Application No.:	A.25-03-010, *et al.*
Exhibit No.:	SCE-07
Witnesses:	B. Villadsen

(U 338-E)

Rebuttal Testimony of Dr. Bente Villadsen on SCE's Return on Equity

Before the
Public Utilities Commission of the State of California

Rosemead, California
August 20, 2025

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BEFORE THE
PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

DIRECT TESTIMONY OF DR. BENTE VILLADSEN

I. INTRODUCTION AND PURPOSE

Q1. Please state your name, occupation and business address for the record.

A1. My name is Bente Villadsen, and I am a Principal of The Brattle Group, whose business address is One Beacon Street, Suite 2600, Boston, Massachusetts, 02108.

Q2. Are you the same Bente Villadsen, who previously filed Direct Testimony in this matter?

A2. Yes.[1]

Q3. What is the purpose of your rebuttal testimony in this proceeding?

A3. I have been asked by Southern California Edison ("SCE" or the "Company") to review and respond to the testimonies of

- Ms. Jennifer Dowdell ("Dowdell Testimony") on behalf of The Utility Reform Network ("TURN");[2]
- Dr. Mark E. Ellis ("Ellis Testimony") on behalf of Sierra Club ("Sierra Club") and the Protect Our Communities Foundation ("PCF");[3]

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[1] Exhibit SCE-02, Villadsen Direct Testimony, California Public Utilities Commission A.25-03-012, March 20, 2025 ("Villadsen Direct Testimony").

[2] Prepared Testimony of Jennifer Dowdell on behalf of The Utility Reform Network, Exhibit No. TURN-01.

[3] Direct Testimony of Mark E. Ellis on behalf of Sierra Club and the Protect Our Communities Foundation, Exhibit No. SC/PCF-01.

- Mr. Michael P. Gorman ("Gorman Testimony") on behalf of Energy Producers & Users Coalition Network ("EPUC"), Indicated Shippers ("IS"), and the Utility Reform Network ("TURN");[4]
- Dr. Richard McCann ("McCann Testimony") on behalf of Environmental Defense Fund ("EDF");[5]
- Mr. Aaron L. Rothschild ("Rothschild Testimony") on behalf of Wild Tree Foundation ("Wild Tree");[6] and
- Dr. J. Randall Wooldridge ("Wooldridge Testimony") on behalf of Public Advocates Office ("Cal Advocates").[7]

Collectively, I refer to the intervening parties as "Intervenors" and the testimonies as the "Intervenor Testimonies."

Q4. Do you have any exhibits for your rebuttal testimony?

A4. Yes, the following appendices include my exhibits:

- Appendix R-A: Response to Specific Criticisms of Villadsen Direct Regarding ECAPM
- Appendix R-B: Authorized ROEs
- Appendix R-C Bond Yields & MRP
- Appendix R-D MRP and Authorized Utility Risk Premium
- Appendix R-E: EPS and Nominal GDP
- Appendix R-F FERC MRP

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[4] Direct Testimony and Exhibits of Michael P. Gorman on behalf of Energy Producers & Users Coalition, Indicated Shippers, and The Utility Reform Network, Exhibit No. EPUC/IS/TURN-001.

[5] Prepared Direct Testimony of Richard McCann, Ph.D. on behalf of Environmental Defense Fund, Exhibit No. EDF-01.

[6] Direct Testimony of Aaron L. Rothschild on behalf of Wild Tree Foundation, Exhibit No. WTF-01E.

[7] Report on California Energy Companies Cost of Capital by J. Randall Wooldridge, Ph.D., on behalf of Public Advocates Office.

- Appendix R-G S&P 500 Returns
- Appendix R-H Rothschild Options Liquidity
- Appendix R-I Wooldridge Model Adjustments
- Appendix R-J Ellis Model Adjustments (available on request)
- Appendix R-K Gorman Financial Leverage
- Appendix R-L Wooldridge Financial Leverage
- Appendix R-M Gorman Risk Premium
- Appendix R-N Intervenor Inputs
- Appendix R-O Market-to-Book Value Announcements
- Appendix R-P S&P Equity Ratio
- Appendix R-Q S&P Composite 1500 Utilities
- Appendix R-R PE Ratios
- Appendix R-S Share Buybacks
- Appendix R-T Debt Beta

Q5. Having reviewed the testimonies above, have you changed your view on the reasonable cost of equity and recommended Return on Equity ("ROE") for Southern California Edison?

A5. No, having reviewed the direct testimonies of Ms. Dowdell and Messer. Gorman and Rothschild and Drs. Ellis, McCann, and Wooldridge (collectively, the "Intervenors"), I continue to find SCE's requested ROE of 11.75% at a 52% regulatory equity capital structure reasonable based on implementation of standard ROE estimation methodologies, considerations of SCE- and California specific risks, and developments in capital market conditions.[8]

[8] Villadsen Direct Testimony, pp. 68-69.

Q6. How is the remainder of your rebuttal testimony organized?

A6. In the remainder of my rebuttal testimony, I first summarize the recommendations of the expert witnesses as well as my conclusions (Section II) and comment on recent economic developments that impact the cost of equity (Section III). In Section IV, I discuss developments in the electric utility industry and why P/E ratios or market-to-book ratios are not appropriate indicators of the cost of equity. Section V discusses Intervenors' cost of equity estimations and identifies key flaws in their inputs and methodologies that cause them to underestimate the cost of equity. Section VI responds to Intervenors' critique of my business risk analysis. Finally, in Appendix R-A, I respond to specific critiques of my Direct Testimony ("Villadsen Direct") regarding use of the Empirical Capital Asset Pricing Model ("ECAPM").

II. SUMMARY AND CONCLUSIONS

Q7. Please summarize Intervenors' recommendations and your response.

A7. Figure R-1 below summarizes SCE's and Intervenors' recommended capital structures, ROE ranges, and ROEs for SCE.

Figure R-1: Summary of Recommended Ranges and ROEs[9]

	Equity	Preferred Equity	Debt	ROE Range	ROE
Villadsen (SCE)	52.00%	5.00%	43.00%	10.75-11.75%	11.75%
Gorman (EPUC/IS/TURN)	50.00%	5.00%	45.00%	9.25-9.75%	9.50%
Dowdell (TURN)	Adopts Gorman	Adopts Gorman	Adopts Gorman	Adopts Gorman	Adopts Gorman
Wooldridge (Cal Advocates)	50.00%	5.21%	44.79%	N/A	9.38%
McCann (EDF)	N/A	N/A	N/A	5.09-6.66%	5.09%
Ellis (SC/PCF)	54.70%	0.00%	45.30%	N/A	6.11%
Rothschild (WTF)	50.00%	5.00%	45.00%	7.10-8.30%	8.30%
Current	52.00%	5.00%	43.00%	N/A	10.33%

[9] Ms. Dowdell adopts Mr. Gorman's ROE recommendation. For the current ROE and capital structure, see https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/cost-of-capital and https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/historical-electric-cost-data/capital-structure.

All the testimonies recommend an ROE below that currently prevailing in the United States and much below that currently authorized for SCE. Further, the testimonies of Dr. Ellis, Dr. McCann, Mr. Rothschild, and Dr. Wooldridge recommend an ROE that is below any recently approved ROE for a vertically integrated electric utility and, in the case of Drs. Ellis and McCann, at or near the level of the cost of debt.[10] Clearly, the cost of equity and therefore a reasonable ROE is well above the cost of debt and, given the level of risk facing SCE, its cost of equity has increased since it was last determined. I therefore find the recommendations too low.

The low ROE recommendations are even more problematic as Mr. Gorman, Dr. McCann, Mr. Rothschild, and Dr. Wooldridge also recommend a reduction to the authorized equity percentage in SCE's regulatory capital structure with the McCann Testimony, suggesting an equity percentage that is out of line with that commonly seen among utilities.

Q8. Please explain why the cost of equity is higher than the cost of debt.

A8. Equity holders are residual claimants of a company's assets, i.e., last in line in bankruptcy, and they do not have a claim on a fixed return as do debt holders. Therefore, equity carries higher risk, and it is a fundamental concept in financial economics that higher risk is compensated by higher return.[11] As Brealey, Myers, and Allen (2017) state[12]

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[10] The last 12-months saw an average authorized ROE of 9.83% for vertically integrated electric utilities (Source: Regulatory Research Associated, "Major Energy Rate Case Decisions in the US," ending June 30, 2025 (Confidential)) and SCE's currently authorized ROE is 10.33%. Currently the yield on Baa rated utility debt is above 6 percent, while the Ellis and McCann testimonies recommend ROEs of 6.11% and 5.09%, respectively.

[11] See, for example, Brealey, Myers, and Allen, *Principles of Corporate Finance*, 12th edition, 2017 ("Brealey, Myers, and Allen (2017)"), pp. 170-172.

[12] Brealey, Myers, and Allen (2017), p. 216.

The cost of debt is less than the company cost of capital, because debt is safer than the assets. The cost of equity is greater than the company cost of capital, because the equity of a firm that borrows is riskier than the assets.

The Federal Energy Regulatory Commission ("FERC"), for example, recognizes this principle and considers the yield on Baa rated bonds plus 20% of the market risk premium ("MRP") as established by the FERC, a lower bound on a reasonable ROE.[13] At the end of July 2025, this lower bound is 7.60%.[14] Thus, the recommendations of Drs. Ellis and McCann should be ignored for being below, at, or near the cost of debt, as an ROE below the cost of Baa rated utility debt plus a premium simply is unreasonable.

Q9. Do you have other preliminary comments on the ROE recommendations?

A9. Yes. In addition to being too low in today's market, the derivations used by Dr. McCann and Mr. Rothschild are highly unconventional as are the inputs used by Dr. Ellis. Further, much of the specific derivations ignore important details regarding SCE or the electric utility industry; for example, Dr. McCann (1) ignores that in a regulatory setting, return is earned on rate base – not book equity and (2) assumes that an average of the past year is representative for SCE's market value going forward. Mr. Gorman and Dr. Ellis consider utility indices that include, for example, power generators to draw conclusions about SCE's authorized return on equity. It is important to recognize that this proceeding aims to determine an appropriate return on equity for fully regulated utilities in California.

Q10. What are your key conclusions?

A10. My key conclusions are summarized below:

[13] FERC Opinion 569, November 21, 2019, ¶511.

[14] Calculated as: Baa 30-year yield + 20% * FERC MRP (7.60% = 6.06% + 20% * 7.66%), where the Baa yield is calculated as the six-month average as of July 2025 and the MRP is calculated using FERC's methodology as of July 2025. See Exhibit SCE-07, Appendix R-F for details.

- There is nothing in Intervenors' testimonies that causes me to change my opinion and current market conditions do not indicate a change in the recommendation. Hence my requested ROE of 11.75% remains reasonable.
- Intervenors' recommended ROEs are simply too low with several recommendations below, at, or near the cost of debt. As equity is riskier than debt, a recommendation that is not above the cost of debt plus a premium is simply unreasonable.
- Intervenors' use of the Price/Earnings or Market-to-Book ratio is flawed for several reasons, including the reliance on indices that include power producers and companies that are not reflective of SCE's risks. As SCE's Authorized ROE is at issue, it is imperative to look to entities comparable to SCE and not generic energy companies.
- Regarding the determination of Intervenors' proposed ROEs:
    - Dr. McCann's recommendation of 5.09% should be ignored as (1) it is below the current cost of Baa rated utility debt and (2) his derivation using the Market-to-Book ratio is unconventional, fails to recognize that utilities earn a return on rate base not equity, ignores market returns, and is backward-looking.
    - Similarly, Dr. Ellis's recommendation of 6.11% should be ignored as it (1) is below the current cost of Baa rated utility debt plus a small risk premium, and (2) relies on unreasonably low inputs, such as an MRP of 0.92%.
    - None of the Intervenors' ROE recommendations are adjusted to account for differences in financial risk between the proxy groups and SCE. Failing to do so downwardly biases their ROE estimates by at least 20 basis points. It also does not provide a fair risk-adjusted return to equity holders.
    - The Intervenors rely on inputs and assumptions that downwardly bias their ROE estimates. For example, they rely on dividend growth rates that ignore other ways that utilities can and do return earnings to shareholders, like share buybacks. As another example, they rely on outdated or unreliable sources, such as surveys, for the market equity risk premium.
    - Mr. Rothschild relies on highly non-standard option-implied betas and growth rates (to estimate the market-risk premium and the growth rates in his DCF models). In addition, his estimated betas and growth rates rely on thinly traded options data, with some utilities having no data, which calls into question the validity and reliability of his ROE estimates.
- The attempts to use credit ratings or regulatory mechanisms to discredit the elevated business risk of SCE is misguided. SCE's credit rating measures default risk rather than equity risk. As for the regulatory regime, California's rating is average, and many states have similar regulatory mechanisms. Thus, it is the wildfire risk that distinguishes SCE from the proxy group – these risks and any offsetting mechanisms are addressed in other testimony, which finds the risk is well above that of the proxy group.

III. CAPITAL MARKET CONDITIONS

Q11. Do the Intervenors address recent changes in capital market conditions?

A11. Yes. Dr. Wooldridge[15] and Messrs. Gorman[16] and Rothschild[17] discuss recent changes in financial and economic conditions. They argue that while indicators like inflation, interest rates, and volatility have increased, the cost of equity for utilities has not risen significantly.[18] They argue that long-term inflation expectations have moderated and are near the Federal Reserve's target range of 2.0% on average; the yield curve has normalized and is positively sloped; and utilities have not been significantly impacted by tariffs and fiscal policy changes.[19]

Q12. How do you respond to the Intervenors' evidence related to capital market conditions?

A12. I agree with Dr. Wooldridge and Messrs. Gorman and Rothschild that inflation, interest rates, and volatility have increased recently, especially since the time of my Direct Testimony in March 2025. However, based on my evaluation of recent developments in capital market conditions, I disagree that inflation and bond yields are expected to materially moderate during the time when the ROE set in this proceeding is expected to be in effect. I also disagree that tariffs and fiscal policy changes have not impacted utilities—since the time of my Direct Testimony, the Federal Administration has imposed 50% tariffs on steel, aluminum, and copper, all key components of electric utility assets. Further, the July 2025 signing of the One Big Beautiful Bill Act ("OBBBA") rolls back tax credits and subsidies for investments in renewable energy. These changes create significant uncertainty for utilities. I also

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15 Wooldridge Testimony, Section II.

16 Gorman Testimony, Section III.B.

17 Rothschild Testimony, Section V.

18 Wooldridge Testimony, p. 8.

19 *Ibid*; Gorman Testimony pp. 32-36, 45-47; Rothschild Testimony, pp. 29-42.

disagree that the cost of equity of utilities has not increased. I discuss these issues in additional detail next.

Q13. Please provide a brief overview of the development in capital market conditions since the submission of your direct testimony.

A13. Since submitting my Direct Testimony in March 2025, several capital market indicators suggest that economic and financial uncertainty is elevated due to ongoing tariff and geopolitical developments, persistently high levels of inflation, and changes in interest rate expectations.

Inflation, as measured by the Consumer Price Index ("CPI"), has declined since its high of 9.1% in June 2022 but has remained above the Federal Reserve's target of 2% on average since June 2023.[20] The latest CPI reading for July 2025 was 2.7%.[21] However, the recent imposition of global trade tariffs by the U.S. since April 2025 is expected to create additional upward pressure on inflation and slow economic growth. Blue Chip Economic Indicators ("BCEI")—a survey of over 50 economists employed at financial institutions, insurance companies, academic institutions, and manufacturers—estimate that inflation will average 2.8% in both 2025 and 2026.[22] At the time of my direct testimony in March 2025, the estimated inflation for 2025 and 2026 were 2.9% and 2.7%, respectively.[23]

While trade tensions have eased somewhat since April 2025, tariff levels remain elevated relative to year-end 2024 levels. Of note, the Federal Administration recently

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[20] U.S. Bureau of Labor Statistics, "12-month percentage change, Consumer Price Index," https://www.bls.gov/charts/consumer-price-index/consumer-price-index-by-category-line-chart.htm.

[21] *Ibid.*

[22] Blue Chip Economic Indicators, August 2025, pp. 2-3.

[23] Blue Chip Economic Indicators, March 2025, pp. 2-3.

increased Section 232 tariffs to 50% on steel, aluminum, and copper, which are critical materials for the utility industry.[24]

After briefly cutting the Federal Funds Rate in late 2024, the Federal Reserve decided to pause further rate cuts at its January 2025 meeting.[25] It held the Federal Funds Rate at 4.25% to 4.5% due to persistent inflation levels, strong labor markets, and significant federal policy changes.[26] The Federal Reserve maintained rates again at its March, May, June, and July 2025 meetings, citing uncertainty related to trade policy and their impact on the economic outlook.[27] The Projection Materials published at the June meeting showed a decline in real GDP expectations to 1.4% in 2025, 1.6% in 2026, and 1.8% in 2027[28] (down from 1.7% in 2025, 1.8% in 2026 and 2027 in the Federal Reserve's March 2024 projection—the latest available at the time of my Direct Testimony[29]) and an increase in inflation to 3.0% in 2025, 2.4% in 2026, and

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[24] The White House, "Fact Sheet: President Donald J. Trump Increases Section 232 Tariffs on Steel and Aluminum," June 3, 2025, https://www.whitehouse.gov/fact-sheets/2025/06/fact-sheet-president-donald-j-trump-increases-section-232-tariffs-on-steel-and-aluminum/. *See also* White & Case, "President Trump Orders 50 percent Section 232 Tariff on Copper Imports," August 6, 2025, https://www.whitecase.com/insight-alert/president-trump-orders-50-percent-section-232-tariff-copper-imports.

[25] Federal Reserve, "Transcript of Chair Powell's Press Conference," January 29, 2025, pp. 2-3, 7, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20250129.pdf.

[26] *Ibid*.

[27] Federal Reserve, "Transcript of Chair Powell's Press Conference," March 19, 2025, pp. 2-3, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20250319.pdf. See also Federal Reserve, "Transcript of Chair Powell's Press Conference," May 7, 2025, pp. 1-2, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20250507.pdf. See also Federal Reserve, "Transcript of Chair Powell's Press Conference," June 18, 2025, pp. 1-3, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20250618.pdf. See also Federal Reserve, "Transcript of Chair Powell's Press Conference," July 30, 2025, p. 5, https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20250730.pdf.

[28] Federal Reserve, Summary of Economic Projections, June 18, 2025, p. 2, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20250618.pdf.

[29] Federal Reserve, Summary of Economic Projections, March 19, 2024, p. 2, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20250319.pdf.

2.1% in 2027[30] (up from 2.7% in 2025, 2.2% in 2026, and 2.0% in 2027 in the March 2025 projection[31]).

The yields on U.S. Government bonds have changed in reaction to recent trade policy developments. Immediately after the tariff announcements, yields on 10-year U.S. Government bonds rose 50 basis points ("bps") to 4.5% on April 9 following a sell off of U.S. bonds, indicating investors' hesitancy to buy longer-term Treasuries.[32] At the same time, yields on U.S. Governments bonds and utility bond yield spreads have declined slightly since I submitted my Direct Testimony.[33]

Since the time of my Direct Testimony, utility bond yield spreads have declined somewhat. In March 2025, the spread on A-rated and BBB-rated 10-year utility bonds was 0.87% and 1.15% respectively.[34] Today, the spread on the same bonds is 0.74% and 1.00%, respectively.[35] This indicates that the risk on utility bonds has remained near the same level since March 2025.

On May 16, 2025, Moody's Ratings downgraded the United States' credit rating from Aaa to Aa1 citing concerns about the country's debt, deficit, and ability to manage them appropriately.[36] While the impacts of the downgrade remain to be seen, it is another indicator of heightened uncertainty in economic conditions. At the same time, rising debt and deficits, along with policy uncertainty, have been cited as reasons for

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30 *Supra* n. 28.

31 *Supra* n. 29.

32 Sam Goldfarb, "Treasury Selloff Extends, 10-Year Yield Tops 4.5%," April 11, 2025, https://www.wsj.com/livecoverage/stock-market-trump-tariffs-trade-war-04-11-25/card/treasury-yields-keep-climbing-W4tbFgfJuhRcGfCsreyw.

33 Yields on 10-year U.S. Treasury bonds have declined slight from 4.58% at the time of my Direct Testimony to approximately 4.27% currently. *Source*: FRED, "Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity," DGS10, https://fred.stlouisfed.org/series/DGS10.

34 Exhibit SCE-07, Appendix R-C.

35 *Ibid*.

36 Moody's Ratings, "Moody's Ratings downgrades United States rating to Aa1 from Aaa; changes outlook to stable," May 16, 2025, https://ratings.moodys.com/ratings-news/443154.

a 10.7% decline of the U.S. dollar against global currencies since the start of 2025—the worst decline since 1973.[37]

On July 4, 2025, the OBBBA was signed into law and significantly rolled back energy tax credits and subsidies. Specifically, the bill rolled back electric vehicle credits and building energy efficiency credits and deductions.[38] It also created faster phase outs of wind and solar production and investment tax credits.[39] While the impacts of OBBBA are yet to be seen, its passage is a significant shift in federal energy policy and introduces new uncertainties for utilities.

Lastly, the evolving situations in Ukraine and the Middle East have the potential to substantially impact economic policy, financial and commodity markets, and global trade dynamics going forward. These uncertainties have the potential to impact investors' risk perceptions and the return they require to invest in non-risk-free assets.

Q14. Have authorized ROEs for vertically integrated utilities increased in recent years?

A14. Yes. As shown in Figure R-2 below, authorized ROEs for vertically integrated electric utilities have generally risen over the past 5 years. In 2021 the average authorized ROE for vertically integrated electric utilities was 9.53% but has since increased to 9.84% in 2024.[40] This is a notable shift in trends from prior to 2020 when authorized ROEs were declining. Authorized ROEs reflect a myriad of factors considered by regulatory commissions during rate proceedings, including evidence from market-based ROE estimation models presented by utilities and Intervenors. Thus, this trend is another

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[37] Jeff Cox, "The declining dollar faces more headwinds after posting worst first-half return in 52 years," July 7, 2025, https://www.cnbc.com/2025/07/07/the-declining-dollar-faces-more-headwinds-after-posting-worst-first-half-return-in-52-years.html.

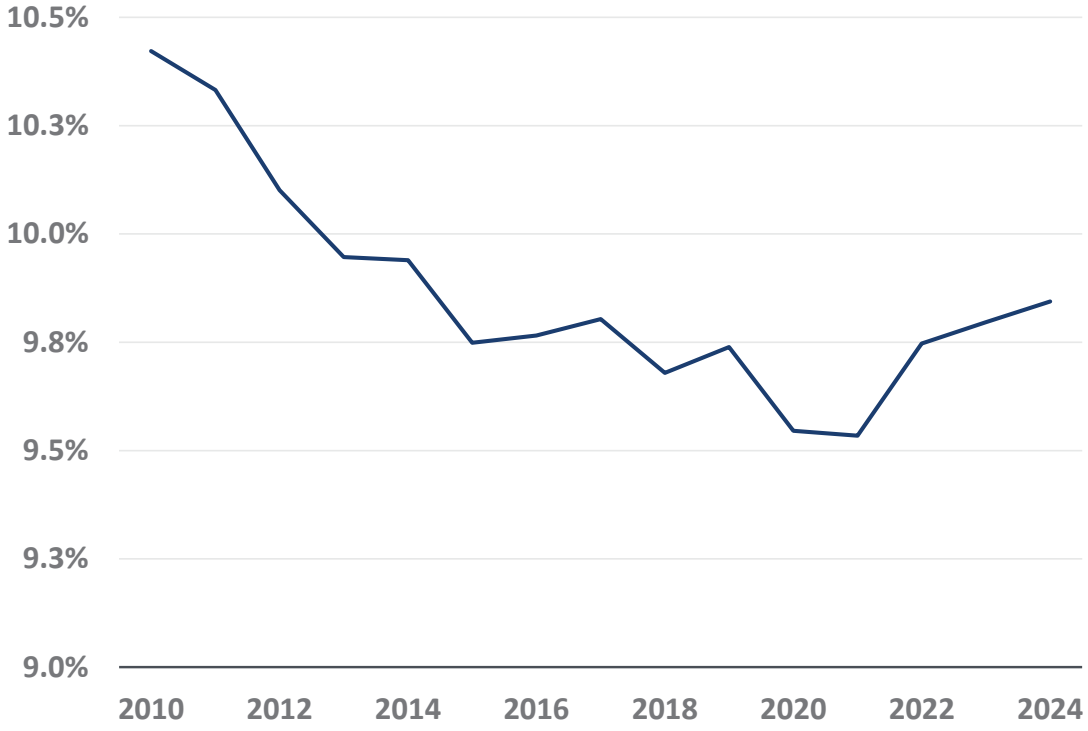
[38] Tax Foundation, "How the One Big Beautiful Bill Changes Green Tax Credits," July 31, 2025, https://taxfoundation.org/blog/big-beautiful-bill-green-energy-tax-credit-changes/.

[39] *Ibid*.

[40] Refuting the Wooldridge Testimony's (p. 17) claim that the ROE has trended downwards.

indication the cost of capital for regulated utilities has increased in recent years. Lastly, the Dowdell Testimony states that the "California utilities have enjoyed authorized ROEs that exceeded the national average among US Utility by 70 bps."[41] However, this argument is flawed as it appears to rely on the dated ROEs for the California utilities and not on the currently authorized ROE, which is not 10.7% but 10.23%,[42] so Ms. Dowdell is overstating the difference by almost 50 bps.

Figure R-2: Vertically Integrated Electric Utilities Authorized ROEs[43]



41 Dowdell Testimony, p. 30.

42 Decision 24-10-008, issued October 17, 2024, p. 2 (average of the authorized return on equity).

43 S&P Capital IQ Pro, RRA Past Rate Cases.

IV. INTERVENORS' GENERAL OBSERVATIONS REGARDING UTILITY ROES

Q15. What do you discuss in this section?

A15. I discuss my concerns with several witnesses' reliance on two specific papers, as well as the economic and empirical evidence regarding Price-to-Book and Market-to-Book ratios for electric utilities and their application in this matter. First, the Ellis, McCann and Wooldridge Testimonies rely on articles by Rode & Fischbeck (2019) and Werner & Jarvis (2025) to claim that authorized ROEs are well above the cost of equity.[44] I disagree. Second, I discuss the empirical facts and economics behind the price/earnings ratio and market-to-book analyses and their flaws. Finally, I discuss the development in authorized ROEs and the implications for the determination of an appropriate ROE for SCE.

Q16. What do the Rode & Fischbeck and Werner and Jarvis articles examine and conclude?

A16. Rode & Fischbeck (2019) examine whether the CAPM can explain a rising trend (as of 2018) in the average utility risk premium (measured as the authorized ROE minus the risk-free rate). Rode & Fischbeck perform time series regression analysis using specific inputs to the CAPM—utility asset (i.e., unlevered) betas, allowed regulatory capital structures, and the historical average MRP—as explanatory variables. With these specifications of the CAPM input variables Rode and Fischbeck observe an inverse relationship between each input and the utility risk premium. On this basis, they conclude that the increasing trend in the allowed utility risk premium runs counter to traditional asset pricing theory as embodied by the CAPM. The paper does not explore models other than the CAPM nor does it explore measures of the MRP other than the historical average MRP.

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[44] David C. Rode & Paul S. Fischbeck, "Regulated Equity Returns: A Puzzle," Energy Policy Vol 133, 2019 ("Rode & Fischbeck (2019)"); Carl Dunkle Werner & Stephen Jarvis, "Rate of Return Regulation Revisited," Energy Institute at Haas, Working paper 2025 ("Werner & Jarvis (2025)") – Dr. Wooldridge cites to an earlier (2022) version of the Werner & Jarvis paper.

Werner and Jarvis (2025) examine the difference between utilities' authorized ROEs and measures of the cost of equity. Like the Rode & Fischbeck (2019) paper, they rely exclusively on the CAPM using data from 1980 through 2022. They bound the MRP between 4.5% and 7.5% using data from the historically realized MRPs over varying periods and Damodaran's estimated MRP. Based on their analyses, the authors conclude that utilities' authorized ROEs have increasingly deviated from the authors' CAPM measures of the cost of equity and indicators such as bond yields. Werner & Jarvis go further and state these increases lead to over investment. However, the authors do not consider, for example, the FERC or Bloomberg forecasted MRP nor do they consider DCF estimates of the cost of equity.

A. Relied Upon Articles Are Flawed

Q17. What is your concern with the Ellis, McCann, and Wooldridge Testimonies reliance on these specific articles regarding utilities' ROE?[45]

A17. I have several concerns. First, the papers suffer from several flaws in the application to the case at hand. Second, the Werner & Jarvis paper has not been published despite being in circulation since at least 2022,[46] while the Rode & Fischbeck (2019) paper relies on data up until 2018.[47] Therefore, Rode & Fischbeck cannot take into account the recent changes in the economy or electric industry. Below I discuss the details and implications of these observations as they relate to the case at hand – determining SCE's cost of equity.

Q18. What are some flaws that make the papers inappropriate for the determination of SCE's cost of equity?

A18. Both articles rely exclusively on the CAPM to determine the cost of equity, while regulators commonly consider multiple models. In addition, the rely on a MRP that

[45] Ellis Testimony, pp. 21-22; McCann Testimony, pp. 25-27; Wooldridge Testimony, pp. 21-22.

[46] Dr. Wooldridge relies on a 2022 version (Wooldridge Testimony footnote 6, p. 21).

[47] Rode & Fischbeck (2019), Table 2.

does not vary with interest rates. The use of multiple models is preferred because, as Professor Myers stated:

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.[48]

And when commenting on the sole use of the CAPM, Professor Myers noted:

> *Analysts and decision makers should consider estimates from other [non-CAPM] models or sources whenever the estimates are informative.*[49]

Similarly, Professors Berk and DeMarzo, in their corporate finance textbook comment on the use of the CAPM, DCF and other models by practitioners as follows:

> *It is not difficult to see why there is so little consensus in practice about which technique to use. All the techniques we covered are imprecise. Financial economics has not yet reached the point where we can provide a theory of expected returns that gives a precise estimate of the cost of capital. Consider, too, that all techniques are not equally simple to implement. Because the tradeoff between simplicity and precision varies across sectors, practitioners apply the techniques that best suit their particular circumstances.*[50]

Yet, the cited papers draw dramatic conclusions from the use of a single method. For example, the DCF model appears to explain a good portion of the authorized ROE as

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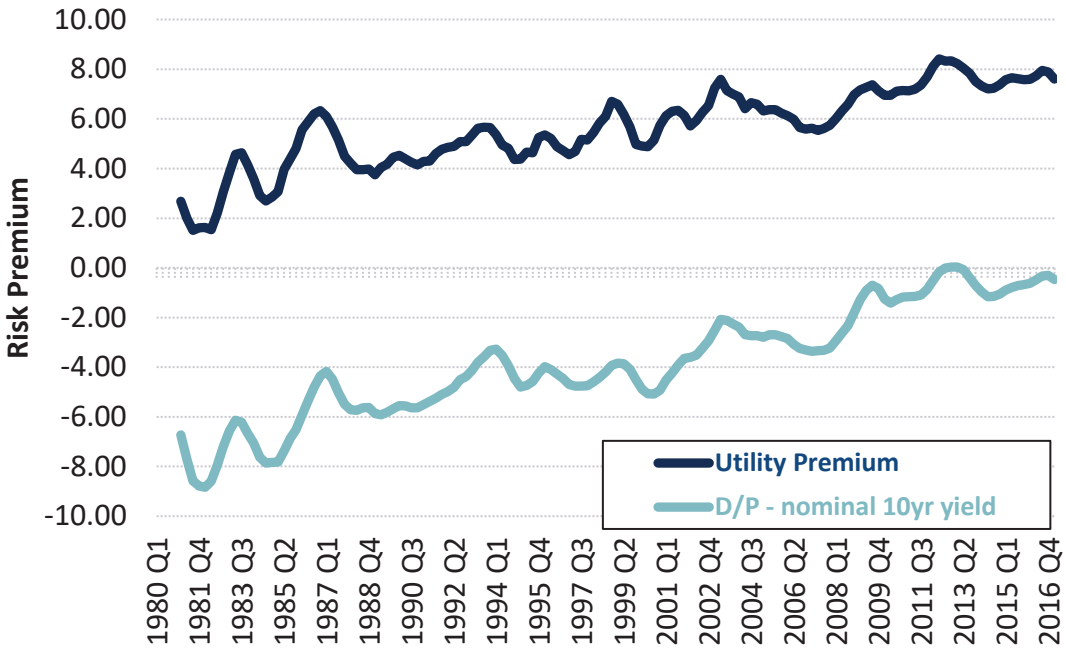
48 Stewart C. Myers, "On the Use of Modern Portfolio Theory in Public Utility Rate Cases: Comment," *Financial Management*, Autumn 1978, p. 67.

49 Stewart C. Myers, "Estimating the Cost of Equity: Introduction and Overview," submitted to the *Australian Energy Regulator* on behalf of the Australian Pipeline Industry Association, February 2013 (Myers AER Report), p. 12.

50 Jonathan Berk and Peter DeMarzo, *Corporate Finance: The Core*, 3rd edition, 2014, (Berk & DeMarzo 2014) p. 466.

illustrated in Figure R-3 below. In Figure R-3 the development in electric utilities' authorized risk premium (the authorized ROE minus the contemporaneous 10-year Treasury bond yield) to a large degree has matched the development in the dividend yield over the 10-year Treasury bond yield (e.g., a measure of the DCF-based risk premium). The development over the period used by Rode & Fischbeck is shown in Figure R-3 below. Specifically, the chart shows that the authorized utility risk premium largely has followed the development in the DCF model, so that indications are that that utilities' authorized risk premium is in line with that indicated by the DCF model, which is part of how most state regulatory commissions assess the cost of equity.

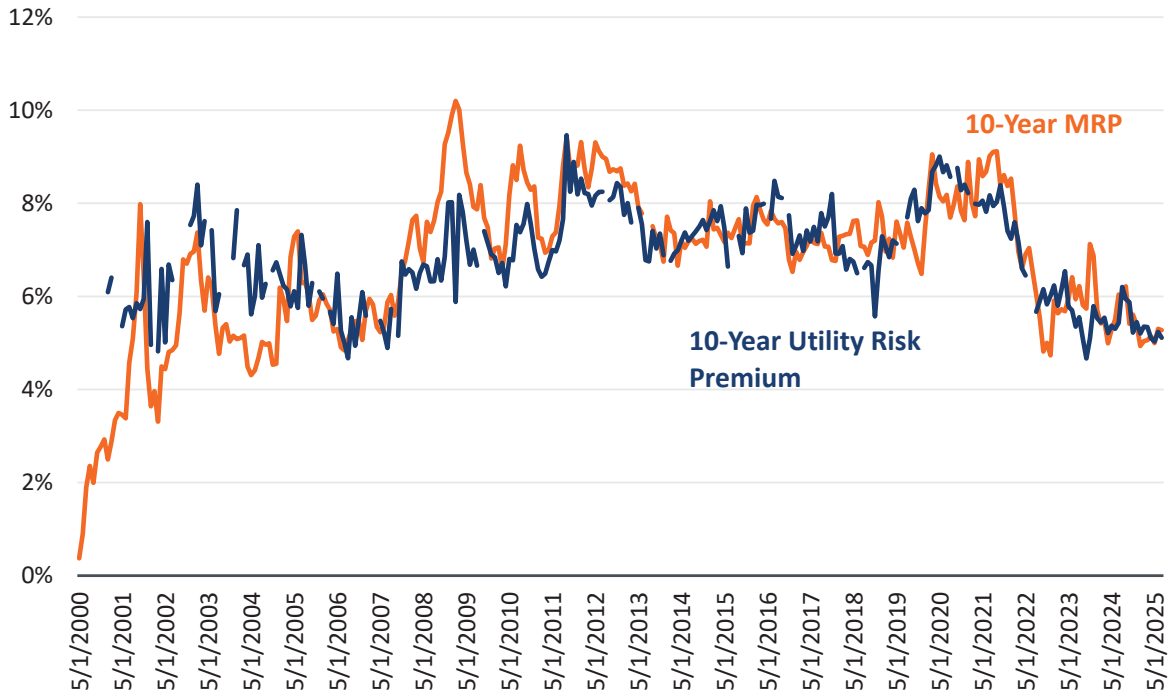
Figure R-3: Dividend Yield Over Risk-Free Rate versus Utility Risk Premium



In addition, the papers do not recognize that the MRP varies with the level of Treasury Bond yields. Again, taking this relationship into account by, for example, considering the development in Bloomberg's forecasted MRP and electric utilities' authorized risk premium (authorized ROE minus risk-free rate) shows that there are reasons for the development in ROE as illustrated in Figure R-4 below. Specifically, there is **no**

indication that the utilities' authorized risk premium (authorized ROE minus risk-free rate) somehow has deviated from the market-based cost of equity adjusted for bond yield changes.

Figure R-4: Market Risk Premium and Authorized Utility Risk Premium[51]



Note that in Figure R-4 above, the MRP pertains to about 80% equity, while the utility premium pertains to about 50% equity.[52] Thus, if the MRP and utility premium both are 7%, then the equity premium on $1,000 is $56 for the S&P 500 and $35 for utilities.

As shown in Figure R-4 above, once the changes in the MRP as a result of changes in Treasury bond yields are taken into account, the authorized utility risk premium largely follows the development in the MRP.

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[51] Authorized ROEs were obtained from S&P Global, the MRP and the 10-year Treasury bond yield were obtained from Bloomberg. In some months, there were no authorized ROEs reported by S&P Global.

[52] The S&P 500 currently has a capital structure including 82.2% equity and authorized ROEs are on average granted on approximately 50% equity.

In short, Figure R-3 and Figure R-4 above show that the papers' results hinge on assumptions that do not match how regulatory commissions determine the ROE. Specifically, most commissions look to the DCF model (Figure R-3) and, for example, the FERC has acknowledged that the MRP varies with interest rates (Figure R-4). Importantly, the utility risk premium is at the same level as the MRP because the MRP is calculated using a much higher equity percentage (currently the S&P 500 has 82.2% equity) than utilities, whose authorized ROE is awarded on about 50% equity.

Q19. What is the impact of the Rode & Fischbeck paper relying on data only up to 2018?

A19. The key problem with this end date is that the paper inherently cannot take into account the impact of the COVID-19 pandemic nor can it take into account the substantial changes the electric industry has seen over the last 6 ½ years. For example, the annual growth in electricity demand was 0.1% during the 2005-2020 period, while the forecast for 2020-2026 is 1.7%.[53] Further, the electric industry has seen a very high level of capital investments in recent years and California is expecting substantial load growth.[54] Because these changes may have changed the risk profile of electric utilities, Rode & Fischbeck's findings may no longer apply.

Q20. Why does it matter that the Werner & Jarvis paper is not published?

A20. Published academic articles are commonly subject to a formal peer review. The Werner & Jarvis paper has been in circulation since at least 2022 but has not been

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[53] Energy Information Administration, "After more than a decade of little change, U.S. electricity consumption is rising again," May 13, 2025, https://www.eia.gov/todayinenergy/detail.php?id=65264.

[54] Edison Electric Institute shows the industry had capital expenditures of $123.8 billion in 2019, which are forecast to be above $202 billion in 2025 and 2026 for an increase of more than 60 percent. Source: Edison Electric Institute, "Industry Capital Expenditures," July 2024, https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Finance-And-Tax/Industry-Capital-Expenditures.pdf, and see Figure R-8 and Figure R-9 below.

published and therefore not been subject to a formal peer review. "The rigor of a peer review system ensures the quality of a research article."[55]

B. PRICE/EARNINGS RATIOS AND MARKET-TO-BOOK

Q21. What do you discuss regarding price/earnings ratios and market-to-book?

A21. Witnesses Ellis, McCann, Ellis, and Rothschild look to the Price/Earnings ("P/E") or market-to-book ratios of utilities and conclude that (1) the current level of utilities' P/E ratios and/or (2) a market-to-book ratio above one is "evidence" that the authorized levels of ROE are too high.[56] The McCann Testimony goes a step further and relies on an unconventional approach to determine his ROE recommendation.

Q22. Do you agree?

A22. No. The conclusions using the P/E or market-to-book ratio are much too simplified as I explain below.

Q23. What are some key issues with relying on price/earnings or market-to-book ratios to determine the cost of equity?

A23. First, stock prices take into account current or potential non-regulated activities. For example, stock prices may account for options available to the utilities that are not recognized in earnings or the book value of the utility. For example, a utility that has the potential to sign large unregulated data center loads, but has yet to do so, may exhibit a premium stock price and hence a high market-to-book ratio and a high price/earnings ratio. Yet, the potential load increase has no impact on currently regulated returns.

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[55] Academic Journals, Policies, https://academicjournals.org/peer_review.

[56] Ellis Testimony, pp. 15, 19-23; McCann Testimony, pp. 22-23; Rothschild Testimony, p. 21. See also Gorman Testimony, p. 41.

From a financial economics perspective, Brealey, Myers, and Allen (2017) discuss, the share price is the present value of a level stream of earnings plus the present value of growth opportunities.[57] In the DCF model, the dividend yield cannot capture growth opportunities and neither can an economy-wide growth rate used in a multi-stage DCF. Thus, the only place such growth opportunities can be captured is in the company (or industry) specific growth rate. Therefore, looking to historical price/earnings or market-to-book ratios may inappropriately incorporate the growth opportunities in the stock price, but not in earnings or the book value. Hence, a conclusion about the appropriate level of ROE for the regulated entity using such ratios fails to capture the impact of growth opportunities.

Second, much of the analysis draws conclusions without regard to capital structure or the regulatory environment. For example, the S&P 500 on average have a market value capital structure containing about 82.2% equity,[58] while the average market-value equity percentage for my electric utility sample is 57%-58% equity.[59] Thus, a direct comparison of an index such as the S&P 500 and utilities in California is inappropriate.

Third, reliance on the market-to-book ratio as "evidence" that the authorized ROE is too high fails for the reasons discussed above, namely that the stock price is determined not only by the utility's current regulated operations but also by non-regulated activities and options such as the ability to take on non-regulated data center load in the future or other growth opportunities. In addition, some research has found that market values are "fuzzy." As Professor Myers concluded,[60]

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57 Brealey, Myers, and Allen (2017), p. 93.

58 Exhibit SCE-07, Appendix R-P.

59 Villadsen Direct, Appendix C, Schedule No. BV-4.

60 Stewart C. Myers, "Fuzzy Efficiency," *Institutional Investor*, 1988.

Fundamental value is not a definite number, but a fuzzy band of possible values.

The implication is that markets get relative (stock price) values about right, but the absolute value may be fuzzy. Thus, the market-to-book ratio of utilities cannot be viewed in isolation but only relative to other industries. As a consequence, utilities' current absolute market-to-book value says little about the absolute level of return. Not only is it not possible to determine the market-to-book value of each segment of a multi-segment business with any precision, but it may be impossible to draw a conclusion about a business absolute stock price as only relative prices are well determined according to this research.

Of note, EIX's (and other California electric utilities') market-to-book ratio declined in early 2025, while all other of Dr. McCann's proxies but one saw an increasing market-to-book ratio.[61] In contrast to EIX's market-to-book of about 1.6, the S&P 500 has a market-to-book of about 5.3.[62]

Q24. Please discuss the specific issues with each witness' analysis.

A24. The Ellis Testimony relies on the S&P 1500 Utilities index to conclude that the market-to-book value of utilities shows that the authorized ROEs are too high.[63] The use of the S&P 1500 utility index substantially overstates the market-to-book for utilities such as SCE, as EIX's market-to-book ratio is 36% *below* that of the index.[64] Therefore, Dr. Ellis's analysis does not address the issue at hand, SCE's cost of equity and recommended ROE. Dr. Ellis's use of the S&P 1500 utilities index to determine

[61] McCann Testimony, Workpaper labelled "EDF-Figure 3-IOU-valuation_measures-2025.xlsx," tab "P-B ratio."

