	53.593843			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.0984289	0.0152786	6.4422568	1.76208E-10	0.068450093	0.1284078
A Rated Public Util Bond Yield	-0.8464329	0.2163968	-3.911486	9.73981E-05	-1.27103384	-0.421832



**Spire Missouri Inc.**  
 Portfolio Ranks by Size and Risk Premiums over CAPM Results  
 as Compiled by Duff and Phelps Guide to Cost of Capital

Portfolio Rank by Size	B-1		B-2		B-3		B-4		B-5		B-6		B-7		B-8	
	Market Val of Equity (in \$millions)	RP	Average Book Val (in \$millions)	RP	5 yr Net Income (in \$millions)	RP	Market Value of Invested Capital (in \$millions)	RP	Total Assets (in \$millions)	RP	5-yr EBITDA (in \$millions)	RP	Sales (in \$millions)	RP	Average Number of Employees	RP
1	\$222 261 and Up	-0.78%	\$44 861 and Up	1.22%	\$7 190 and Up	0.85%	\$258 435 and Up	-0.32%	\$121 632 and Up	0.84%	\$14 837 and Up	0.95%	\$95 905 and Up	1.02%	234 707 and Up	0.67%
2	\$67 607 - \$222 261	0.50%	\$15 985 - \$44 861	1.88%	\$2 418 - \$7 190	1.69%	\$85 545 - \$258 435	0.77%	\$52 712 - \$121 632	1.52%	\$5 561 - \$14 837	1.74%	\$33 447 - \$95 905	1.85%	92 311 - 234 707	1.57%
3	\$42 245 - \$67 607	0.96%	\$10 286 - \$15 985	2.16%	\$1 515 - \$2 418	1.98%	\$54 459 - \$85 545	1.19%	\$34 307 - \$52 712	1.79%	\$3 740 - \$5 561	2.03%	\$20 941 - \$33 447	2.25%	62 769 - 92 311	1.92%
4	\$29 591 - \$42 245	1.30%	\$7 504 - \$10 286	2.32%	\$1 013 - \$1 515	2.28%	\$39 733 - \$54 459	2.28%	\$23 000 - \$34 307	1.67%	\$2 748 - \$3 740	2.24%	\$16 179 - \$20 941	2.43%	47 290 - 62 769	2.16%
5	\$21 930 - \$29 591	1.57%	\$5 725 - \$7 504	2.49%	\$772 - \$1 013	2.47%	\$29 472 - \$39 733	1.49%	\$17 517 - \$23 000	2.29%	\$2 103 - \$2,748	2.43%	\$12 750 - \$16 179	2.60%	36 723 - 47 290	2.36%
6	\$16 592 - \$21 930	1.83%	\$4 594 - \$5 725	2.60%	\$513 - \$772	2.62%	\$21 901 - \$29 472	1.97%	\$14 200 - \$17 517	2.43%	\$1 650 - \$2,103	2.59%	\$10 380 - \$12 750	2.75%	28 971 - 36 723	2.55%
7	\$12 962 - \$16 592	2.06%	\$3 718 - \$4 594	2.72%	\$502 - \$613	2.76%	\$17 501 - \$21 901	2.16%	\$11 581 - \$14,200	2.57%	\$1 315 - \$1,650	2.75%	\$8 805 - \$10 380	2.87%	23 614 - 28 971	2.73%
8	\$10 730 - \$12 962	2.26%	\$3 164 - \$3 718	2.82%	\$422 - \$502	2.87%	\$14 263 - \$17 501	2.33%	\$9 608 - \$11 581	2.69%	\$1 094 - \$1,315	2.88%	\$7 598 - \$8 805	2.97%	19 619 - 23 614	2.87%
9	\$9 185 - \$10 730	2.39%	\$2 750 - \$3 164	2.89%	\$355 - \$422	2.98%	\$11 972 - \$14 263	2.49%	\$8 067 - \$9 608	2.81%	\$924 - \$1,094	2.98%	\$6 502 - \$7 598	3.07%	16 645 - 19 619	3.02%
10	\$7 763 - \$9 185	2.53%	\$2 388 - \$2 750	2.96%	\$305 - \$355	3.08%	\$10 234 - \$11 972	2.61%	\$6 901 - \$8 067	2.92%	\$784 - \$924	3.10%	\$5,381 - \$6 502	3.18%	14 557 - 16 645	3.12%