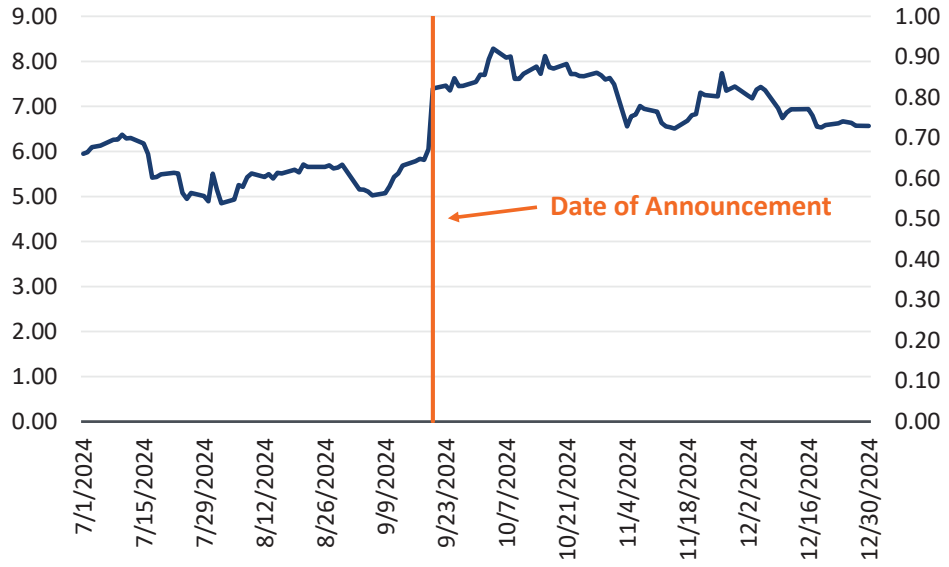
[62] McCann Testimony Q1, 2025 and S&P 500 at https://www.multpl.com/s-p-500-price-to-book.

[63] Ellis Testimony, pp. 19-23.

[64] McCann Testimony, Workpaper labelled "EDF-Figure-5-McCann-Cost of Capital dataset-2026.xlsx" finds EIX's Market-to-Book to be 1.6 and the Ellis Testimony, p. 19 cites a Market-to-Book ratio of 2.5 for the index.

the average market-to-book ratio results in a significant over-estimation of the ratio due to the presence of, for example, Constellation, NextEra and Vistra Corp in the top 5;[65] none of these companies are proxies for SCE. Thus, it is not representative for regulated electric utilities which are at issues here. As an illustration, I note the substantial movement in Constellation's market-to-book ratios at the time of the announcement of Constellation's deal with Microsoft regarding Three Mile Island.[66] This is shown in Figure R- 5 below.

Figure R- 5: Changing Market-to-Book Due to Large Load Change[67]



The Gorman Testimony looks to the P/E ratio of the S&P 500 Utilities index to argue it has followed the S&P 500 / Dow Jones index.[68] Similar to the Ellis Testimony, the analysis is an attempt to show utilities' ROEs are too high. However, Mr. Gorman

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65 S&P Dow Jones Indices, "S&P Composite 1500 Utilities," as of July 31, 2025 (Attached as Exhibit SCE-07 Appendix R-Q).

66 Constellation Press Release, "Constellation to Launch Crane Clean Energy Center, Restoring Jobs and Carbon-Free Power to The Grid," September 20, 2024, https://www.constellationenergy.com/newsroom/2024/Constellation-to-Launch-Crane-Clean-Energy-Center-Restoring-Jobs-and-Carbon-Free-Power-to-The-Grid.html.

67 SCE-07 Appendix R-O.

68 Gorman Testimony, p. 41.

fails to recognize that this index includes non-utilities as well as utilities that were not included in my (or Mr. Gorman's) proxy group due to their lack of sufficient regulated assets.[69] For example, the S&P 500 Utilities index includes power producers NRG Energy and Vistra Corp., whose P/E ratios are at 64.3 and 31.7, respectively, which are well above the average for utilities and well above SCE's parent, EIX's, P/E ratio of 8.1.[70]

The McCann testimony looks to the P/E Ratio of the S&P 500 and finds that it implies a return on the market equity of the S&P 500 of 4.44%.[71] However, during 2024 and 2025, the market return on the S&P 500 was 25% and is 8.63% as of August 8, 2025.[72] In addition, the forecasted return on the S&P 500 as measured by the FERC methodology is 12.45% using IBES data as of July 2025.[73] As the current capital structure for the S&P 500 includes 82.2% equity,[74] an equity return of 8.63% and 12.45% would be equivalent to a return of about 11.5% and 17.1% on 52% equity, respectively.[75] Viewed in that light, SCE's requested ROE is reasonable.

The Rothschild Testimony also maintains that a market-to-book Ratio above one shows the authorized ROE is too high.[76] However, it does not appear that Mr. Rothschild undertakes a specific analysis on either the P/E or the market-to-book ratio for which reason, I simply refer to the general discussion above.

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69 For example, NextEra.

70 Tradingview, "S&P 500 Utilities: S5UTIL Components," as of August 11, 2025 (Attached as Appendix R-R).

71 McCann Testimony, pp. 22-23.

72 RBC Wealth Management, U.S. equity returns in 2024: Premium Performance, January 9, 2025 (https://www.rbcwealthmanagement.com/en-us/insights/us-equity-returns-in-2024-premium-performance) and S&P Global – Index Finder (https://www.spglobal.com/spdji/en/indices/equity/sp-500/#overview). I note that the 8.63% accounts for only about 7 months of the year.

73 Exhibit SCE-07, Appendix R-F.

74 Exhibit SCE-07, Appendix R-P.

75 Calculated using a cost of debt of 6% and a tax rate of 26%. I note that this calculation does not take imputed debt into account.

76 Rothschild Testimony, p. 21 and Appendix D.

Q25. Please explain how the McCann Testimony determines the recommended ROE.[77]

A25. The McCann Testimony goes a step further and relies on an unconventional approach to determine his ROE recommendation. He calculates his recommended ROE as follows. First, he determines the so-called Regulated Income as a function of the authorized ROE, Market Value of Equity, and the Market-to-Book for each utility. Specifically:

Regulated Income = (Authorized ROE) / (Market Equity / Market-to-Book)

As Dr. McCann relies on all equity a utility has, he fails to acknowledge that a return is earned on the rate base – not the financing thereof. Second, Dr. McCann calculates the Implied Market ROE as follows:

Implied Market ROE = Regulated Income / Market Equity.

This concept uses a mix of regulatory ROE and market figures, while a standard market return relies on the sum of the dividend and stock appreciation.

Third, Dr. McCann determines the Difference between the authorized ROE and his Implied Market ROE using the most recent four quarters, i.e., he averages the following over four quarters.

Difference = Authorized ROE – Implied Market ROE

Fourth, Dr. McCann calculates his recommended ROE as:

Recommended ROE = (Authorized ROE (current) – Difference) plus 10%.

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[77] McCann Testimony, Workpaper labelled "EDF-Figure-5-McCann-Cost of Capital dataset-2026.xlsx."

Q26. Do you agree with this approach?

A26. No. There are multiple problems with the approach. First, the approach relies on the following invalid assumptions:

- Utilities earn an equity return on the Book Value of Equity
  - Utilities earn the equity return on the portion of the rate base that is financed by equity.
- Investors "earn" the Regulated Income
  - Investors can realize dividends and stock appreciation (positive or negative) but not Regulated Income.
- The Market-to-Book ratio is a perfect translator of market to book equity values
  - The equity amount authorized to finance rate base as of a specific test year is not likely to match the market value adjusted for Market-to-Book over four quarters.

In addition to being a highly unconventional approach to determine the cost of equity for a utility, Dr. McCann's approach fails to recognize standard regulatory approaches such as the return being earned on rate base. Further, the cost of equity is forward-looking and determined in capital markets, while Dr. McCann relies on the historically authorized ROE and a four-quarter average for the market-to-book and ignores the forward-looking principle. For these reasons, and because his recommended ROE is below current yield on Baa rated utility bonds, the recommendation should be ignored.

Q27. What conclusions do you draw from the discussion above?

A27. Based on the discussion above, I conclude that the two articles relied upon by several witnesses as well as the reliance on P/E or market-to-book ratios are subject to multiple flaws. For example, the two articles fail to consider estimation methods other than the CAPM and the regulatory context in which utilities operate. Regarding the P/E and market-to-book ratios, the witnesses rely on indices that include power producers and

other entities that are not reflective of SCE or the regulated utilities in my proxy group. Specifically, the witnesses fail to consider that SCE's parent, EIX's, stock market performance has been below that of the indices they rely on and thus fail to recognize the substantial impact of, for example, wildfires, on EIX's stock price.[78] Finally, there is research questioning the absolute market value, so a simple statement that the market-to-book for a company is above one is not meaningful. A comparison of the relative market-to-book values instead shows that utilities are substantially below, for example, the S&P 500 as expected.

V. COST OF EQUITY ESTIMATION METHODS

Q28. What models do the Intervenors employ to estimate the allowed ROE for SCE?

A28. The Intervenors employ several different approaches to estimate the ROE for SCE using proxy groups consisting primarily of electric utilities. Four of the Intervenors generally rely on forms of the DCF, CAPM, and/or Risk Premium models that rely on different inputs and assumptions. Specifically, Dr. Ellis relies on the CAPM and the multi-stage DCF;[79] Mr. Gorman implements the CAPM, a constant growth DCF, a sustainable growth rate DCF, a multi-stage DCF, and two versions of a Risk Premium Model;[80] Mr. Rothschild estimates the ROE using four versions of the CAPM and a constant growth DCF, sustainable growth rate DCF, and a multi-stage DCF;[81] and Dr. Wooldridge implements the CAPM and a single-stage DCF.[82]

Ms. Dowdell does not sponsor her own ROE methodology and instead adopts the results of Mr. Gorman's models.[83] Finally, Dr. McCann does not rely on the DCF,

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78 EIX's stock price has declined by about 30% since the beginning of the year (as of August 15, 2025). Source: Yahoo Finance.

79 Ellis Testimony, p. 7.

80 Gorman Testimony, pp. 128, 146, 152-153, 157.

81 Rothschild Testimony, pp. 14-15.

82 Wooldridge Testimony, p. 72.

83 Dowdell Testimony, p. 11.

CAPM, or Risk Premium models in his testimony, but instead proposes an adjustment to SCE's currently authorized ROE based on his estimate of the Company's historical market-to-book value as discussed above.[84]

I discuss each of the Intervenor's ROE estimation methodologies in additional detail in the following sections.

Q29. What are your key comments about the Intervenors' approaches to cost of equity estimation?

A29. Based on my review of the Intervenors' approach to estimate the cost of equity, I find the following:

- None of the Intervenors' CAPM and DCF models account for differences in financial leverage between the proxy sample and SCE, which understates the ROE. Applying standard financial techniques to adjust for financial leverage, their ROE estimates increase by at least 20 basis points.
- Dr. Ellis uses financial leverage adjustments to optimize a recommended capital structure and ROE to achieve supportive credit metrics and minimize customer costs by holding ROE constant. However, his recommended equity ratio relies on his non-financial leverage adjusted ROE.
- Dr. Ellis' CAPM and DCF models suffer from significant flaws that cause all of his CAPM-based ROE estimates to be below the cost of debt and most of his DCF-based estimates to be below FERC's lower bound threshold for ROEs. These results violate the basic tenet of finance that the cost of equity is higher than the cost of debt due to equity investors' lower priority of claim on a company's earnings. Dr. Ellis' ROE estimates should be ignored.
- Drs. Ellis and Wooldridge and Messrs. Rothschild all rely on dividend growth rates in their DCF models and do not account for other ways that utilities can and do return earnings to equity investors, such as share buybacks. This downwardly biases their ROE estimates.
- The Intervenors raise criticisms that utilities cannot grow at analyst growth rates for extended periods of time. I find that utilities' earnings per share can and do grow at rates above nominal GDP for extended periods of time. This is particularly relevant now given demand growth from large customers forecasted to come online in the near future, which will require significant investments in electric infrastructure to accommodate. I find that the constant growth DCF, when placed

[84] McCann Testimony, pp. 68-69.

in the proper context and considered alongside other models, is useful for determining the appropriate ROE for SCE.

- Dr. Wooldridge relies on survey estimates of the MRP, which studies have shown to be subject to bias and highly unreliable. He also cites several studies that rely on geometric means, which are not appropriate for estimating the cost of equity. These estimates downwardly bias his CAPM estimates.
- Mr. Rothschild relies on highly non-standard option-implied betas and growth rates (to estimate the market-risk premium and the growth rates in his DCF models). In addition, his estimated betas and growth rates rely on thinly traded options data, with some utilities having no data, which calls into question the validity and reliability of his ROE estimates. His CAPM and DCF models that rely on option implied betas and growth rates should be given no consideration by the Commission.
- Mr. Gorman's Risk Premium model ignores the historical relationship between utility allowed ROEs and interest rates. By using a historical average of the risk premium, the ROE estimates from Mr. Gorman's Risk Premium are downwardly biased by 70 to 87 basis points.

A. PROXY GROUPS

Q30. What proxy groups do Drs. Ellis and Wooldridge and Messrs. Gorman and Rothschild rely on in their ROE estimation methodologies?

A30. Drs. Ellis and Wooldridge and Messrs. Gorman and Rothschild use proxy groups consisting of regulated utilities to estimate the allowed ROE for SCE. Dr. Ellis adopts and relies on my Electric Utility proxy group consisting of 26 vertically integrated electric utility companies.[85] Dr. Wooldridge also adopts all of the electric utility proxy companies across each utility witness's sample to derive his ROE estimates for SCE.[86] Mr. Gorman started with my Electric Utility proxy sample but excluded MGE Energy due to lack of growth rates at the time of his analysis and TXNM Energy due to its recently announced acquisition by Blackstone.[87] Rothschild considers two proxy samples. His first sample is the RFC Electric Proxy Sample which is the same as PG&E Witness Bulkley's and SDG&E Witness Nowak's electric proxy group. His

[85] Ellis Testimony, p. 43, n. 95.

[86] Wooldridge Testimony, p. 24.

[87] Gorman Testimony, p. 129.

second sample is the RFC Gas Proxy Sample, which is the same as Mr. Nowak's gas proxy sample and overlaps with my Natural Gas Utility sample.[88] A comparison of the companies in the Intervenors' proxy samples can be found in Exhibit SCE-07, Appendix R-N.

Q31. What are your observations about the differences in proxy samples?

A31. Generally, there is a significant amount of overlap in the electric utilities that the Intervenors and I relied upon to construct our proxy groups. However, there are some notable differences, particularly with Dr. Wooldridge and Mr. Rothschild's Electric Utility samples.

Dr. Wooldridge and Mr. Rothschild included Edison International, SCE's parent company, in their proxy group. I excluded Edison International since SCE is the largest subsidiary of Edison International's business operations and including it in the proxy sample can thus create circularity issues that may unduly influence the ROE estimate.[89] Dr. Wooldridge and Mr. Rothschild also include Con Edison in their proxy groups, which is not a vertically integrated electric utility like SCE and thus faces different business risks.[90] Dr. Wooldridge also includes Eversource Energy which suffers from the same issue. Both of these utilities are distribution only entities, which commonly are viewed as having lower risk.

Further, Dr. Wooldridge and Mr. Rothschild also include natural gas utilities in their proxy groups. Dr. Wooldridge relies on the same group of natural gas utilities that are in my Natural Gas Utility Proxy sample. Mr. Rothschild does so as well, except he excludes Chesapeake Utilities for unspecified reasons.

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88 Rothschild Testimony, pp. 44-47.

89 Villadsen Direct Testimony, p. 34.

90 *See* Villadsen Direct Testimony, p. 33.

Q32. Mr. Gorman excludes TXNM Energy due to its May 19, 2025 agreement to be acquired by Blackstone Energy.[91] How do you respond?

A32. TXNM Energy's announced its acquisition in May 2025, which was after the date of my ROE analysis (January 31, 2025). Therefore, I still find it appropriate to include TXNM Energy in my ROE analysis as of January 2025 to estimate the ROE for SCE. However, if I were to perform my ROE analysis after the date of the announcement, I agree with Mr. Gorman that TXNM Energy should be excluded. I note that Drs. Wooldridge and Ellis and Mr. Rothschild included TXNM Energy in their ROE analyses, which were performed after the deal was announced, which introduces an unnecessary deal impact into their ROE estimates.

Q33. Do the Intervenors rely on proxy samples consisting of other highly regulated utilities?

A33. Messrs. Gorman and Rothschild and Dr. Ellis do not consider proxy groups of other highly regulated utilities and they raise concerns with the use of my Natural Gas Utility and Water Utility proxy samples.[92] On the other hand, Dr. Wooldridge and Mr. Rothschild include natural gas utilities in their proxy samples, but not water utilities.[93]

Q34. Do you continue to find that Natural Gas and Water utilities are reasonable companies to consider when estimating the ROE for SCE?

A34. Yes, as discussed extensively in my Direct Testimony, natural gas and water utilities are appropriate companies to consider as they are highly regulated and provide commodity services to end-users.[94] Comparing the operations of gas utilities and water utilities to those of electric utilities: they serve customers through a network of assets; they are highly regulated (in most states by the same Commission); both water

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91 Gorman Testimony, p. 129.

92 Ellis Testimony, p. 45, n. 95; Gorman Testimony, p. 129.

93 Wooldridge Testimony, p. 24; Rothschild Testimony, pp. 44-47.

94 Villadsen Direct Testimony, pp. 33, 37-39.

utilities and gas utilities are currently undertaking substantial investment in their distribution systems; and both gas and water utilities generally have had stable credit ratings similar to those of electric utilities. I continue to find that natural gas and water utilities provide a relevant benchmark for the risk profile of electric utilities, including SCE. It is important to note that my reasonable range of ROE for SCE is based on the results from my Electric Utility sample and I only rely on the results from the natural gas and water utility samples as a reasonable check.[95]

B. DCF MODELS

Q35. Please provide a brief overview of Drs. Ellis' and Wooldridge's and Messrs. Gorman's and Rothschild's DCF model methodologies.

A35. Drs. Ellis' and Wooldridge and Messrs. Gorman and Rothschild all utilize the DCF model to estimate the ROE for SCE. Generally, each of the Intervenors implements a version of the constant growth, sustainable growth, or multi-stage (or non-constant) DCF model. Their implementation of these models differ in how they estimate the key inputs (dividend yield, growth rates) and assumptions for each model.

Dr. Ellis performs a multi-stage DCF model, which varies the proxy company's growth rate over different periods. Dr. Ellis assumes an initial growth stage of three years, using analysts' consensus 3-to-5 year earnings per share ("EPS") growth forecasts from S&P Global Market Intelligence, which he states is the lower end of the analysts' forecast horizon and to mitigate alleged upward bias in the estimates.[96] He then applies a 7-year transition phase whereby the consensus growth rate is tapered up or down to the terminal growth rate.[97] In the final stage, Dr. Ellis assumes a growth rate of 1.95% which is the Treasury-TIPS spread as of June 2025.[98] He argues that

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95 Villadsen Direct Testimony, pp. 51-52, 57, 61-62.

96 Ellis Testimony, p. 52.

97 *Ibid*.

98 *Id.*, p. 54.

utilities' long-term growth is consistent with inflation, not the long terminal nominal GDP growth rate that I rely on in my multi-stage DCF model.[99] To calculate the dividend yield, he relies on the average stock price over 20 days for each proxy company as well as the company's quarterly dividend.[100] Dr. Ellis estimates a ROE of 6.90%.[101]

Dr. Wooldridge employs a constant growth DCF model to estimate the ROE for SCE, which he argues is appropriate for utilities given they are stable and mature businesses.[102] He considers multiple sources of growth rates estimates for his proxy companies including forecasted and historical EPS, dividend per share ("DPS"), and book value per share ("BVPS") growth rate forecasts from *Value Line* and EPS growth rates from Wall Street analysts published by Zacks and S&P Cap IQ.[103] With this information, he determines an appropriate growth rate for the entire proxy group is 6.3%, which is the midpoint of his reasonable range of growth rates 5.6% to 7.0%.[104] He then adjusts the growth rate by one-half.[105] He then uses the 30-, 90-, and 180-day average stock price and annual dividend for each of the companies to calculate a range of dividend yields of 3.40% to 3.70% for his Electric Proxy Group.[106] He takes the midpoint of this range, 3.55%, as the dividend yield in his DCF analysis.[107] Dr. Wooldridge's constant growth DCF model results in an ROE of 9.75% for his Electric Proxy Group.[108]

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99 *Id.*, pp. 53-54.

100 *Id.*, pp. 48, 52.

101 *Id.*, p. 55.

102 Wooldridge Testimony, pp. 44-45.

103 *Id.*, pp. 48, 55-57.

104 *Id.*, p. 57.

105 *Id.*, p. 47. *Note*, he forecasts future dividend payments as $D_1 = D_o \times (1 + 0.5\ g)$.

106 *Id.*, p. 46.

107 *Ibid*.

108 *Id.*, p. 57. *Note*, Dr. Wooldridge calculates an ROE of 10.15% and 9.75% based on his Gas Proxy Group and Combination Proxy Group, respectively.

Mr. Gorman uses a constant growth, sustainable growth, and multi-stage DCF model to estimate the ROE for SCE.[109] For each model he calculates the dividend yield using the high and low stock price over a 13-week period and the most recent dividend for each of his proxy companies.[110] In his constant growth DCF model, he relied on a simple average of the EPS growth rate estimates published by Zacks, Market Intelligence, and IBES for each of his proxy companies.[111] Mr. Gorman's sustainable growth rate model is an internal growth rate model, where the growth rate is tied to the percentage of earnings retained by the utility and not paid out as dividends.[112] Lastly, his multi-stage DCF model consists of an initial five-year period whereby the proxy company's dividend growth at analysts' consensus EPS growth rate estimates, a second five-year transitional period, and a third period where dividends grow at a long-term growth rate equal to GDP growth rate.[113] He relies on a GDP growth rate of 4.1%, as published by *Blue Chip Financial Forecasts* ("BCFF").[114] Mr. Gorman obtains an average ROE 10.88% from his constant growth DCF, 8.97% from his sustainable growth DCF, and 8.59% from his multi-stage DCF. He concludes a reasonable range of ROEs from his three DCF analyses is 9.00% to 9.50% with a midpoint of 9.25%.[115]

Similarly, Mr. Rothschild also relies on a constant growth, sustainable growth, and non-constant growth DCF model to estimate the ROE for SCE.[116] He calculates the dividend yield using each proxy company's (1) average high and low stock price over the past year and (2) closing stock price on June 30, 2025.[117] He also uses the proxy

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[109] Gorman Testimony, p. 146.

[110] *Id.*, p. 131-132 and Gorman Workpaper Chapter 5 (SCE) MPG Public WP1.

[111] *Id.*, p. 132-133.

[112] *Id.*, p. 136-137.

[113] *Id.*, p. 139.

[114] *Id.*, p. 142-143.

[115] *Id.*, p. 146.

[116] Rothschild Testimony, p. 47-52.

[117] Rothschild Testimony, pp. 51-52.

companies' most recent annualized dividend and increases it by one-half of the growth rate.[118] In his constant growth DCF, he relies on option-implied growth rates which are estimated using 6-month option contracts for each proxy company. This gives a range of growth rates of 4.10% to 4.68%.[119] His sustainable growth rate accounts for the proxy companies' retained earnings that are reinvested in the company.[120] He estimates an average sustainable growth rate of 4.51% and 4.61% using the proxy companies' annual average and current parameters, respectively, to estimate the growth rate.[121] Mr. Rothschild's non-constant growth DCF model is based on the cash flows that an investor would receive from investing in a proxy company's stock for a period of time.[122] The first period consists of the initial purchase proxy of the stock. The second period is based on the stream of dividends that an investor would receive until June 30, 2029. The final cash flow comes from selling the stock on June 30, 2029, which Mr. Rothschild estimates by taking the proxy companies' estimated book value per share and applying a market-to-book ratio adjustment to get the implied stock price.[123] Mr. Rothschild obtains a range of ROE estimates of 7.92% to 8.51% from his constant growth DCF; 8.34% to 8.43% from his sustainable growth rate DCF; and 8.69% to 8.70% from his non-constant growth DCF.[124]

The different methodologies, inputs, assumptions, and resulting ROEs for each of the Intervenor's is summarized in Figure R-6 below.

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[118] *Ibid*.

[119] *Id.*, p. 87.

[120] *Id.*, p. 79.

[121] Rothschild Workpapers, 2025.06.30 – CA Energy Cost of Capital (RFC Electric PG), Exhibit ALR-3, page 1.

[122] Rothschild Testimony, pp. 52-53.

[123] Rothschild Workpapers, 2025.06.30 – CA Energy Cost of Capital (RFC Electric PG), Exhibit ALR-3, page 3.

[124] Rothschild Testimony, p. 13.

Figure R-6: Summary of Intervenors' DCF Inputs and Results[125]

		Ellis [1]	Wooldridge [2]	Gorman [3]	Rothschild [4]
Model(s)	[A]	Multi-Stage	Single-Stage	Multi-Stage, Single-Stage, Sustainable Growth	Multi-Stage, Single-Stage, Sustainable Growth
Growth Rates	[B]	EPS, S&P Global MI	EPS, DPS, BVPS; Value Line, Zacks, S&P CapIQ; Adjusted by 0.5g	EPS; Zacks, MI, IBES	Adjusted by 0.5g
Multi-Stage DCF Terminal Growth Rates	[C]	TIPS/Inflation (1.95%)	n/a	Nominal GDP (4.1%)	5x Market-to-Book of Final Year Stock Price
Dividend	[D]	Quarterly	Annual	Quarterly	Annual
Stock Price	[E]	20-Day Average	30-, 90-, 180-Day Average	High and Low Stock Price 13-Week Average	(1) Annual Average (2) Single-Day
Result	[F]	6.90%	9.75%	9.00% - 9.50% Midpoint: 9.25%	7.92% - 8.70%

Finally, none of the Intervenors' DCF models apply standard financial techniques to account for the impact on the estimated ROE for SCE due to differences in financial leverage between the proxy companies and SCE. As discussed below, this downwardly biases Drs. Ellis' and Wooldridge's and Messrs. Gorman's and Rothschild's DCF-based ROE estimates.

Q36. Please provide a brief summary of your concerns with the Intervenors' DCF models.

A36. Having reviewed the DCF models implemented by the Intervenors, I have the following concerns.

- None of the Intervenors' DCF models account for differences in financial leverage between the proxy sample and SCE, which results in understating

[125] Rothschild Multi-Stage DCF Model is based on an investor's cash flows for buying a stock, holding it for a period of time, and then selling the stock at the end of the analysis.

the ROE. The after-tax weighted-average cost of capital methodology is a standard financial technique to adjust the DCF results for financial leverage. In Section V.D below I discuss the academic and regulatory precedent for this approach. In that section I also apply this methodology to the Intervenors' DCF models and find that their ROE estimates are downwardly biased by at least 56 basis points.

- Dr. Ellis' DCF model is downwardly biased due to methodological choices regarding utility growth rates and terminal growth rate expectations. This results in four ROE estimates that are below the cost of debt and an additional 15 ROEs that are below FERC's lower bound threshold for ROE estimates. These results are too low and violate a basic tenet of finance that the cost of equity is higher than the cost of debt plus a premium—they should not be given any consideration.
- The Intervenors' criticisms that the constant growth DCF overstates utility growth is unfounded. I provide evidence that electric utilities, like SCE, are expected to undergo significant growth going forward as they make investments to serve growing demand on their systems from large load customers in addition to California's goal of decarbonizing through electrification. Further, I show that utilities can and do grow at rates faster than GDP for periods of time. I continue to find the constant-growth DCF is a reliable and informative model when placed in the proper context and considered alongside other models.
- Drs. Ellis and Wooldridge, and Mr. Rothschild all rely on DPS growth rates in their DCF methodologies, which ignores other ways utilities return earnings to equity investors. Relying on DPS growth rates downwardly biases the Intervenors' ROE estimates.
- Dr. Ellis's multi-stage DCF model is downwardly biased because it arbitrarily uses a three-year initial growth phase and relies on a perpetual growth rate equal to inflation. These assumptions result in the lowest DCF-based ROE estimate in this proceeding.
- Mr. Rothschild relies on highly non-standard option implied growth rates. I am not aware of any standard financial textbooks or regulatory commission that relies on such growth rates. His constant growth rate DCF that uses option-implied growth rates should be disregarded.
- Dr. Wooldridge and Mr. Rothschild rely on annualized dividends, which delay payments to equity investors and downwardly biases the ROE estimates.
- Dr. Wooldridge and Messrs. Gorman and Rothschild employ a sustainable growth rate DCF that takes as an input book value ROE estimates are that are substantially above the ROE estimates resulting from the DCF model.

In Section V.F below, I perform simple adjustments to the Intervenors' DCF model to address these concerns. Doing so increases the Intervenors' DCF-based ROE results by 7 to 177 basis points.

1. Constant Growth DCF

Q37. Dr. Ellis and Messrs. Gorman and Rothschild criticize the use of the single-stage or constant-growth DCF because it overstates the rate at which utilities grow over long periods of time. How do you respond?

A37. Dr. Ellis and Messrs. Gorman and Rothschild argue that the sole reliance on analyst growth rates in the single-stage DCF overstates the rate at which utilities grow over the long-term, thus upwardly biasing the ROE estimates.[126] Instead, Dr. Ellis and Mr. Gorman only implement a multi-stage DCF model that tapers analyst growth rates over time and/or gives less weight to their single-stage DCF models.[127] Mr. Rothschild appears to consider the results when determining his reasonable range, but the four cost of equity results from his constant growth DCF are nearly all outside of his reasonable range.[128]

I acknowledge that there are advantages and disadvantages to the single-stage DCF, just like any other cost of equity model. This "model risk" is why it is important to rely on multiple complementary models when estimating the cost of equity.[129] That said, the single-stage DCF model should not be disregarded because it relies on analysts' forecasts in perpetuity. Utilities can grow faster than the economy for an extended period of time, particularly as the energy landscape is evolving. For example,

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[126] Ellis Testimony, pp. 50-51; Gorman Testimony, pp. 133-134, 135-136; Rothschild Testimony, pp. 86-88.

[127] Ellis Testimony, p. 50; Gorman Testimony, p. 146.

[128] Rothschild Testimony, p. 14 and Rothschild Workpapers, 2025.06.30 – CA Energy Cost of Capital (RFC Electric PG) Exhibit ALR-2.

[129] Regulators consider multiple models to limit model risk. For example, FERC in Opinion 569-A found that "ROE determinations should consider multiple models, both to capture the variety of model used by investors and to mitigate model risk" *Source* FERC Order 569-A, p. 25.

electric utilities, like SCE, may experience extended periods of high growth from system reinforcement work to accommodate the interconnection of renewable generation and increasing loads from new customers (*e.g.*, building electrification, electric vehicles, data centers, *etc.*).

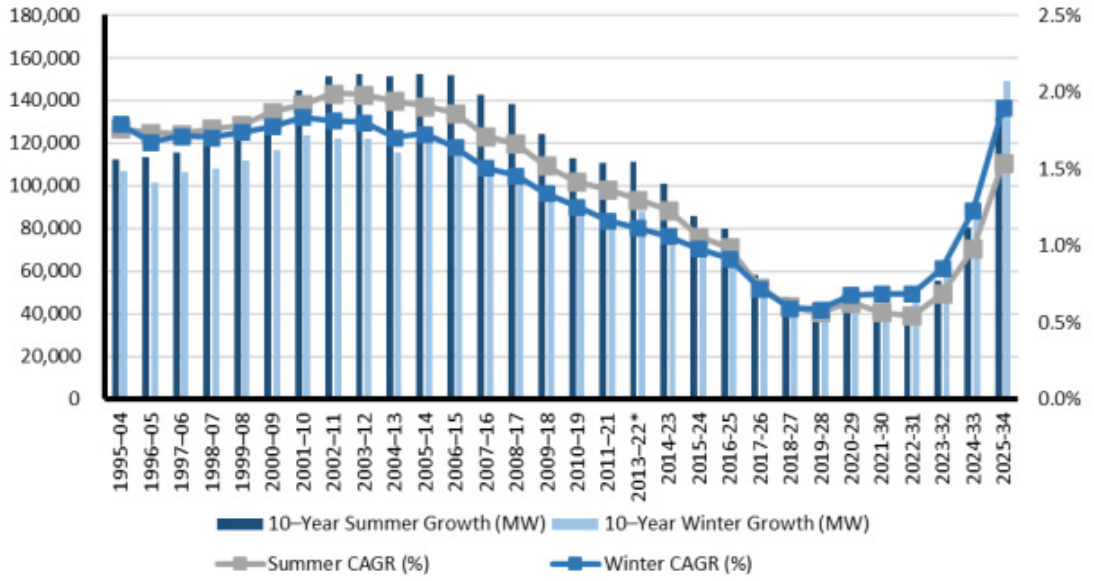
The National Electric Reliability Council's ("NERC") most recent Long-Term Reliability Assessment ("LTRA") discusses a sharp increase in peak demand forecast from now until 2034 driven by large commercial and industrial loads, including datacenters, which breaks multi-decade historic demand trends.[130]

> *"**Electricity peak demand and energy growth forecasts over the 10-year assessment period continue to climb higher than at any point in the past two decades.** The aggregated assessment area summer peak demand forecast is expected to rise by over 132 GW, and aggregated winter peak demand forecasts are increasing by 149 GW. The growth rates of forecasted peak demand and energy continue to rise sharply since the 2022 [Long-Term Reliability Assessment], **reversing an almost two-decade trend of falling or flat growth rates**"*[131]

[130] NERC 2024 Long-Term Reliability Assessment, p. 8, https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf

[131] Emphasis added, internal citations omitted. *Id.*, p. 31.

Figure R-7: NERC 10-Year Summer and Winter Peak Demand Growth[132]



Similarly, in January 2025 the California Energy Commission ("CEC") released its updated California Energy Demand Forecast for the years 2024 to 2040. The CEC projects in its Planning Forecast that electricity sales in California will increase by 1.6x from approximately 250 terawatt hours ("TWh") in 2024 to 411 TWh in 2040, which equivalent to a 3.2% CAGR.[133] Similarly, the CEC projects California ISO's ("CAISO") peak demand to grow by 1.4x from approximately 48.3 gigawatts ("GW") in 2024[134] to approximately 66.8 GW by 2040, which is equivalent to a 2.4% CAGR.[135] See Figure R-8 below

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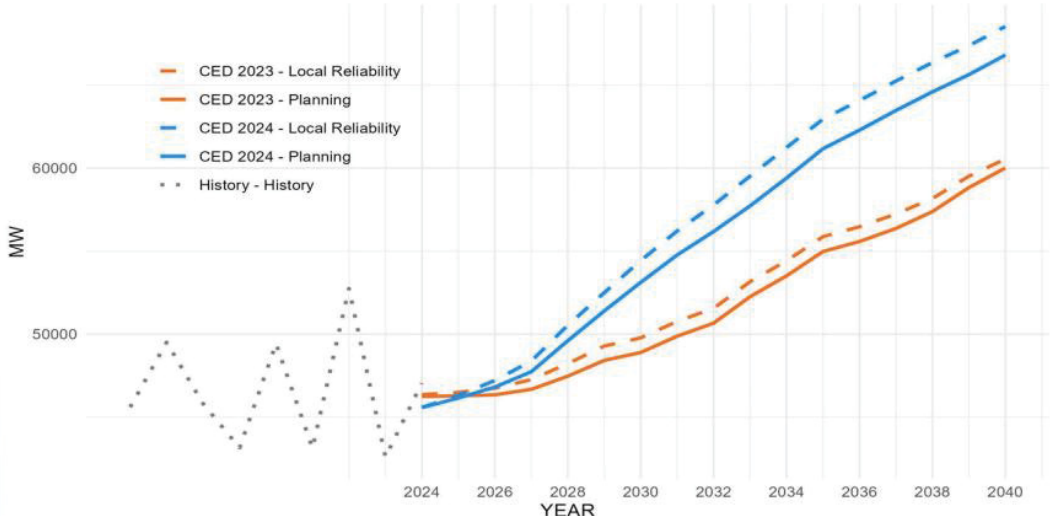
[132] *Ibid*.

[133] State of California Energy Commission, "Item 5: Resolution Adopting the California Energy Demand 2024-2040 Forecast Update," January 21, 2025, p. 5, https://www.energy.ca.gov/filebrowser/download/6928?fid=6928

[134] CAISO, "California ISO Peak Load History 1998 through 2023," p. 5, https://www.caiso.com/Documents/CaliforniaISOPeakLoadHistory.pdf

[135] *Supra* n. 133, p. 6.

Figure R-8: CEC's CAISO Peak Demand Forecast[136]



As the NERC and CEC forecasts show, electricity demand is expected to increase substantially in the coming years both at the national and California level. However, it is important to remember that utility earnings are primarily driven by investments, not *per se* sales, especially in states, like California, with full revenue decoupling.[137] To meet the unprecedented demand growth shown in the NERC and CEC forecasts, electric utilities will need to make substantial investments in generation, transmission, and distribution infrastructure to serve the future needs of their customers. Recent studies indicate that utility capital expenditures will increase by 2x[138] to 3x[139] over the coming years. A recent equity analyst report from Jefferies forecast that projected electric utility capex will be $212 billion in 2025, 22% higher than 2024 ($173

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136 *Ibid*.

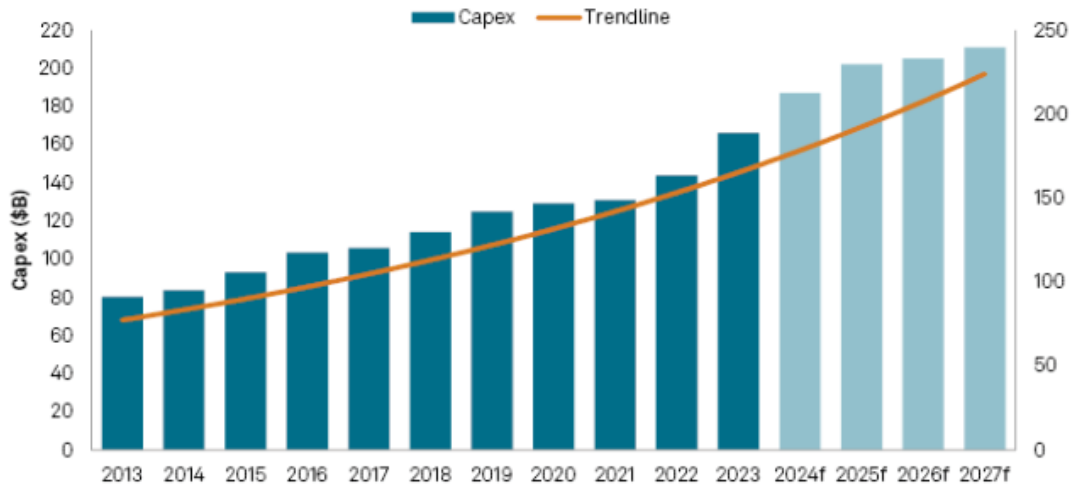
137 *See* Exhibit SCE-02 Appendix K.

138 Edison Electric Institute, "Industry Capital Expenditures," p. 1, https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Finance-And-Tax/Industry-Capital-Expenditures.

139 S&P Global RRA, "Energy utility capex projected to eclipse $790B from 2025 through 2028," January 9, 2025, https://www.spglobal.com/market-intelligence/en/news-insights/research/energy-utility-capex-projected-to-eclipse-790b-from-2025-through-202b.

billion).[140] They forecast further growth to $222 billion in 2026 and $228 billion in 2027.[141]

Figure R-9: RRA Energy Utility Actual and Estimated Capex[142]



Data compiled Dec. 23, 2024.
capex = capital expenditure; f = forecast.
Source: Regulatory Research Associates, a group within S&P Global Commodity Insights.

As noted above, I find it important to rely on multiple complementary models when estimating the cost of equity to balance the relative advantages and disadvantages of each model. The single-stage DCF model assumes that a proxy company will grow at an analysts' growth rate for perpetuity; while the multi-stage DCF model limits analyst growth rates to the first five years of the model, which may understate the ROE. Taken together, I find it important to consider both the single- and multi-stage DCF models together, taking into account each model's advantages and disadvantages, when determining a recommended ROE.

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140 Jefferies, "From Poles to Power Plants, The Next Utility Capex Boom is Here," June 20, 2025.

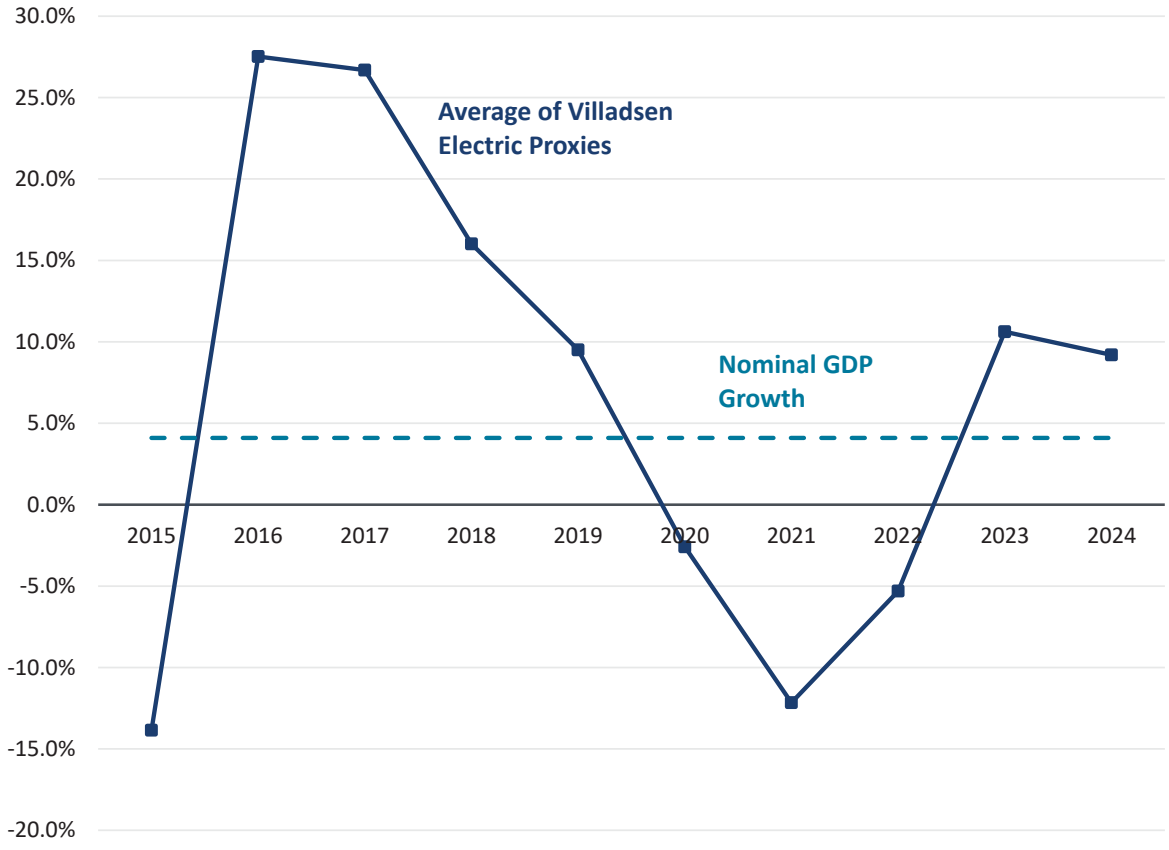
141 *Ibid*.

142 *Ibid*.

Q38. Have utilities' earnings grown faster than GDP in the past?

A38. Yes. Figure R-10 shows the average year-over-year EPS growth for the companies in my Electric Utility proxy group versus a nominal GDP growth rate estimate of 4.1%.[143] In six out of the ten past years, the average electric utility EPS growth rate has exceeded nominal GDP. EPS growth rate was negative during economic downturns, such as the COVID-19 pandemic starting in early 2020. The average EPS growth rate for the proxy sample over the past ten years is 6.6% - well above the GDP growth over the same period, so certainly it is possible to grow at a rate higher than the economy for a longer period of time.

Figure R-10: Electric Utility Proxy Group Actual EPS Growth vs. Nominal GDP



[143] Exhibit SCE-07, Appendix R-E.

2. Non-Constant Growth DCF Model

Q39. What concerns do you have with Dr. Ellis's non-constant DCF model?

A39. Dr. Ellis's non-constant DCF model has serious issues. He limits the initial growth stage to three years to mitigate the alleged upward bias in analyst growth rates (I discuss this in further detail in the next sub-section). He then tapers the analyst growth rate to a perpetual growth rate of 1.95%, which is the Treasury-TIPS spread as of June 2025. These methodological choices fail to recognize the current real growth in the electric utility industry and significantly downward bias his ROE estimates. As shown in Figure R-11 below, his ROE estimates are so low in-fact that 4 of them are below the proxy company's cost of debt. This violates a basic tenet of finance that the cost of equity is higher than the cost of debt due to equity investors' lower priority of claims on a company's earnings. In its ROE methodology, the FERC disregards ROE estimates that are less than the cost of debt plus 20% of the FERC MRP to account for the risk relationship between debt and equity holders.[144] Figure R-11 shows that an additional 15 companies have ROE estimates that are below FERC's threshold. Dr. Ellis's DCF model suffers from significant issues that undermine basic principles of finance and should therefore not be considered.

[144] FERC Order 569-A, ¶ 161. FERC uses Moody's Baa utility bond yields as the cost of debt.

Figure R-11: Ellis DCF-Based ROE Estimates versus Proxy Company's Cost of Debt

Company	Credit Rating	Ellis' DCF Cost of Equity	DCF Cost of Debt	CoE - CoD
American Electric Power Co.	BBB+	6.83%	6.11%	0.72%
Alliant Energy	BBB+	6.35%	6.11%	0.23%
Ameren Corp.	BBB+	5.98%	6.11%	-0.14%
Avista Corp.	BBB	8.56%	6.11%	2.45%
Black Hills Corp	BBB+	7.91%	6.11%	1.80%
CenterPoint Energy Inc.	BBB+	5.43%	6.11%	-0.69%
CMS Energy Corp.	BBB+	6.24%	6.11%	0.12%
Dominion Energy	BBB+	10.06%	6.11%	3.95%
DTE Energy Co.	BBB+	6.55%	6.11%	0.44%
Duke Energy Corp	BBB+	6.66%	6.11%	0.55%
Entergy Corp.	BBB+	6.32%	6.11%	0.21%
Evergy, Inc.	BBB+	6.97%	6.11%	0.86%
Exelon Corp.	A-	6.85%	5.83%	1.01%
IDACORP Inc.	BBB	6.35%	6.11%	0.24%
NorthWestern Energy Group	BBB	8.36%	6.11%	2.25%
OGE Energy Corp.	BBB+	7.05%	6.11%	0.93%
Pinnacle West Capital Corp.	BBB+	6.88%	6.11%	0.77%
Portland General Electric Co.	BBB+	8.12%	6.11%	2.01%
PPL Corp.	A-	6.40%	5.83%	0.57%
Public Svc Entpr Group Inc.	BBB+	6.03%	6.11%	-0.08%
Sempra	BBB+	6.73%	6.11%	0.62%
The Southern Co.	A-	6.36%	5.83%	0.53%
TXNM Energy Inc.	BBB	6.04%	6.11%	-0.07%
WEC Energy Group Inc.	A-	6.58%	5.83%	0.75%
Average		6.90%	6.06%	0.84%

No. of Companies with CoE < CoD	4
No. of Companies with CoE + 20% of FERC MRP < CoD	19
Total No. of Companies	24

Q40. What concerns do you have with Mr. Rothschild's non-constant growth DCF model?

A40. There are several concerns with Mr. Rothschild's non-constant growth DCF model. First, the DCF model only considers five years of dividend payments, which is inconsistent with the underlying theory of the DCF model. The DCF model is premised on a stream of cash flows to investors that extend into perpetuity due to the assumed indefinite lifetime of a corporation. Modeling only five years of dividend payments makes his DCF model highly susceptible to short-term growth expectations. Further, his DCF model only relies on the expectations of a single financial analyst

(*i.e.*, Value Line). Second, Mr. Rothschild estimates the terminal stock value as the forecasted book value in year 5 times the current market-to-book value ratio. He provides no rationale for why the current market-to-book ratio would be the same in five years and clearly a company such as SCE has seen a substantial decline in its market-to-book value. The DCF model is assumes that the market price is equal to the discounted present value of all future expected cash flows. The estimated market price in year 5 from the standard DCF model is equal to the forecast dividend in year 6 divided by (k – g) where k is the cost of capital and g is the long-term growth rate. Mr. Rothschild's non-constant growth rate DCF model is non-standard and inconsistent with the basic principles of the DCF model. It should be given no consideration.

3. Growth Rate Assumptions

Q41. Dr. Wooldridge argues that "the appropriate growth rate in the DCF model is the dividend growth rate, not the earnings growth rate." Do you agree?

A41. No, I do not. The DCF model is a *cash flow* model which considers all ways that proxy companies can and do return earnings to shareholders. Earnings reflect the monies available to equity investors after the proxy company has satisfied all of its obligations (*i.e.*, its net income). A company can choose to distribute earnings to its investors in a myriad of ways. Dividends to equity investors is one such way, but there are others. For example, a company can retain the earnings and re-invest the earnings in the company, for example, to finance capital necessary to serve growing load and (hopefully) increase shareholder value. The company can also use its earnings to repurchase stocks from equity investors. Figure R-12 below shows that there has been substantial share buyback activity for the Electric Utility proxy sample since 2015. Simply put, utilities not only can but do distribute cash to shareholders through means other than dividends.

Figure R-12: Electric Utility Share Buybacks 2015-2025[145]

Ticker	Company	Years Share Repurchase Occurred	Total Shares Repurchased	Total Share Repurchase Value ($ Million)
Electric Proxies				
LNT	Alliant Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	491,700	$22
AEP	Amer. Elec. Power		0	$0
AEE	Ameren Corp.	2015, 2016, 2017, 2018	2,022,200	$97
AVA	Avista Corp.		0	$0
BKH	Black Hills	2023, 2024, 2025	14,100	$1
CMS	CMS Energy Corp.	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	3,051,700	$161
CNP	CenterPoint Energy		0	$0
DTE	DTE Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	4,598,900	$473
D	Dominion Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	40,515,700	$3,152
DUK	Duke Energy	2015	19,803,100	$1,500
ETR	Entergy Corp.	2015	2,938,000	$100
EVRG	Evergy Inc.	2022, 2023, 2024, 2025	70,600	$4
EXC	Exelon Corp.		0	$0
IDA	IDACORP Inc.	2015, 2016, 2017, 2018, 2019	220,600	$18
MGEE	MGE Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022	2,519,200	$153
NWE	NorthWestern Corp.		5,800	$0
OGE	OGE Energy	2015, 2016, 2020	154,200	$5
TXNM	PNM Resources		0	$0
PPL	PPL Corp.	2015	37,100	$1
PNW	Pinnacle West Capital	2015, 2016	226,800	$15
POR	Portland General		0	$0
PEG	Public Serv. Enterprise	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023	14,241,800	$723
SRE	Sempra Energy	2025	6,700	$1
SO	Southern Co.	2015	2,599,400	$115
WEC	WEC Energy Group	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	1,396,700	$129
XEL	Xcel Energy Inc.	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	1,014,800	$41

Sources and Notes:
Bloomberg, accessed 08/12/2025.

The use of earnings growth rates captures all of the ways that a company can return cash flow to investors. Narrowing focus on dividend growth rates downwardly biases the DCF estimates because it ignores other ways that distribute earnings. Drs. Ellis

[145] Exhibit SCE-07, Appendix R-S.

and Wooldridge and Mr. Rothschild all rely on DPS growth rates in their implementation of their DCF models, whereas Mr. Gorman and I solely rely on EPS growth rates in our respective DCF models.

Q42. Please provide an illustration of the impact of ignoring share buybacks.

A42. In Figure R-13 below, I provide an illustrative example of the impact of ignoring share buybacks on the estimated cost of equity. The illustrative company has 1,000 share outstanding at a stock price of $20.00/share. The company will pay a dividend of $1.00/share and repurchase 10 shares at the current stock price.

The bottom left of the table calculates the cost of equity using only the dividends paid by the illustrative company to equity investors. Adding together the illustrative company's dividend yield of 5.0% to its growth rate of 6.8% results in a dividend-only cost of equity estimate of 11.8%.

The bottom right of the table calculates the cost of equity considering both the dividends paid by the company *and* the repurchase of 10 shares. Equity investors will receive a dividend distribution of $1,000 based on the number of shares outstanding (1,000 shares) and the announced dividend per share ($1/share). Equity investors will also receive $200 as a result of the buyback, which is calculated as the number of shares repurchased (10 shares) multiplied by the current stock price ($20). This results in a total cash distribution to equity investors of $1,200 from both the dividend and share buyback. Next, I calculate a cash yield of 6.1% by dividing the cash distribution ($1,200) by the value of outstanding equity ($19,800 after adjusting for the buyback). Adding the growth rate (6.8%) to the cash yield (6.1%) results in a cost of equity of 12.9%. Thus, based on this illustrative example, ignoring share buybacks downwardly biases the cost of equity by 110 basis points.

Figure R-13: Illustrative Impact of Share Buybacks on the Cost of Equity

Shares outstanding	[A]	1,000			
Share price	[B]	$20.00			
Growth rate	[C]	6.8%			
Dividend per share	[D]	$1.00			
Shares bought back	[E]	10			
Dividends Only			**Dividends and Share Buybacks**		
Dividend Yield	[F] = [D] / [B]	5.0%	Dividend Distribution	[I] = [D] x [A]	$1,000
Growth Rate	[G] = [C]	6.8%	Buyback Distribution	[J] = [E] x [B]	$200
			Cash Distribution	[K] = [I] + [J]	$1,200
			Equity Outstanding	[L] = [B] x ([A] - [E])	$19,800
			Cash Yield	[M] = [K] / [L]	6.1%
			Growth Rate	[N] = [C]	6.8%
Cost of Equity	**[H] = [F] + [G]**	**11.8%**	**Cost of Equity**	**[O] = [M] + [N]**	**12.9%**

Q43. What concerns do you have with Dr. Wooldridge's growth rate estimation methodology?

A43. Dr. Wooldridge considers various estimates of growth rates for the proxy companies, including *Value Line's* EPS, DPS, and BVPS growth rates on both a historic and projected basis.[146] He also considers EPS growth rate forecasts from Zacks and S&P Capital IQ.[147] Ultimately, Dr. Wooldridge ignores the historic estimate and focuses on just the forecasted EPS, DPS, BVPS and EPS estimates from Zacks and S&P to perform a series of averages.

First, Dr. Wooldridge calculates the average of the EPS, DPS, and BVPS estimates from *Value Line*, which is 5.2%. Second, He calculates an average forecasted sustainable growth rate based on *Value Line* data, which is 4.3%.[148] Third, he finds the average of the Zacks and S&P growth rate estimates, 6.9%.[149] He sets the lower bound of his reasonable range of growth range estimates to the average of the three

[146] Wooldridge Testimony, p. 48.

[147] *Ibid*.

[148] *Id.*, p. 55.

[149] *Ibid*.

projected growth rate estimates (5.2%, 4.3%, and 7.0%), which gives a growth rate of 5.4%. The upper bound is set equal to average of the Zacks and S&P estimates, 6.9%. He then takes the midpoint of this range as his growth rate, 6.1%.

My concern with Dr. Wooldridge's approach is that the reliance on DPS and BVPS growth rate estimates does not consider other ways that companies can return earnings to investors, as discussed above. This downwardly biases his growth rate estimate. If he only considered the EPS growth rates from *Value Line*, Zacks, and S&P, his reasonable range of growth rates estimates would be 6.0% to 7.0%, with a midpoint of 6.5%.[150] As discussed in further detail in Section V.F below, the inclusion of DPS and BVPS growth rates in Dr. Wooldridge's DCF model downwardly biases his results by 17 basis points.

Q44. The initial phase of Dr. Ellis' multi-stage DCF model grows the proxy company's dividends at analyst growth rates for only three years. Is this assumption realistic?

A44. No. Dr. Ellis states that he limits the initial growth stage to three years to mitigate the alleged upward bias in analyst growth rates. Adjusting the term of the first stage to three years is arbitrary and not well supported and only serves to downwardly bias his ROE estimates. As discussed in further detail in Section V.F below, limiting the initial growth stage to three years downwardly biases his ROE estimates by 20 basis points (relative to a more-standard five-year initial phase model). As demonstrated above, utilities can and do grow at elevated growth rates for extended periods of time, particularly as the industry is expected to undergo significant investment to accommodate growth from large loads. Further, he offers no analysis to quantify the extent to which his EPS growth rate estimates from S&P Global Market Intelligence are biased and that only rely on the as-reported estimates for three years is the

[150] Wooldridge Exhibit JRW-5, median in columns "Earnings" under heading "Project Growth Est'd '22-'24 to '28-'30" of Panel A.

appropriate remedy to address that bias. It is not clear why Dr. Ellis did not make a direct adjustment to the reported growth rate to address the alleged bias. Simply put, this adjustment is arbitrary and only serves to downwardly bias his ROE estimates.

Q45. Drs. Ellis and Wooldridge allege that analyst growth rates are biased.[151] What has the academic literature found regarding "optimism bias" in analyst growth rate estimates?

A45. Optimism bias is the tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. Any optimism bias might be related to incentives faced by analysts that provide rewards not strictly based on the accuracy of their forecasts. While academic research during the 1990s and early 2000s found evidence of analysts' optimism bias, there is some evidence that regulatory reforms have eliminated the issue. A more recent paper by Hovakimina and Saenyasiri (2010) found that recent efforts to curb analysts' incentive to provide optimistic forecasts have worked, so that "the median forecast bias essentially disappeared."[152] Thus, some recent research indicates that the analyst bias may be a problem of the past.

Further, the findings of several academics show that analyst earnings forecast turn out to be too optimistic for stocks that are more difficult to value, for instance, stocks of smaller firms, firms with high volatility or turnover, younger firms, or firms whose prospects are uncertain.[153] Coincidentally, stocks with greater analyst disagreement have higher analyst optimism bias—all of these describe companies that are more volatile and/or less transparent—none of which is applicable to the majority of utility

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[151] Ellis Testimony, pp. 46-47; Wooldridge Testimony, pp. 50-53.

[152] A. Hovakimina and E. Saenyasiri, "Conflicts of Interest and Analyst Behavior: Evidence from Recent Changes in Regulation," Financial Analysts Journal, vol. 66, 2010.

[153] *See for example*, (i) Hribar, P, McInnis, J. "Investor Sentiment and Analysts' Earnings Forecast Errors," Management Science Vol. 58, No. 2 (February 2012): pp. 293-307; (ii) Scherbina, A. (2004), "Analyst Disagreement, Forecast Bias and Stock Returns," downloaded from Harvard Business School Working Knowledge: http://hbswk.hbs.edu/item/5418.html; and (iii) Michel, J-S., Pandes J.A. (2012), "Are Analysts Really Too Optimistic?" downloaded from http://www.efmaefm.org.

companies with wide analyst coverage and information transparency. Consequently, optimism bias is not expected to be an issue for the proxy companies.

Q46. Dr. Ellis uses a long-term terminal growth rate of 1.95%, which is based on Treasury Inflation-Protected Security yields.[154] What are your concerns?

A46. Dr. Ellis's terminal growth rate of 1.95% is substantially below that of the other Intervenors or any utility witness in this proceeding. His terminal growth rate reflects the yield on TIPS as of June 2025. He justifies this growth rate by saying that over the past 100-years, utility sector dividend per share ("DPS") growth has tracked inflation.[155] He further argues that long-term real DPS growth have tracked GDP per capita, not total GDP.[156] There are several issues with this.

First, the argument is premised on tracking utility DPS growth, which, as discussed above, is a flawed metric. Utilities can and do return earnings to investors in various ways, such as dividends, share buybacks, and reinvestments in the company. Notably, Dr. Ellis relies on EPS growth rate estimates in the first 3 years of his model, which means that investors initially have access to all forms of cash flows from the utility but are later subject to only receiving dividend returns after year 10 (and perhaps in the transition years too). Narrowly focusing on dividends in the perpetual growth phase of his DCF model downwardly biases equity investor returns.

Second, Dr. Ellis's approach is inconsistent with arguments that he makes about utilities growing above the GDP growth period for a sustained period of time. There, he argues that growing at a faster rate than GDP in perpetuity would overtake the entire U.S. GDP by the end of the next century.[157] However, here he assumes that utilities grow in perpetuity at 1.8% whereas his estimate of U.S. GDP growth is

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[154] Ellis Testimony, pp. 54-55.

[155] *Id.*, p. 53.

[156] *Ibid*.

[157] *Id.*, p. 44.

approximately 4%.[158] Applying Dr. Ellis' same logic here would imply that utilities would become a very small and insignificant part of the U.S. GDP by the end of the next century. This is not realistic.

Lastly, Dr. Ellis creates a logical inconsistency in his model by growing dividends at a real perpetual growth rate and then using the results to obtain a nominal ROE estimate. (Dividends grow at nominal growth rates in the initial and transition phase of Dr. Ellis' multi-stage DCF model). Discounting real cash flows at nominal growth rates creates a serious concern with his model that downwardly bias his multi-stage DCF ROE estimates. Dr. Ellis's 1.8% real growth rate is equivalent to a 3.84% nominal growth rate,[159] which is closer to albeit slightly lower than the nominal GDP forecast of 4.1% from *Blue Chip Economic Indicators*.[160]

Taken together with this arbitrarily short initial growth phase of three years, Dr. Ellis obtains the lowest multi-stage DCF ROE estimate (6.90%) of any Intervenor or utility witness in this proceeding. Indeed, this ROE estimate falls below the FERC determined floor for reasonableness discussed above. As discussed in further detail in Section V.F below, converting his real terminal growth rate into a nominal growth rate increases his DCF results by 162 basis points.

Q47. Mr. Rothschild derives option-implied growth rates using 6-month put and call option contracts for each proxy company.[161] What are your concerns?

A47. Mr. Rothschild's growth rates are derived using highly a non-standard methodology that, to my knowledge, has not been relied upon in any regulatory jurisdiction. I have not been able to find any public source that provides option-implied growth rates and note that option-implied growth rates require the availability of publicly traded

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158 *Id.*, p. 43.

159 3.84% = (1+1.8%) x (1+2.0%)-1

160 Blue Chip Economic Indicators, March 2025, p. 14.

161 Rothschild Testimony, p. 79.

options, which is a thin market for some companies, especially smaller companies. A thin market is one in which there is limited trading and thus limited data available for estimation. In such instances, the estimation results become statistically less reliable.

Figure R-14 below shows the number of options traded on each of the proxy companies in Mr. Rothschild's proxy group that he relies on to estimate the option implied growth rates, as reported in his workpapers. Approximately 13 of his 36 proxy companies have insufficient data to calculate a growth rate using his methodology.

Figure R-14: Liquidity of Options Used by Rothschild to Estimate Growth Rates (Electric Utility Proxies)

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Electric Proxy						
AEE	[1]	168	0	19	0	x
AEP	[2]	14732	22	3870	4	x
AGR	[3]	na	na	na	na	0
ALE	[4]	2	2	0	0	0
AVA	[5]	212	18	0	0	x
BKH	[6]	83	0	18	0	x
CMS	[7]	122	4	2020	0	x
CNP	[8]	795	0	2327	20	0
D	[9]	12558	126	5841	20	0
DTE	[10]	54	0	6	0	x
DUK	[11]	13218	132	5717	13	x
ED	[12]	3918	16	1350	25	x
EIX	[13]	18924	142	4026	33	x
ES	[14]	1673	20	397	0	0
ETR	[15]	1184	299	4165	6	x
EVRG	[16]	498	4	330	0	x
EXC	[17]	13391	157	9622	18	x
FE	[18]	10464	72	4370	79	x
FTS.TO	[19]	na	na	na	na	0
HE	[20]	33173	252	8776	0	0
IDA	[21]	13	1	4	0	x
LNT	[22]	1027	0	5	1	x
MGEE	[23]	0	0	7	0	0
NEE	[24]	33663	630	41342	447	x
NWE	[25]	27	2	0	0	x
OGE	[26]	124	3	0	0	x
OTTR	[27]	35	0	0	0	0
PEG	[28]	1649	24	233	0	x
TXNM	[29]	510	0	154	0	0
PNW	[30]	429	14	21	0	x
POR	[31]	414	9	18	1	x
PPL	[32]	4196	113	4853	49	x
SO	[33]	3450	66	3420	47	x
SRE	[34]	5583	25	3677	3	x
WEC	[35]	2022	1	1794	0	x
XEL	[36]	1523	116	1042	9	x
S&P 500	[37]	530153	15025	1875369	54996	
Utilities (daily per CCJV)	[38]		117		66	

Sources and Notes:

[1] - [36], [37]: From Rothchild's working file, 2025.04-06 - RFC FULL Electric Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[38]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Second, I observe that standard MBA textbooks, such as Brealey, Allen & Myers; Ross, Westerfield & Jaffe; as well as Berk & DeMarzo have no discussion of option-implied growth rates.[162] In addition, I am not aware of any regulatory jurisdictions that rely on option-implied growth rates to set the ROE for utilities. Mr. Rothschild offers no regulatory precedent either.

Simply put, Mr. Rothschilds option implied growth rates as well as his constant growth DCF model that relies on these growth rates are highly non-standard and should be given no weight by the Commission.

Q48. Dr. Wooldridge and Mr. Rothschild adjust their growth rates by one-half when implementing their DCF models. What are the implications of this approach?

A48. Dr. Wooldridge[163] and Mr. Rothschild[164] adjust the growth rate in their DCF model by one-half. Specifically, Dr. Wooldridge and Mr. Rothschild apply the following formula to calculate their constant growth DCF models:[165]

$$K = \left[\left(\frac{D}{P}\right) \times (1 + 0.5g)\right] + g$$

This one-half growth rate adjustment attempts to approximate the effect of dividend growth during the year. However, the 0.5 scalar is arbitrary and not based on the theoretic foundations in a dividend discount model (*i.e.*, constant growth DCF model). The standard model is based on the present value of future dividend payments calculated as:

$$D_1 = D_0(1 + g)$$

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[162] Brealey, Myers & Allen (2020), *Principles of Corporate Finance*; Ross, Westerfield & Jaffe (2022), *Corporate Finance*, 13th Edition; Berk & DeMarzo (2020), *Corporate Finance: The Core*, 5th edition.

[163] Wooldridge Testimony, p. 47.

[164] Rothschild Testimony, p. 47.

[165] Wooldridge Testimony, p. 47 and Rothschild Workpaper 2025.06.30 – CA Energy Cost of Capital (RFC Electric PG) tab "CGDCF" and "CGDCF-OIG".

Instead, applying the 0.5 scalar assumes that growth occurs in the middle of the year and therefore D_1 becomes a blend of both the present-period and forward-looking dividend payments. This effectively understates future cash flows. Further the scalar creates an internal inconsistency in the model whereby the future dividend payment (D_1) grows at 0.5g but then to solve for the ROE you add the full growth rate. Another inconsistency is that the adjusted formula assumes that dividends grow partway through the year, which is a cash flow timing or discounting matter, yet the discount rate is not adjusted to a mid-year convention. Simply put, this 0.5 growth adjustment factor is problematic, downwardly biases the ROE estimate, and should not be considered. As discussed in further detail in Section V.F below, the growth rate in Dr. Wooldridge's DCF model downwardly biases his results by 14 basis points.[166]

If Dr. Wooldridge and Mr. Rothschild are concerned about the timing of dividend growth there are more rigorous applications of the dividend discount model that could have been used. For example, valuing a stream of quarterly dividend payments rather than annual dividend payments. I discuss this in further detail next.

4. Dividend Yields Assumptions

Q49. Dr. Wooldridge and Mr. Rothschild use annual dividend payments in their DCF models. Does this bias their results?

A49. Yes, Dr. Wooldridge's and Mr. Rothschild's DCF models are derived using annual dividend payments.[167] Utilities typically pay dividends to investors on a quarterly basis. By using annual dividends, Dr. Wooldridge and Mr. Rothschild are extending the time it takes for an investor to receive its dividend. According to the time value of money, an investor values a cash flow less if it receives it later in time, per the time value of money. Therefore, delaying quarterly dividend payments until a single lump-

[166] *Note*, due to my significant concerns with Mr. Rothschild's option implied growth rates I don't adjust his DCF model to remove the 0.5g scalar.

[167] Wooldridge Testimony, p. 46; Rothschild Workpaper 2025.06.30 – CA Energy Cost of Capital (RFC Electric PG), Exhibit ALR-5, page 1.

sum payment at the end of year results in lower discount rate (all else equal, *e.g.,* current stock price). Quarterly dividend data is readily available or can be calculated using the proxy companies' annual dividend numbers. By delaying the dividend payments to investors in their models, the Intervenors' DCF models are downwardly biased.

Q50. What concerns do you have with Dr. Wooldridge's and Messrs. Gorman's and Rothschild's averaging methodologies to determine the stock price in their dividend yields?

A50. Generally, I find that Dr. Wooldridge, Mr. Gorman, and Mr. Rothschild all rely on arbitrary averaging methodologies to determine the stock price for their dividend yields. These methodologies do not comport with the idea that the DCF uses the current stock price as an input. Dr. Wooldridge calculates the 30-, 90-, and 180-day average stock price for each of his proxy companies.[168] Mr. Gorman uses the average high and low stock price of his proxy companies over a 13-week historic period.[169] Mr. Rothschild uses (1) the average high and low stock price over the past year and (2) the closing stock price on a single day.[170] Averaging over an entire year is simply too long. However, I do generally agree that an averaging convention is better than using a single day stock price, as Mr. Rothschild did for one of his scenarios. A single-day stock price is subject to selection bias depending if there are significant shifts in the market on that day. Instead, I prefer to use a shorter-term average of 15-days, which both reflects the current stock price but also eliminates potential single-day biases. Dr. Ellis also prefers to use a short-term average of approximately 20 to 21 days to minimize bias.[171]

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[168] Wooldridge Testimony, p. 46.

[169] Gorman Testimony, p. 131-132.

[170] Rothschild Testimony, p. 48.

[171] Ellis Testimony, pp. 48-49.

5. Sustainable Growth Rate DCF

Q51. Dr. Wooldridge and Messrs. Gorman and Rothschild rely on or consider DCF models that use a sustainable growth rate.[172] Do you agree with this implementation of the DCF model?

A51. I do not. This implementation of the DCF model relies on a so-called sustainable growth rate which is calculated as follows:

$$g = b \times r + s \times v$$

Where g is the sustainable growth rate, b is the is the earnings retention ration, r is the expected return on common equity (measured on a book basis), s is the rate of stock financing, and v is fraction of funds raised by the sale of stock that increases the book value of shareholders common equity.

First, the sustainable growth rate estimates employed or considered by Dr. Wooldridge and Messrs. Gorman and Rothschild are inherently inconsistent with their recommended ROEs in this case. For example, Dr. Wooldridge's Exhibit JRW-5 shows an average (median) book value return on equity of 11.0% (10.5%) for the electric sample, which is 125 (75) basis points higher than the ROE that results from his constant-growth DCF model.[173] Similarly, Mr. Gorman's workpapers show an average book value ROE of 11.29% for the proxy group versus an ROE of 10.88% from his constant-growth DCF.[174] Similarly, Mr. Rothschild's workpapers show an average book value ROE of 10.96% for his electric sample, which is at least 253 basis points about his sustainable growth rate DCF results.[175]

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[172] Wooldridge Testimony, p. 54; Gorman Testimony, pp. 209-210; Rothschild Testimony, pp. 49-53.

[173] Wooldridge Exhibit JRW-5, page 4.

[174] Gorman Workpaper MPG Public WP-1, tab MPG-6 and MPG-4.

[175] Rothschild Exhibit, ALR-3, page 1.

Second, the FERC has previously rejected the use of the sustainable growth rate DCF model in Order 531 in 2014 in favor of its current two-stage DCF methodology.[176] In Order 531, the Commission found that the sustainable growth rate methodology (BR + SV) does not estimate a company's sustainable growth because it relies on short-term growth estimates from *Value Line* (as Dr. Wooldridge, Messrs. Gorman and Rothschild have done), which do not capture the growth in free cash flows during the indefinite lifetime of a corporation. The FERC found:

> *Most importantly, including a long-term estimate of dividend growth in the constant growth DCF model, as is done in natural gas/oil pipeline cases, will now bring the public utility ROE approach in full alignment with the underlying theory of the DCF model.*[177]

Lastly, I note that Mr. Rothschild's assertion that JP Morgan Chase uses the sustainable growth rate DCF is out of date.[178] While JP Morgan Chase did use the sustainable growth rate DCF model in 2019, it has since abandoned the model and now uses a multi-factor model.[179]

6. Correction to DCF Modeling

Q52. Do you have any other comments on critiques of the Villadsen Direct?

A52. Yes. Dr. Ellis states:

> *SCE's 15-day trailing average is reasonable. Nonetheless, in reviewing SCE witness Villadsen's spreadsheets, I found an error in the CG DCF dividend yield calculation that introduces upward bias into her CG DCF results. The 15-day average price, calculated over the period from the 13th*

[176] Opinion No. 531, 147 FERC ¶ 61,234, 2014, p. 58.

[177] *Id.*, p. 19.

[178] Rothschild Testimony, p. 11.

[179] JP Morgan Chase, "2025 Long-Term Capital Market Assumptions." *See also* J.P. Morgan Asset Management, "2022 26th Annual Long-Term Capital Market Assumptions," p. 89.

> *through the 31st of January 2025, has "0" for each proxy group member's price on January 13. This reduces the average trailing price for each proxy group member by approximately 1/15, thereby raising the dividend yield a corresponding amount. The reported average yield for SCE's proxy group is 3.89%; it should be 3.63%, 0.26% less. SCE's average reported CG DCF result, 11.40%, should also be reduced, to 11.11%.*[180]

In my direct testimony, I inadvertently omitted the stock prices for one day in the 15-day stock prices for my proxy groups (i.e., the prices for that day all said zero). I have corrected this issue by pulling the correct stock prices for my proxy group for the previously omitted day. The electric proxy and gas proxy's simple stage DCF results drop slightly. The multi-stage DCF results for the three proxy groups remain unchanged. A revised Figure 15 is provided below, and an errata to SCE-02 to make this correction is forthcoming.

Figure R-15: Revised Figure 15 – Electric Proxy

	Simple	Multi-Stage
Electric Sample	12.2~~5~~%	9.5%

This correction results in a slightly lower average of the high end of my ROE results at SCE's 50.6% equity capital structure reflecting $1.574 billion PPA-related imputed debt. Rounding to the nearest 1/4th percentage point would result in a range of 9.75% to 11.5%; however, this is not my recommended approach as this range would not include the average high end of 11.58%. Accordingly, I determine the range for the Electric Utility Sample as the average low-end of the three estimation methods to the average-high-end of the three estimation methods, rounded to the nearest 1/4th percentage point that includes the averages in the range. This results in a range of 9.75% to 11.75% for the proxy group, which is the same as the range provided in SCE-02. As set forth in SCE-02, I still determine that a reasonable range for SCE is in the upper half of this range, i.e., 10.75% to 11.75%.

[180] Ellis Testimony, p. 40.

Figure R-16: Revised Figure 1 - Summary of Results

	With PPA Debt	
	Low	High
CAPM	9.50%	11.75%
DCF	9.50%	12.25%
Risk Premium	10.50%	10.75%
Average	9.83%	11.58%
Range	9.75%	11.75%

C. CAPM

Q53. Please provide a brief overview of Drs. Ellis' and Wooldridge's and Messrs. Gorman's and Rothschild's CAPM methodologies.

A53. Drs. Wooldridge and Ellis and Messrs. Gorman and Rothschild all rely on at least one version of the CAPM to estimate the ROE for SCE. The primary differences between each Intervenor's CAPM is how they derive their inputs to CAPM: the risk-free rate, beta, and the MRP.

Dr. Wooldridge's CAPM uses a risk-free rate of 5.00% derived from the current yield on 30-year U.S. Treasury bonds.[181] Dr. Wooldridge departs from his normal source of betas, *Value Line*, due to concerns about lingering impacts from the COVID-19 pandemic that caused utility betas to increase relative to their historic values.[182] Instead, he uses the average of betas published by S&P Capital IQ to which he applies the Blume Adjustment and *Value Line* betas.[183] Next, Dr. Wooldridge considers various sources of MRP estimates, including historical stock and bond returns; *ex ante* models, surveys, and building blocks, from which he determines a reasonable range

[181] Wooldridge Testimony, pp. 59-60.

[182] *Ibid*.

[183] *Id.*, p. 62.

of MRP estimates of 5.0% to 5.5% and a point estimate of 5.25%.[184] Using these inputs, Dr. Wooldridge obtains an CAPM-based ROE estimate of 8.75% based on his Electric Proxy Group.[185]

Dr. Ellis uses a risk-free rate based on the most recent monthly (June 2025) average on the 30-year U.S. Treasury bond, which is 4.89%.[186] He calculates his own betas using 5-years of monthly return data.[187] His beta estimates are not Blume adjusted because he argues that utility betas regress towards 0.5 over time, not 1.0.[188] This results in a proxy sample average beta of 0.57.[189] Finally, he calculates the MRP using a multi-stage DCF based on the S&P 500's current dividend yield and near-term EPS growth rate forecast from S&P and a terminal value equal to forecast GDP per capita.[190] This results in a market return of 5.81% from which he subtracts his risk-free rate of 4.89%, resulting in an extremely low MRP of 0.92%.[191] Taken together, Dr. Ellis obtains an ROE estimate of 5.42% for SCE based on his implementation of the CAPM.[192]

Mr. Gorman calculates his CAPM uses two different estimates of the risk-free rate. The first is the projected yield on 30-year U.S. Treasury bonds from *BCFF* of 4.50%.[193] His second risk-free rate is the current-yield on 30-year U.S. Treasury bonds of 4.74%. Mr. Gorman considers two estimates of beta. The first is Blume-adjusted

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184 *Id*., p. 66-71.

185 *Id.*, p. 71. Dr. Wooldridge obtains an ROE estimate of 9.05% and 8.90% based on his Gas Proxy and Combination Proxy Group, respectively.

186 Ellis Testimony, p. 84.

187 *Ibid*.

188 *Id.*, p. 71.

189 *Id.*, p. 76.

190 *Id.,* p. 84.

191 *Ibid*. *See also* Gorman's Workpapers CA IOU MSDCF CAPM COE (unlevered) 2506 250730 tab "CAPM mo xcs beta".

192 *Ibid*.

193 Gorman Testimony, p. 93.

five-year weekly betas sourced from *Value Line*.[194] However, he argues that *Value Line* betas are skewed due to lingering market data from the COVID-19 pandemic and therefore gives no weight to the *Value Line* betas.[195] Instead, he calculates his own betas using *Value Line*'s methodology using market data ending May 30, 2025, which results in a proxy sample average of 0.75.[196] He calculates a "normalized MRP" which is a forward-looking MRP estimated by calculating the forecasted market return on the S&P 500 and then subtracting his estimates of the risk-free rate. This results in an MRP of 7.03%.[197] Finally, he calculates a historic MRP by subtracting the total return on bonds from the average return on the S&P 500 over the period from 1926 to 2023.[198] This results in an MRP of 6.54%.[199] Taken together, Mr. Gorman calculates an ROE of 9.77% based on his implementation of the CAPM using a risk-free rate of 4.50%, an MRP of 7.03% and a beta of 0.75.[200] He rounds this result to 9.75%.[201]

Mr. Rothschild relies on a short-term risk-free rate of 4.37% and 4.41% based on his estimate of the weighted average short-term return and spot rate, respectively, on 3-month U.S. Treasury bills.[202] He also considers a long-term risk-free rate of 4.78% and 4.80% based on the spot and weighted average rate, respectively, on 30-year U.S. Treasury bonds.[203] Mr. Rothschild uses two estimates for beta. The first is his "forward beta" which are option implied betas calculated using the covariance between return expectations based on out-of-the-money utility stock call and put

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194 *Id.*, p. 156.
195 *Id.*, pp. 156-157.
196 *Ibid*.
197 *Id.*, pp. 157-158.
198 *Ibid*.
199 *Ibid*.
200 *Id.*, p. 161.
201 *Ibid*.
202 Rothschild Testimony, pp. 71-73.
203 *Ibid*.

options and options on the S&P 500.[204] His second beta estimate is his "historical blended beta" calculated based on historical utility stock return data over 6-month, 2-year, and 5-year periods.[205] He then weights the betas resulting from historic periods using the formula 50% (6-months) + 30% (2 years) + 20% (5 years) to obtain a single historical blend beta estimate.[206] Lastly, he estimates the MRP using option implied market expectations on the S&P 500 to obtain the expected market return.[207] He then subtracts his estimates of the risk-free rate to obtain an MRP of 4.39% and 4.02% using short- and long-term risk-free rate, respectively.[208] Taken together, Mr. Rothschild obtains a range of CAPM-derived ROEs of 6.80% to 7.29% based on his spot risk-free rates and 6.69% to 7.24% based on his 3-month and 30-year weighted average risk-free rate.

The different methodologies, inputs, assumptions, and resulting ROEs for each of the Intervenor's is summarized in Figure R-17 below.

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[204] *Id*., pp. 61, 70-73.

[205] *Id.*, p. 62.

[206] *Id.*, p. 61.

[207] *Id.,* pp. 69-70.

[208] *Ibid*.

Figure R-17: Summary of Intervenors' CAPM Inputs and Results

		Ellis [1]	Wooldridge [2]	Gorman [3]	Rothschild [4]
Risk-Free Rate	[A]	30-Year UST Monthly Avg. (4.89%)	30-Year UST Current Yield (5.00%)	(1) 30 Year UST Forecast BCFF (4.50%); (2) 30-Year UST Current Yield (4.74%)	3-Month UST Bill (1) Weighted Avg. (4.78%); (2) Spot (4.80%). 30-year UST (1) Weighted Avg (4.8%); (2) Spot (4.78%)
Beta	[B]	5-Year Monthly Raw	S&P CapIQ with Blume Adjusted	5-Year Weekly Betas, Blume Adjusted	Option-Implied Beta; Weighted Beta
MRP	[C]	Multi-Stage DCF (0.92%)	Kroll and Surveys (5.25%)	(1) Normalized forward-looking MRP (7.03%); (2) Historic MRP (6.54%)	Multi-Stage DCF with Option-Implied Growth Rates (4.02%, 4.39%)
Result	[D]	5.42%	8.75%	9.75%	6.69% to 7.29%

Finally, none of the Intervenors' CAPMs apply standard financial techniques to account for the impact on the estimated ROE for SCE due to differences in financial leverage between the proxy companies and SCE. As discussed below, this downwardly biases Drs. Ellis' and Wooldridge's and Messrs. Gorman's and Rothschild's CAPM-based ROE estimates.

Q54. Please provide a brief summary of your concerns with the Intervenors' implementation of the CAPM.

A54. Having reviewed the CAPM models implemented by the Intervenors, I have the following concerns.

- None of the Intervenors' CAPM estimates account for differences in financial leverage between the proxy sample and SCE, which understates the ROE. The Hamada adjustment and after-tax weighted-average cost of capital methodology are standard financial techniques to adjust the CAPM for financial leverage. In Section V.D below I apply these standard financial adjustments to the Intervenors' CAPM and find that their ROE estimates are downwardly biased by at least 20 basis points.
- Dr. Ellis' CAPM model is downwardly biased due to methodological choices regarding the use of raw betas and growth rate expectations in the market risk premium. This causes all of his ROE estimates to be below the cost of debt. Similar to Dr. Ellis's DCF model, these results are too low and violate a basic tenet of finance. Dr. Ellis's CAPM should be ignored.

- Dr. Ellis and Mr. Rothschild assert that forecast interest rates are inaccurate. However, these arguments are premised on an unattainable goal that forecasts perfectly match actual yields. Second, the Congressional Budget Office report cited by Dr. Ellis indicates that *Blue Chip*'s forecast performs as well as CBO's and the federal administration's forecasts. Academic evidence also indicates that forecasts tend to under forecast yields in a rising rates environment, which I demonstrate has been true over the past five years.
- Mr. Rothschild relies on short-term U.S. Treasury bills as the risk-free rate, which he justifies, in part, by misquoting Brealey, Myers, and Allen. It is more appropriate to use long-term bonds as the risk-free rate to match the life of the assets that are being financed by equity.
- Mr. Rothschild relies on highly non-standard option implied betas and growth rates (to calculate the MRP). I am not aware of any standard financial textbooks or regulatory commission that relies on such betas. Further, his estimates rely on thinly traded betas, which calls into question the reliability of his estimates. His CAPM estimates that are derived using options data should be disregarded.
- Drs. Wooldridge and Ellis and Messrs. Gorman and Rothschild allege that beta estimates are upwardly biased due to anomalous market data from the onset of the COVID-19 pandemic. They rely on non-standard estimates of beta to mitigate this alleged impact. However, five-year betas estimated at the time of their analysis would not incorporate market return data from the onset of the pandemic.
- Dr. Wooldridge relies on survey estimates of the MRP, which studies have shown to be subject to bias and highly unreliable. He also cites several studies that rely on geometric means, which are not appropriate for estimating the cost of equity. These estimates downwardly bias his CAPM estimates.
- I disagree with Dr. McCann that the CAPM is an unreliable model and should not be considered. The CAPM is a widely accepted financial model and widely used by financial analysts, practitioners, and utility regulators.

In Section V.F below, I perform simple adjustments to the Intervenors' CAPM implementations to address these concerns. Doing so increases the Intervenors' CAPM-based ROE results by at least 36 basis points.

1. Preliminaries

Q55. What concerns do you have with Dr. Ellis's CAPM?

A55. Dr. Ellis's CAPM suffers from significant issues. As discussed in further detail below, he relies on raw betas rather than adjusted betas. In addition, he estimates the market risk premium using a multi-stage DCF with a terminal growth rate equal to the forecasted GDP per capita growth rate. Together, these methodological choices

downwardly bias his ROE estimates. As shown in Figure R-36 below, all of his CAPM-based ROE estimates are below the proxy company's cost of debt. Dr. Ellis's CAPM model also suffers from significant issues, even more so than his DCF model. His CAPM results undermine the basic principles of finance and should therefore not be considered.