11	\$6 515 - \$7 763	2.68%	\$2 059 - \$2 388	3.04%	\$259 - \$305	3.17%	\$8 619 - \$10 234	2.74%	\$6 025 - \$6 901	3.01%	\$675 - \$784	3.20%	\$4 454 - \$5 381	3.32%	12 653 - 14 557	3.23%
12	\$5 542 - \$6 515	2.84%	\$1 769 - \$2 059	3.12%	\$221 - \$259	3.29%	\$7 384 - \$8 619	2.89%	\$5 275 - \$6 025	3.09%	\$582 - \$675	3.30%	\$3 801 - \$4 454	3.43%	11 017 - 12 653	3.34%
13	\$4 806 - \$5 542	2.97%	\$1 542 - \$1 769	3.20%	\$189 - \$221	3.37%	\$6 601 - \$7 384	2.99%	\$4 495 - \$5 275	3.19%	\$509 - \$582	3.39%	\$3 318 - \$3 801	3.53%	9 726 - 11 017	3.44%
14	\$4 160 - \$4 806	3.09%	\$1 358 - \$1 542	3.27%	\$159 - \$189	3.49%	\$5 895 - \$6 601	3.07%	\$3 807 - \$4 495	3.30%	\$450 - \$509	3.47%	\$2 935 - \$3 318	3.62%	8 526 - 9 726	3.54%
15	\$3 572 - \$4 160	3.22%	\$1 204 - \$1 358	3.33%	\$138 - \$159	3.58%	\$5 125 - \$5 895	3.18%	\$3 263 - \$3 807	3.40%	\$402 - \$450	3.55%	\$2 571 - \$2 935	3.70%	7 367 - 8 526	3.65%
16	\$3 052 - \$3 572	3.36%	\$1 049 - \$1 204	3.39%	\$120 - \$138	3.67%	\$4 340 - \$5 125	3.30%	\$2 788 - \$3 263	3.50%	\$349 - \$402	3.62%	\$2 252 - \$2 571	3.80%	6 292 - 7 367	3.77%
17	\$2 627 - \$3 052	3.50%	\$899 - \$1 049	3.48%	\$103 - \$120	3.76%	\$3 663 - \$4 340	3.45%	\$2 358 - \$2 788	3.61%	\$293 - \$349	3.73%	\$2 005 - \$2 252	3.88%	5 374 - 6 292	3.90%
18	\$2 238 - \$2 627	3.62%	\$778 - \$899	3.55%	\$87 - \$103	3.85%	\$3 084 - \$3 663	3.58%	\$2 011 - \$2 358	3.72%	\$241 - \$293	3.85%	\$1 786 - \$2 005	3.95%	4 623 - 5 374	4.02%
19	\$1 859 - \$2 238	3.79%	\$670 - \$778	3.63%	\$71 - \$87	3.98%	\$2 511 - \$3 084	3.73%	\$1 712 - \$2 011	3.82%	\$195 - \$241	3.99%	\$1 554 - \$1 786	4.03%	3 913 - 4 623	4.14%
20	\$1 527 - \$1 859	3.95%	\$574 - \$670	3.71%	\$57 - \$71	4.12%	\$2 016 - \$2 511	3.91%	\$1 429 - \$1,712	3.93%	\$161 - \$195	4.12%	\$1 296 - \$1 554	4.14%	3 231 - 3 913	4.28%
21	\$1 243 - \$1 527	4.13%	\$488 - \$574	3.79%	\$47 - \$57	4.24%	\$1 633 - \$2 016	4.08%	\$1 171 - \$1 429	4.05%	\$135 - \$161	4.24%	\$1 046 - \$1 296	4.28%	2 608 - 3 231	4.44%
22	\$964 - \$1 243	4.31%	\$401 - \$488	3.89%	\$36 - \$47	4.38%	\$1 281 - \$1 633	4.25%	\$913 - \$1 171	4.19%	\$106 - \$135	4.36%	\$853 - \$1,046	4.43%	2 007 - 2 608	4.62%
23	\$658 - \$964	4.59%	\$319 - \$401	3.99%	\$25 - \$36	4.56%	\$899 - \$1 281	4.48%	\$646 - \$913	4.38%	\$76 - \$106	4.56%	\$648 - \$853	4.55%	1 451 - 2 007	4.86%
24	\$329 - \$658	5.02%	\$190 - \$319	4.13%	\$13 - \$25	4.86%	\$457 - \$899	4.86%	\$352 - \$646	4.65%	\$42 - \$76	4.80%	\$349 - \$648	4.81%	798 - 1 451	5.13%
25	Up To \$329	6.05%	Up To \$190	4.66%	Up To \$13	5.55%	Up To \$457	5.79%	Up To \$352	5.30%	Up To \$42	5.50%	Up To \$349	5.56%	Up To 798	5.99%