Figure R-36: Ellis CAPM-Based ROE Estimates versus Proxy Company's Cost of Debt

Company	Credit Rating	Ellis' CAPM Cost of Equity	CAPM Cost of Debt	CoE - CoD
American Electric Power Co.	BBB+	5.26%	5.95%	-0.69%
Alliant Energy	BBB+	5.43%	5.89%	-0.46%
Ameren Corp.	BBB+	5.43%	6.11%	-0.68%
Avista Corp.	BBB	5.50%	6.11%	-0.61%
Black Hills Corp	BBB+	5.44%	6.11%	-0.67%
CenterPoint Energy Inc.	BBB+	5.57%	6.11%	-0.54%
CMS Energy Corp.	BBB+	5.24%	6.11%	-0.87%
Dominion Energy	BBB+	5.51%	6.11%	-0.60%
DTE Energy Co.	BBB+	5.39%	6.11%	-0.73%
Duke Energy Corp	BBB+	5.25%	6.11%	-0.86%
Entergy Corp.	BBB+	5.56%	6.11%	-0.55%
Evergy, Inc.	BBB+	5.31%	5.95%	-0.63%
Exelon Corp.	A-	5.40%	6.06%	-0.66%
IDACORP Inc.	BBB	5.52%	6.11%	-0.59%
MGE Energy Inc.	AA-	5.58%	5.83%	-0.26%
NorthWestern Energy Group	BBB	5.39%	6.11%	-0.73%
OGE Energy Corp.	BBB+	5.43%	6.11%	-0.68%
Pinnacle West Capital Corp.	BBB+	5.26%	6.06%	-0.80%
Portland General Electric Co.	BBB+	5.35%	6.11%	-0.76%
PPL Corp.	A-	5.52%	5.83%	-0.31%
Public Svc Entpr Group Inc.	BBB+	5.41%	6.11%	-0.70%
Sempra	BBB+	5.70%	6.11%	-0.41%
The Southern Co.	A-	5.35%	6.00%	-0.66%
TXNM Energy Inc.	BBB	5.30%	6.11%	-0.81%
WEC Energy Group Inc.	A-	5.35%	5.83%	-0.49%
Average		5.42%	6.05%	-0.63%

No. of Companies with CoE < CoD	25
No. of Companies with CoE + 20% of FERC MRP < CoD	25
Total No. of Companies	25

2. Risk-Free Rate

Q56. What concerns do you have with Drs. Wooldridge and Ellis and Mrs. Gorman use of current bond yields as the basis for their risk-free rates?

A56. My concern is that the cost of capital is a forward-looking concept and, as such, the risk-free rate should reflect the market's current expectations of capital market conditions that will prevail when rates are in effect. As discussed in Section III above, inflation remains above the Federal Reserve's target of 2% on average. Further there is additional inflationary pressure from the recent imposition of global trade tariffs. All else equal, these inflationary factors will cause interest rates to rise in coming years. The August 2025 public of BCEI forecasts that yields on 10-year U.S. Treasury bonds will be 4.3% in 2025 and 4.1% in 2026, implying a forecasted yield on 20-year U.S. Treasury bonds of 4.8% in 2025 and 4.6% in 2026.[209]

Having registered my disagreement, I note that Drs. Wooldridge's, Ellis' and Mr. Gorman's risk-free rates based on the current yield on 30-year U.S. Treasury bonds (5.00%, 4.89%, and 4.74%, respectively) are close to the implied forecasted yield on 30-year U.S. Treasury bonds (given that the maturity premium between 10-year and 20- and 30-year bonds is approximately the same at the moment).

Q57. What concerns do you have with Mr. Rothschilds risk-free rate based on the current yield on 3-month U.S. Government bills?

A57. I am concerned about using a short-term risk-free rate for three reasons. First electric utilities have long-lived investments and therefore it makes sense to use risk-free rates that match the life of the assets.

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[209] Blue Chip Economic Indicators, August 2025, pp. 2-3. My estimate of the maturity premium between 10- and 20-year U.S. Treasury bonds is approximately 50 basis points.

Second, it has become common in regulatory proceedings to use a long-term government bond yield. Mr. Rothschild acknowledges as much in his testimony.[210] As an example, the Federal Energy Regulatory Commission uses a 30-year government bond yield,[211] the Surface Transportation Board uses a 20-year government bond yield[212] and the Commission has in the past described the CAPM as the sum of "an interest rate on a **risk-free bond** and a risk premium."[213] All other Intervenors and utility witnesses in this proceeding also rely on long-term government bonds for their risk-free rate estimates, thereby indicating that they view the risk-free rate as relating to government **bonds**, which are long term.

Third, Mr. Rothschild selectively quotes *Brealey, Myers, and Allen* to support his use of short-term interest rates as the risk-free rate (underlined section below). However, the full quote calls into question this approach (bolded section):

> *"The CAPM is a short-term model. It works period by period and calls for a short-term interest rate.* ***But could a .03% three-month risk-free rate give the right discount rate for cash flows 10 or 20 years in the future? Well, now that you mention it, probably not."***[214]

The textbook goes onto to explain that if you use short-term interest rates in the CAPM, you must forecast the expected return for holding Treasury bills over the life of the project.[215] That is, you have to add an additional premium for holding bills over

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[210] Rothschild Testimony, p. 57 ("It is commonplace in utility rate case proceedings to consider a risk-free rate based on long-term investments.")

[211] *See*, for example, FERC Order 569-A, ¶21.

[212] *See*, for example, Surface Transportation Board, Docket No. EP 558 (Sub-No. 24), Railroad Cost of Capital 2020, p. 7.

[213] CPUC Decision 19-12-056, December 19, 2019, p. 22.

[214] Brealey, Myers, and Allen, Corporate Finance, 12th Edition, p. 228. Portions quoted by Mr. Rothschild are underlined. Emphasis added in bold.

[215] *Ibid*.

a 10- or 20-year period. Mr. Rothschild has not added such a premium in his CAPM analysis, thus understating his ROE estimate.

Lastly, the Rothschild Testimony worries that a long-term treasury yield has a non-zero beta on the market.[216] However, a simple regression of the 20-year weekly yield on the weekly return on the S&P 500 shows that currently the bond beta on the market is indistinguishable from zero.[217] Thus, the empirical evidence is that the long-term treasury yield has a zero beta on the market.

Q58. How do you respond to Dr. Ellis and Mr. Rothschild's assertion that forecasted interest rates are inaccurate?

A58. The key question is what risk-free rate is the best reflection of the rate that will be in effect in the future, when the authorized ROE is used to set rates, not whether one or another measure in the past has been able to foresee actions of the Federal Reserve or changes in capital market conditions.

Dr. Ellis' and Mr. Rothschild[218] criticize the use of forecasted risk-free rates in the CAPM.[219] Dr. Ellis argues that forecasts are less accurate predictors than current market rates, specifically those produced by Blue Chip Financial Forecast.[220] Dr. Ellis presents a regression analysis comparing BCFF's forecast to the current yield on 30-year U.S. Treasury bonds from December 1996 to December 2023 and argues that the root mean square error ("RMSE") of using current yields as a predictor is lower than those of BCFF's forecasts. First, this analysis is problematic because it relies on data up until December 2023 and ignores any more recent data points. Second, the

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216 Rothschild Testimony, p. 130.

217 Using five years of weekly data a regression of the weekly yield of the 20-year government bond on the S&P 500 market return finds a beta of zero (0.0073 to be precise) with a t-statistic of 2.34. SCE Exhibit SCE-07 Appendix R-T.

218 Rothschild Testimony, p. 131.

219 Ellis Testimony, p. 59.

220 *Ibid*.

conclusions of his analysis are reductive and imply that future yields on government bonds will always be similar to current bonds. Yet, we see that the level of government bond yields can and does change significantly due to changes in capital market conditions (*e.g.*, monetary policy, geopolitical events, etc.).

Further, Dr. Ellis cites to a Congressional Budget Office ("CBO") report to support his assertion that BCFF suffer from forecasting errors.[221] However, the report finds that Blue Chip performs similarly to forecasts developed by both CBO and the Administration. The report states:

> *"In general, forecasts produced by CBO, the Administration, and the Blue Chip consensus* ***display similar error patterns over time****."*[222]
>
> *"As measured by the root mean square error, approximately two-thirds of CBO's forecasts are more accurate than the Administration's forecasts, and the others are equally accurate; by that measure,* ***CBO's forecasts are roughly comparable to the Blue Chip consensus forecasts"***[223]
>
> *"The forecasts of real and nominal interest rates on 3-month Treasury bills produced by the Blue Chip consensus have a smaller two-thirds spread than those of the other forecasters, but the* ***Administration's forecast of interest rates on 10-year Treasury notes has a larger two-thirds spread than the forecasts of CBO and the Blue Chip consensus.****"*[224]

As a final point, Dr. Ellis's analysis and citation to the CBO report is a straw man argument that because there are forecasting errors in Blue Chip's forecast, they should be disregarded. This is an impossible standard to meet as any forecast will have some amount of forecasting error. The CBO report demonstrates that Blue Chip performs

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221 *Id.*, p. 63.

222 Congressional Budget Office, "CBO's Economic Forecasting Record: 2023 Update," p. 2, https://www.cbo.gov/system/files/2023-06/59078-Economic-Forecasting-Record.pdf. (Emphasis added)

223 *Ibid*. (Emphasis added)

224 *Id.*, p. 11. (Emphasis added)

similarly to forecasts produced by the CBO and the Administration, which are relied upon to set and implement federal policies. I continue to find that forecasted interest rates from BCEI are reasonable estimates of the interest rate environment that will prevail when the ROE set in this proceeding will be effect.

Q59. How have bond yield forecasts from Blue Chip Economic Indicators compared to actual yields in recent years?

A59. Figure R-18 below shows BCEI[225] one-year forecasts for the 10-year U.S. Treasury bond yield as well as the actual yield for the period 2016 to 2025. It is evident from the chart that the contributors to BCEI in the recent past have both over- (2016, 2018-2020) and under- (2017, 2021-2025) forecast the 10-year U.S. Treasury bond yield. Notably, BCEI has under-forecasted in every year since 2021.

Figure R-18: Blue Chip Forecasted 10-Year and Actual Yield

	BCEI Forecast	Realized	Difference
2016	2.70%	2.45%	0.25%
2017	2.10%	2.40%	-0.30%
2018	2.80%	2.69%	0.11%
2019	3.30%	1.90%	1.40%
2020	1.80%	0.93%	0.87%
2021	0.90%	1.52%	-0.62%
2022	1.90%	3.88%	-1.98%
2023	3.00%	3.88%	-0.88%
2024	4.00%	4.58%	-0.58%
2025	3.70%	4.37%	-0.67%

Sources and Notes:
Blue Chip Economic Indicators, October of Prior Year
FRED DGS10 as of last trading day of each year.
For 2025, as of July 31

[225] I rely on BCEI to determine my forecasted risk-free rate, which is a separate but affiliated publication to BCFF. Therefore, my analysis is focused on BCEI.

Q60. Is there any academic evidence about the accuracy of the interest rate projections?

A60. Yes. Research shows that while it is certainly true that expert forecasts of interest rates do not always precisely predict eventual spot yields, such forecasts generally exhibit a conservative status quo bias—tending to over-predict eventual spot yields during falling interest rate environments and under-predict actual yields when interest rates are on the rise.[226] This is exactly what is happening now as shown in Figure R-18 above, where the forecasted yield is below that realized.

Unlike Dr. Ellis, the Federal Reserve economists who conducted this research considered evidence from historical periods where interest rates were generally increasing as well as from periods of generally declining rates. Interest rates have generally followed a downward trajectory since the financial crisis. However, when interest rates do rise, the academic evidence suggests they may well do so more dramatically or at a faster pace than anticipated by market participants.

3. Beta

Q61. Please provide additional detail on how Mr. Rothschild calculates his option-implied betas.

A61. Mr. Rothschild calculated an implied beta using options (he also uses a hybrid beta calculated as using a weighted average of betas measured over several time period). To calculate the option beta, he looks to stock options for the electric utilities in his proxy sample and then identifies out-of-the-money call and put options. With these out-of-the money options, he calculates the implied volatility and skewness implied by those securities.[227] Specifically, the Rothschild Testimony determines the volatility

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[226] R.W. Hafer and Scott Hein, "Comparing Futures and Survey Forecasts of Near-Term Treasury Bill Rates," *Federal Reserve Bank of St. Louis*, May/June 1989.

[227] The statistical ***skewness*** is a measure of the asymmetry of the probability distribution of a random variable about its mean.

and skewness using options that expire 6 months in the future.[228] The implied beta is then calculated as follows:

$$\beta_{\text{Proxy}} = \left(\frac{SKEW_{\text{Proxy}}}{SKEW_{\text{Market}}}\right)^{1/3} \left(\frac{Variance_{\text{Proxy}}}{Variance_{\text{Market}}}\right)^{1/2}$$

Q62. What are your concerns with Mr. Rothschild's option-implied betas?

A62. I have several concerns with Mr. Rothschild's option-implied betas. First, the proxy company options that he relies upon in his analysis are thinly traded and thus have limited data available for estimation. In such cases, the estimation results become statistically less reliable. The academic paper by Chang, Christoffersen, Jacobs, and Vainberg (that Mr. Rothschild cites to support his beat methodology) agrees with this, stating the option-implied betas only perform well when the underlying options are liquidly traded.[229]

Figure R-19 below shows the trading volume data for the options Mr. Rothschild relies on to calculate the betas for his proxy companies – clearly the market is thin.[230] Several of the utilities have either no trading volume on their call options or put options, or in some instances both. Those that do have volume data have very few trades. For example, CMS Energy only had 4 trades on its call options and none on its put options. Despite these thinly traded options, Mr. Rothschild included most of the utilities in his option-implied beta calculations (designated as an x in the "Reduced Proxy" column).

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[228] Rothschild Testimony, p. 66.

[229] Mr. Rothschild: Bo-Young Chang, Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, "Option-Implied Measures of Equity Risk," *Review of Finance* 16, 2012, pp. 385-428, p. 420.

[230] Chang, Christoffersen, Jacobs, and Vainberg, at p. 392 shows that the daily volume for utilities is magnitudes lower than for other industries considered by the paper. I included these figures in]Figure R-19.

Figure R-19: Liquidity in Options Used by Rothschild to Calculate Beta
Panel A: Electric Proxy

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Electric Proxy						
AEE	[1]	101	0	11	0	x
AEP	[2]	2846	7	731	1	x
AGR	[3]	na	na	na	na	0
ALE	[4]	0	2	0	0	0
AVA	[5]	212	18	0	0	x
BKH	[6]	50	0	11	0	x
CMS	[7]	122	4	2020	0	x
CNP	[8]	735	0	2132	2	0
D	[9]	7271	57	4077	6	0
DTE	[10]	16	0	1	0	x
DUK	[11]	2527	42	1093	2	x
ED	[12]	1908	7	721	12	x
EIX	[13]	7502	78	2267	21	x
ES	[14]	526	8	135	0	0
ETR	[15]	1184	299	4165	6	x
EVRG	[16]	498	4	330	0	x
EXC	[17]	8538	117	6605	14	x
FE	[18]	3595	25	2005	15	x
FTS.TO	[19]	na	na	na	na	0
HE	[20]	6723	107	1672	0	0
IDA	[21]	8	1	3	0	x
LNT	[22]	300	0	4	1	x
MGEE	[23]	0	0	3	0	0
NEE	[24]	12400	359	11285	331	x
NWE	[25]	27	2	0	0	x
OGE	[26]	124	3	0	0	x
OTTR	[27]	10	0	0	0	0
PEG	[28]	492	19	62	0	x
TXNM	[29]	284	0	62	0	0
PNW	[30]	129	9	13	0	x
POR	[31]	414	9	18	1	x
PPL	[32]	2427	71	3144	36	x
SO	[33]	713	35	648	9	x
SRE	[34]	4497	12	2784	2	x
WEC	[35]	1183	0	1077	0	x
XEL	[36]	1523	116	1042	9	x
S&P 500	[37]	352521	10603	1313754	32957	
Utilities (daily per CCJV)	[38]		117		66	

Sources and Notes:

[1] - [36], [37]: From Rothchild's working file, 2025.04-06 - RFC FULL Electric Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[38]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Panel B: Gas Proxy

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Gas Proxy						
ATO	[1]	65	3	24	0	x
CPK	[2]	0	0	0	0	0
NI	[3]	12	0	0	0	x
NJR	[4]	59	0	0	0	x
NWN	[5]	337	0	0	0	x
OGS	[6]	19	0	2	0	x
SJI	[7]	na	na	na	na	0
SR	[8]	20	2	0	0	x
SWX	[9]	90	0	2	0	x
UGI	[10]	2274	18	536	3	0
S&P 500	[11]	352521	10603	1313754	32957	
Utilities (daily per CCJV)	[12]		117		66	

Sources and Notes:
[1] - [10], [11]: From Rothchild's working file, 2025.06 - RFC Gas Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.
[12]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Second, as discussed previously, I reviewed the MBA textbooks of Brealey, Allen & Myers (2020), Ross, Westerfield & Jaffe, as well as Berk & DeMarzo and found no discussion of option-implied betas.[231] Thus, the practitioner sources are limited as is the discussion in the MBA textbooks. Further, I have been unable to find any public source that provides option-implied betas and note that option-implied betas require the availability of publicly traded options, which as shown above is a thin market for some companies.

Third, I have not seen option-implied betas used in a cost of capital proceeding by witnesses other than Mr. Rothschild and I do not see regulatory decisions relying on them. Of note, the Granite Water Order[232] that Mr. Rothschild cites as evidence that

[231] Brealey, Myers & Allen (2020), *Principles of Corporate Finance*; Ross, Westerfield & Jaffe (2022), *Corporate Finance*, 13th Edition; Berk & DeMarzo (2020), *Corporate Finance: The Core*, 5th edition.

[232] Rothschild Testimony, p. 12. *See also*, Public Service Commission of South Carolina, "Order Ruling on Application for Adjustment in Rates," Docket No. 2019-290-WS – Order No. 2020-306.

commissions have relied upon his ROE estimation methodologies never discusses option implied betas.

There are very good reasons: cost of capital proceedings generally do not use 6-month option implied betas: (i) six months are not truly representative, when the cost of equity is being determined for several years as is the case here, (ii) the market for electric utility options is quite thin meaning that there is limited data available for estimation and therefore the statistical properties of the estimates may be less than ideal, and (iii) standard MBA textbooks do not discuss these betas. Notably, Mr. Rothschild cites to a second academic paper by Christoffersen, Jacobs, and Vainberg to say there is nothing inherent in the methodology that limits the use of 6-month horizons to estimate betas. Yet, the paper explicitly states that longer horizon betas would be better for estimating the cost of equity:

> *"The main focus in this paper has been on forecasting 180-day realized betas, which are relevant for applications such as abnormal returns.* ***For other applications, such as cost of capital calculations, longer-horizon betas may be needed.****"*[233]

Mr. Rothschild's option-implied betas are highly non-standard, are calculated using illiquid options for the proxy companies (and some proxy companies are excluded due to lack of data) and are inconsistent with the academic literature that Mr. Rothschild relies upon. Neither his option-implied betas nor the ROE estimates derived from them should be given any consideration by the Commission.

[233] Peter Christoffersen, Kris Jacobs, Gregory Vainberg, "Forward-Looking Betas," April 25, 2008, p. 24, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=891467.

Q63. Mr. Rothschild also relies on a historical blend beta. What are your concerns with his beta estimate?

A63. Mr. Rothschild also calculates a historical blend beta, which is a weighted average of raw (*i.e.*, not Blume adjusted) betas calculated using 6-month, 2-years, and 5-years of market return data for the proxy companies.[234] Specifically, three beta estimates are weighted 50%, 30%, and 20%, respectively.[235] First, performing a weighted average of beta estimates is highly non-standard and arbitrary. Second, this methodology is problematic because each of the beta estimates have a degree of overlapping market data, which will overweight more recent market data when they are combined into a single estimate making the beta estimates unreliable.

Q64. Drs. Wooldridge and Ellis and Messrs. Gorman and Rothschild argue that beta estimates are currently elevated due to anomalous market data during the COVID-19 pandemic.[236] How do you respond?

A64. The Intervenors argue that market data from early 2020 increased *Value Line* beta estimates due to increased volatility at the start of the COVID-19 pandemic.[237] As a result, they make various adjustments to their beta estimates to mitigate the alleged impact of the COVID-19 pandemic on beta. Dr. Wooldridge, who has traditionally only relied on *Value Line* betas, changes methodology to also use 5-year monthly betas from S&P Capital IQ.[238] Similarly, Dr. Ellis relies on 5-year monthly betas.[239] Mr.

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234 Rothschild Testimony, p. 94.

235 *Ibid*.

236 Wooldridge Testimony, p. 60; Ellis Testimony, pp. 74-75; Gorman Testimony, pp. 228-229; Rothschild Testimony, pp. 103-104.

237 *See* Ellis Testimony, p. 74.

238 Wooldridge Testimony, p. 62.

239 Ellis Testimony, pp. 74-75.

Gorman[240] and Mr. Rothschild[241] place more weight on shorter duration estimates of betas.

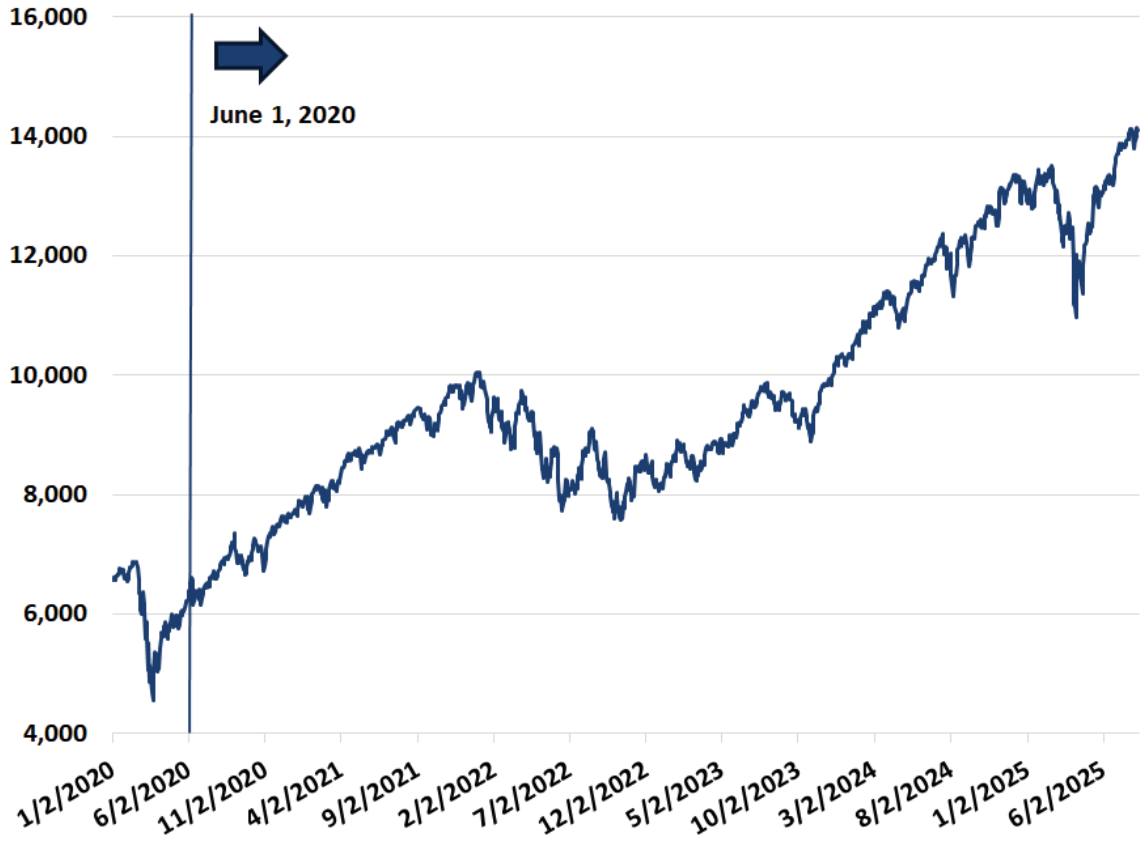
Drs. Ellis and Wooldridge and Messrs. Gorman and Rothschild provide no evidence as to why this real market data is not relevant for estimating the systematic risk of companies. Market disruptions can and do happen; for example, the broad market sell off after the announcement of the global tariffs in April 2025. The market data from these periods should not simply be excluded from cost of equity analyses.

Additionally, the beta estimates relied upon by Drs. Ellis and Wooldridge and Messrs. Gorman and Rothschild are dated after June 2025 and therefore estimated using 5-years of market data that is past the stock market reaction in March 2020 as shown in Figure R-20 below. Because the stock market reaction was earlier than the data that enters the Intervenors betas, their argument that market volatility in early 2020 is impacting current beta estimates is no longer relevant.

[240] Gorman Testimony, pp. 228-229.

[241] Rothschild Testimony, pp. 103-104.

Figure R-20: S&P 500 Total Return From January 1, 2020 to Current



Q65. Dr. Ellis argues that the proper way to calculate beta is to use five-years of monthly excess returns.[242] What concerns do you have with this approach?

A65. I have several concerns with Dr. Ellis's approach. First, he argues that monthly beta estimates are superior because they provide enough data to be statistically robust.[243] While I agree with Dr. Ellis that it is important to have sufficient data to obtain a robust beta estimate, weekly betas are calculated based on 260 data points over the five-year estimation period versus only 60 data points for monthly betas. All else equal, having fewer observations will result in a less statistically robust estimate of beta.

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[242] Ellis Testimony, p. 75.

[243] *Id.*, p. 68.

Second, Dr. Ellis argues that monthly betas limit random noise from asynchronous trading (*i.e.*, timing differences between when company returns are reported and when market returns are reported) and non-trading day effects that can impact weekly betas.[244] Dr. Ellis provides no analysis or research to support that *Value Line* betas for the proxy companies currently suffer from this issue.

Lastly, Dr. Ellis argues that the CAPM is a model of *excess* returns and thus the beta should be calculated based on excess returns over the risk-free rate.[245] Betas are calculated based on the slope of the regression of stock returns and market returns. Subtracting the risk-free rate from both the stock return and the market return to get excess returns does not change the slope of the regression line. That is, calculating betas using total returns (as *Value Line* does) and excess returns results in the same numerical estimate of beta. Dr. Ellis' criticisms should not be given any weight.

Q66. Do other regulatory commissions regularly rely on weekly beta estimates to set the allowed ROE for regulated entities?

A66. Yes, several other regulatory commissions also rely on weekly betas. For example, the FERC relies on Value Line betas in its CAPM methodology.[246] Notably, FERC also found that "there is substantial evidence indicating that investors rely on Value Line betas in making investment decisions."[247] The Surface Transportation Board also relies on weekly betas were "persuaded that using weekly data can address [the STB's] concern over statistical noise,..." [248] Similarly, the Federal Communications Commission relies on weekly data.[249] In addition, commission staff the Oregon Public

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[244] *Ibid*.

[245] *Id.*, p. 67.

[246] FERC, Opinion 569A, 171 FERC ¶ 61,154 ("FERC Opinion 569A), ¶ 75

[247] *Ibid*.

[248] Surface Transportation Board, Ex. Parte No. 664, January 17, 2008, p. 10. For the continues use hereof, see Surface Transportation Board, Ex. Parte No. 664 Sub. No. 4, June 23, 2020, p. 2.

[249] Federal Communications Commission, Report and Order, WC Docket 10-90, 14-58 and CC Docket No. 01-92, March 30, 2016, ¶ 288.

Utilities Commission,[250] New York Public Service Commission,[251] Public Service Commission of Utah,[252] Maryland Public Service Commission,[253] Michigan Public Service Commission,[254] and Viriginia Corporation Commission[255] use Value Line betas in their implementation of CAPM. In addition, the California Public Utilities Commission considered weekly betas when setting the allowed ROE.[256] Most recently, the Arkansas Public Service Commission,[257] the Colorado Public Service Commission,[258] Florida Public Service Commission,[259] and Pennsylvania Public Utility Commission[260] have considered weekly betas when established the allowed ROE for utilities that they regulate. Simply put, weekly betas are commonly used to establish the allowed ROE for regulated companies.

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[250] Oregon Public Utilities Commission, Staff Testimony Exhibit 100, Docket UG 435, April 22, 2022, p. 41.

[251] New York Public Service Commission, Staff Finance Panel, Cases 21-G-0073 and 21-E-0074, May 2021, p. 86.

[252] Public Service Commission of Utah, Prefilled Surrebuttal Testimony of William A. Powell, Docket No. 02-057-02, October 11, 2002, p. 13.

[253] Maryland Public Service Commission, Order 90948, Case No. 9692, December 14, 2023, p. 227.

[254] Michigan Public Service Commission, Direct Testimony of Joseph Ufolla, Case No. U-21291, May 7, 2024, p. 19.

[255] Virginia Corporation Commission, Pre-filed Staff Testimony Volume III, April 28, 2023, Kaufman Schedule 7.

[256] CPUC Decision D.12-12-034, p. 38.

[257] Arkansas Public Service Commission, Order 7, Docket No. 21-097-U, October 10, 2022, pp. 43, 56.

[258] Colorado Public Utilities Commission, Decision No. C24-0778, Proceeding No. 24AL-0049G, October 25, 2024, pp. 31, 45-46.

[259] Florida Public Service Commission, Order No. PSC-2023-0103-FOF-GU, Docket No. 20220067-GU, March 15, 2023, pp. 63-66.

[260] Pennsylvania Public Service Commission, Order and Opinion, Docket R-2020-3018835, February 19, 2021, pp. 122, 126-127.

Q67. Dr. Ellis argues that the Blume Adjustment does not apply to utility stocks.[261] How do you respond?

A67. *Value Line* betas are Blume-adjusted, meaning that they have been corrected based on empirical evidence that shows betas tend to converge towards the market beta over time.[262] The Blume Adjustment was developed by Professor Marshall Blume and well-established academic evidence shows that the adjustment improves the forward-looking predictive power relative to raw historic betas. I note that Dr. Wooldridge, Mr. Gorman, and Mr. Rothschild all rely on Blume Adjusted betas in their CAPM implementations.[263]

Dr. Ellis argues that utilities are large and mature companies with low risk profiles that keep their betas consistently below 1.0. While Dr. Ellis provides no analysis to support this argument, he cites to a paper by Michelfelder and Theodossiou (2013). However, he ignores well-established academic evidence showing that Blume adjustments improve the forward-looking predictive power relative to raw betas.

Q68. Is there statistical evidence for using adjusted betas?

A68. Yes. Beta is the regression of returns of a firm's stock against a broad market index and thus the market-weighted average beta for all assets by definition is 1.0. Repeated measurement of betas for individual stocks show that betas are clustered between 0.5 and 1.5. Given the distribution of betas across the entire market, particularly high or low beta estimates are more likely to reflect sampling error than an accurate measurement of the security's systematic risk. In addition, studies show that betas derived from historical data are not the best predictors of a company's *future* systematic risk and therefore do not provide a reliable indicator of investors' expected returns.

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[261] Ellis Testimony, p. 71.

[262] Marshall E. Blume "Betas and Their Regression Tendencies," *Journal of Finance*, Vol. 30, No. 3, June 1975, pp. 785-795.

[263] Wooldridge Testimony, p. 62; Gorman Testimony, p. 229; Rothschild Testimony, p. 132.

To study this, Professor Blume[264] performed a linear regression analysis comparing betas measured in one time period to betas measured in a subsequent time period. He found that the first period betas were not the best predictor of the subsequent period betas. Rather, his analysis indicated that second-period betas were better predicted by taking a weighted average of the first-period beta estimates and the market-average beta of 1.0. The estimated coefficients of his regression equations suggested a weight of 2/3 on the first-period beta estimate and 1/3 on the market beta of 1.0. This regression analysis was the basis for calculating a "Blume adjusted" beta from the "raw" beta estimated based on historical market data.

Q69. Is the Blume adjustment commonly used?

A69. Yes. Services such as Bloomberg and Value Line that cater to investors apply the Blume adjustment to their "off-the-shelf" betas. While Bloomberg allows users to manually specify beta estimation parameters, its *default setting is an adjusted beta* based on two years of weekly return data. Value Line provides only adjusted betas. The CFA curriculum teaches its candidates to adjust raw betas because doing so results in a more accurate prediction future betas.[265] Furthermore the CFA Institute's curriculum only teaches candidates to adjust betas using the Blume adjustment procedure. Other regulatory jurisdictions use adjusted betas in cost of capital proceedings. Examples include the U.S. FERC,[266] and the New York State Public Service Commission's use of Value Line adjusted betas since the mid-1990s.[267] It is therefore widely relied upon by financial practitioners and accepted by many regulatory agencies. Of note, many regulators do not specify their source for beta, but in my experience most regulators are presented with Value Line betas and

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[264] Blume, M.E. (1971), "On the Assessment of Risk," *Journal of Finance*, 26, pp. 1-10.

[265] CFA Institute Curriculum Level II Vol. 4, p. 71.

[266] FERC Order 569-A.

[267] New York State Public Service Commission, "Staff Finance Panel Testimony," Case 19-E-0066, May 2019, p. 102, lines 2-4; FERC Opinion No. 569-A, p. 38; Mississippi Power PEP-5A, January 9, 2009, p. 24.

Commission Staff in Michigan, Oregon, and Illinois, for example, consistently rely on Value Line betas,[268] which are adjusted betas.[269]

4. Market Risk Premium

Q70. What concerns do you have with Dr. Ellis' estimation of the MRP?

A70. Dr. Ellis derives an extremely low MRP estimate of 0.92%, which is significantly below other estimates of the MRP. This MRP estimate is lower than the utility bond risk-free rate spread of 1.09%, which makes no sense.[270] On face value, his MRP and the CAPM results that are derived from it should be disregarded.

Q71. Dr. Wooldridge presents studies that estimate the MRP using different methodologies. What are your concerns with these studies?

A71. Dr. Wooldridge presents various studies that estimate the MRP using one of four different methodologies: (1) historic risk premium; (2) ex ante models; (3) surveys; and (4) building blocks.[271] Based on his review of these studies, he focuses on Kroll's normalized MRP and survey results from Fernandez and Duke to determine his estimated MRP of 5.25%.[272]

As an initial matter, I note that many of the studies were published a long time ago and/or they do not reflect more recent-market data. Of the 45 studies shown in Exhibit JRW-6, only 9 of the studies were published in 2025—the majority of the remaining 36 studies were published in the 2000s (25 studies) or 2010s (9 studies) and just 1 was published in the 2020s. The majority of the 36 studies rely on data that extends until

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[268] Direct Testimony of Joseph Ufolla in Michigan PSC Docket U-20642, March 24, 2020, pp. 18-19; Matt Muldoon Direct Testimony in OR PUC Docket UG 344, April 20, 2018, p. 44; Corrected Direct Testimony of Rochelle Phipps in Illinois Commerce Commission Docket No. 21-0098, May 11, 2021.

[269] In many other jurisdictions, Commission Staff does not submit testimony.

[270] Based on 30-year BBB-rated utility bond yields as of July 31, 2025.

[271] Wooldridge Testimony, Exhibit JRW-6, page 5.

[272] Wooldridge Testimony, p. 71.

the mid-2000s. This casts significant doubt onto how reliable these studies are for estimating the market risk premium that investors *currently* require.

In addition, several of the studies rely on geometric means to estimate the MRP, which downwardly bias the estimates.[273] Geometric returns are appropriately used to evaluate the historic performance of a stock portfolio (*i.e.*, the average annual achieved return over some time period). However, when estimating the cost of capital, which is a forward-looking concept, the goal is to estimate the rate of return that investors expect. Dr. Morin in his textbook says:

> *"In capital markets, where returns are a probability distribution, the answer that takes account of uncertainty, the arithmetic mean is the correct one for estimating discount rates and the cost of capital. While the* ***geometric mean*** *is appropriate when estimating performance over a long time period, it* ***is incorrect when estimating a risk premium to compute the cost of capital.****"*[274]

One of the sources that Dr. Wooldridge considers to determine his MRP point estimate is the Kroll normalized MRP of 5.5%, as of April 2025. I rely on Kroll's normalized MRP in the third scenario of my CAPM implementation (at the time of my analysis the normalized MRP was 5.0%).[275] However, as discussed in my Direct Testimony, this MRP estimate is not without its problems.[276] It is based on a proprietary model that considers both historic and forward-looking data points. The recommended MRP is premised on a "normal" MRP in the range of 3.5% to 6.0% and the location of the recommended MRP is placed within this range based on Kroll's assessment of various financial and economic indicators. The proprietary model makes it challenging to assess the recommendation or its basis for a normal range of 3.5% to 6.0%. Further,

[273] Wooldridge Testimony, Exhibit JRW-6, page 5.

[274] Roger A. Morin, New Regulatory Finance, p. 151. (emphasis added).

[275] Villadsen Direct Testimony, p. 45

[276] *Id.*, n. 102.

Kroll provides a database of long-term historic MRP estimates, which are notably outside the range of the "normal" MRP range. For example, the longest-term estimate provided by Kroll (1925-current, or December 31, 2024) indicates that the historic MRP is 7.31%, which is 181 basis points above its normalized MRP (5.5%) and 131 basis points about its "normal" MRP range (upper bound 6.0%). I consider the Kroll normalized MRP to be the lower bound of a reasonable MRP estimate today.

In addition, Dr. Wooldridge considers the results of the Fernandez and Duke-CFO survey as additional point estimate of the MRP.[277] Survey data can be problematic and should not be given any weight by the Commission. A study from Professor Ibbotson noted:

> *"When using this [survey] method, one attempts to obtain the estimates from the market participants themselves. But there are a number of problems with this approach. Most of these investors have no clear opinion about the long-run outlook. Many of them have only very short-term horizons. Individual investors often exhibit extreme optimism or pessimism and make no pro-cyclical forecasts…"*[278]

Professor Ibbotson further expands on the points above by noting there are problems with replicability, the determination of the horizon over which the forecast is made, and the very large variation in forecasts amongst participants. These survey-based estimates lack reliability and should be disregarded. Lastly, it is worth noting that the Fernandez survey specifically cautions against using the survey data to estimate the cost of equity, as Dr. Wooldridge is doing. Fernandez says the average of the MRP survey estimates "cannot be interpreted as the [required equity premium] on the

[277] Wooldridge Testimony, p. 71.

[278] Roger G. Ibbotson, "The Equity Risk Premium," published in *Rethinking the Equity Risk Premium*, Research Foundation of CFA Institute, December 2011, p. 20 (notes omitted).

market nor as the [required equity premium] of a representative investor."[279] As discussed in further detail in Section V.F below, the inclusion of survey-based MRP estimates in Dr. Wooldridge's CAPM downwardly biases his results by 17 basis points.

Q72. Do you agree with Mr. Rothschild's options-based approach to estimating the MRP?

A72. No. The option-based approach is uncommon – not only in regulatory proceedings but also in MBA finance classes as I see no mention of this approach in three common textbooks. Therefore, the adoption of such an approach would require substantial documentation of its properties, ability to match shareholder expectations, and the availability of sufficient data for examination. I therefore find it premature to rely on the approach.

Q73. How do you respond to Mr. Rothschild's criticisms that using betas and market-risk premiums measured using two different market indices will result in "sometimes drastically different values" than if you used the same index.[280]

A73. It is true that Kroll's and Bloomberg's MRP are measured using the S&P 500 whereas the *Value Line* betas are measured using the New York Stock Exchange ("NYSE"). However, this does not have a substantial effect on ROE estimates as Mr. Rothschild alleges. The S&P 500 and NYSE are both broad market indices. The movement of the S&P 500 and the NYSE are highly correlated with an R-squared value of 97.28%.[281] The FERC also addressed this issue in Opinion 569-A, stating that there was substantial evidence that investors rely on *Value Line* betas to make investment

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[279] Pablo Fernandez, Diego Garcia de la Garza, Lucia Fernandez Acin, "Survey: Market Risk Premium and Risk-Free Rates used for 54 countries in 2025," May 21, 2025, p. 9, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5260463.

[280] Rothschild Testimony, p. 133.

[281] Calculated based on daily returns of the S&P 500 and NYSE Composite Index from August 11, 2015 to August 11, 2025.

decisions.[282] They were further not persuaded by arguments raised that NYSE-based betas cannot be used with S&P 500 data.[283]

Q74. Drs. Wooldridge and Ellis and Mr. Rothschild argue that the MRP estimates you rely upon in your CAPM are too high. Do you agree?

A74. I do not. Drs. Wooldridge and Ellis and Mr. Rothschild argue that my MRP estimates are above estimates published by other sources such as academic papers; historical stock and bond returns; surveys; and financial data providers.[284] As discussed above, there are serious issues with some of the estimated compiled by Dr. Wooldridge from academic papers and surveys as many of the estimates are outdated or rely on methodologies that are not appropriate for estimating the cost of capital. Mr. Rothschild points to Kroll's normalized MRP (which he misquotes as 5.0% when Kroll updated their estimate to 5.5% in April 2025[285]) and Bloomberg's MRP and incorrectly states that I do not rely on these estimates in my analysis.[286] However, I rely on these estimates in two scenarios of the CAPM.[287] I also present extensive evidence based on the FERC MRP (7.92% and 7.47%) and UBS' MRP (6.4%) that estimates from that the Bloomberg MRP is too low and the Kroll recommended ROE should be a considered a floor.[288] The current FERC MRP is 7.66% based on IBES growth rates and 6.64% based on Value Line growth rates,[289] supporting my findings regarding the Kroll normalized MRP and Bloomberg MRP estimates.

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[282] FERC Order 569-A, p. 38.

[283] *Ibid*.

[284] Wooldridge Testimony pp. 94-95; Ellis Testimony, pp. 76-77; Rothschild Testimony, pp. 80-84.

[285] Kroll, "Kroll Recommended U.S. Equity Risk Premium and Corresponding Risk-Free Rates to be Used in Computing Cost of Capital: January 2008 – Present," April 15, 2025, https://www.kroll.com/en/reports/cost-of-capital/recommended-us-equity-risk-premium-and-corresponding-risk-free-rates

[286] Rothschild Testimony, p. 80.

[287] Villadsen Direct Testimony, p. 48.

[288] *Id.*, pp. 44-45.

[289] Exhibit SCE-07 Attachment R-F. As of July 31, 2025.

D. FINANCIAL LEVERAGE ADJUSTMENTS

1. Preliminaries

Q75. What do you cover in this section of your rebuttal testimony?

A75. I respond to the critiques and misunderstandings of my Direct Testimony regarding financial leverage. Specifically, I address Intervenors' concerns regarding the use of the Hamada adjustment and the after-tax weighed average cost of capital to account for differences in financial leverage. I also present the regulatory precedent for taking financial leverage into account. Finally, I assess the impact on the Intervenors' ROE estimates by failing to take into account differences in capital structure.

Q76. What arguments do the Intervenors make regarding financial risk?

A76. Dr. Wooldridge [290] and Mr. Gorman criticize my use of standard financial techniques—the after tax weighted average cost of capital and Hamada adjustment—to account for differences in financial leverage between the proxy companies and SCE's requested capital structure. [291] Dr. Wooldridge claims that the ATWACC adjustment is not applicable because traditional regulation uses book values and it is therefore not correct to consider the market value capital structure of the proxy companies.[292] Mr. Gorman disagrees with my ATWACC and similarly argues that it is inappropriate to compare the proxy company's market value capital structure to SCE's requested capital structure.[293]

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[290] Wooldridge Testimony, pp. 112-114.

[291] While Mr. Rothschild does not explicitly criticize my use of financial leverage adjustments, he does not apply such techniques in his CAPM and DCF models.

[292] Wooldridge Testimony, pp. 112-113.

[293] Gorman Testimony, pp. 166-169.

Q77. How do you respond to Dr. Wooldridge and Mr. Gorman's arguments that financial risk adjustments are inappropriate?

A77. Standard cost of equity estimation methods, including the CAPM and DCF model, express a company's cost of equity in percentage terms per dollar of equity as measured at market value – that is at the prevailing market capital structures. The CAPM and DCF models tell us what the unit price of risk is as measured in the current capital market. However, cost of service regulation (in California as well as many other jurisdictions) applies the rate of return to the book value and not the market value, for good reason: it strives to give a fair return on and recovery of the utility's capital investments, not their economic value. If rates of return were awarded against market value, then it would create a circular situation whereby the allowed rate would either boost or suppress the market value gaining the allowance according to whether it was high or low.

Most utilities have a greater share of debt in their book capital structure than in their market value capital structure (i.e. they are more levered in book terms).[294] As a result, if the market cost of equity were granted against the book amount (cost basis), then the utility shareholders would not be earning enough to offset the risk of full cost recovery. The additional debt in the book capital structure will put investors at risk for non-recovery. The leverage adjustment in turn takes this additional leverage into account and adjusts the allowed return of equity (from the market measured rate) just enough to ensure the risk of cost recovery is compensated. Making the adjustments keeps investors whole, and the equity competitive with other investment opportunities.

Q78. Does Dr. Ellis consider financial leverage in his ROE methodology?

A78. In part. Dr. Ellis recognizes that the amount of debt in a company's capital structure can impact equity investors' required returns.[295] He also recognizes that the allowed

[294] This also includes other debt-like obligations, such as Power Purchase Agreements ("PPA").

[295] Ellis Testimony, p. 29.

ROE and capital should be considered together to account for financial risk.[296] However, Dr. Ellis relies on financial leverage adjustments to optimize his recommended capital structure in an attempt to achieve credit metrics consistent with an A3 credit rating for SCE and minimize costs to customers (via the equity return portion of the revenue requirement).[297] Notably, Dr. Ellis unlevers his ROE estimates using the Hamada adjustment and ATWACC.[298] For both adjustments he relies on the market value capital structure for the proxy companies, which he argues is the best practice for such adjustments.[299] To do so, he performs an analysis that evaluates impacts on these metrics at different equity ratios by holding the ROE constant at either (1) SCE's proposed ROE or (2) Dr. Ellis' non-financial risk adjusted ROE recommendation of 6.11%.[300] Based on this analysis, he determines an optimized equity ratio of 54.7% meets his objective.[301]

Q79. Do you agree with Dr. Ellis's financial leverage adjustments?

A79. Not entirely. I agree with Dr. Ellis that the amount of financial leverage in a company's capital structure impacts the cost of equity and that this can be accounted for using standard financial techniques, like the Hamada adjustment and ATWACC. I also agree with him that it is appropriate to use the proxy company's market value capital structure and SCE's authorized capital structure to make the adjustments.

However, a concern with Dr. Ellis's financial leverage adjustments is that he holds the ROE constant to find an optimized capital structure, despite recognizing the interdependent relationship between the two. Another concern is that Dr. Ellis's ultimate ROE recommendation (that goes along with his optimized capital structure)

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296 *Id.*, p. 85.

297 *Id.*, pp. 96-97.

298 *Id.*, pp. 86-87.

299 *Ibid*.

300 *Id.*, pp. 88-89; 96-97.

301 *Id.* pp. 96-97.

is his non-financial leverage adjusted recommended ROE of 6.11%. This is inconsistent with his recognition of the impacts of financial risk on equity returns and only serves to downwardly bias his recommendations.

Further, Dr. Ellis's financial leverage adjustments also fail to account for other debt-like obligations, which biases his capital structure calculations. It would also downwardly bias his re-levered ROE estimates; however, as discussed above, he does not attempt to reconcile his capital structure adjustments with his recommended ROE.

2. Financial Economics

Q80. How should capital structure be taken into account to ensure that the allowed returns meet the fair return standard?

A80. The proportion of debt in the capital structure—also known as financial leverage—influences the risk borne by equity investors. For a given degree of business risk, a higher proportion of debt financing increases the expected variability of equity returns. Thus, to compare the fair returns of two otherwise identical firms, on a risk adjusted basis, the capital structures must be taken into account. This adjustment should also account for other debt-like obligations, such as PPA. For example, if more debt is used, the greater financial risk imposed by the greater financial leverage must be compensated by a commensurately higher expected return on equity. Otherwise, the more leveraged firm will not receive a fair return and will be at a disadvantage in the competition to attract capital in equity markets.

Q81. How does leverage relate to the cost of equity?

A81. Financial risk or capital structure is a large topic in financial economics. The principle that financial leverage amplifies the variability of equity returns and thereby increases the financial risk to equity investors is a firmly established core principal of corporate finance. It is directly connected to the Modigliani Miller proposition that, except as influenced by the tax-deductibility of debt and the cost of financial distress, the value

of a firm's assets is independent of its choice of financing. This intuitive framework means that some measures of the overall cost of capital for firms with comparable systematic business risk should be the same regardless of capital structure,[302] even if the cost of the equity and/or debt components of financing vary in proportion to the degree of financial leverage.

It is commonly recognized in finance textbooks that financial leverage impacts the cost of equity for a company. A replication from a standard MBA textbook is provided below:[303]

COMMON MISTAKE **Is Debt Better Than Equity?**

Because debt has a lower cost of capital than equity, a common mistake is to assume that a firm can reduce its overall WACC by increasing the amount of debt financing. If this strategy works, shouldn't a firm take on as much debt as possible, at least as long as the debt is not risky?

This argument ignores the fact that even if the debt is risk free and the firm will not default, adding leverage increases the risk of the equity. Given the increase in risk, equity holders will demand a higher risk premium and, therefore, a higher expected return. The increase in the cost of equity exactly offsets the benefit of a greater reliance on the cheaper debt capital, so that the firm's overall cost of capital remains unchanged.

As professors Berk and DeMarzo further note:

> *The levered equity return equals the unlevered equity return, plus an extra "kick" due to leverage…The amount of additional risk depends on the amount of leverage, measured by the firm's market value debt-equity ratio, D/E…*[304]

This relationship is further illustrated in Figure R-21Figure R-21, reproduced from the MBA textbook *Principles of Corporate Finance* by Brealey, Myers, and Allen. It illustrates that as capital structure shifts to use a greater proportion of lower cost debt

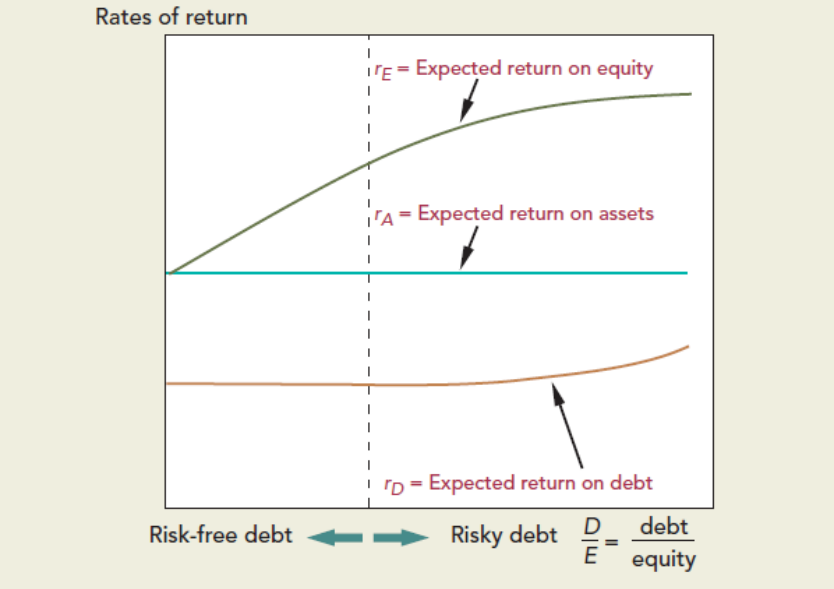
[302] Except in cases of extremely high or low leverage, where the tax and financial distress effects may dominate.

[303] Jonathan Berk and Peter DeMarzo, "Corporate Finance," Third Edition, 2013 (Berk & DeMarzo 2013), p. 492.

[304] Berk & Peter DeMarzo 2013, p. 489. Similar comments appear in Richard A. Brealey, Stewart C. Myers, and Franklin Allen, 2014, Principles of Corporate Finance, 11th edition, McGraw-Hill Irwin (Brealey, Myers & Allen 2014), p. 433.

financing, the investor required return on equity (and debt, especially at higher leverage ratios) increases to compensate for the greater financial risk, such that the overall required return on assets remain unchanged.

Figure R-21: Illustration of the Modigliani Miller Principle[305]



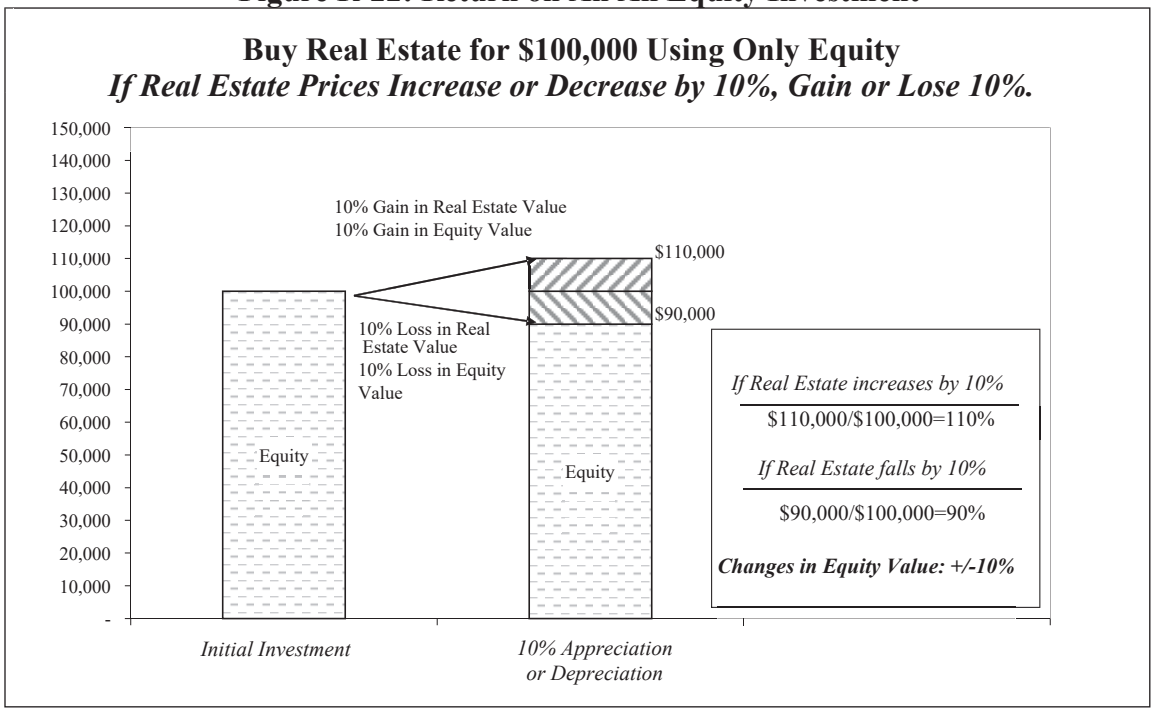
Financial economics simply does not leave any doubt that the cost of equity increases with financial leverage and that the relevant measure of financial leverage depends on market value. I—like the Intervenors—estimate the cost of equity using market data in the CAPM and DCF-based models. Since the Risk Premium model is based on book values, the relevant leverage for this methodology is book value based.

Q82. Could you provide a numerical example to illustrate the impact of financial leverage on the cost of equity?

A82. Yes. As a simple example, think of an investor who takes money out of her savings and invests $100,000 in real estate. The future value of the real estate is uncertain. If the real estate market booms, she will realize a gain. However, if the real estate market declines, she will realize a loss. Figure R-22 below provides an illustration of this:

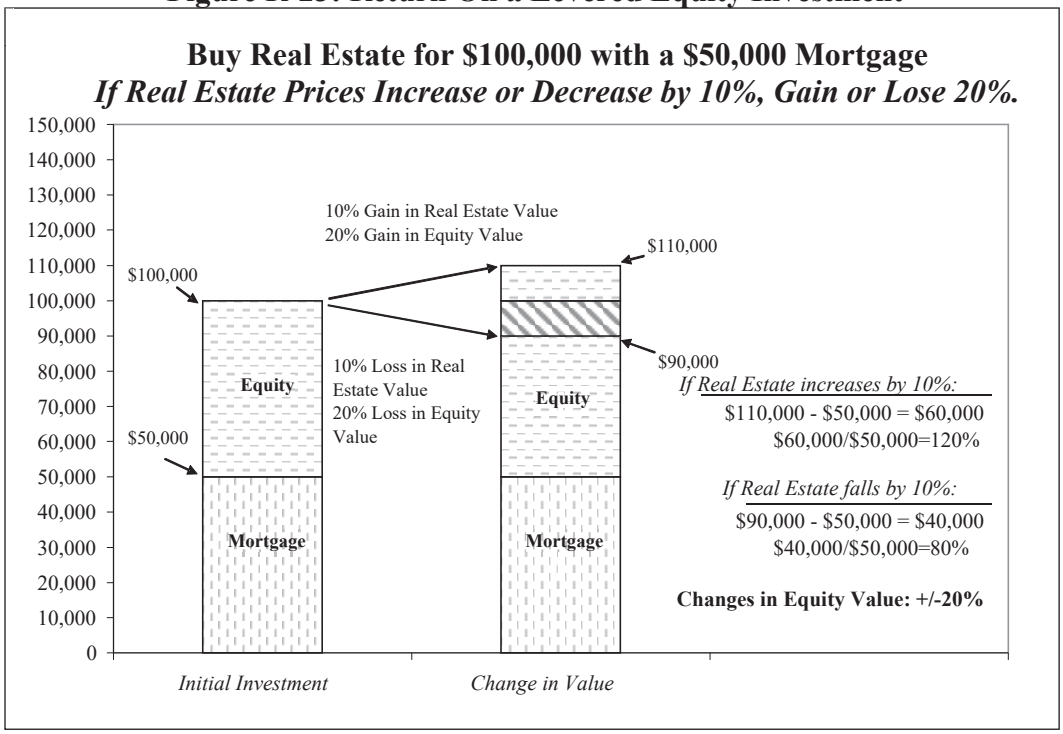
[305] Brealey, Myers, and Allen, Principles of Corporate Finance, 10th Ed. (2011), p. 429, Figure 17.2.

Figure R-22: Return on An All Equity Investment



Compare this to the situation illustrated in Figure R-23 below, where the investor finances the same real estate purchase using 50% cash from her savings (equity) and finances 50% using funds from a mortgage (debt). In this case, the variability in the investor's expected equity return is two times greater than in Figure R-22 above. The entire fluctuation of 10% from rising or falling real estate prices falls on the investor's equity investment, which is smaller ($50,000) for the leveraged investment depicted in Figure R-23 below as compared to the all-equity $100,000 investment shown in Figure R-22 above. The equity return for the leveraged investment goes up or down by 20% in the leverage scenario even though the actual change in the value of the real estate (+/- 10%) is the same as depicted in Figure R-22 above for the all-equity investment. The lesson from this example is obvious: debt adds risk because, while there is more potential gain on the equity investment by using debt, there is a higher potential loss on that equity investment that goes with it. This concept is colloquially referred to as "high risk, high reward."

Figure R-23: Return On a Levered Equity Investment



Q83. Do financial textbooks also address the question of how financial leverage affects the cost of equity?

A83. Yes. Standard textbooks on corporate finance provide examples, like the one I presented above, to illustrate how the introduction of debt financing amplifies the variability of equity returns and thus increasing the risk to equity holders which causes them to demand higher expected returns. For example, Professors Brealey, Myers, and Allen write:

> *Our example shows how borrowing creates financial leverage or gearing. Financial leverage does not affect the risk or the expected return on the firm's assets, but it does push up the risk of the common stock. Shareholders demand a correspondingly higher return because of this financial risk.*[306]

[306] Brealey, Myers and Allen (2017), Principles of Corporate Finance, 12th Edition, p. 446.

Similarly, Professors Berk and DeMarzo summarize the effect of leverage on the cost of capital as follows.

> *…[L]everage increases the risk of equity even when there is no risk that the firm will default. Thus, while debt may be cheaper when considered on its own, it raises the cost of capital for equity. Considering both sources of capital together, the firm's average cost of capital with leverage is … the same as for the unlevered firm.*[307]

These statements by preeminent finance scholars in widely-used Corporate Finance textbooks highlight two important points that can also be intuitively observed based on the real estate investment example:

- The variability of returns on the asset itself (e.g., the piece of real estate) is unchanged by the introduction of financial leverage, therefore "leverage does not affect the risk or the expected return on the firm's assets." Rather, it is the risk and required returns of the equity and debt financing instruments that are changed by the degree of financial leverage.

- The mechanism by which leverage adds variability to returns is independent of any effect of increased leverage on the risk that the firm will be unable to fulfill its fixed financial obligations, and thus (as Berk and DeMarzo put it) "leverage increases the risk of equity even when there is no risk that the firm will default."

Q84. Do financial economists recognize the calculation of the after-tax weighted average cost of capital based on market values?

A84. Yes. Looking to the most widely-used MBA textbook by Professor Brealey, Myers, and Allen, they explain that:

[307] Berk and DeMarzo (2014), Corporate Finance, 3rd Ed., p. 482.

The formula for the after-tax weighted average cost of capital is:

$$WACC = r_D(1 - TC)\left(\frac{D}{V}\right) + r_E\left(\frac{E}{V}\right)$$

where r_D and r_E are the expected rate of return demanded by investors in the firm's debt and equity securities, D and E are the current market values of debt and equity and V is the total market value of the firm (V = D + E).[308]

Professors Brealey, Myers, and Allen then show that the after-tax weighted average cost of capital is flat over a broad range of capital structures and calculates the cost of equity using the same formula as I do.[309]

Q85. Do financial economists recognize the Hamada technique?

A85. Yes. The Technical Appendix to my Direct Testimony provides a detailed description of the standard textbook formulas used to implement the Hamada technique for unlevering measured equity betas based on the proxy companies' capital structure to calculate "asset betas" that measure the proxy companies' business risk independent of the financial risk imposed by differing capital structures. I also note that standard MBA textbooks,[310] practitioner texts,[311] as well as the CFA curriculum[312] all describe the Hamada approach and use formula like those relied upon in my direct testimony. Thus, the Hamada method is simply a well-established methodology taught in business schools as well as to CFA applicants.

[308] Brealey, Myers and Allen (2014), p. 492.

[309] *Ibid*.

[310] Brealey, Myers and Allen (2014), pp. 492-493, Berk and DeMarzo (2014) pp. 415-417, Ross, Westerfield and Jaffe (2013), pp. 571-573.

[311] Roger A. Morin, "New Regulatory Finance," Public Utilities Reports, Inc., 2006, pp. 221-225; Leonardo R. Giacchino and Jonathan A. Lesser, "Principles of Utility Corporate Finance," Public Utilities Report, Inc., 2011, pp. 229-232.

[312] CFA Institute, "2023 Curriculum, CFA Program Level 1, Corporate Finance: Cost of Capital," https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/cost-capital

Q86. What are the implications of these fundamental principles for the Intervenors' ROE results?

A86. Failing to recognize the impact of financial leverage on the cost of equity results in a non-trivial downward bias in the cost of equity estimates. This can readily be estimated by looking to the differences in sample betas obtained at an assumed capital structure for the proxy group utilizing the same beta at their recommended equity ratio. First, I calculate the asset (or zero-debt financing) beta using the betas provided by the Intervenors along with an assumed market value capital structure for the proxy group. Next, I calculate the re-levered betas that are consistent with (i) SCE's requested equity ratio of 50.6% (reflecting PPA obligations) and (ii) the Intervenors' recommended equity ratios. This approach is exactly as described in standard textbooks such as Brealey, Myers and Allen (2014), Berk and DeMarzo (2014), and Ross, Westerfield and Jaffe (2013) and the CFA curriculum.[313] This is shown in Exhibit SCE-02 Appendix B.

Q87. What is the impact on the Intervenors' ROE estimations when considering financial leverage adjustments?

A87. Applying the Hamada adjustment to Intervenors' betas increases the range of their CAPM-based ROE results by approximately 27 to 28 basis points using the Hamada approach and SCE's recommended capital structure (50.6%).[314] Using the Intervenors' recommended capital structures, the range of CAPM-based ROE results increase by approximately 32 basis points. Similarly, applying the financial leverage adjustment to the Intervenors' DCF models,[315] increases their range of ROE results by approximately 56 to 101 basis points at SCE's recommended capital structure. Using

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[313] *Supra* 310, 312.

[314] *Note*, given the significant issues with Dr. Ellis' and Mr. Rothschilds' CAPM and DCF models, I do not attempt to apply financial leverage adjustments to their models. However, their models also fail to account for financial risk.

[315] *Note*, I do not apply financial leverage adjustments to Mr. Gorman's sustainable growth rate DCF model given my fundamental concerns with the model, as discussed in Section V.B.5.

the Intervenors' recommended capital structures, the range of DCF-based ROE results increase by approximately 62 to 110 basis points.

Figure R-24: Impact of Financial Leverage Adjustments on Intervenor CAPM and DCF Model Estimates

Intervenor	Original Analysis	At SCE's 50.6% Eq. Ratio	At Intervenors' Eq. Ratio
Mr. Gorman			50% Eq. Ratio
DCF	8.59% - 10.88%	9.15% - 11.89%	9.21% - 11.98%
CAPM	9.77%	10.04%	10.09%
Dr. Wooldridge			50% Eq. Ratio
DCF	9.75%	10.52%	10.59%
CAPM	8.75%	9.03%	9.07%

Based on the above, I find that the Intervenors' ROE estimates are downwardly biased because they fail to account for the impact of financial leverage on the cost of equity, using standard financial techniques.

E. RISK PREMIUM

Q88. Please provide a brief overview of Mr. Gorman's Risk Premium models.

A88. Mr. Gorman implements two versions of the Risk Premium model to estimate the ROE on SCE. In his first model, he estimates the difference between commission-authorized ROEs from 1986 through March 2025 and the yield on U.S. Treasury bonds at the time of the regulatory decision.[316] From this data he calculates a risk premium of 5.68% based on the average current market observable risk premium spread from 1986 to March 2025 and then takes 90% of this value to arrive at his final risk premium of 5.10%.[317] Adding the projected 30-year U.S. Treasury bond yield of 4.50% results in an ROE estimate of 9.60%.[318]

[316] Gorman Testimony, pp. 146-147.

[317] *Id.*, p. 152.

[318] *Ibid*.

His second model calculates the premium based on the difference between commission-authorized ROEs and the yield on A-rated utility bond yields, as reported by Moody's, at the time of the regulatory decision.[319] With this data, he then calculates an average risk premium of 4.33% from 1986 to 2025 and then he takes 90% of this value to arrive at his final risk premium of 3.90%.[320] Mr. Gorman then adds the 3-month average A-rated utility bond yield of 5.89% to obtain an ROE estimate of 9.80%.[321]

Q89. What concerns do you have with Mr. Gorman's Risk Premium Model?

A89. Mr. Gorman's Risk Premium Model downwardly biases the premium estimate by simply taking the average premium over time. This approach ignores any changes in the underlying relationship between authorized ROEs and prevailing bond yields at the time of the decision. Further, his decision to take 90% of estimated premium to account for differences between the current and historic utility premium arbitrary—again a more rigorous approach would be to consider the risk premium relationship using a regression analysis. These choices downwardly bias his Risk Premium estimates.

This is evidenced by looking at Figure R-25 below, which plots the data used in Mr. Gorman's Risk Premium Model and shows the implied risk premium (red line) increase over time, while the yields on 30-year Treasury bonds (teal line) and authorized electric ROEs (blue line) decline over the same period. Mr. Gorman's average premium of 5.68% (versus 30-year U.S. Treasury) is akin to an implied risk premium last observed approximately 17 years ago in 2008. Taking 90% of this premium (5.10%) is akin to an implied risk premium last observed approximately 26 years ago in 1999.

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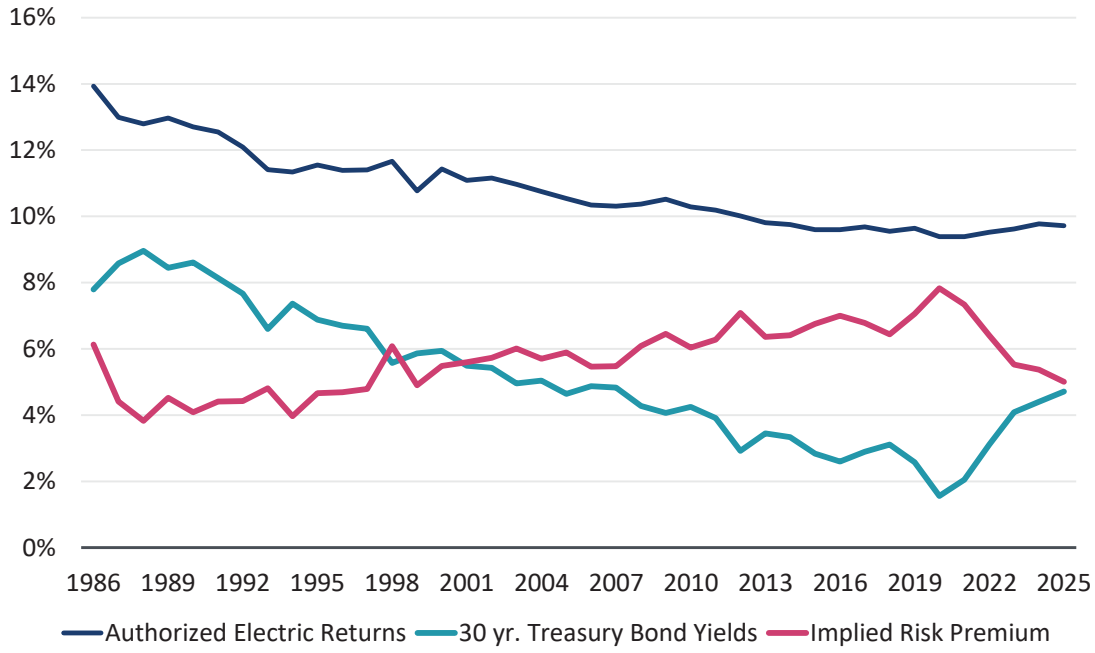
[319] *Id.*, p. 147.

[320] *Id.*, p. 152-153.

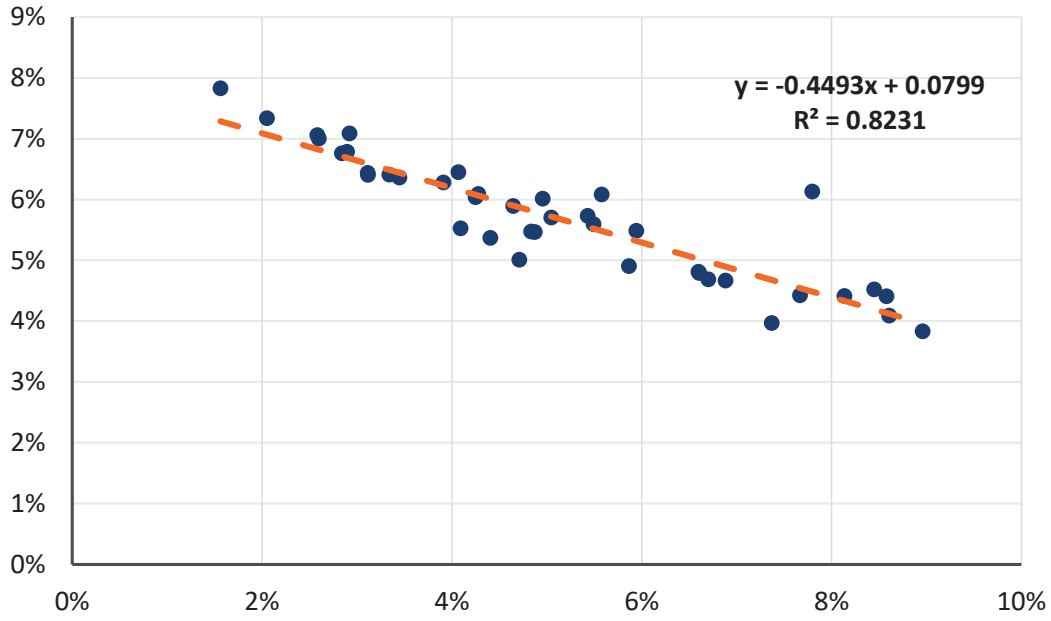
[321] *Ibid*.

Figure R-25: Gorman Risk Premium Relationship Since 1986



The more common and rigorous approach is to use ordinary least squares regression, which describes the relationship between implied premiums (dependent variable) and prevailing bond yields (independent variable). By using the rolling average, Mr. Gorman's version of the Risk Premium Model loses the explanatory power of the relationship between prevailing bond yields and authorized ROEs. Figure R-26 below shows the linear relationship and regression equation based on Mr. Gorman's calculated premiums and prevailing bond yields.

Figure R-26: Linear Regression Risk Premium Relationship (30-Year U.S. Treasuries)



Q90. How do Mr. Gorman's Risk Premium results change if he had used a regression analysis instead of a simple average?

A90. Using Mr. Gorman's data, I recalculated both of Mr. Gorman's Risk Premium Models (using Treasury bonds or utility bond yields). I used ordinary least squares (OLS) regression to estimate the parameters of the linear equation:

$$\text{Risk Premium} = A_o + A_1 \times (\text{Bond Yields})$$

Looking first to Mr. Gorman's risk premium estimates based on 30-year Treasury bond yields, I derived the following estimates for A_O and A_1 as shown in Figure R-27 below. I note that the risk premium regression model fits the data well as the R-squared regression is equal to 0.823 (see also Figure R-26 above). Using Mr. Gorman's projected 30-year Treasury bond yield of 4.50% and rate case data, the cost of equity estimate is equal 10.47%, which is 87 basis points above Mr. Gorman's ROE estimate of 9.60%.

Figure R-27: Gorman Risk Premium Using OLS Regression (30-year Treasury Yields)

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)				
R Squared	0.823			
Estimate of Intercept (A_0)	0.080			
Estimate of Slope (A_1)	-0.449			
Predicted Risk Premium	**+**	**Projected 30-Year Treasury Bond Yield**	**=**	**Est. Cost of Equity for Electric Utilities**
5.97%		4.50%		10.47%

Sources and Notes:
A0, A1, and R^2 are derived from an OLS regression analyzing the relationship between 30-year Treasury yields and risk premiums.
Projected 30-Year Treasury Bond Yield is from Gorman Direct Testimony, p. 91.

Next, I turn to Mr. Gorman's risk premium estimates based on A-rated utility bond yields. The estimates for A_O and A_1 as shown in Figure R-28 below and the R-squared value is 0.853. Using Mr. Gorman's current 3-month average on A-rated utility bonds of 5.89% as the bond yield input results in a revised cost of equity estimate of 10.49%, which is around 70 basis points higher than his ROE estimate of 9.80%.

Figure R-28: Gorman Risk Premium Using OLS Regression (A-Rated Utility Bond Yields)

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)				
R Squared	0.853			
Estimate of Intercept (A_0)	0.073			
Estimate of Slope (A_1)	-0.461			
Predicted Risk Premium	**+**	**3-Month Average A-Rated Utility Bond Yield**	**=**	**Est. Cost of Equity for Electric Utilities**
4.60%		5.89%		10.49%

Sources and Notes:
A0, A1, and R^2 are derived from an OLS regression analyzing the relationship between 30-year Treasury yields and risk premiums.
3-M Average A-Rated Utility Bond Yield is from Gorman Direct Testimony, p. 91.

Q91. Dr. Wooldridge critiques your risk premium model because it "produces an inflated measure of the risk premium because [the approach] uses historic authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury yields."[322] Do you agree?

A91. No. The purpose of my risk premium model is to statistically assess the relationship between the authorized ROEs and the Treasury yield prevailing at the time of the decision and then apply those insights to the 2023-2025 period, when the ROE being determined in this proceeding will apply to SCE. Therefore, it is necessary to use a forecasted yield. Historically, the risk premium equity investors require to invest in utility stock has fluctuated, as have interest rates, and my approach uses statistical analysis to reflect that fact.

[322] Wooldridge Testimony, p. 111

Q92. Dr. Wooldridge also states that allowed ROEs reflect regulatory commission behavior and not investor expectations.[323] Do you agree?

A92. No. Certainly, the authorized ROEs reflect decisions of regulatory commissions, but regulatory commissions seek to set the allowed ROE at the cost of equity. As the Commission noted in D.12-12-034:

> *"We attempt to set the ROE at a level of return commensurate with market returns on investments having corresponding risks, and adequate to enable a utility to attract investors to finance the replacement and expansion of a utility's facilities to fulfill its public utility service obligation."*[324]

I read this statement as the Commission seeking to set the authorized ROE at a level commensurate with the rate prevailing in financial markets—the cost of equity. This is also consistent with, for example, the advice in Dr. Morin's text:

> *"The regulator should set the allowed rate of return equal to the cost of capital so that the utility can achieve the optimal rate of investment at the minimum price to ratepayers."*[325]

Simply put, this objection implies that regulator commissions set the authorized ROE at something other than their best estimate of the cost of equity, which is inconsistent with their public statements and regulatory economists' advice. I do not believe they do.

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[323] *Ibid*.

[324] D.12-12-034, p. 18

[325] Roger A. Morin, 1994, "Regulatory Finance: Utilities' Cost of Capital," in collaboration with Lisa Todd Hillman, Public Utilities Reports, Inc., p. 23.

Q93. Dr. McCann says that using past authorized ROEs to determine the ROE is circular and should not be relied upon.[326] Do you agree?

A93. I disagree. Ignoring the results from the Risk Premium Model disregards information availability to equity investors who are making decisions about holding assets with commensurate risk, as required by the Fair Return Standard. Dr. McCann's circularity argument would only be applicable if I were to only rely on authorized returns in California, which I have not.

Q94. Mr. Rothschild says that the Risk Premium Model is not market based.[327] Do you agree?

A94. No. Commissions base their decisions on financial models using market data, so the authorized ROE is implicitly based on market data. Additionally, as discussed above, it relies on information available to investors when making investment decisions and provides a direct comparison of allowed ROEs on fully regulated entities.

F. IMPACT OF INTERVENOR CHOICES

Q95. In the prior sections you describe several shortcomings of Drs. Wooldridge's and Ellis' and Messrs. Gorman's and Rothschild's cost of equity estimation methods. What are the impacts on their ROE estimates of those shortcomings.

A95. In this section I make reasonable adjustments to Drs. Wooldridge's and Ellis' and Messrs. Gorman's and Rothschild's CAPM and DCF models to correct for the shortcomings that I identified above.[328] I will address the changes to each Intervenors model separately, but overall, I find that the Intervenors' ROEs estimates are

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[326] McCann Testimony, p. 24.

[327] Rothschild Testimony, pp. 82-83.

[328] *Note*, I did not make adjustments to address all of the critiques I raise of Drs. Wooldridge's and Ellis' and Messrs. Gorman's and Rothschild's cost of equity models. Not making an adjustment does not imply that it does not have an impact on the ROE estimates. Instead, I focus on what I consider to be significant shortcomings of their methods and methods/inputs where such inputs could reasonably be modified. In cases, where, for example, the MRP is below the spread between BBB rated utility debt and the risk-free rate, the input is simply meaningless and cannot readily be modified.

downwardly biased by 27 to 177 basis points. To better illustrate the impact of the Intervenors' choices the adjustments in this section are *not* also adjusted for financial leverage. As shown in Section V.D above, accounting for financial leverage would increase the Intervenors' ROE estimates by at least 20 basis points before making any other adjustments to their models.

Q96. What adjustments do you make to Dr. Wooldridge's CAPM and DCF models?

A96. I make several adjustments to Dr. Wooldridge's CAPM and DCF models. First, I change his proxy group to exclude Edison International to avoid any circularity issues due to SCE being the largest subsidiary of the company. I also remove Con Edison and Eversource because they are not vertically integrated electric utilities. Lastly, I avoid TXNM Energy to avoid any potential impacts on the cost of equity from their announced acquisition by Blackstone in May 2025.

Turning to Dr. Wooldridge's DCF, I first exclude his DPS and BVPS growth rates and instead only rely on his EPS growth rates for the proxy companies. DPS and BVPS growth rates do not account for other ways that companies can and do return earnings to equity investors. I also replace his 0.5 scalar of the growth rate and instead implement a quarterly dividend model. Lastly, I replace his 30-, 60-, and 90-day stock price averages with a 15-day stock price average to better reflect the "current" stock in the model.

I next adjust Dr. Wooldridge's CAPM in two ways. First, instead of taking the average of S&P's monthly betas and *Value Line*'s weekly betas for the proxy companies, I instead only use *Value Line* weekly betas as of the date of his analysis. As discussed above, averaging monthly and weekly betas is problematic and *Value Line* betas are now free of any alleged lingering impacts from the COVID-19 pandemic. Second, I disregard his estimates of the MRP that come from survey data. Instead, I use the normalized MRP estimate that he sourced from Kroll (5.5%). As discussed in my

Direct Testimony, I consider Kroll's normalized MRP to currently be a floor for the MRP.

As shown in Figure R-29 below, making the above reasonable adjustments to Dr. Wooldridge's CAPM and DCF models increases his ROE estimates by 27 to 36 basis points, before consideration of financial leverage adjustments.

Figure R-29: Impact of Reasonable Adjustments to Dr. Wooldridge's CAPM and DCF Models

	ROE	Change from Dr. Wooldridge ROE Estimate
Wooldridge DCF (as reported)	9.75%	
Proxy Group	9.76%	0.01%
Exclude DPS and BVPS Growth rates	9.92%	0.17%
Exclude 0.5g scalar - quarterly growth rates instead	9.89%	0.14%
Use 15-day stock price	9.77%	0.02%
Adjusted DCF Model	**10.02%**	**0.27%**
Woolridge CAPM (as reported)	8.75%	
Proxy Group	8.74%	-0.01%
Exclude Monthly Betas	8.93%	0.18%
Exclude Survey MRPs	8.92%	0.17%
Adjusted CAPM Model	**9.11%**	**0.36%**

Q97. What adjustments do you make to Dr. Ellis' CAPM and DCF models?

A97. First, I make changes to Dr. Ellis' proxy group by excluding TXNM due to its recently announced acquisition. Next, turning to Dr. Ellis' DCF model, I extend the first stage of his DCF model to five years of growth at analyst growth rate estimates. I also convert his real terminal growth rate of 1.95% to a nominal growth rate of 3.99%.[329]

I do not attempt to make any corrections to Dr. Ellis's CAPM. As discussed above, his CAPM suffers from significant methodological flaws that do not make his ROE estimates credible. As a result of using raw beta estimates along with an extremely

[329] 3.99% = (1+1.95%) x (1+2%) -1

low MRP estimate of 0.92% all of his CAPM-based ROE estimates are below the proxy companies' cost of equity. This violates fundamental principles of finance about the relationship between the cost of equity and the cost of debt. The Commission should also disregard his CAPM.

As shown in Figure R-30 below, making the above reasonable adjustments to Dr. Ellis's DCF models increases his ROE estimates by 177 basis points, before consideration of financial leverage adjustments.

Figure R-30: Impact of Reasonable Adjustments to Dr. Ellis' DCF Models

	ROE	Change from Dr. Ellis ROE Estimate
Dr. Ellis DCF (As Reported)	6.90%	
Proxy Group Adjustment	6.94%	0.04%
Extending First Stage to 5 Years	7.10%	0.20%
Adjusting Terminal Growth Rate	8.52%	1.62%
Adjusted DCF Model	**8.67%**	**1.77%**

Q98. What adjustments do you make to Mr. Gorman's CAPM and DCF models?

A98. My primary concern with Mr. Gorman's CAPM and DCF models is that they do not account for financial leverages. As discussed above, applying financial leverage adjustments to his models increases his ROE estimates by 27 to 110 basis points. Aside from this, Mr. Gorman uses a 13-week stock price average in his DCF Model, which does not accurately reflect the "current" stock in his model. Further, as demonstrated in Section V.E above, I also correct Mr. Gorman's Risk Premium Model to use a regression analysis rather than a simple average of the historic risk premium.

As shown in Figure R-31 below, making the above reasonable adjustments to Dr. Wooldridge's risk premium model increases his ROE estimates by 70 to 87 basis points, before consideration of financial leverage adjustments.

Figure R-31: Impact of Reasonable Adjustments to Mr. Gorman's Risk Premium Models

	ROE	Change from Mr. Gorman ROE Estimate
Gorman Risk Premium (As Reported)	9.60% - 9.80%	
Regression Methodology	10.47% - 10.50%	0.70% - 0.87%
Adjusted Risk Premium Model	**10.47% - 10.50%**	**0.70% - 0.87%**

Q99. Do you perform any adjustments on Mr. Rothschild's CAPM and DCF models?

A99. No, I find that Mr. Rothschild's CAPM and DCF models rely on highly non-standard inputs, such as option implied betas, an option-derived MRP, and growth rates. These inputs rely on thinly traded options data and, in many instances, there is insufficient data to calculate a beta or growth rate. Mr. Rothschild's CAPM and the resulting ROE estimates should not be considered.

VI. BUSINESS RISK CONSIDERATIONS

Q100. What do you discuss in this section?

A100. I discuss the distinction between debt and equity risk as several witnesses rely on credit ratings or metrics to infer the risk that SCE's equity investors face.[330] Additionally, I address the witnesses' assertion that SCE is no more risky than the comparable companies as the witnesses assert that the wildfire risks are equally prevalent among the proxy companies or that equity investors do not carry the risk due to regulatory or legislative initiatives.

[330] Gorman Testimony, p. 20, 22, 28-29, McCann Testimony, p. 14-16, Rothschild, p. 22, Wooldridge Testimony, p. 26-27.

Q101. What comments do you have regarding Intervenor witnesses' use of credit ratings to measure business risk?

A101. First and foremost, credit ratings measure default risk – not equity risk. As Moody's has stated:[331]

> *Long-term ratings are assigned to issuers or obligations with an original maturity of eleven months or more and reflect both on the likelihood of a default or impairment on contractual financial obligations and the expected financial loss suffered in the event of default or impairment.*

Unlike shareholders (equity investors), debt holders are generally ensured a fixed periodical return and have priority in default. Therefore, debtholders care about default risk. However, shareholders are residual claimants, do not have a guaranteed return, and are last in line in case of default. Therefore, solid credit ratings are not sufficient to conclude that a company's equity carries little risk.

The Gorman Testimony emphasizes credit ratings and concludes that "credit rating agencies view California regulations and various recovery mechanisms approved by the Commission as **credit supportive**."[332] (emphasis added) I emphasized the last two words of the sentence because it shows that Mr. Gorman agrees that credit ratings are related to credit (or default) risk and not equity risk.

The Rothschild Testimony similarly notes California's regulatory environment as favorable citing credit rating agencies.[333] As noted above, credit ratings measures default risk and not equity risk, so the commentary from credit ratings regarding regulation pertain to their impact on credit risk and is primarily relevant for bondholders.

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[331] Moody's Investor Service, *Ratings, Symbols, and Definitions*, March 2025.

[332] Gorman Testimony, p. 29.

[333] Rothschild Testimony, p. 20.

Dr. Wooldridge "believe[s] that bond ratings provide a good assessment of the investment risk of a company."[334] I agree that bond ratings are good assessments of debtholder risk, but disagree that they are determinative of shareholders' risk for the reasons articulated above.

Q102. Please address the specifics of the witnesses' arguments regarding wildfires.

A102. Ms. Dowdell's business risk testimony states that wildfire risk is spreading nation-wide and California has better mechanisms in place.[335] The discussion of wildfire risk in the Gorman Testimony is focused on credit rating agencies' views and mitigation initiatives.[336] Dr. McCann similarly focuses on the wildfire risk and like Ms. Dowdell notes the risk in the Northeast and the wildfire fund created in AB 1054.[337]

Q103. How do you respond?

A103. Wildfire risks are discussed in the Rebuttal Testimony of Mr. Frank Graves and Mr. Robert Mudge (SCE-08) as well as in Company Testimony (SCE-05). I therefore only note that the testimony of Messrs. Graves and Mudge finds that (1) California's wildfire profile differs substantially from that of other areas and (2) that AB 1054 requires significant shareholder contributions and does not eliminate risk. I therefore shall not address wildfire risk further.

Q104. What other business or regulatory issues do Intervenors raise?

A104. The Dowdell Testimony says that California has a constructive regulatory environment including a decoupling mechanism, a forward test year, and balancing accounts [338] – indicating that this lowers SCE's business risk. However, as

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[334] Wooldridge Testimony, p. 26.

[335] Dowdell Testimony, p. 13-14 and 20.