Dr. Won's Proxy Group	B-1 Value		B-2 Value		B-3 Value		B-4 Value		B-5 Value		B-6 Value		B-7 Value		B-8 Value	
	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking	\$	Portfolio Ranking
Spire Missouri Inc.	\$ 2 298	18	\$ 1 435	14	\$ 119	17	\$ 3 612	18	\$ 4 310	14	\$ 284	18	\$ 1 194	21	\$ 2 424	22
Indicated Risk Premium	0.40%		0.31%		0.27%		0.59%		0.38%		0.38%		0.33%		0.34%	

Sources of Information: Duff & Phelps Risk Premium Size Study Premia as of December 31 2020  
 SNL Financial  
 SEC Form 10-K  
 Company financial statements

Spire Missouri Inc.  
Comparison of Decoupling Mechanisms for  
Utility Proxy Group

Company (bold if parent)	State	Partial or Full Decoupling
<b>Atmos Energy Corporation</b>		
Atmos Energy Holdings, Inc.	CO	
Atmos Energy Holdings, Inc.	KS	Partial Decoupling
Atmos Energy Holdings, Inc.	KY	Partial Decoupling
Atmos Energy Holdings, Inc.	LA	Partial Decoupling
Atmos Energy Holdings, Inc.	MS	Partial Decoupling
Atmos Energy Holdings, Inc.	TN	Partial Decoupling
Atmos Energy Holdings, Inc.	TX	Partial Decoupling
Atmos Energy Holdings, Inc.	VA	Partial Decoupling
<b>New Jersey Resources Corporation</b>		
New Jersey Natural Gas Co.		Full Decoupling
<b>Northwest Natural Holding Company</b>		
Northwest Natural Gas	OR	Partial Decoupling
Northwest Natural Gas	WA	
<b>ONE Gas, Inc.</b>		
ONE Gas, Inc.	KS	Partial Decoupling
ONE Gas, Inc.	OK	Partial Decoupling
ONE Gas, Inc.	TX	Partial Decoupling
<b>South Jersey Industries, Inc.</b>		
Elizabethtown Gas Co.	NJ	Partial Decoupling
South Jersey Gas Co.	NJ	Full Decoupling
<b>Southwest Gas Holdings, Inc.</b>		
Southwest Gas Corporation	AZ	Full Decoupling
Southwest Gas Corporation	CA	Full Decoupling
Southwest Gas Corporation	NV	Full Decoupling
<b>Spire Inc.</b>		
Alabama Gas Corporation	AL	Partial Decoupling
Spire Gulf Inc.	AL	Partial Decoupling
Spire Missouri East	MO	Partial Decoupling
Spire Missouri West	MO	Partial Decoupling

Source: Company Financial Statements, Company Tariffs.