[336] Gorman Testimony, p. 23-29.

[337] McCann Testimony, p. 4, 45-48.

[338] Dowdell Testimony, p 14, 17-22.

acknowledged by Ms. Dowdell, a decoupling mechanism generally does not affect the cost of equity as shown in several research papers.[339] These papers focus on whether there is empirical evidence as measured by the DCF model or CAPM that the cost of equity for companies with a decoupling mechanism is lower than for those that do not have such a mechanism. They find that there is no such evidence using standard statistical methods.

Q105. Does the Dowdell Testimony raise other issues?

A105. Yes, she states that SCE has earned its authorized ROE since 2018.[340] Whether SCE has earned its authorized return appears to depend on the measure hereof. For example, Table 9 in the Dowdell Testimony shows that the "Earned ROE on Theoretical Equity" in four years is below the authorized ROE and in three years above the Authorized ROE, while the GAAP earned ROE in all years is below the Authorized ROE. This issue is addressed in SCE-05.

Q106. What does the McCann Testimony say about the inclusion of imputed debt?

A106. The McCann Testimony critiques the inclusion of imputed debt or debt equivalence from Power Purchase Agreements ("PPA") in my analysis stating that California has preapproval and concludes:[341]

> *other states do not have such an extensive set of protections for utility shareholders from the risks that might be posed by PPAs. This situation creates an "apples and oranges" comparison of debt equivalence among utilities.*

[339] Joe Wharton and Michael J. Vilbert, "Decoupling and the Cost of Capital," *The Electricity Journal*, vol 28, 2015; Richard A. Michelfelder, Pauline Ahern and Dylan D'Ascendis, "Decoupling, risk impact and the cost of capital," *The Electricity Journal*, vol. 33, 2020.

[340] Dowdell Testimony, p. 31-33.

[341] McCann Testimony, p. 4, 50-53 (cite from p. 53).

This simply misunderstands my analysis as I specifically looked to an "apples to apples" comparison in that I relied on S&P's imputed PPA debt for each and every company in my proxy group.[342] The S&P approach to imputed debt explicitly acknowledges the regulatory treatment of PPA.[343] Further, as noted in my Direct Testimony, the Commission has explicitly acknowledged the importance of imputed debt (debt equivalence).[344] Therefore, the McCann argument on the exclusion of imputed debt has no merit.

Q107. What do you conclude regarding SCE's business risk?

A107. First, credit ratings measure default risk, so for utilities with a solid investment grade credit rating, they have little bearing on the cost of equity. Second, risks such as wildfire risks are asymmetric meaning that there is a one-sided risk. In the case of wildfires, it is a downside risk that is not compensated by an upside opportunity. Such risks are generally not measured in the financial models relied upon to determine the cost of equity. For example, betas are measured over a longer period of time using utility market returns for a group of proxy companies and stock market returns for, for example, the S&P 500. Messrs. Graves and Mudge (SCE-08) find that California's wildfire profile is unique and the offsetting mechanisms may not be sufficient.[345] As for other mechanisms, several papers have shown that decoupling mechanisms do not affect the cost of capital and, for example, deferral mechanisms or the choice of test year are (1) not unique to California and (2) do not impact systematic risk.

Q108. Does the fact that you have not addressed each and every issue mean you agree?

A108. No.

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342 Villadsen Direct, p. 40-41 and Appendix I.

343 Standard & Poor's, "Methodology for Imputing Debt for U.S. Utilities' Purchase Power Agreements," May 7, 2007 and "Key Factors for the Regulated Utility Industry," re-issued April 5, 2021.

344 Decision 22-12-031, p. 24.

345 Exhibit SCE-08 [[cite to conclusion]]

Q109. Does this conclude your rebuttal testimony?

A109. Yes.

APPENDIX R-A: RESPONSE TO SPECIFIC CRITICISMS OF VILLADSEN DIRECT REGARDING ECAPM

Q1. What critiques do the Intervenors raise regarding your use of the ECAPM methodology?

A1. Dr. Wooldridge claims that the ECAPM has no theoretical foundation and is an attempt to inflate cost of equity estimates.[346] Dr. Ellis similarly objects to the ECAPM as the underlying research is dated and not based on long-term risk-free rates.[347] In addition, Dr. Ellis finds the Fama-French model more appropriate.[348] Mr. Gorman argues that the use of adjusted betas in the ECAPM methodology is not appropriate and that such an approach is flawed.[349] Mr. Gorman also argues that the ECAPM is not a widely accepted methodology in regulatory settings.[350]

Q2. How do you respond to the criticisms?

A2. I disagree. Addressing first Dr. Wooldridge's concerns, I note that the ECAPM is based on the empirical analysis of many authors and not an attempt to increase the cost of equity estimate.[351] Second, Dr. Ellis mentions the Fama-French model, which, like the ECAPM, finds that the security market line is too steep. Thus, it affirms the ECAPM findings. As for the fact that the studies are based on short-term and not long-term risk-free rates, I note that my ECAPM parameters take that into account and use a much lower figure than the research supports. Finally, Mr. Gorman is concerned that I use ECAPM in combination with Value Line betas, which are adjusted using the

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346 Wooldridge Testimony, p. 89.

347 Ellis Testimony, p. 81-84.

348 *Ibid.*

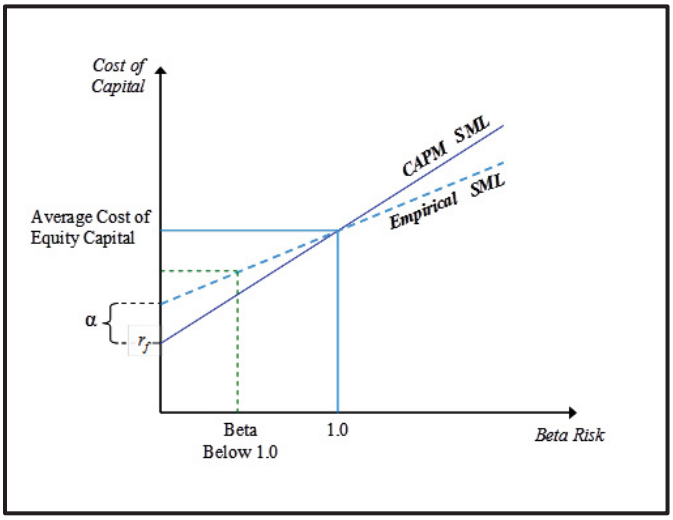
349 Gorman Testimony, p. 177-178.

350 Gorman Testimony, p. 179-180.

351 Villadsen Direct, Appendix B, Figure B-3. As shown in Figure 13, p. 50 of the Villadsen Direct Testimony, there is currently virtually no difference between the CAPM and ECAPM.

Blume Adjustment. He believes the adjustment is inappropriate. However, the Blume Adjustment and the ECAPM are two fundamentally different and complementary adjustments and both are well supported by academic literature. The reason for these necessary adjustments can be shown by reference to Figure R-32 below, which illustrates the empirical security market line ("SML"). The adjustment to beta corrects the estimate of the relative risk of the company, which is measured along the horizontal axis of the SML. The ECAPM adjusts the risk-return tradeoff (i.e., the slope) in the SML, which is on the vertical axis. In other words, the expected return (measured on the vertical axis) for a given level of risk (measured on the horizontal axis) is different from the predictions of the theoretical CAPM. Getting the relative risk of the investment correct does not adjust for the slope of the SML, nor does adjusting the slope correct for errors in the estimation of **relative risk**.

Figure R-32: The Empirical Security Market Line



Importantly, the Blume adjustment has the effect of moving the beta along the x-axis whereas the ECAPM is using the y-axis. The Value Line relied upon method to make betas more precise was developed by Professor Blume.[352] As shown in Professor Blume's paper, it is possible to apply a consistent adjustment procedure to historical

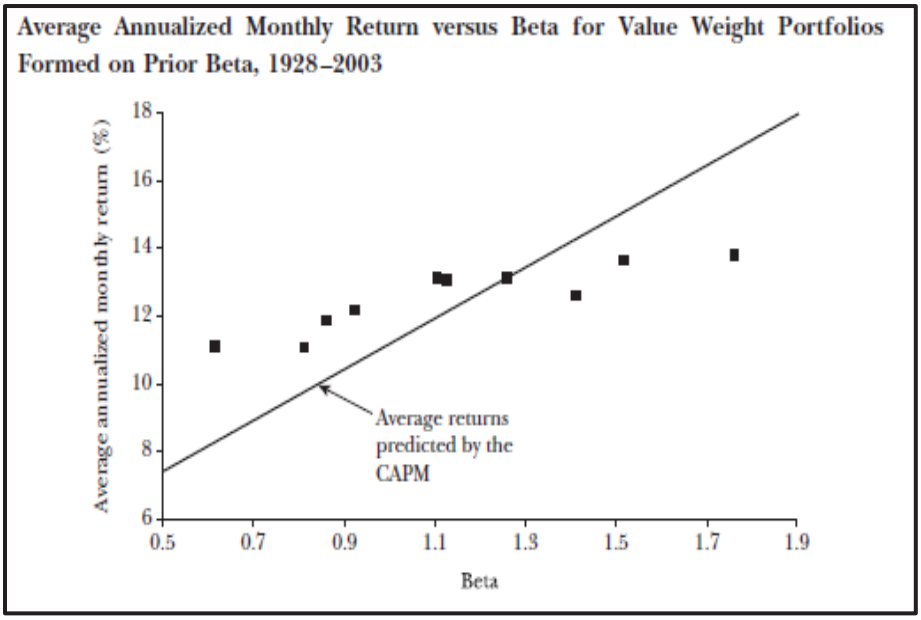
[352] Blume, Marshall E. (1971), "On the Assessment of Risk," *The Journal of Finance*, 26, p. 1-10.

betas that increased the accuracy in *forecasting* realized betas. Essentially, Professor Blume's adjustment transforms a historical beta into a better estimate of expected future beta. It is this expected "true" beta that drives investors' expected returns according to the CAPM.

The backward-looking empirical tests of the CAPM that gave rise to the ECAPM did not suffer from bias in the measurement of betas as does a forward-looking use. Researchers plotted realized stock portfolio returns against betas measured *over the same time period* to produce plots such as Figure R-33 below, which comes from the 2004 paper by Professors Eugene Fama and Kenneth French.[353] The fact that betas and returns were measured contemporaneously means that the betas used in the tests were *already the best possible measure* of the "true" systematic risk over the relevant time period. In other words, no adjustments were needed for these betas. Despite this, researchers observed that the risk-return trade-off predicted by the CAPM was too steep to accurately explain the realized returns. As explained above, the ECAPM explicitly corrects for this empirical observation.

[353] Fama, Eugene F. & French, Kenneth R, (2004), "The Capital Asset Pricing Model: Theory and Evidence," *Journal of Economic Perspectives*, 18(3), p. 25-46.

Figure R-33: Evidence from Empirical Tests of CAPM[354]



Q3. Do the empirical tests that gave rise to the ECAPM use raw betas in their analysis?

A3. They did. However, this is simply because the researchers were able to measure raw betas and realized returns from the same historical period. In other words, no adjustment to the raw beta was necessary to evaluate the market return realized for the same historical period – that is different from using betas to determine the cost of equity for future periods. Hence, the raw betas they measured accurately captured the systematic risk that impacted the returns they measured. In a sense, the measured betas and realized returns were already contemporaneous in the tests of the CAPM that identified the effect shown in Figure R-32 and Figure R-33 above.

This is explicit in the article by Litzenberger et al.,[355] who explain (on page 376) that the estimate of "alpha" they obtain when using historical (i.e., "raw") betas is a linear combination of the alpha that would be obtained with a perfect estimate of "true" beta

[354] *Ibid.*, p. 33.

[355] Robert Litzenberger, Krishna Ramaswamy and Howard Sosin, "On the CAPM Approach to the Estimation of a Public Utility's Cost of Equity Capital," *Journal of Finance*, Vol 35, 1979.

and the weighting factor employed in the Blume "global adjustment" procedure, which they describe with the equation $\beta_i = \omega\beta_{i(historical)} + (1-\omega)$. Using the equations that the authors present along with their results presented in the "Raw Betas" panel of Table 1 (on page 380 of the paper), it is possible to derive the estimate of alpha implied for use of Blume adjusted beta with $\omega = 0.67$:

$$a = a' - b'\left(\frac{1-\omega}{\omega}\right) = 0.326 - 0.330\left(\frac{0.33}{0.67}\right) = 0.163$$

In other words, the results of Litzenberger et. al.'s study are consistent with an ECAPM alpha factor of approximately 2.0% when applying Blume-adjusted betas.[356] In that light, my use of an alpha factor of 1.5% is conservative.

Q4. How do you respond to the assertion that the ECAPM is not widely accepted in regulatory settings?

A4. First, I believe that the Commission should be presented with the best possible analysis even if the Commission has not previously accepted the simultaneous use of adjusted betas and ECAPM. Second, there certainly are regulatory commissions that have adopted the ECAPM methodology. Examples include the Mississippi Public Service Commission[357] and the New York State Public Service Commission.[358] Also, the Alabama Public Service Commission recognized the methodology.[359] Importantly, all of these regulators rely on the ECAPM in conjunction with adjusted betas, and the California Public Utilities Commission did not distinguish between CAPM and ECAPM when reporting results.[360] This list is not exhaustive as many commissions

[356] Since Litzenberger, et. al. used monthly return data, their monthly alpha estimate of 0.163% corresponds to (1.00163)^12-1=1.97% when annualized.

[357] Mississippi Power, PEP-5A, p. 24.

[358] NY PSC Case 19-E-0065, Staff Finance Panel Testimony, May 2019, p. 141.

[359] Alabama Public Service Commission, "Report and Order in Dockets 18117 and 18416," August 21, 2013, p. 13.

[360] California Public Utilities Commission, "Decision 19-12-056," December 19, 2019, p.23.

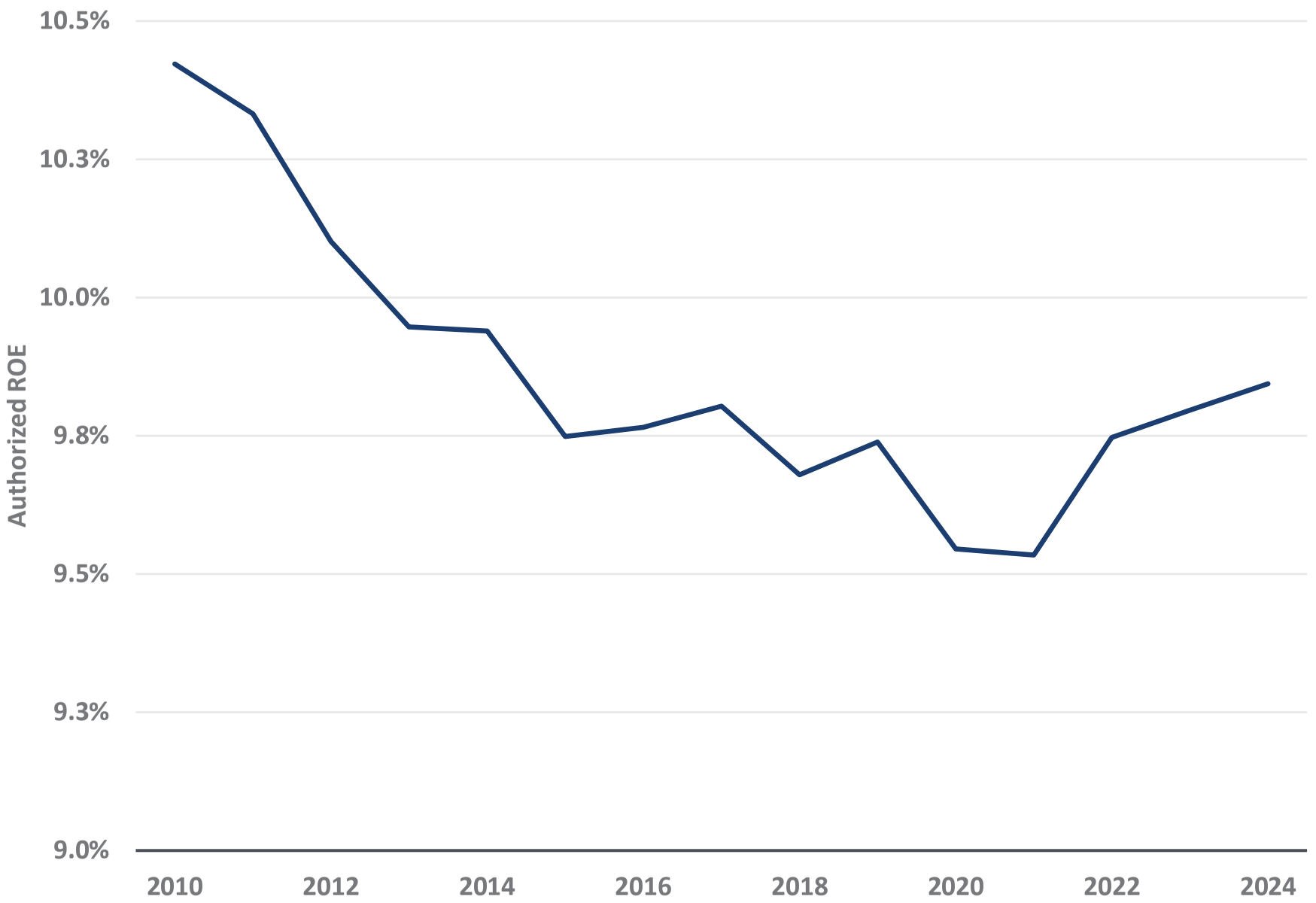
review the evidence before them, based on which they decide on an allowed return without explicitly accepting or rejecting any specific methodology.

Q5. What is the impact of ignoring ECAPM at this time?

A5. The impact is minimal as can be seen from, for example, Figures 13 and 14 in my Direct Testimony. For that reason, it is unnecessary to further analyze the impact of ignoring the ECAPM.

Appendix R-B

Authorized ROEs


Authorized ROE
10.5%
10.3%
10.0%
9.8%
9.5%
9.3%
9.0%
2010
2012
2014
2016
2018
2020
2022
2024

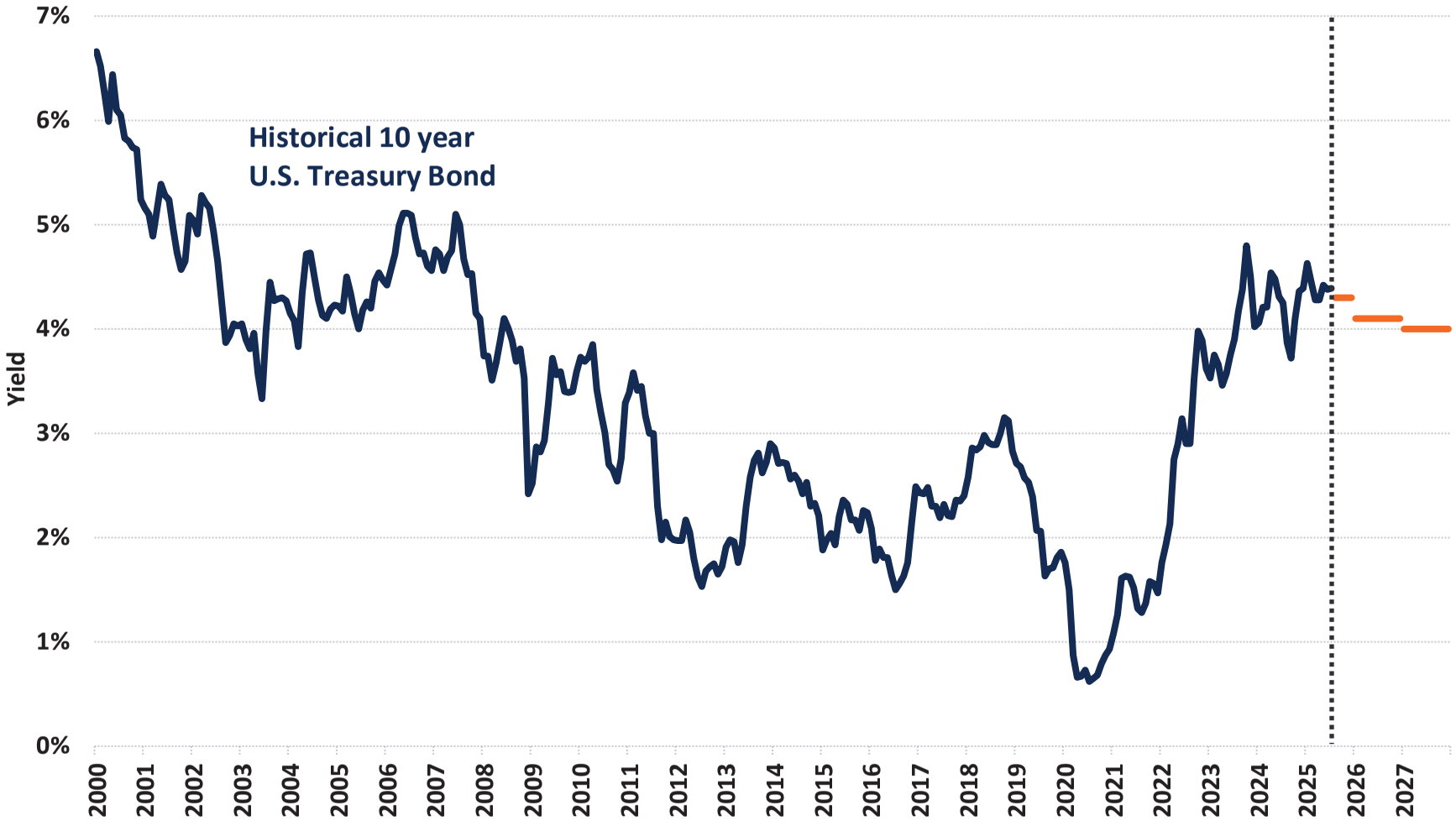
Authorized ROE Over Time

Year	Average ROE
2010	10.42%
2011	10.33%
2012	10.10%
2013	9.95%
2014	9.94%
2015	9.75%
2016	9.77%
2017	9.80%
2018	9.68%
2019	9.74%
2020	9.55%
2021	9.53%
2022	9.75%
2023	9.80%
2024	9.84%

Sources and Notes:
S&P Capital IQ Pro.

Appendix R-C

Bond Yields & MRP

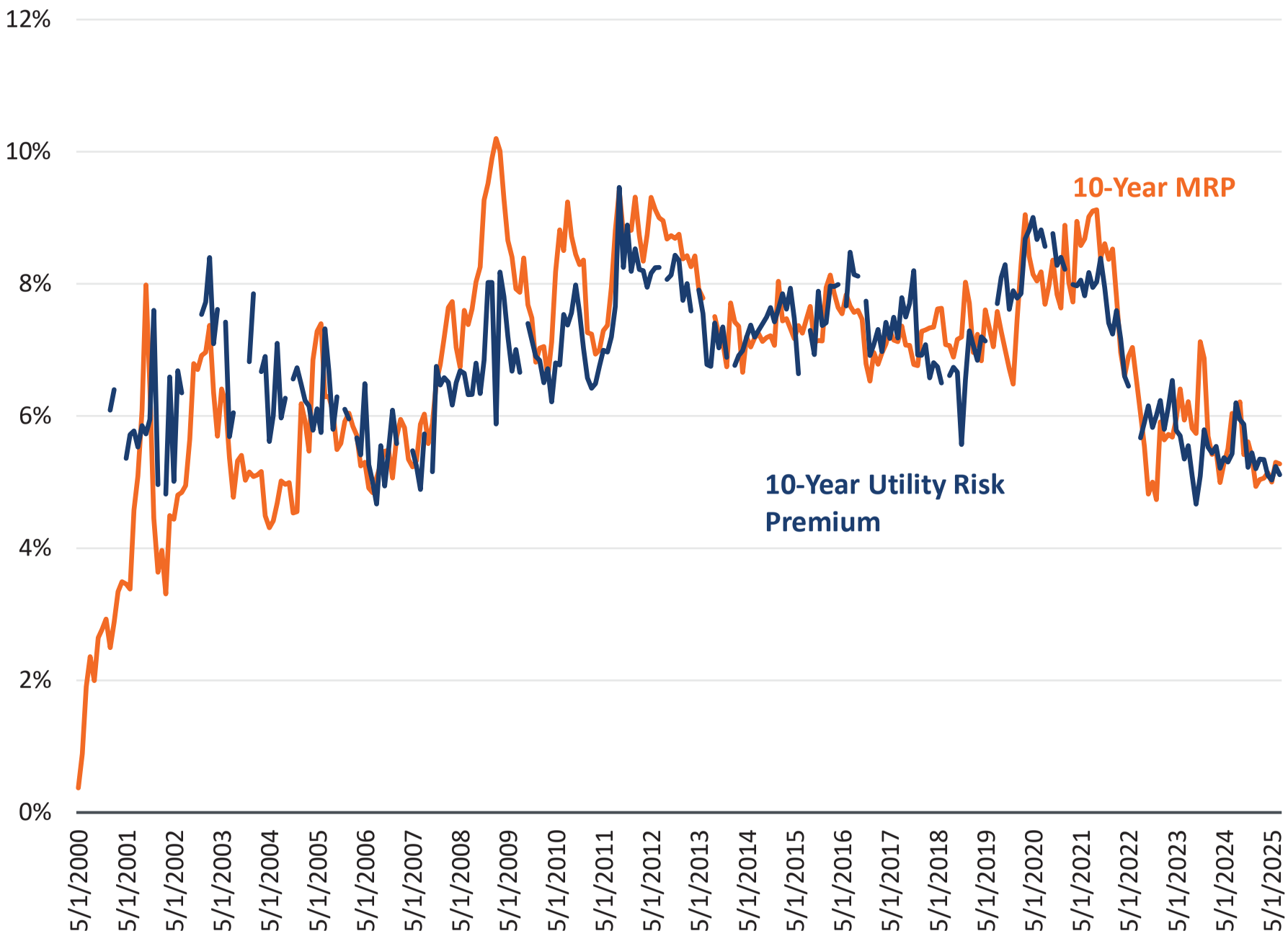

Historical 10 year
U.S. Treasury Bond
Yield
7%
6%
5%
4%
3%
2%
1%
0%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027

Spread Calculations: 15-Day Average

		United States															
		Yields								Spreads					
		Treasury			Utility Bonds						Utility Bonds						
		10 Year	20 Year	30 Year	10 Year		20 Year		30 Year		10 Year		20 Year		30 Year	
	Date	Federal Reserve T-Note	Federal Reserve T-Note	Federal Reserve T-Note	A-Rated Bond	BBB-Rated Bond	A-Rated Bond	BBB-Rated Bond	A-Rated Bond	BBB-Rated Bond	A-Rated Bond	BBB-Rated Bond	A-Rated Bond	BBB-Rated Bond	A-Rated Bond	BBB-Rated Bond
2025	7/31/2025	4.37	4.89	4.89	5.13	5.39	5.74	6.02	5.77	6.01	0.76	1.02	0.85	1.13	0.88	1.12
2025	7/30/2025	4.38	4.90	4.89	5.14	5.39	5.74	6.02	5.78	6.01	0.76	1.01	0.84	1.12	0.89	1.12
2025	7/29/2025	4.34	4.86	4.86	5.10	5.35	5.71	5.99	5.74	5.98	0.76	1.01	0.85	1.13	0.88	1.12
2025	7/28/2025	4.42	4.95	4.96	5.17	5.44	5.80	6.09	5.83	6.08	0.75	1.02	0.85	1.14	0.87	1.12
2025	7/25/2025	4.40	4.92	4.92	5.14	5.40	5.76	6.05	5.80	6.04	0.74	1.00	0.84	1.13	0.88	1.12
2025	7/24/2025	4.43	4.95	4.96	5.17	5.44	5.80	6.09	5.84	6.08	0.74	1.01	0.85	1.14	0.88	1.12
2025	7/23/2025	4.40	4.93	4.95	5.16	5.42	5.79	6.09	5.83	6.08	0.76	1.02	0.86	1.16	0.88	1.13
2025	7/22/2025	4.35	4.90	4.90	5.12	5.39	5.77	6.06	5.81	6.06	0.77	1.04	0.87	1.16	0.91	1.16
2025	7/21/2025	4.38	4.93	4.94	5.15	5.42	5.80	6.09	5.84	6.08	0.77	1.04	0.87	1.16	0.90	1.14
2025	7/18/2025	4.44	4.99	5.00	5.20	5.46	5.85	6.14	5.90	6.13	0.76	1.02	0.86	1.15	0.90	1.13
2025	7/17/2025	4.47	5.01	5.01	5.23	5.49	5.87	6.16	5.91	6.14	0.76	1.02	0.86	1.15	0.90	1.13
2025	7/16/2025	4.46	5.01	5.01	5.23	5.49	5.88	6.16	5.92	6.16	0.77	1.03	0.87	1.15	0.91	1.15
2025	7/15/2025	4.50	5.02	5.01	5.27	5.53	5.89	6.18	5.92	6.16	0.77	1.03	0.87	1.16	0.91	1.15
2025	7/14/2025	4.43	4.97	4.97	5.22	5.48	5.85	6.14	5.89	6.12	0.79	1.05	0.88	1.17	0.92	1.15
2025	7/11/2025	4.43	4.96	4.96	5.22	5.48	5.84	6.13	5.88	6.12	0.79	1.05	0.88	1.17	0.92	1.16
	15-Day Average	4.41	4.95	4.95	5.18	5.44	5.81	6.09	5.84	6.08	0.76	1.03	0.86	1.15	0.89	1.13

Appendix R-D

MRP and Authorized Utility Risk Premium


12%
10%
8%
6%
4%
2%
0%
10-Year MRP
10-Year Utility Risk Premium
5/1/2000
5/1/2001
5/1/2002
5/1/2003
5/1/2004
5/1/2005
5/1/2006
5/1/2007
5/1/2008
5/1/2009
5/1/2010
5/1/2011
5/1/2012
5/1/2013
5/1/2014
5/1/2015
5/1/2016
5/1/2017
5/1/2018
5/1/2019
5/1/2020
5/1/2021
5/1/2022
5/1/2023
5/1/2024
5/1/2025

Electric Utility ROEs and 10Y Utility Risk Premium

Monthly, from 5/31/2000 to 7/31/2025

Date	10-Year MRP	Authorized Electric Utility ROE	10-Year Treasury Yield	10-Year Utility Risk Premium
7/31/2025	5.27%	9.50%	4.39%	5.11%
6/30/2025	5.30%	9.62%	4.38%	5.24%
5/31/2025	5.00%	9.45%	4.42%	5.03%
4/30/2025	5.14%	9.38%	4.28%	5.10%
3/31/2025	5.06%	9.62%	4.28%	5.34%
2/28/2025	5.04%	9.80%	4.45%	5.35%
1/31/2025	4.94%	9.83%	4.63%	5.20%
12/31/2024	5.38%	9.83%	4.39%	5.44%
11/30/2024	5.61%	9.58%	4.36%	5.22%
10/31/2024	5.42%	9.98%	4.10%	5.88%
9/30/2024	6.22%	9.66%	3.72%	5.94%
8/31/2024	5.96%	10.07%	3.87%	6.20%
7/31/2024	6.04%	9.68%	4.25%	5.43%
6/30/2024	5.50%	9.61%	4.31%	5.30%
5/31/2024	5.28%	9.85%	4.48%	5.37%
4/30/2024	4.99%	9.75%	4.54%	5.21%
3/31/2024	5.47%	9.75%	4.21%	5.54%
2/29/2024	5.42%	9.65%	4.21%	5.44%
1/31/2024	5.69%	9.59%	4.06%	5.53%
12/31/2023	6.87%	9.81%	4.02%	5.79%
11/30/2023	7.13%	9.59%	4.50%	5.09%
10/31/2023	5.74%	9.47%	4.80%	4.67%
9/30/2023	5.81%	9.48%	4.38%	5.10%
8/31/2023	6.22%	9.72%	4.17%	5.55%
7/31/2023	5.94%	9.25%	3.90%	5.35%
6/30/2023	6.41%	9.45%	3.75%	5.70%
5/31/2023	5.96%	9.35%	3.57%	5.78%
4/30/2023	5.68%	10.00%	3.46%	6.54%
3/31/2023	5.72%	9.80%	3.66%	6.14%
2/28/2023	5.64%	9.55%	3.75%	5.80%
1/31/2023	5.91%	9.77%	3.53%	6.24%
12/31/2022	4.74%	9.63%	3.62%	6.01%
11/30/2022	5.00%	9.72%	3.89%	5.83%
10/31/2022	4.82%	10.13%	3.98%	6.15%
9/30/2022	5.54%	9.43%	3.52%	5.91%
8/31/2022	6.04%	8.57%	2.90%	5.67%
7/31/2022	6.53%	#N/A	2.90%	#N/A
6/30/2022	7.04%	#N/A	3.14%	#N/A

5/31/2022	6.90%	9.35%	2.90%	6.45%
4/30/2022	6.61%	9.35%	2.75%	6.60%
3/31/2022	6.96%	9.30%	2.13%	7.17%
2/28/2022	7.80%	9.53%	1.93%	7.60%
1/31/2022	8.53%	9.00%	1.76%	7.24%
12/31/2021	8.37%	8.88%	1.47%	7.41%
11/30/2021	8.61%	9.50%	1.56%	7.94%
10/31/2021	8.39%	9.97%	1.58%	8.39%
9/30/2021	9.12%	9.40%	1.37%	8.03%
8/31/2021	9.11%	9.22%	1.28%	7.94%
7/31/2021	9.02%	9.49%	1.32%	8.17%
6/30/2021	8.68%	9.34%	1.52%	7.82%
5/31/2021	8.58%	9.68%	1.62%	8.06%
4/30/2021	8.95%	9.60%	1.63%	7.97%
3/31/2021	7.72%	9.60%	1.61%	7.99%
2/28/2021	8.03%	#N/A	1.26%	#N/A
1/31/2021	8.89%	9.30%	1.08%	8.22%
12/31/2020	7.63%	9.33%	0.93%	8.40%
11/30/2020	7.84%	9.15%	0.87%	8.28%
10/31/2020	8.36%	9.55%	0.79%	8.76%
9/30/2020	7.97%	#N/A	0.68%	#N/A
8/31/2020	7.69%	9.22%	0.65%	8.57%
7/31/2020	8.18%	9.44%	0.62%	8.82%
6/30/2020	8.04%	9.40%	0.73%	8.67%
5/31/2020	8.15%	9.68%	0.67%	9.01%
4/30/2020	8.42%	9.48%	0.66%	8.82%
3/31/2020	9.05%	9.55%	0.87%	8.68%
2/29/2020	8.29%	9.35%	1.50%	7.85%
1/31/2020	7.46%	9.55%	1.76%	7.79%
12/31/2019	6.48%	9.76%	1.86%	7.90%
11/30/2019	6.72%	9.43%	1.81%	7.62%
10/31/2019	7.01%	10.00%	1.71%	8.29%
9/30/2019	7.28%	9.80%	1.70%	8.10%
8/31/2019	7.58%	9.33%	1.63%	7.70%
7/31/2019	7.05%	#N/A	2.06%	#N/A
6/30/2019	7.34%	#N/A	2.07%	#N/A
5/31/2019	7.61%	9.53%	2.39%	7.14%
4/30/2019	6.83%	9.73%	2.53%	7.20%
3/31/2019	7.24%	9.41%	2.57%	6.84%
2/28/2019	6.96%	9.75%	2.68%	7.07%
1/31/2019	7.71%	10.00%	2.71%	7.29%
12/31/2018	8.03%	9.38%	2.83%	6.55%
11/30/2018	7.20%	8.69%	3.12%	5.57%
10/31/2018	7.16%	9.81%	3.15%	6.66%
9/30/2018	6.89%	9.74%	3.00%	6.74%

8/31/2018	7.07%	9.50%	2.89%	6.61%
7/31/2018	7.08%	#N/A	2.89%	#N/A
6/30/2018	7.63%	9.41%	2.91%	6.50%
5/31/2018	7.62%	9.73%	2.98%	6.75%
4/30/2018	7.34%	9.68%	2.87%	6.81%
3/31/2018	7.34%	9.42%	2.84%	6.58%
2/28/2018	7.30%	9.94%	2.86%	7.08%
1/31/2018	7.28%	9.50%	2.58%	6.92%
12/31/2017	6.76%	9.32%	2.40%	6.92%
11/30/2017	6.78%	10.55%	2.35%	8.20%
10/31/2017	7.07%	10.06%	2.36%	7.70%
9/30/2017	7.07%	9.70%	2.20%	7.50%
8/31/2017	7.36%	10.00%	2.21%	7.79%
7/31/2017	7.12%	9.50%	2.32%	7.18%
6/30/2017	7.15%	9.68%	2.19%	7.49%
5/31/2017	7.30%	9.48%	2.30%	7.18%
4/30/2017	7.09%	9.72%	2.30%	7.42%
3/31/2017	6.95%	9.46%	2.48%	6.98%
2/28/2017	6.78%	9.73%	2.42%	7.31%
1/31/2017	6.96%	9.52%	2.43%	7.09%
12/31/2016	6.53%	9.40%	2.49%	6.91%
11/30/2016	6.79%	9.88%	2.14%	7.74%
10/31/2016	7.46%	#N/A	1.76%	#N/A
9/30/2016	7.60%	9.75%	1.63%	8.12%
8/31/2016	7.57%	9.70%	1.56%	8.14%
7/31/2016	7.67%	9.98%	1.50%	8.48%
6/30/2016	7.84%	9.31%	1.64%	7.67%
5/31/2016	7.55%	#N/A	1.81%	#N/A
4/30/2016	7.64%	9.80%	1.81%	7.99%
3/31/2016	7.86%	9.85%	1.89%	7.96%
2/29/2016	8.14%	9.75%	1.78%	7.97%
1/31/2016	7.95%	9.50%	2.09%	7.41%
12/31/2015	7.14%	9.61%	2.24%	7.37%
11/30/2015	7.14%	10.15%	2.26%	7.89%
10/31/2015	7.12%	9.00%	2.07%	6.93%
9/30/2015	7.66%	9.47%	2.17%	7.30%
8/31/2015	7.46%	#N/A	2.17%	#N/A
7/31/2015	7.25%	#N/A	2.32%	#N/A
6/30/2015	7.37%	9.00%	2.36%	6.64%
5/31/2015	7.17%	9.68%	2.20%	7.48%
4/30/2015	7.33%	9.87%	1.93%	7.94%
3/31/2015	7.48%	9.66%	2.04%	7.62%
2/28/2015	7.44%	9.83%	1.98%	7.85%
1/31/2015	8.04%	9.50%	1.88%	7.62%
12/31/2014	7.07%	9.64%	2.21%	7.43%

11/30/2014	7.22%	9.97%	2.33%	7.64%
10/31/2014	7.19%	9.80%	2.30%	7.50%
9/30/2014	7.13%	9.93%	2.53%	7.40%
8/31/2014	7.25%	9.72%	2.42%	7.30%
7/31/2014	7.18%	9.73%	2.54%	7.19%
6/30/2014	7.05%	9.98%	2.60%	7.38%
5/31/2014	7.20%	9.75%	2.56%	7.19%
4/30/2014	6.66%	9.70%	2.71%	6.99%
3/31/2014	7.36%	9.64%	2.72%	6.92%
2/28/2014	7.42%	9.48%	2.71%	6.77%
1/31/2014	7.71%	#N/A	2.86%	#N/A
12/31/2013	6.75%	9.79%	2.90%	6.89%
11/30/2013	7.12%	10.07%	2.72%	7.35%
10/31/2013	7.23%	9.65%	2.62%	7.03%
9/30/2013	7.51%	10.22%	2.81%	7.41%
8/31/2013	#N/A	9.49%	2.74%	6.75%
7/31/2013	#N/A	9.36%	2.58%	6.78%
6/30/2013	7.78%	9.85%	2.30%	7.55%
5/31/2013	7.92%	9.84%	1.93%	7.91%
4/30/2013	8.42%	#N/A	1.76%	#N/A
3/31/2013	8.26%	9.55%	1.96%	7.59%
2/28/2013	8.43%	9.98%	1.98%	8.00%
1/31/2013	8.38%	9.66%	1.91%	7.75%
12/31/2012	8.75%	10.07%	1.72%	8.35%
11/30/2012	8.69%	10.08%	1.65%	8.43%
10/31/2012	8.73%	9.88%	1.75%	8.13%
9/30/2012	8.68%	9.79%	1.72%	8.07%
8/31/2012	8.96%	#N/A	1.68%	#N/A
7/31/2012	9.00%	9.78%	1.53%	8.25%
6/30/2012	9.12%	9.86%	1.62%	8.24%
5/31/2012	9.31%	9.96%	1.80%	8.16%
4/30/2012	8.75%	10.00%	2.05%	7.95%
3/31/2012	8.34%	10.37%	2.17%	8.20%
2/29/2012	8.73%	10.19%	1.97%	8.22%
1/31/2012	9.31%	10.50%	1.97%	8.53%
12/31/2011	8.81%	10.17%	1.98%	8.19%
11/30/2011	8.80%	10.90%	2.01%	8.89%
10/31/2011	8.76%	10.40%	2.15%	8.25%
9/30/2011	9.41%	11.44%	1.98%	9.46%
8/31/2011	8.81%	9.96%	2.30%	7.66%
7/31/2011	7.95%	10.20%	3.00%	7.20%
6/30/2011	7.37%	9.97%	3.00%	6.97%
5/31/2011	7.29%	10.17%	3.17%	7.00%
4/30/2011	7.00%	10.20%	3.45%	6.75%
3/31/2011	6.94%	9.90%	3.41%	6.49%

2/28/2011	7.24%	10.00%	3.58%	6.42%
1/31/2011	7.26%	9.97%	3.39%	6.58%
12/31/2010	8.36%	10.31%	3.29%	7.02%
11/30/2010	8.29%	10.32%	2.76%	7.56%
10/31/2010	8.45%	10.53%	2.54%	7.99%
9/30/2010	8.72%	10.21%	2.65%	7.56%
8/31/2010	9.24%	10.08%	2.70%	7.38%
7/31/2010	8.50%	10.55%	3.01%	7.54%
6/30/2010	8.82%	9.97%	3.20%	6.77%
5/31/2010	8.18%	10.23%	3.42%	6.81%
4/30/2010	7.12%	10.06%	3.85%	6.21%
3/31/2010	6.58%	10.45%	3.73%	6.72%
2/28/2010	7.05%	10.19%	3.69%	6.50%
1/31/2010	7.03%	10.57%	3.73%	6.84%
12/31/2009	6.81%	10.49%	3.59%	6.90%
11/30/2009	7.49%	10.55%	3.40%	7.15%
10/31/2009	7.68%	10.79%	3.39%	7.40%
9/30/2009	8.39%	#N/A	3.40%	#N/A
8/31/2009	7.87%	10.25%	3.59%	6.66%
7/31/2009	7.92%	10.57%	3.56%	7.01%
6/30/2009	8.41%	10.40%	3.72%	6.68%
5/31/2009	8.66%	10.50%	3.29%	7.21%
4/30/2009	9.29%	10.74%	2.93%	7.81%
3/31/2009	10.01%	11.00%	2.82%	8.18%
2/28/2009	10.20%	8.75%	2.87%	5.88%
1/31/2009	9.89%	10.54%	2.52%	8.02%
12/31/2008	9.52%	10.44%	2.42%	8.02%
11/30/2008	9.27%	10.38%	3.53%	6.85%
10/31/2008	8.26%	10.15%	3.81%	6.34%
9/30/2008	8.03%	10.49%	3.69%	6.80%
8/31/2008	7.62%	10.22%	3.89%	6.33%
7/31/2008	7.38%	10.33%	4.01%	6.32%
6/30/2008	7.60%	10.75%	4.10%	6.65%
5/31/2008	6.74%	10.57%	3.88%	6.69%
4/30/2008	7.04%	10.18%	3.67%	6.51%
3/31/2008	7.73%	9.68%	3.51%	6.17%
2/29/2008	7.64%	10.25%	3.74%	6.51%
1/31/2008	7.19%	10.32%	3.74%	6.58%
12/31/2007	6.78%	10.57%	4.10%	6.47%
11/30/2007	6.51%	10.90%	4.15%	6.75%
10/31/2007	5.89%	9.69%	4.53%	5.16%
9/30/2007	5.58%	#N/A	4.52%	#N/A
8/31/2007	6.03%	10.40%	4.67%	5.73%
7/31/2007	5.88%	9.89%	5.00%	4.89%
6/30/2007	5.33%	10.34%	5.10%	5.24%

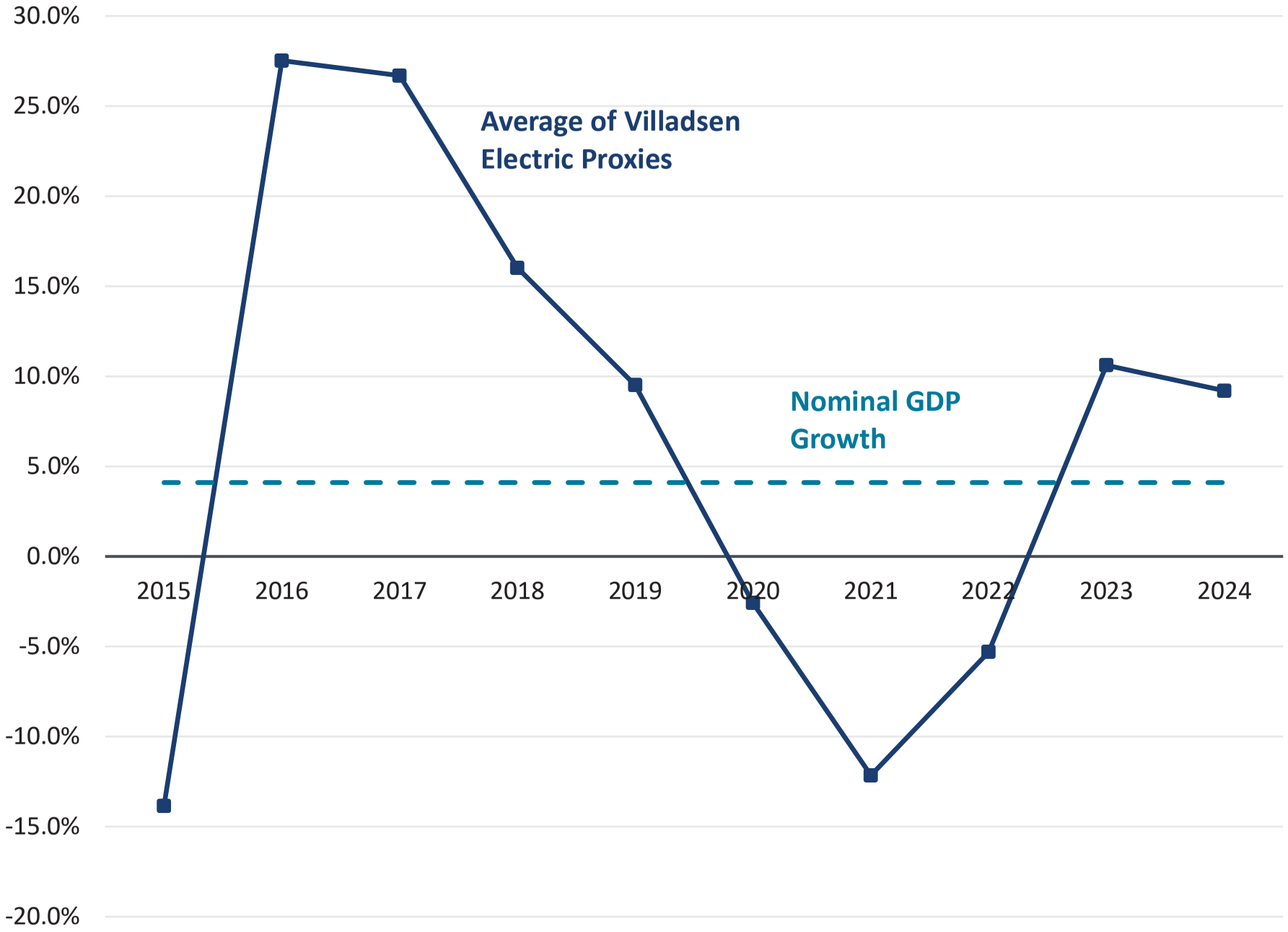
5/31/2007	5.23%	10.22%	4.75%	5.47%
4/30/2007	5.35%	#N/A	4.69%	#N/A
3/31/2007	5.82%	10.55%	4.56%	5.99%
2/28/2007	5.95%	#N/A	4.72%	#N/A
1/31/2007	5.69%	10.34%	4.76%	5.58%
12/31/2006	5.06%	10.65%	4.56%	6.09%
11/30/2006	5.48%	10.09%	4.60%	5.49%
10/31/2006	5.47%	9.67%	4.73%	4.94%
9/30/2006	5.28%	10.27%	4.72%	5.55%
8/31/2006	5.07%	9.55%	4.88%	4.67%
7/31/2006	4.84%	10.09%	5.09%	5.00%
6/30/2006	4.91%	10.38%	5.11%	5.27%
5/31/2006	5.30%	11.60%	5.11%	6.49%
4/30/2006	5.24%	10.40%	4.99%	5.41%
3/31/2006	5.71%	10.39%	4.72%	5.67%
2/28/2006	5.85%	#N/A	4.57%	#N/A
1/31/2006	6.05%	10.38%	4.42%	5.96%
12/31/2005	5.92%	10.57%	4.47%	6.10%
11/30/2005	5.59%	#N/A	4.54%	#N/A
10/31/2005	5.49%	10.75%	4.46%	6.29%
9/30/2005	6.06%	10.00%	4.20%	5.80%
8/31/2005	6.30%	10.94%	4.26%	6.68%
7/31/2005	6.29%	11.50%	4.18%	7.32%
6/30/2005	7.40%	9.75%	4.00%	5.75%
5/31/2005	7.28%	10.25%	4.14%	6.11%
4/30/2005	6.85%	10.13%	4.34%	5.79%
3/31/2005	5.47%	10.65%	4.50%	6.15%
2/28/2005	5.92%	10.40%	4.17%	6.23%
1/31/2005	6.19%	10.70%	4.22%	6.48%
12/31/2004	4.55%	10.96%	4.23%	6.73%
11/30/2004	4.53%	10.75%	4.19%	6.56%
10/31/2004	4.99%	#N/A	4.10%	#N/A
9/30/2004	4.96%	10.40%	4.13%	6.27%
8/31/2004	5.02%	10.25%	4.28%	5.97%
7/31/2004	4.68%	11.60%	4.50%	7.10%
6/30/2004	4.42%	10.74%	4.73%	6.01%
5/31/2004	4.31%	10.33%	4.72%	5.61%
4/30/2004	4.49%	11.25%	4.35%	6.90%
3/31/2004	5.16%	10.50%	3.83%	6.67%
2/29/2004	5.11%	#N/A	4.08%	#N/A
1/31/2004	5.08%	12.00%	4.15%	7.85%
12/31/2003	5.15%	11.09%	4.27%	6.82%
11/30/2003	5.03%	#N/A	4.30%	#N/A
10/31/2003	5.41%	#N/A	4.29%	#N/A
9/30/2003	5.32%	#N/A	4.27%	#N/A

8/31/2003	4.77%	10.50%	4.45%	6.05%
7/31/2003	5.37%	9.67%	3.98%	5.69%
6/30/2003	6.20%	10.75%	3.33%	7.42%
5/31/2003	6.41%	#N/A	3.57%	#N/A
4/30/2003	5.70%	11.58%	3.96%	7.62%
3/31/2003	6.36%	10.90%	3.81%	7.09%
2/28/2003	7.37%	12.30%	3.90%	8.40%
1/31/2003	6.96%	11.78%	4.05%	7.73%
12/31/2002	6.91%	11.57%	4.03%	7.54%
11/30/2002	6.70%	#N/A	4.05%	#N/A
10/31/2002	6.79%	#N/A	3.94%	#N/A
9/30/2002	5.65%	11.38%	3.87%	7.51%
8/31/2002	4.95%	#N/A	4.26%	#N/A
7/31/2002	4.84%	11.00%	4.65%	6.35%
6/30/2002	4.80%	11.62%	4.93%	6.69%
5/31/2002	4.44%	10.17%	5.16%	5.01%
4/30/2002	4.49%	11.80%	5.21%	6.59%
3/31/2002	3.31%	10.10%	5.28%	4.82%
2/28/2002	3.97%	#N/A	4.91%	#N/A
1/31/2002	3.64%	10.00%	5.04%	4.96%
12/31/2001	4.45%	12.69%	5.09%	7.60%
11/30/2001	6.43%	10.60%	4.65%	5.95%
10/31/2001	7.98%	10.30%	4.57%	5.73%
9/30/2001	6.09%	10.58%	4.73%	5.85%
8/31/2001	5.09%	10.50%	4.97%	5.53%
7/31/2001	4.58%	11.01%	5.24%	5.77%
6/30/2001	3.38%	11.00%	5.28%	5.72%
5/31/2001	3.46%	10.75%	5.39%	5.36%
4/30/2001	3.49%	#N/A	5.14%	#N/A
3/31/2001	3.34%	#N/A	4.89%	#N/A
2/28/2001	2.88%	11.50%	5.10%	6.40%
1/31/2001	2.49%	11.25%	5.16%	6.09%
12/31/2000	2.93%	#N/A	5.24%	#N/A
11/30/2000	2.78%	12.50%	5.72%	6.78%
10/31/2000	2.65%	#N/A	5.74%	#N/A
9/30/2000	2.00%	11.16%	5.80%	5.36%
8/31/2000	2.36%	#N/A	5.83%	#N/A
7/31/2000	1.90%	12.20%	6.05%	6.15%
6/30/2000	0.89%	#N/A	6.10%	#N/A
5/31/2000	0.37%	11.00%	6.44%	4.56%

Sources and Notes:
Bloomberg and S&P Capital IQ Pro.

Appendix R-E

EPS and Nominal GDP


30.0%
25.0%
20.0%
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-5.0%
-10.0%
-15.0%
-20.0%
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Average of Villadsen Electric Proxies
Nominal GDP Growth

% Change in Annual EPS

Electric Proxy	Ticker		Basic EPS (Excl. Extra Items)										
			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Alliant Energy	NASDAQGS:LNT	[1]	n/a	-2.9%	-2.5%	20.6%	10.4%	6.5%	5.9%	6.6%	3.8%	1.6%	-3.2%
Amer. Elec. Power	NASDAQGS:AEP	[2]	n/a	10.7%	-65.3%	211.6%	0.4%	-0.3%	14.1%	12.0%	-9.3%	-5.6%	31.5%
Ameren Corp.	NYSE:AEE	[3]	n/a	-1.4%	12.8%	-19.9%	55.1%	0.8%	4.6%	9.6%	7.6%	5.5%	1.0%
Avista Corp.	NYSE:AVA	[4]	n/a	-2.4%	14.0%	-16.8%	15.6%	43.2%	-36.0%	10.6%	0.9%	5.4%	2.1%
Black Hills	NYSE:BKH	[5]	n/a	6.0%	-15.5%	38.1%	33.7%	-32.6%	11.0%	2.6%	6.3%	-1.7%	0.0%
CenterPoint Energy	NYSE:CNP	[6]	n/a	-213.2%	-162.3%	314.6%	-80.7%	-1.4%	-27.1%	67.1%	65.7%	-14.2%	15.3%
CMS Energy Corp.	NYSE:CMS	[7]	n/a	7.7%	4.5%	-17.1%	41.7%	-4.2%	9.7%	5.5%	10.2%	5.8%	10.9%
Dominion Energy	NYSE:D	[8]	n/a	42.6%	7.4%	36.9%	-35.3%	-74.7%	119.8%	43.7%	-91.2%	n/a	-11.2%
DTE Energy	NYSE:DTE	[9]	n/a	-20.7%	19.5%	30.7%	-2.3%	-16.6%	5.8%	-24.5%	34.6%	22.2%	0.0%
Duke Energy	NYSE:DUK	[10]	n/a	6.3%	-2.3%	17.6%	-14.6%	35.8%	-65.8%	196.2%	-4.6%	11.1%	4.7%
Entergy Corp.	NYSE:ETR	[11]	n/a	-118.8%	230.8%	-170.2%	104.3%	35.9%	9.1%	-19.8%	-3.1%	106.4%	-55.7%
Evergy Inc.	NASDAQGS:EVRG	[12]	n/a	-12.2%	15.5%	-6.8%	10.2%	11.7%	-2.7%	41.2%	-14.8%	-2.9%	19.3%
Exelon Corp.	NASDAQGS:EXC	[13]	n/a	35.1%	-52.4%	228.9%	-48.0%	45.5%	-62.4%	34.4%	36.5%	12.2%	5.0%
IDACORP Inc.	NYSE:IDA	[14]	n/a	0.5%	1.7%	7.0%	6.6%	2.5%	1.9%	3.3%	5.3%	0.7%	6.9%
MGE Energy	NASDAQGS:MGEE	[15]	n/a	-11.2%	5.9%	29.1%	-13.7%	3.2%	3.6%	12.7%	4.9%	6.1%	2.3%
NorthWestern Corp.	NYSE:NWN	[16]	n/a	-9.1%	15.0%	11.3%	-7.0%	-6.2%	4.9%	11.3%	-0.7%	1.9%	-21.6%
OGE Energy	NYSE:OGE	[17]	n/a	-31.6%	24.7%	83.0%	-31.3%	1.7%	-140.1%	-524.5%	-9.8%	-37.4%	5.7%
Pinnacle West Capital	NYSE:PNW	[18]	n/a	9.6%	0.8%	10.1%	4.4%	5.0%	2.1%	12.1%	-22.0%	3.5%	21.0%
PNM Resources (TXNM)	NYSE:TXNM	[19]	n/a	-86.5%	647.4%	-31.7%	7.2%	-9.7%	122.6%	5.6%	-13.5%	-48.3%	162.8%
Portland General	NYSE:POR	[20]	n/a	-8.7%	6.3%	-3.3%	13.1%	0.8%	-27.7%	57.4%	-4.3%	-10.6%	29.1%
PPL Corp.	NYSE:PPL	[21]	n/a	9.4%	17.1%	-41.3%	57.7%	-61.1%	-17.6%	-97.1%	n/a	3.5%	19.7%
Public Serv. Enterprise	NYSE:PEG	[22]	n/a	10.8%	-47.2%	77.5%	-8.5%	17.7%	12.5%	-134.0%	-261.0%	148.6%	-30.9%
Sempra Energy	NYSE:SRE	[23]	n/a	15.1%	0.8%	-79.2%	140.9%	121.7%	8.0%	-38.8%	65.2%	44.7%	-7.5%
Southern Co.	NYSE:SO	[24]	n/a	18.9%	-1.1%	-67.3%	159.1%	107.7%	-34.9%	-23.5%	45.4%	11.1%	10.3%
WEC Energy Group	NYSE:WEC	[25]	n/a	-9.7%	26.3%	28.2%	-12.0%	7.1%	5.8%	8.4%	8.3%	-5.4%	14.4%
Xcel Energy Inc.	NASDAQGS:XEL	[26]	n/a	-4.4%	13.8%	2.2%	9.4%	7.1%	5.7%	6.0%	7.1%	1.1%	7.2%
Con. Edison	NYSE:ED	[27]	n/a	9.2%	1.8%	19.8%	-10.7%	-7.8%	-19.5%	17.5%	21.2%	54.7%	-27.4%
Edison Internat'L	NYSE:EIX	[28]	n/a	-31.0%	32.0%	-56.5%	-180.9%	-369.3%	-47.5%	0.8%	-19.6%	94.6%	6.4%
Eversource Energy	NYSE:ES	[29]	n/a	6.8%	7.2%	5.0%	4.6%	-13.1%	25.8%	-0.3%	14.2%	-131.2%	-279.4%
First Energy	NYSE:FE	[30]	n/a	170.2%	-5.6%	-150.3%	-304.5%	26.4%	10.0%	22.8%	-68.7%	175.7%	-13.2%
NextEra Energy	NYSE:NEE	[31]	n/a	7.6%	2.8%	82.9%	22.2%	-44.3%	-23.8%	22.2%	15.4%	71.6%	-6.2%
Average of Villadsen Electric Proxies		**6.6%**	**n/a**	**-13.8%**	**27.5%**	**26.7%**	**16.0%**	**9.5%**	**-2.6%**	**-12.2%**	**-5.3%**	**10.6%**	**9.2%**
Average of All Electric Proxies		**2.8%**	**n/a**	**-6.4%**	**24.3%**	**19.2%**	**-1.7%**	**-5.2%**	**-3.9%**	**-8.2%**	**-5.7%**	**17.7%**	**-2.6%**
Nominal GDP Growth		**4.1%**	**n/a**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**	**4.1%**

Sources and Notes:
S&P Capital IQ Pro.
The outliers (> 1000%) are removed and marked as "n/a".

Annual EPS

Electric Proxy	Ticker		Basic EPS (Excl. Extra Items)										
			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Alliant Energy	NASDAQGS:LNT	[1]	1.74	1.69	1.65	1.99	2.19	2.34	2.47	2.63	2.73	2.78	2.69
Amer. Elec. Power	NASDAQGS:AEP	[2]	3.25	3.60	1.25	3.89	3.90	3.89	4.44	4.97	4.51	4.26	5.60
Ameren Corp.	NYSE:AEE	[3]	2.42	2.39	2.69	2.16	3.34	3.37	3.53	3.86	4.16	4.38	4.43
Avista Corp.	NYSE:AVA	[4]	1.94	1.90	2.16	1.80	2.08	2.98	1.91	2.11	2.12	2.24	2.29
Black Hills	NYSE:BKH	[5]	2.95	3.13	2.64	3.65	4.88	3.29	3.65	3.75	3.98	3.91	3.91
CenterPoint Energy	NYSE:CNP	[6]	1.42	-1.61	1.00	4.16	0.80	0.79	0.58	0.97	1.60	1.37	1.58
CMS Energy Corp.	NYSE:CMS	[7]	1.76	1.90	1.98	1.64	2.33	2.23	2.45	2.58	2.84	3.01	3.34
Dominion Energy	NYSE:D	[8]	2.25	3.21	3.44	4.72	3.05	0.77	1.70	2.44	0.21	2.48	2.20
DTE Energy	NYSE:DTE	[9]	5.11	4.05	4.84	6.32	6.18	5.15	5.45	4.11	5.54	6.77	6.77
Duke Energy	NYSE:DUK	[10]	3.58	3.80	3.72	4.37	3.73	5.07	1.73	5.13	4.89	5.44	5.69
Entergy Corp.	NYSE:ETR	[11]	2.62	-0.49	-1.63	1.15	2.34	3.18	3.47	2.78	2.70	5.57	2.47
Evergy Inc.	NASDAQGS:EVRG	[12]	2.40	2.11	2.44	2.27	2.51	2.80	2.72	3.84	3.27	3.18	3.79
Exelon Corp.	NASDAQGS:EXC	[13]	1.89	2.55	1.21	3.99	2.07	3.02	1.14	1.53	2.08	2.34	2.45
IDACORP Inc.	NYSE:IDA	[14]	3.86	3.88	3.94	4.22	4.50	4.61	4.70	4.85	5.11	5.15	5.50
MGE Energy	NASDAQGS:MGEE	[15]	2.32	2.06	2.18	2.82	2.43	2.51	2.60	2.93	3.07	3.26	3.33
NorthWestern Corp.	NYSE:NWN	[16]	2.16	1.96	2.26	2.51	2.34	2.19	2.30	2.56	2.54	2.59	2.03
OGE Energy	NYSE:OGE	[17]	1.99	1.36	1.69	3.10	2.13	2.17	-0.87	3.69	3.33	2.08	2.20
Pinnacle West Capital	NYSE:PNW	[18]	3.59	3.94	3.97	4.37	4.56	4.79	4.89	5.48	4.27	4.42	5.35
PNM Resources (TXNM)	NYSE:TXNM	[19]	1.46	0.20	1.47	1.00	1.07	0.97	2.16	2.28	1.97	1.02	2.68
Portland General	NYSE:POR	[20]	2.24	2.04	2.17	2.10	2.38	2.40	1.73	2.73	2.61	2.33	3.01
PPL Corp.	NYSE:PPL	[21]	2.19	2.39	2.80	1.64	2.59	1.01	0.83	0.02	0.97	1.00	1.20
Public Serv. Enterprise	NYSE:PEG	[22]	3.00	3.33	1.76	3.12	2.85	3.36	3.78	-1.29	2.07	5.15	3.56
Sempra Energy	NYSE:SRE	[23]	2.36	2.72	2.74	0.57	1.37	3.04	3.29	2.01	3.32	4.81	4.45
Southern Co.	NYSE:SO	[24]	2.19	2.60	2.57	0.84	2.18	4.53	2.95	2.26	3.28	3.64	4.02
WEC Energy Group	NYSE:WEC	[25]	2.61	2.36	2.98	3.81	3.36	3.60	3.80	4.12	4.46	4.22	4.83
Xcel Energy Inc.	NASDAQGS:XEL	[26]	2.03	1.94	2.21	2.26	2.47	2.64	2.80	2.96	3.17	3.21	3.44
Con. Edison	NYSE:ED	[27]	3.73	4.07	4.14	4.97	4.43	4.09	3.29	3.86	4.68	7.25	5.26
Edison Internat'L	NYSE:EIX	[28]	4.37	3.02	3.99	1.73	-1.40	3.78	1.98	2.00	1.61	3.13	3.33
Eversource Energy	NYSE:ES	[29]	2.59	2.77	2.97	3.11	3.26	2.83	3.56	3.55	4.05	-1.27	2.27
First Energy	NYSE:FE	[30]	0.51	1.37	1.29	-0.65	1.33	1.68	1.85	2.27	0.71	1.96	1.70
NextEra Energy	NYSE:NEE	[31]	1.42	1.53	1.57	2.87	3.51	1.96	1.49	1.82	2.10	3.61	3.38
Average of Villadsen Electric Proxies			**2.51**	**2.27**	**2.31**	**2.86**	**2.83**	**2.95**	**2.70**	**2.90**	**3.11**	**3.48**	**3.57**
Average of All Electric Proxies			**2.51**	**2.31**	**2.39**	**2.79**	**2.73**	**2.94**	**2.66**	**2.86**	**3.03**	**3.40**	**3.51**

Sources and Notes:
S&P Capital IQ Pro.

Appendix R-F

FERC MRP

	Value
Model Date	7/31/2025
ValueLine Date	7/25/2025

Table No. BV-12 (a)

Market Risk Premium Summary (30 Year UST)

		IBES	Value Line
Dividend Yield	[a]	1.58%	1.65%
Growth Rate	[b]	10.87%	9.79%
Estimated Cost of Equity	[c] = [a] + [b]	12.45%	11.43%
Risk Free Rate (30-Year)	[d]	4.79%	4.79%
Market Risk Premium	**[e] = [c] - [d]**	**7.66%**	**6.64%**
Baa 30-Year Yield		6.06%	6.06%
Lower Bound Threshold		**7.60%**	**7.39%**

Note: Based on 30-Year U.S. Government Bond Yields, FERC Order 569 P 238 and FERC Order 569-A P 21.

Table No. BV-12 (b)

Market Risk Premium Summary (20 Year UST)

		IBES	Value Line
Dividend Yield	[a]	1.58%	1.65%
Growth Rate	[b]	10.87%	9.79%
Estimated Cost of Equity	[c] = [a] + [b]	12.45%	11.43%
Risk Free Rate (20-Year)	[d]	4.81%	4.81%
Market Risk Premium	**[e] = [c] - [d]**	**7.64%**	**6.62%**

Note: Based on 20-Year U.S. Government Bond Yield, consistent with Bloomberg and Duff & Phelps MRP used in Villadsen Direct Testimony Section V.B.1.

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
3M Company	84,796	1.9%	8%	3	8%	2%	40%	n/a	n/a
Abbott Labs.	229,206	1.8%	10%	5	10%	2%	6%	6%	2%
AbbVie Inc.	336,619	3.4%	16%	5	16%	3%	7%	7%	3%
Accenture Plc	174,163	2.1%	8%	2	8%	2%	7%	7%	2%
Adobe Inc.	154,476	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Advanced Micro Dev.	258,689	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AES Corp.	9,269	5.5%	4%	1	4%	5%	30%	n/a	n/a
Aflac Inc.	54,843	2.4%	5%	1	5%	2%	9%	9%	2%
Agilent Technologies	32,207	0.9%	7%	4	7%	1%	8%	8%	1%
Air Products & Chem.	64,313	2.5%	4%	3	4%	2%	7%	7%	2%
Airbnb Inc.	84,624	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Akamai Technologies	11,255	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Albemarle Corp.	8,284	2.3%	n/a	n/a	n/a	n/a	5%	5%	2%
Alexandria Real Estate	13,344	6.8%	76%	1	n/a	n/a	9%	9%	7%
Align Techn.	13,898	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Allegion plc	12,571	1.4%	9%	2	9%	1%	7%	7%	1%
Alliant Energy	16,150	3.2%	6%	2	6%	3%	8%	8%	3%
Allstate Corp.	51,839	2.1%	7%	2	7%	2%	28%	n/a	n/a
Alphabet Inc.	2,230,049	0.5%	16%	7	16%	0%	13%	13%	0%
Alphabet Inc. 'A'	2,224,000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Altria Group	99,212	6.9%	3%	3	3%	7%	5%	5%	7%
Amazon.com	2,368,716	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Amcor plc	13,660	5.4%	10%	1	10%	5%	11%	11%	5%
Amer. Elec. Power	56,332	3.6%	7%	3	7%	4%	7%	7%	4%
Amer. Express	218,642	1.1%	15%	2	15%	1%	9%	9%	1%
Amer. Int'l Group	47,005	2.2%	22%	2	n/a	n/a	9%	9%	2%
Amer. Tower 'A'	104,561	3.2%	19%	3	19%	3%	10%	10%	3%
Amer. Water Works	27,637	2.4%	7%	1	7%	2%	7%	7%	2%
Ameren Corp.	26,179	2.9%	9%	1	9%	3%	7%	7%	3%
Ameriprise Fin'l	50,142	0.4%	n/a	n/a	n/a	n/a	10%	10%	0%
AMETEK Inc.	40,877	0.7%	10%	2	10%	1%	9%	9%	1%
Amgen	160,783	3.2%	5%	4	5%	3%	6%	6%	3%
Amphenol Corp.	121,595	0.7%	26%	1	n/a	n/a	17%	17%	1%
Analog Devices	119,402	1.7%	17%	2	17%	2%	9%	9%	2%
Aon plc	76,620	0.8%	10%	2	10%	1%	10%	10%	1%
APA Corp.	6,557	5.5%	1%	3	1%	6%	3%	3%	6%
Apollo Global Mgmt	87,111	1.3%	14%	3	14%	1%	25%	n/a	n/a
Apple Inc.	3,139,647	0.5%	11%	3	11%	0%	11%	11%	0%
Applied Materials	156,335	0.9%	10%	2	10%	1%	9%	9%	1%
Aptiv PLC	15,694	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Arch Capital Group	33,455	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Archer Daniels Midl'd	25,920	3.8%	0%	2	0%	4%	2%	2%	4%
Arista Networks	136,090	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Assurant Inc.	9,439	1.7%	n/a	n/a	n/a	n/a	11%	11%	2%
AT&T Inc.	193,920	4.1%	5%	2	5%	4%	7%	7%	4%
Atmos Energy	24,592	2.4%	7%	2	7%	2%	7%	7%	2%
Autodesk Inc.	61,947	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Automatic Data Proc.	122,000	2.1%	9%	1	9%	2%	7%	7%	2%
AutoZone Inc.	61,588	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AvalonBay Communities	28,715	3.5%	-6%	1	n/a	n/a	6%	6%	4%
Avery Dennison	13,996	2.1%	7%	1	7%	2%	6%	6%	2%
Axon Enterprise	57,823	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Baker Hughes	38,293	2.5%	16%	3	16%	2%	20%	20%	2%
Ball Corp.	16,290	1.4%	10%	1	10%	1%	9%	9%	1%
Bank of America	347,991	2.4%	11%	2	11%	2%	9%	9%	2%
Bank of NY Mellon	68,317	2.2%	14%	2	14%	2%	11%	11%	2%
Baxter Int'l Inc.	14,556	2.4%	15%	2	15%	2%	1%	1%	2%
Becton Dickinson	51,093	2.4%	9%	1	9%	2%	8%	8%	2%
Berkley (W.R.)	25,782	0.5%	6%	3	6%	0%	14%	14%	0%
Berkshire Hathaway 'B'	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Best Buy Co.	14,125	5.7%	n/a	n/a	n/a	n/a	3%	3%	6%
Bio-Techne Corp.	8,119	0.6%	11%	2	11%	1%	10%	10%	1%
Biogen	18,819	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BlackRock Inc.	167,771	2.0%	11%	3	11%	2%	11%	11%	2%
Blackstone Inc.	121,441	2.2%	23%	3	n/a	n/a	26%	n/a	n/a
Boeing	173,200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Booking Holdings	185,015	0.7%	16%	3	16%	1%	14%	14%	1%
Boston Scientific	152,638	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bristol-Myers Squibb	95,991	5.3%	73%	3	n/a	n/a	30%	n/a	n/a
Broadcom Inc.	1,320,649	0.9%	20%	2	n/a	n/a	25%	n/a	n/a
Broadridge Fin'l	27,526	1.5%	n/a	n/a	n/a	n/a	10%	10%	2%
Brown & Brown	30,126	0.6%	10%	2	10%	1%	11%	11%	1%
Brown-Forman 'B'	13,079	3.5%	2%	3	2%	4%	8%	8%	4%
Builders FirstSource	14,330	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bunge Global SA	9,811	3.9%	1%	2	1%	4%	2%	2%	4%
BXP Inc.	11,002	5.6%	22%	1	n/a	n/a	2%	2%	6%
C.H. Robinson	11,651	2.5%	12%	3	12%	3%	9%	9%	3%
Cadence Design Sys.	85,894	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Caesars Entertainment	6,360	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Camden Property Trust	12,173	3.7%	5%	1	5%	4%	-7%	n/a	n/a
Capital One Fin'l	82,957	1.1%	20%	3	20%	1%	10%	10%	1%
Cardinal Health	38,505	1.3%	11%	3	11%	1%	8%	8%	1%
CarMax Inc.	9,395	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Carnival Corp.	33,901	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Carrier Global	64,884	1.2%	13%	4	13%	1%	12%	12%	1%
Caterpillar Inc.	194,484	1.4%	2%	3	2%	1%	7%	7%	1%
Cboe Global Markets	24,834	1.1%	10%	3	10%	1%	13%	13%	1%
CBRE Group	41,447	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CDW Corp.	23,144	1.4%	10%	2	10%	1%	7%	7%	1%
Cencora	57,715	0.7%	12%	3	12%	1%	11%	11%	1%
Centene Corp.	15,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CenterPoint Energy	23,557	2.4%	9%	3	9%	2%	7%	7%	2%
CF Industries	15,247	2.3%	-5%	1	n/a	n/a	-2%	n/a	n/a
Charles River	7,610	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Charter Communic.	53,285	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chevron Corp.	261,819	4.6%	6%	3	6%	5%	3%	3%	5%
Chipotle Mex. Grill	72,052	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chubb Ltd.	111,248	1.4%	6%	3	6%	1%	11%	11%	1%
Church & Dwight	23,714	1.2%	5%	4	5%	1%	8%	8%	1%
Cigna Group	81,697	2.2%	11%	4	11%	2%	11%	11%	2%
Cincinnati Financial	23,090	2.4%	4%	1	4%	2%	14%	14%	2%
Cintas Corp.	86,393	0.8%	12%	2	12%	1%	14%	14%	1%
Cisco Systems	266,785	2.5%	5%	3	5%	2%	6%	6%	2%
Citigroup Inc.	168,133	2.6%	n/a	n/a	n/a	n/a	3%	3%	3%
Citizens Fin'l Group	20,557	3.8%	24%	2	n/a	n/a	10%	10%	4%
Clorox Co.	15,641	3.9%	6%	3	6%	4%	9%	9%	4%
CME Group	99,813	1.8%	6%	3	6%	2%	6%	6%	2%
CMS Energy Corp.	21,143	3.1%	8%	3	8%	3%	6%	6%	3%
Coca-Cola	298,138	2.9%	6%	3	6%	3%	7%	7%	3%
Cognizant Technology	36,891	1.7%	8%	1	8%	2%	8%	8%	2%
Coinbase Global	101,378	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Colgate-Palmolive	71,041	2.4%	5%	3	5%	2%	10%	10%	2%
Comcast Corp.	128,804	3.6%	4%	6	4%	4%	7%	7%	4%
Conagra Brands	9,089	7.5%	-6%	3	n/a	n/a	1%	1%	8%
ConocoPhillips	115,523	3.4%	9%	3	9%	3%	2%	2%	3%
Consol. Edison	36,166	3.4%	5%	2	5%	3%	6%	6%	3%
Constellation Brands	29,706	2.4%	1%	4	1%	2%	4%	4%	2%
Constellation Energy	96,467	0.5%	n/a	n/a	n/a	n/a	18%	18%	1%
Cooper Cos.	14,504	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Copart Inc.	44,454	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Corning Inc.	42,906	2.3%	16%	3	16%	2%	23%	n/a	n/a
Corpay	23,049	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Corteva Inc.	49,847	1.0%	14%	2	14%	1%	10%	10%	1%
CoStar Group	36,048	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Costco Wholesale	421,951	0.6%	9%	3	9%	1%	10%	10%	1%
Coterra Energy	18,481	3.6%	38%	2	n/a	n/a	7%	7%	4%
CrowdStrike Hldgs.	117,177	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Crown Castle Inc.	45,149	4.1%	-32%	2	n/a	n/a	-8%	n/a	n/a
CSX Corp.	62,480	1.6%	7%	3	7%	2%	5%	5%	2%
Cummins Inc.	47,585	2.1%	9%	3	9%	2%	8%	8%	2%
CVS Health	80,516	4.5%	16%	3	16%	4%	3%	3%	4%
Danaher Corp.	138,326	0.7%	7%	3	7%	1%	2%	2%	1%
Darden Restaurants	24,386	2.7%	10%	4	10%	3%	11%	11%	3%
DaVita Inc.	10,836	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dayforce Inc.	8,853	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Deckers Outdoor	14,702	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Deere & Co.	137,507	1.4%	-2%	3	n/a	n/a	3%	3%	1%
Dell Technologies	84,398	1.7%	12%	2	12%	2%	11%	11%	2%
Delta Air Lines	36,278	1.1%	6%	3	6%	1%	7%	7%	1%
Devon Energy	20,447	3.0%	10%	3	10%	3%	-2%	n/a	n/a
DexCom Inc.	32,987	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Diamondback Energy	39,206	2.9%	0%	3	0%	3%	2%	2%	3%
Digital Realty Trust	58,232	2.9%	2%	2	2%	3%	8%	8%	3%
Disney (Walt)	220,109	0.8%	13%	4	13%	1%	25%	n/a	n/a
Dollar General	24,728	2.1%	8%	3	8%	2%	2%	2%	2%
Dollar Tree Inc.	22,406	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dominion Energy	48,766	4.7%	21%	1	n/a	n/a	6%	6%	5%
Domino's Pizza	15,928	1.5%	10%	4	10%	2%	14%	14%	2%
DoorDash Inc.	99,341	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dover Corp.	25,754	1.1%	11%	4	11%	1%	5%	5%	1%
Dow Inc.	19,891	10.0%	-7%	2	n/a	n/a	3%	3%	10%
DTE Energy	27,855	3.3%	8%	7	8%	3%	8%	8%	3%
Duke Energy	91,523	3.6%	7%	3	7%	4%	6%	6%	4%
DuPont de Nemours	30,948	2.3%	8%	2	8%	2%	11%	11%	2%
Eastman Chemical	8,950	4.3%	5%	2	5%	4%	5%	5%	4%
Eaton Corp. plc	141,999	1.2%	12%	4	12%	1%	11%	11%	1%
eBay Inc.	35,614	1.5%	10%	6	10%	2%	12%	12%	2%
Ecolab Inc.	75,899	1.0%	12%	5	12%	1%	8%	8%	1%
Edison Int'l	19,600	6.8%	10%	2	10%	7%	7%	7%	7%
Edwards Lifesciences	44,633	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Electronic Arts	37,636	0.5%	11%	1	11%	1%	12%	12%	1%
Elevance Health	77,745	2.0%	13%	3	13%	2%	10%	10%	2%
Emerson Electric	78,919	1.5%	9%	4	9%	2%	11%	11%	2%
Enphase Energy	5,120	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Entergy Corp.	35,991	2.9%	10%	2	10%	3%	3%	3%	3%
EOG Resources	65,485	3.4%	4%	4	4%	3%	5%	5%	3%
EPAM Systems	9,448	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
EQT Corp.	35,424	1.1%	38%	3	n/a	n/a	8%	8%	1%
Equifax Inc.	32,209	0.8%	13%	5	13%	1%	8%	8%	1%
Equinix Inc.	74,894	2.5%	9%	3	9%	2%	11%	11%	2%
Equity Residential	25,336	4.2%	6%	1	6%	4%	4%	4%	4%
Erie Indemnity	16,086	1.6%	n/a	n/a	n/a	n/a	14%	14%	2%
Essex Property Trust	18,367	3.6%	n/a	n/a	n/a	n/a	6%	6%	4%
Everest Group	24,694	2.5%	32%	2	n/a	n/a	6%	6%	2%
Evergy Inc.	15,662	4.0%	6%	3	6%	4%	6%	6%	4%
Eversource Energy	23,798	4.7%	n/a	n/a	n/a	n/a	6%	6%	5%
Exelon Corp.	43,236	3.8%	8%	5	8%	4%	6%	6%	4%
Expedia Group	22,777	0.9%	16%	3	16%	1%	20%	20%	1%
Expeditors Int'l	15,441	1.3%	1%	2	1%	1%	2%	2%	1%
Extra Space Storage	31,470	4.5%	7%	2	7%	4%	-1%	n/a	n/a

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Exxon Mobil Corp.	483,711	3.5%	11%	2	11%	4%	-3%	n/a	n/a
F5 Inc.	16,977	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FactSet Research	16,519	1.0%	8%	2	8%	1%	8%	8%	1%
Fair Isaac	37,423	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fastenal Co.	52,313	1.8%	n/a	n/a	n/a	n/a	10%	10%	2%
Federal Rlty. Inv. Trust	7,674	4.7%	3%	1	3%	5%	n/a	n/a	n/a
FedEx Corp.	54,808	2.6%	10%	4	10%	3%	7%	7%	3%
Fidelity Nat'l Info.	41,738	2.1%	9%	2	9%	2%	4%	4%	2%
Fifth Third Bancorp	28,726	3.6%	n/a	n/a	n/a	n/a	7%	7%	4%
First Solar Inc.	17,890	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
FirstEnergy Corp.	23,259	4.5%	6%	2	6%	4%	5%	5%	4%
Fiserv Inc.	92,135	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ford Motor	47,174	5.3%	-9%	3	n/a	n/a	17%	17%	5%
Fortinet Inc.	79,566	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fortive Corp.	17,104	0.6%	7%	2	7%	1%	11%	11%	1%
Fox Corp. 'A'	25,086	1.0%	14%	5	14%	1%	8%	8%	1%
Fox Corp. 'B'	n/a	1.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Franklin Resources	12,794	5.3%	7%	2	7%	5%	4%	4%	5%
Freep't-McMoRan Inc.	63,199	1.4%	44%	2	n/a	n/a	18%	18%	1%
Gallagher (Arthur J.)	79,371	0.8%	12%	1	12%	1%	15%	15%	1%
Garmin Ltd.	42,551	1.8%	11%	1	11%	2%	8%	8%	2%
Gartner Inc.	28,136	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GE HealthCare	34,544	0.2%	6%	2	6%	0%	n/a	n/a	n/a
GE Vernova Inc	153,163	0.2%	102%	3	n/a	n/a	n/a	n/a	n/a
Gen Digital Inc.	18,492	1.7%	13%	2	13%	2%	9%	9%	2%
Gen'l Dynamics	80,519	2.0%	12%	3	12%	2%	10%	10%	2%
Gen'l Electric	283,851	0.5%	21%	3	n/a	n/a	20%	20%	1%
Gen'l Mills	27,169	4.9%	-2%	3	n/a	n/a	1%	1%	5%
Gen'l Motors	51,372	0.9%	5%	2	5%	1%	10%	10%	1%
Generac Holdings	8,669	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Genuine Parts	17,009	3.4%	n/a	n/a	n/a	n/a	2%	2%	3%
Gilead Sciences	136,763	2.9%	28%	2	n/a	n/a	16%	16%	3%
Global Payments	20,282	1.3%	10%	3	10%	1%	11%	11%	1%
Globe Life Inc.	9,942	0.9%	n/a	n/a	n/a	n/a	10%	10%	1%
GoDaddy Inc.	23,963	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Goldman Sachs	218,053	1.7%	13%	4	13%	2%	12%	12%	2%
Grainger (W.W.)	49,981	0.8%	6%	2	6%	1%	6%	6%	1%
Halliburton Co.	18,288	3.5%	-6%	4	n/a	n/a	9%	9%	3%
Hartford Ins. Group	34,369	1.7%	12%	2	12%	2%	7%	7%	2%
Hasbro Inc.	10,638	3.7%	n/a	n/a	n/a	n/a	11%	11%	4%
HCA Healthcare	88,091	0.8%	12%	5	12%	1%	12%	12%	1%
Healthpeak Properties	9,982	6.7%	n/a	n/a	n/a	n/a	6%	6%	7%
Henry (Jack) & Assoc.	12,925	1.3%	n/a	n/a	n/a	n/a	6%	6%	1%
Hershey Co.	33,281	3.5%	-10%	4	n/a	n/a	5%	5%	3%
Hess Corp.	45,633	1.4%	n/a	n/a	n/a	n/a	2%	2%	1%
Hewlett Packard Ent.	26,669	2.6%	8%	3	8%	3%	6%	6%	3%
Hilton Worldwide	65,301	0.2%	13%	3	13%	0%	15%	15%	0%
Hologic Inc.	14,231	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Home Depot	355,613	2.6%	5%	2	5%	3%	7%	7%	3%
Honeywell Int'l	152,239	1.9%	8%	4	8%	2%	10%	10%	2%
Hormel Foods	16,447	3.9%	7%	3	7%	4%	5%	5%	4%
Horton D.R.	40,588	1.3%	-2%	2	n/a	n/a	3%	3%	1%
Host Hotels & Resorts	11,363	5.1%	n/a	n/a	n/a	n/a	12%	12%	5%
Howmet Aerospace	74,457	0.2%	25%	2	n/a	n/a	24%	n/a	n/a
HP Inc.	23,136	4.7%	0%	1	n/a	n/a	5%	5%	5%
Hubbell Inc.	22,332	1.4%	8%	2	8%	1%	6%	6%	1%
Humana Inc.	1,036	1.6%	16%	4	16%	2%	-2%	n/a	n/a
Hunt (J.B.)	15,022	1.2%	13%	3	13%	1%	8%	8%	1%
Huntington Bancshs.	24,241	3.8%	13%	2	13%	4%	5%	5%	4%
Huntington Ingalls	9,960	2.1%	11%	3	11%	2%	11%	11%	2%

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Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
IDEX Corp.	13,609	1.6%	12%	1	12%	2%	5%	5%	2%
IDEXX Labs.	42,031	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Illinois Tool Works	75,248	2.3%	2%	2	2%	2%	7%	7%	2%
Incyte Corp.	13,416	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ingersoll Rand Inc.	34,748	0.1%	7%	2	7%	0%	9%	9%	0%
Insulet Corp.	20,283	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Int'l Business Mach.	262,016	2.6%	7%	2	7%	3%	6%	6%	3%
Int'l Flavors & Frag.	18,978	2.2%	5%	3	5%	2%	2%	2%	2%
Int'l Paper	27,071	3.6%	47%	1	n/a	n/a	17%	17%	4%
Intel Corp.	98,974	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Intercontinental Exch.	103,779	1.1%	12%	4	12%	1%	7%	7%	1%
Interpublic Group	9,415	5.2%	7%	1	7%	5%	7%	7%	5%
Intuit Inc.	209,506	0.8%	15%	5	15%	1%	13%	13%	1%
Intuitive Surgical	183,730	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Invesco Ltd.	7,556	5.0%	11%	3	11%	5%	23%	n/a	n/a
Invitation Homes	19,711	3.7%	7%	1	7%	4%	10%	10%	4%
IQVIA Holdings	27,619	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Iron Mountain	28,978	3.3%	n/a	n/a	n/a	n/a	4%	4%	3%
Jabil Inc.	23,427	0.2%	15%	2	15%	0%	12%	12%	0%
Jacobs Solutions	16,580	0.9%	11%	1	11%	1%	7%	7%	1%
Johnson & Johnson	396,399	3.2%	7%	3	7%	3%	5%	5%	3%
Johnson Ctrls. Int'l plc	70,595	1.4%	17%	4	17%	1%	12%	12%	1%
JPMorgan Chase	794,321	2.1%	9%	2	9%	2%	9%	9%	2%
Kellanova	27,668	2.9%	2%	3	2%	3%	4%	4%	3%
Kenvue Inc.	41,927	3.8%	4%	3	4%	4%	n/a	n/a	n/a
Keurig Dr Pepper	45,105	2.9%	7%	3	7%	3%	13%	13%	3%
KeyCorp	19,982	4.6%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Keysight Technologies	27,581	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kimberly-Clark	42,360	4.0%	5%	3	5%	4%	7%	7%	4%
Kimco Realty	14,548	4.8%	12%	1	12%	5%	28%	n/a	n/a
Kinder Morgan Inc.	62,018	4.2%	8%	2	8%	4%	9%	9%	4%
KKR & Co.	127,062	0.5%	21%	3	n/a	n/a	7%	7%	0%
KLA Corp.	123,446	0.8%	16%	3	16%	1%	13%	13%	1%
Kraft Heinz Co.	32,848	5.8%	-3%	4	n/a	n/a	3%	3%	6%
Kroger Co.	47,533	2.0%	5%	3	5%	2%	6%	6%	2%
L3Harris Technologies	49,461	1.8%	13%	3	13%	2%	15%	15%	2%
Labcorp Holdings	20,613	1.2%	10%	4	10%	1%	6%	6%	1%
Lam Research	128,770	0.9%	18%	3	18%	1%	12%	12%	1%
Lamb Weston Holdings	7,056	3.0%	-3%	3	n/a	n/a	5%	5%	3%
Las Vegas Sands	34,728	2.0%	4%	3	4%	2%	29%	n/a	n/a
Lauder (Estee)	31,083	1.6%	5%	3	5%	2%	-2%	n/a	n/a
Leidos Hldgs.	20,728	1.0%	n/a	n/a	n/a	n/a	10%	10%	1%
Lennar Corp.	28,343	1.9%	-5%	2	n/a	n/a	3%	3%	2%
Lennox Int'l	21,194	0.8%	11%	4	11%	1%	11%	11%	1%
Lilly (Eli)	748,517	0.8%	39%	5	n/a	n/a	27%	n/a	n/a
Linde plc	216,640	1.3%	8%	2	8%	1%	6%	6%	1%
Live Nation Entertain.	34,436	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LKQ Corp.	9,648	3.2%	n/a	n/a	n/a	n/a	5%	5%	3%
Lockheed Martin	109,853	2.9%	13%	2	13%	3%	13%	13%	3%
Loews Corp.	19,555	0.3%	n/a	n/a	n/a	n/a	13%	13%	0%
Lowe's Cos.	121,296	2.2%	6%	2	6%	2%	6%	6%	2%
lululemon athletica	28,296	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LyondellBasell Inds.	20,158	8.6%	5%	2	5%	9%	-6%	n/a	n/a
M&T Bank Corp.	31,293	2.8%	12%	1	12%	3%	5%	5%	3%
Marathon Petroleum	53,262	2.1%	0%	2	0%	2%	-8%	n/a	n/a
MarketAxess Holdings	8,098	1.4%	11%	3	11%	1%	10%	10%	1%
Marriott Int'l	75,240	1.0%	10%	3	10%	1%	9%	9%	1%
Marsh & McLennan	104,439	1.6%	8%	2	8%	2%	11%	11%	2%
Martin Marietta	32,934	0.6%	9%	2	9%	1%	10%	10%	1%
Masco Corp.	13,704	1.9%	7%	3	7%	2%	7%	7%	2%

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Mastercard Inc.	505,523	0.6%	15%	6	15%	1%	11%	11%	1%
Match Group	8,010	2.5%	15%	4	15%	2%	7%	7%	2%
McCormick & Co.	19,156	2.5%	7%	2	7%	3%	6%	6%	3%
McDonald's Corp.	213,714	2.4%	7%	4	7%	2%	9%	9%	2%
McKesson Corp.	90,183	0.4%	12%	4	12%	0%	10%	10%	0%
Medtronic plc	115,092	3.1%	6%	7	6%	3%	6%	6%	3%
Merck & Co.	207,401	3.9%	13%	3	13%	4%	13%	13%	4%
Meta Platforms	1,773,442	0.3%	13%	6	13%	0%	17%	17%	0%
MetLife Inc.	51,568	3.0%	13%	2	13%	3%	6%	6%	3%
Mettler-Toledo Int'l	24,611	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MGM Resorts Int'l	10,431	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Microchip Technology	40,096	2.4%	30%	1	n/a	n/a	3%	3%	2%
Micron Technology	130,285	0.4%	n/a	n/a	n/a	n/a	39%	n/a	n/a
Microsoft Corp.	3,758,779	0.7%	14%	5	14%	1%	12%	12%	1%
Mid-America Apt.	17,364	3.9%	-2%	1	n/a	n/a	-14%	n/a	n/a
Moderna Inc.	12,407	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mohawk Inds.	6,808	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Molina Healthcare	11,667	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Molson Coors Beverage	10,065	3.9%	3%	4	3%	4%	11%	11%	4%
Mondelez Int'l	87,363	2.8%	2%	3	2%	3%	7%	7%	3%
Monolithic Power Sys.	34,186	0.9%	19%	2	19%	1%	12%	12%	1%
Monster Beverage	57,192	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moody's Corp.	90,010	0.8%	13%	2	13%	1%	10%	10%	1%
Morgan Stanley	224,615	2.7%	9%	3	9%	3%	13%	13%	3%
Mosaic Company	11,268	2.5%	5%	1	5%	2%	-8%	n/a	n/a
Motorola Solutions	69,479	1.1%	8%	3	8%	1%	10%	10%	1%
MSCI Inc.	44,398	1.3%	11%	2	11%	1%	8%	8%	1%
Nasdaq Inc.	51,104	1.2%	15%	3	15%	1%	7%	7%	1%
NetApp Inc.	20,936	2.0%	6%	2	6%	2%	9%	9%	2%
Netflix Inc.	532,236	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Newmont Corp.	65,464	1.7%	16%	2	16%	2%	13%	13%	2%
News Corp. 'A'	16,931	0.7%	18%	2	18%	1%	17%	17%	1%
News Corp. 'B'	20,349	0.6%	18%	2	18%	1%	n/a	n/a	n/a
NextEra Energy	153,951	3.1%	8%	3	8%	3%	9%	9%	3%
NIKE Inc. 'B'	106,492	2.2%	-11%	4	n/a	n/a	-1%	n/a	n/a
NiSource Inc.	18,891	2.8%	7%	2	7%	3%	8%	8%	3%
Nordson Corp.	12,037	1.5%	13%	1	13%	1%	7%	7%	1%
Norfolk Southern	58,688	2.1%	10%	2	10%	2%	8%	8%	2%
Northern Trust Corp.	24,280	2.4%	9%	2	9%	2%	5%	5%	2%
Northrop Grumman	74,874	1.7%	6%	3	6%	2%	8%	8%	2%
Norwegian Cruise Line	10,221	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NRG Energy	28,479	1.2%	15%	1	15%	1%	19%	19%	1%
Nucor Corp.	32,078	1.6%	19%	1	19%	2%	-1%	n/a	n/a
NVIDIA Corp.	4,179,372	0.0%	31%	4	n/a	n/a	32%	n/a	n/a
NVR Inc.	21,723	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NXP Semi. NV	56,099	1.8%	8%	3	8%	2%	8%	8%	2%
O'Reilly Automotive	78,166	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Occidental Petroleum	40,160	2.3%	5%	2	5%	2%	6%	6%	2%
Old Dominion Freight	34,085	0.7%	8%	3	8%	1%	6%	6%	1%
Omnicom Group	14,448	3.8%	8%	2	8%	4%	7%	7%	4%
ON Semiconductor	24,871	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ONEOK Inc.	49,452	5.3%	4%	2	4%	5%	13%	13%	5%
Oracle Corp.	676,364	0.8%	16%	3	16%	1%	12%	12%	1%
Otis Worldwide	39,685	1.7%	7%	2	7%	2%	10%	10%	2%
PACCAR Inc.	50,076	4.8%	n/a	n/a	n/a	n/a	6%	6%	5%
Packaging Corp.	18,211	2.5%	8%	1	8%	2%	8%	8%	2%
Palantir Technologies	356,097	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Palo Alto Networks	128,246	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Paramount Global	8,742	1.5%	1%	5	1%	2%	6%	6%	2%
Parker-Hannifin	90,751	1.0%	7%	2	7%	1%	10%	10%	1%

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Paychex Inc.	51,238	3.0%	n/a	n/a	n/a	n/a	8%	8%	3%
Paycom Software	12,501	0.7%	11%	4	11%	1%	13%	13%	1%
PayPal Holdings	71,438	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pentair plc	17,251	1.0%	10%	3	10%	1%	12%	12%	1%
PepsiCo Inc.	185,430	4.2%	3%	3	3%	4%	6%	6%	4%
Pfizer Inc.	139,908	7.0%	-1%	3	n/a	n/a	6%	6%	7%
PG&E Corp.	28,922	1.1%	9%	2	9%	1%	9%	9%	1%
Philip Morris Int'l	285,258	3.0%	12%	3	12%	3%	9%	9%	3%
Phillips 66	50,406	3.9%	23%	3	n/a	n/a	n/a	n/a	n/a
Pinnacle West Capital	10,855	4.0%	2%	2	2%	4%	6%	6%	4%
PNC Financial Serv.	76,756	3.5%	n/a	n/a	n/a	n/a	8%	8%	4%
Pool Corp.	11,022	1.7%	5%	2	5%	2%	4%	4%	2%
PPG Inds.	26,234	2.4%	6%	2	6%	2%	6%	6%	2%
PPL Corp.	25,986	3.1%	8%	2	8%	3%	11%	11%	3%
Price (T. Rowe) Group	22,780	5.0%	-3%	2	n/a	n/a	9%	9%	5%
Principal Fin'l Group	17,957	3.8%	13%	2	13%	4%	6%	6%	4%
Procter & Gamble	360,427	2.8%	5%	3	5%	3%	5%	5%	3%
Progressive Corp.	144,426	0.2%	11%	2	11%	0%	17%	17%	0%
Prologis	102,049	3.8%	n/a	n/a	n/a	n/a	3%	3%	4%
Prudential Fin'l	36,180	5.3%	8%	2	8%	5%	5%	5%	5%
PTC Inc.	23,288	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Public Serv. Enterprise	41,003	3.1%	8%	3	8%	3%	7%	7%	3%
Public Storage	50,010	4.2%	2%	1	2%	4%	7%	7%	4%
PulteGroup Inc.	21,920	0.8%	-2%	1	n/a	n/a	5%	5%	1%
Qualcomm Inc.	169,477	2.3%	6%	3	6%	2%	6%	6%	2%
Quanta Services	57,692	0.1%	16%	2	16%	0%	18%	18%	0%
Quest Diagnostics	18,707	1.9%	8%	4	8%	2%	8%	8%	2%
Ralph Lauren	17,508	1.3%	10%	2	10%	1%	14%	14%	1%
Raymond James Fin'l	31,721	1.4%	12%	1	12%	1%	11%	11%	1%
Realty Income Corp.	33,578	5.8%	23%	1	n/a	n/a	5%	5%	6%
Regency Centers Corp.	11,849	4.1%	n/a	n/a	n/a	n/a	10%	10%	4%
Regeneron Pharmac.	59,286	0.6%	3%	4	3%	1%	4%	4%	1%
Regions Financial	21,631	4.7%	n/a	n/a	n/a	n/a	7%	7%	5%
Republic Services	75,301	1.0%	9%	3	9%	1%	12%	12%	1%
ResMed Inc.	37,278	0.9%	18%	2	18%	1%	11%	11%	1%
Revvity Inc.	11,332	0.3%	7%	3	7%	0%	-2%	n/a	n/a
Rockwell Automation	39,633	1.5%	11%	4	11%	1%	8%	8%	1%
Rollins Inc.	26,974	1.2%	13%	1	13%	1%	10%	10%	1%
Roper Tech.	58,620	0.6%	8%	2	8%	1%	8%	8%	1%
Ross Stores	42,252	1.3%	6%	2	6%	1%	8%	8%	1%
Royal Caribbean	92,121	0.7%	21%	2	n/a	n/a	n/a	n/a	n/a
RTX Corp.	200,620	1.8%	9%	3	9%	2%	12%	12%	2%
S&P Global	160,821	0.7%	11%	2	11%	1%	9%	9%	1%
Salesforce Inc.	247,116	0.6%	12%	5	12%	1%	22%	n/a	n/a
SBA Communications	25,267	2.0%	9%	3	9%	2%	14%	14%	2%
Schein (Henry)	8,474	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Schlumberger Ltd.	47,042	3.4%	2%	4	2%	3%	13%	13%	3%
Schwab (Charles)	165,726	1.2%	23%	3	n/a	n/a	11%	11%	1%
Seagate Technology plc	31,221	2.0%	96%	2	n/a	n/a	24%	n/a	n/a
Sempra Energy	49,051	3.5%	n/a	n/a	n/a	n/a	5%	5%	4%
ServiceNow Inc.	200,143	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sherwin-Williams	85,169	1.0%	8%	2	8%	1%	11%	11%	1%
Simon Property Group	53,057	5.5%	0%	1	0%	5%	4%	4%	5%
Skyworks Solutions	11,193	4.0%	n/a	n/a	n/a	n/a	-3%	n/a	n/a
Smith (A.O.)	9,821	2.0%	n/a	n/a	n/a	n/a	8%	8%	2%
Smucker (J.M.)	11,451	4.0%	1%	3	1%	4%	5%	5%	4%
Snap-on Inc.	16,327	2.8%	10%	3	10%	3%	5%	5%	3%
Solventum Corp	12,616	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Southern Co.	102,542	3.2%	7%	2	7%	3%	7%	7%	3%
Southwest Airlines	21,470	1.9%	57%	4	n/a	n/a	15%	15%	2%

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Stanley Black & Decker	10,752	4.8%	11%	2	11%	5%	20%	20%	5%
Starbucks Corp.	105,110	2.7%	0%	3	n/a	n/a	3%	3%	3%
State Street Corp.	30,320	3.2%	10%	3	10%	3%	7%	7%	3%
Steel Dynamics	19,042	1.6%	n/a	n/a	n/a	n/a	1%	1%	2%
STERIS plc	22,363	1.0%	n/a	n/a	n/a	n/a	5%	5%	1%
Stryker Corp.	149,351	0.9%	10%	3	10%	1%	11%	11%	1%
Super Micro Computer	31,760	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Synchrony Financial	26,371	1.7%	6%	2	6%	2%	5%	5%	2%
Synopsys Inc.	87,411	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sysco Corp.	37,471	2.8%	6%	3	6%	3%	8%	8%	3%
T-Mobile US	260,155	1.6%	16%	6	16%	2%	18%	18%	2%
Take-Two Interactive	42,279	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tapestry Inc.	20,909	1.4%	13%	3	13%	1%	10%	10%	1%
Targa Resources	36,096	0.6%	21%	2	n/a	n/a	18%	18%	1%
Target Corp.	46,045	4.4%	-1%	2	n/a	n/a	7%	7%	4%
TE Connectivity	52,409	1.6%	11%	2	11%	2%	9%	9%	2%
Teledyne Technologies	25,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Teradyne Inc.	14,779	0.5%	15%	1	15%	1%	12%	12%	1%
Tesla Inc.	1,035,777	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Texas Instruments	196,926	2.6%	11%	3	11%	3%	7%	7%	3%
Texas Pacif. Land Corp.	22,680	0.7%	n/a	n/a	n/a	n/a	10%	10%	1%
Textron Inc.	15,194	0.1%	13%	3	13%	0%	15%	15%	0%
The Campbell's Company	9,226	5.4%	-2%	3	n/a	n/a	4%	4%	5%
Thermo Fisher Sci.	157,155	0.4%	7%	5	7%	0%	8%	8%	0%
TJX Companies	135,404	1.5%	8%	2	8%	2%	10%	10%	2%
TKO Group	13,823	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tractor Supply	29,771	1.7%	9%	3	9%	2%	9%	9%	2%
Trade Desk (The)	39,861	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trane Technologies plc	97,665	0.9%	13%	4	13%	1%	13%	13%	1%
TransDigm Group	88,530	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Travelers Cos.	57,146	1.8%	5%	3	5%	2%	11%	11%	2%
Trimble Inc.	19,135	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Truist Fin'l	58,091	4.7%	7%	2	7%	5%	5%	5%	5%
Tyler Technologies	24,086	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tyson Foods 'A'	19,146	3.7%	20%	2	20%	4%	4%	4%	4%
U.S. Bancorp	71,274	4.5%	10%	3	10%	5%	6%	6%	5%
Uber Technologies	189,836	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
UDR Inc.	13,456	4.4%	34%	1	n/a	n/a	8%	8%	4%
Ulta Beauty	21,849	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Union Pacific	138,475	2.3%	9%	3	9%	2%	6%	6%	2%
United Airlines Hldgs.	28,647	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
United Parcel Serv.	84,377	6.6%	1%	3	1%	7%	1%	1%	7%
United Rentals	51,899	0.8%	9%	3	9%	1%	10%	10%	1%
UnitedHealth Group	266,166	2.9%	6%	5	6%	3%	8%	8%	3%
Universal Health `B'	10,973	0.5%	13%	4	13%	0%	13%	13%	0%
Valero Energy	44,847	3.2%	14%	2	14%	3%	-8%	n/a	n/a
Ventas Inc.	28,629	3.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Veralto Corp.	24,906	0.4%	8%	1	8%	0%	n/a	n/a	n/a
VeriSign Inc.	26,656	1.1%	n/a	n/a	n/a	n/a	10%	10%	1%
Verisk Analytics	42,195	0.6%	9%	2	9%	1%	10%	10%	1%
Verizon Communic.	173,921	6.6%	2%	3	2%	7%	1%	1%	7%
Vertex Pharmac.	120,659	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Viatris Inc.	10,767	5.3%	-4%	1	n/a	n/a	n/a	n/a	n/a
VICI Properties	31,811	5.2%	n/a	n/a	n/a	n/a	10%	10%	5%
Visa Inc.	680,201	0.7%	13%	5	13%	1%	11%	11%	1%
Vistra Corp.	62,613	0.5%	n/a	n/a	n/a	n/a	31%	n/a	n/a
Vulcan Materials	34,428	0.8%	13%	1	13%	1%	7%	7%	1%
Wabtec Corp.	36,195	0.5%	14%	1	14%	0%	15%	15%	0%
Walgreens Boots	9,971	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Walmart Inc.	759,868	1.0%	8%	3	8%	1%	10%	10%	1%

Table No. BV-13

Estimation of S&P 500 Cost of Equity- DDM

Company	VL Market Cap ($Millions)	VL Indicated Annual Dividend Yield	IBES Growth Rates				Value Line Growth Rates		
			Growth Rate	# of Analyst Estimates (Consensus)	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR	Growth Rate	Growth Rate Filtered Between 0 and 20%	Dividend Yield for companies with valid GR
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Market Cap Weighted Average			**14.23%**	**3.6**	**10.87%**	**1.58%**	**12.73%**	**9.79%**	**1.65%**
Warner Bros. Discovery	31,110	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Waste Management	90,880	1.5%	10%	4	10%	1%	8%	8%	1%
Waters Corp.	17,228	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WEC Energy Group	33,870	3.4%	n/a	n/a	n/a	n/a	8%	8%	3%
Wells Fargo	260,641	2.3%	14%	3	14%	2%	10%	10%	2%
Welltower Inc.	100,090	2.0%	27%	1	n/a	n/a	24%	n/a	n/a
West Pharmac. Svcs.	16,111	0.4%	7%	3	7%	0%	4%	4%	0%
Western Digital	23,219	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Weyerhaeuser Co.	18,795	3.2%	-9%	1	n/a	n/a	7%	7%	3%
Williams Cos.	71,287	3.4%	13%	1	13%	3%	10%	10%	3%
Williams-Sonoma	20,295	1.6%	0%	3	n/a	n/a	5%	5%	2%
Willis Towers Wat. plc	30,516	1.2%	7%	1	7%	1%	7%	7%	1%
Workday Inc.	60,537	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wynn Resorts	11,630	0.9%	-13%	4	n/a	n/a	n/a	n/a	n/a
Xcel Energy Inc.	39,880	3.4%	9%	2	9%	3%	7%	7%	3%
Xylem Inc.	31,744	1.2%	12%	1	12%	1%	10%	10%	1%
Yum! Brands	40,627	1.9%	11%	4	11%	2%	10%	10%	2%
Zebra Techn. 'A'	16,337	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Zimmer Biomet Hldgs.	18,646	1.0%	6%	4	6%	1%	5%	5%	1%
Zoetis Inc.	67,593	1.3%	9%	3	9%	1%	8%	8%	1%

Sources and Notes:

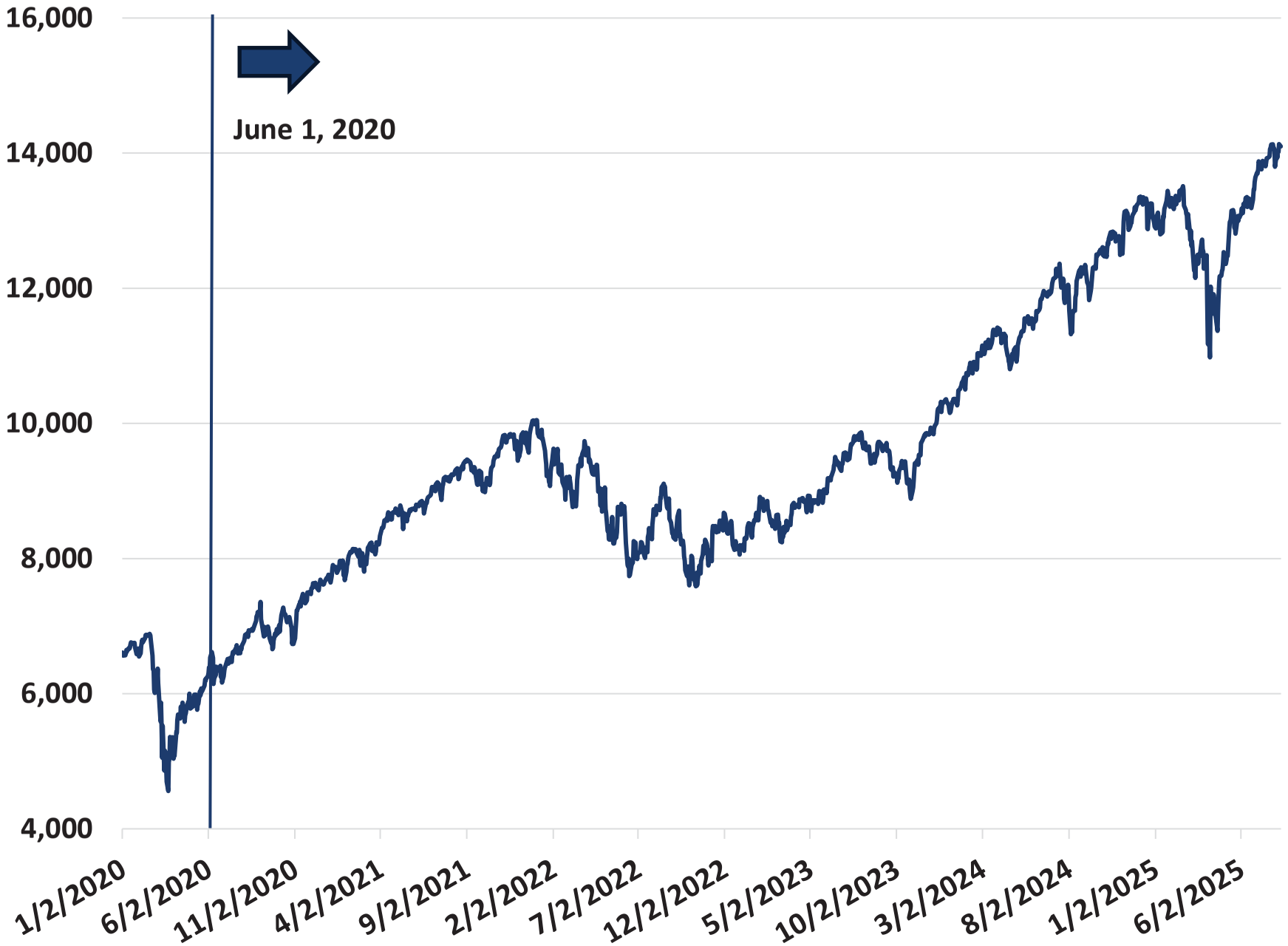
[1] and [7]: Value Line Investment Analyzer as of 7/25/2025.

[3]: Thomson Reuters as of 7/31/2025.

[6],[9]: Excludes non-dividend paying companies.

Appendix R-G

S&P 500 Returns


16,000
14,000
12,000
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June 1, 2020
1/2/2020
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11/2/2020
4/2/2021
9/2/2021
2/2/2022
7/2/2022
12/2/2022
5/2/2023
10/2/2023
3/2/2024
8/2/2024
1/2/2025
6/2/2025

Appendix R-H

Rothschild Options Liquidity

Liquidity in Options Used by Rothchild

Gas Proxy, Implied Growth

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Gas Proxy						
ATO	[1]	89	4	36	0	x
CPK	[2]	0	0	0	0	0
NI	[3]	61	0	0	0	x
NJR	[4]	93	0	0	0	x
NWN	[5]	337	0	0	0	x
OGS	[6]	57	0	8	0	x
SJI	[7]	na	na	na	na	0
SR	[8]	20	2	0	0	x
SWX	[9]	362	0	8	0	x
UGI	[10]	3659	27	675	5	0
S&P 500	[11]	530153	15025	1875369	54996	
Utilities (daily per CCJV)	[12]		117		66	

Sources and Notes:

[1] - [10], [11]: From Rothchild's working file, 2025.06 - RFC Gas Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[12]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Liquidity in Options Used by Rothchild

Electric Proxy, Implied Growth

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Electric Proxy						
AEE	[1]	168	0	19	0	x
AEP	[2]	14732	22	3870	4	x
AGR	[3]	na	na	na	na	0
ALE	[4]	2	2	0	0	0
AVA	[5]	212	18	0	0	x
BKH	[6]	83	0	18	0	x
CMS	[7]	122	4	2020	0	x
CNP	[8]	795	0	2327	20	0
D	[9]	12558	126	5841	20	0
DTE	[10]	54	0	6	0	x
DUK	[11]	13218	132	5717	13	x
ED	[12]	3918	16	1350	25	x
EIX	[13]	18924	142	4026	33	x
ES	[14]	1673	20	397	0	0
ETR	[15]	1184	299	4165	6	x
EVRG	[16]	498	4	330	0	x
EXC	[17]	13391	157	9622	18	x
FE	[18]	10464	72	4370	79	x
FTS.TO	[19]	na	na	na	na	0
HE	[20]	33173	252	8776	0	0
IDA	[21]	13	1	4	0	x
LNT	[22]	1027	0	5	1	x
MGEE	[23]	0	0	7	0	0
NEE	[24]	33663	630	41342	447	x
NWE	[25]	27	2	0	0	x
OGE	[26]	124	3	0	0	x
OTTR	[27]	35	0	0	0	0
PEG	[28]	1649	24	233	0	x
TXNM	[29]	510	0	154	0	0
PNW	[30]	429	14	21	0	x
POR	[31]	414	9	18	1	x
PPL	[32]	4196	113	4853	49	x
SO	[33]	3450	66	3420	47	x
SRE	[34]	5583	25	3677	3	x
WEC	[35]	2022	1	1794	0	x
XEL	[36]	1523	116	1042	9	x
S&P 500	[37]	530153	15025	1875369	54996	
Utilities (daily per CCJV)	[38]		117		66	

Sources and Notes:

[1] - [36], [37]: From Rothchild's working file, 2025.04-06 - RFC FULL Electric Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[38]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Liquidity in Options Used by Rothchild

Gas Proxy, Beta

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Gas Proxy						
ATO	[1]	65	3	24	0	x
CPK	[2]	0	0	0	0	0
NI	[3]	12	0	0	0	x
NJR	[4]	59	0	0	0	x
NWN	[5]	337	0	0	0	x
OGS	[6]	19	0	2	0	x
SJI	[7]	na	na	na	na	0
SR	[8]	20	2	0	0	x
SWX	[9]	90	0	2	0	x
UGI	[10]	2274	18	536	3	0
S&P 500	[11]	352521	10603	1313754	32957	
Utilities (daily per CCJV)	[12]		117		66	

Sources and Notes:

[1] - [10], [11]: From Rothchild's working file, 2025.06 - RFC Gas Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[12]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Liquidity in Options Used by Rothchild

Electric Proxy, Beta

Company		Open Interest, Call Options [A]	Volume, Call Options [B]	Open Interest, Put Options [C]	Volume, Put Options [D]	Reduced Proxy [E]
Electric Proxy						
AEE	[1]	101	0	11	0	x
AEP	[2]	2846	7	731	1	x
AGR	[3]	na	na	na	na	0
ALE	[4]	0	2	0	0	0
AVA	[5]	212	18	0	0	x
BKH	[6]	50	0	11	0	x
CMS	[7]	122	4	2020	0	x
CNP	[8]	735	0	2132	2	0
D	[9]	7271	57	4077	6	0
DTE	[10]	16	0	1	0	x
DUK	[11]	2527	42	1093	2	x
ED	[12]	1908	7	721	12	x
EIX	[13]	7502	78	2267	21	x
ES	[14]	526	8	135	0	0
ETR	[15]	1184	299	4165	6	x
EVRG	[16]	498	4	330	0	x
EXC	[17]	8538	117	6605	14	x
FE	[18]	3595	25	2005	15	x
FTS.TO	[19]	na	na	na	na	0
HE	[20]	6723	107	1672	0	0
IDA	[21]	8	1	3	0	x
LNT	[22]	300	0	4	1	x
MGEE	[23]	0	0	3	0	0
NEE	[24]	12400	359	11285	331	x
NWE	[25]	27	2	0	0	x
OGE	[26]	124	3	0	0	x
OTTR	[27]	10	0	0	0	0
PEG	[28]	492	19	62	0	x
TXNM	[29]	284	0	62	0	0
PNW	[30]	129	9	13	0	x
POR	[31]	414	9	18	1	x
PPL	[32]	2427	71	3144	36	x
SO	[33]	713	35	648	9	x
SRE	[34]	4497	12	2784	2	x
WEC	[35]	1183	0	1077	0	x
XEL	[36]	1523	116	1042	9	x
S&P 500	[37]	352521	10603	1313754	32957	
Utilities (daily per CCJV)	[38]		117		66	

Sources and Notes:

[1] - [36], [37]: From Rothchild's working file, 2025.04-06 - RFC FULL Electric Proxy Group OptIVA Results.xlsx, using 6-month data, as of 2025.06.24.

[38]: Chang, Christoffersen, Jacobs and Vainberg, "Option-Implied Measures of Equity Risk," Review of Finance 2012.

Appendix R-I

Woolridge Model Adjustments

Impact of Reasonable Adjustments to Dr. Wooldridge's CAPM and DCF Models

	ROE	Change from Dr. Wooldridge ROE Estimate
Wooldridge DCF (as reported)	9.75%	
Proxy Group	9.76%	0.01%
Exclude DPS and BVPS Growth rates	9.92%	0.17%
Exclude 0.5g scalar - quarterly growth rates instead	9.89%	0.14%
Use 15-day stock price	9.77%	0.02%
Adjusted DCF Model	**10.02%**	**0.27%**
Woolridge CAPM (as reported)	8.75%	
Proxy Group	8.74%	-0.01%
Exclude Monthly Betas	8.93%	0.18%
Exclude Survey MRPs	8.92%	0.17%
Adjusted CAPM Model	**9.11%**	**0.36%**

DCF Summary

	Wooldridge DCF (as replicated)	Exclude DPS and BVPS Growth rates	Proxy Group (Exclude EIX, ED, ES, TXNM)	Exclude 0.5g scalar - quarterly growth rates instead	Use 15-day stock price	Adjusted DCF Model
Dividend Yield	3.54%	3.54%	3.50%	0.88%	3.52%	0.88%
Adjustment Factor	1.031	1.031	1.031		1.031	
Adjusted Dividend Yield	3.65%	3.65%	3.60%	0.88%	3.63%	0.88%
Growth Rate	6.14%	6.28%	6.16%	1.50%	6.14%	1.54%
Equity Cost Rate	9.78%	9.92%	9.76%	9.89%	9.77%	10.02%

CAPM Summary

	Wooldridge DCF (as replicated)	Proxy Group (Exclude EIX, ED, ES, TXNM)	Exclude Monthly Betas	Exclude Survey MRPs	Adjusted CAPM Model
Risk-Free Interest Rate	5.00%	5.00%	5.00%	5.00%	5.00%
Beta	71.27%	71.27%	74.84%	71.27%	74.81%
Ex Ante Market Risk Premium	5.25%	5.25%	5.25%	5.50%	5.50%
CAPM Cost of Equity	8.74%	8.74%	8.93%	8.92%	9.11%

Monthly Dividend Yields

Company	Ticker	Annual Dividend	Dividend Yield 15 Day	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
Consolidated Edison, Inc. (NYSE-ED)	ED	$3.40	3.40%	3.36%	3.23%	3.38%
Edison International (NYSE-EIX)	EIX	$3.31	6.47%	6.41%	6.01%	5.22%
Eversource Energy (NYSE-ES)	ES	$3.01	4.69%	4.67%	4.88%	4.93%
TXNM Energy, Inc.	TXNM	$1.63	2.89%	2.89%	3.01%	3.19%
Alliant Energy Corporation (NYSE-LNT)	LNT	$2.03	3.32%	3.32%	3.29%	3.33%
Ameren Corporation (NYSE-AEE)	AEE	$2.84	2.97%	2.96%	2.92%	2.99%
American Electric Power Co. (NYSE-AEP)	AEP	$3.72	3.59%	3.61%	3.57%	3.69%
Avista Corporation (NYSE-AVA)	AVA	$1.96	5.16%	5.18%	4.97%	5.11%
Black Hills Corporation (NYSE-BKH)	BKH	$2.70	4.79%	4.75%	4.60%	4.56%
CenterPoint Energy, Inc. (NYSE-CNP)	CNP	$0.88	2.43%	2.42%	2.41%	2.58%
CMS Energy Corporation (NYSE-CMS)	CMS	$2.17	3.12%	3.11%	3.03%	3.10%
Dominion Energy Inc. (NYSE-D)	D	$2.67	4.73%	4.76%	4.86%	4.81%
DTE Energy Company (NYSE-DTE)	DTE	$4.36	3.30%	3.27%	3.25%	3.39%
Duke Energy Corporation (NYSE-DUK)	DUK	$4.18	3.57%	3.59%	3.54%	3.63%
Entergy Corporation (NYSE-ETR)	ETR	$2.40	2.93%	2.92%	2.90%	3.00%
Evergy, Inc. (NYSE-EVRG)	EVRG	$2.67	3.88%	3.94%	3.96%	4.09%
Exelon Corporation (NYSE-EXC)	EXC	$1.60	3.72%	3.72%	3.61%	3.82%
FirstEnergy Corp. (NYSE-FE)	FE	$1.78	4.44%	4.41%	4.37%	4.37%
IDACORP, Inc. (NYSE-IDA)	IDA	$3.44	2.98%	2.98%	2.97%	3.03%
MGE Energy, Inc. (NYSE-MGEE)	MGEE	$1.80	2.03%	2.02%	1.99%	1.95%
NextEra Energy, Inc. (NYSE-NEE)	NEE	$2.27	3.13%	3.14%	3.22%	3.15%
NorthWestern Corporation (NYSE-NWE)	NWE	$2.64	5.10%	5.05%	4.79%	4.85%
OGE Energy Corp. (NYSE-OGE)	OGE	$1.69	3.81%	3.82%	3.79%	3.88%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	$3.58	3.98%	3.99%	3.91%	3.98%
Portland General Electric Company (NYSE-POR)	POR	$2.10	5.16%	5.12%	4.96%	4.83%
PPL Corporation (NYSE-PPL)	PPL	$1.09	3.22%	3.21%	3.14%	3.21%
Public Service Enterprise Gp. Inc. (NYSE-PEG)	PEG	$2.52	3.05%	3.09%	3.12%	3.01%
Sempra Energy (NYSE-SRE)	SRE	$2.58	3.44%	3.41%	3.52%	3.24%
Southern Company (NYSE-SO)	SO	$2.96	3.24%	3.28%	3.29%	3.36%
WEC Energy Group (NYSE-WEC)	WEC	$3.57	3.42%	3.40%	3.36%	3.49%
Xcel Energy Inc. (NYSE-XEL)	XEL	$2.28	3.36%	3.35%	3.29%	3.33%
Mean			**3.72%**	**3.71%**	**3.67%**	**3.69%**
Median			**3.42%**	**3.40%**	**3.36%**	**3.39%**
Mean (Exclude EIX, ED, ES, TXNM)			**3.62%**	**3.62%**	**3.58%**	**3.62%**
Median (Exclude EIX, ED, ES, TXNM)			**3.42%**	**3.40%**	**3.36%**	**3.39%**

Value Line Historical

Company	Ticker	Value Line Historic Growth					
		Past 10 Years			Past 5 Years		
		Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Consolidated Edison, Inc. (NYSE-ED)	ED	3.00	3.00	4.00	3.00	2.50	3.00
Edison International (NYSE-EIX)	EIX	1.00	8.00	1.50	12.50	4.50	0.50
Eversource Energy (NYSE-ES)	ES	6.50	6.50	3.50	6.00	6.00	3.00
TXNM Energy, Inc.	TXNM	7.00	8.00	2.00	6.50	6.00	4.00
Alliant Energy Corporation (NYSE-LNT)	LNT	5.50	6.50	6.00	4.50	6.00	6.00
Ameren Corporation (NYSE-AEE)	AEE	4.00	3.50	2.00	8.00	5.00	5.50
American Electric Power Co. (NYSE-AEP)	AEP	5.00	5.00	3.50	4.00	5.00	3.50
Avista Corporation (NYSE-AVA)	AVA	3.00	4.00	3.50	-1.00	4.00	3.00
Black Hills Corporation (NYSE-BKH)	BKH	4.50	5.00	4.50	2.50	5.00	5.50
CenterPoint Energy, Inc. (NYSE-CNP)	CNP	1.00	-1.00	4.00	3.50	-7.00	5.00
CMS Energy Corporation (NYSE-CMS)	CMS	6.50	6.50	7.00	6.00	6.50	8.50
Dominion Resources, Inc. (NYSE-D)	D		1.50	5.00	-5.50	-4.50	0.50
DTE Energy Company (NYSE-DTE)	DTE	4.00	5.50	3.00	2.50	5.50	1.50
Duke Energy Corporation (NYSE-DUK)	DUK	3.50	3.00	0.50	3.50	2.50	0.50
Entergy Corporation (NYSE-ETR)	ETR	2.50	2.50	2.00	4.00	4.00	7.00
Evergy, Inc. (NYSE-EVRG)	EVRG						
Exelon Corporation (NYSE-EXC)	EXC	-0.50	-3.00	4.50	2.50	4.00	3.50
FirstEnergy Corp. (NYSE-FE)	FE		-1.00	-4.50	-0.50	0.50	10.50
IDACORP, Inc. (NYSE-IDA)	IDA	4.00	7.50	4.50	3.50	6.00	4.50
MGE Energy, Inc. (NYSE-MGEE)	MGEE	4.50	4.50	6.00	6.00	5.00	6.00
NextEra Energy, Inc. (NYSE-NEE)	NEE	9.50	11.00	8.00	12.50	11.00	5.50
NorthWestern Corporation (NYSE-NWE)	NWE	2.50	5.50	5.00	-1.00	3.00	3.50
OGE Energy Corp. (NYSE-OGE)	OGE	3.00	7.50	4.00	4.50	8.50	1.50
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	2.50	4.00	4.00		4.00	3.50
Portland General Electric Company (NYSE-POR	POR	3.50	5.50	3.50	3.00	5.50	3.00
PPL Corporation (NYSE-PPL)	PPL	-9.00	-1.00		-17.00	-4.50	4.00
Public Service Enterprise Gp. Inc. (NYSE-PEG)	PEG	3.00	4.50	3.00	3.00	5.00	1.00
Sempra Energy (NYSE-SRE)	SRE	7.50	6.50	7.00	11.50	6.00	10.00
Southern Company (NYSE-SO)	SO	3.00	3.50	3.00	3.00	3.50	2.50
WEC Energy Group (NYSE-WEC)	WEC	6.50	10.00	7.00	7.00	6.50	3.50
Xcel Energy Inc. (NYSE-XEL)	XEL	5.50	6.50	5.50	6.00	6.50	6.00
Mean		**3.66**	**4.63**	**3.88**	**3.59**	**4.05**	**4.18**
Median		**3.75**	**5.00**	**4.00**	**3.50**	**5.00**	**3.50**
Median (Exclude EIX, ED, ES, TXNM)		**3.75**	**4.75**	**4.00**	**3.50**	**5.00**	**3.75**
Average of Median Figures =							**4.13**
Average of Median EPS Growth Rates =							**3.63**
Average of Median Figures (Exclude EIX, ED, ES, TXNM) =							**4.13**
Average of Median EPS Growth Rates (Exclude EIX, ED, ES, TXNM) =							**3.63**

Value Line Projected

Company	Ticker	Projected Growth Est'd. '22-'24 to '28-'30			Sustainable Growth		
		Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Consolidated Edison, Inc. (NYSE-ED)	ED	6.00	4.50	4.00	9.00%	40.00%	3.60%
Edison International (NYSE-EIX)	EIX	6.50	5.50	6.00	14.00%	37.00%	5.18%
Eversource Energy (NYSE-ES)	ES	5.50	5.50	3.50	11.50%	37.00%	4.26%
TXNM Energy, Inc.	TXNM	4.50	5.00	3.50	10.00%	45.00%	4.50%
Alliant Energy Corporation (NYSE-LNT)	LNT	6.00	6.00	4.00	12.00%	38.00%	4.56%
Ameren Corporation (NYSE-AEE)	AEE	6.50	6.50	6.50	10.00%	40.00%	4.00%
American Electric Power Co. (NYSE-AEP)	AEP	6.50	5.50	6.00	11.00%	39.00%	4.29%
Avista Corporation (NYSE-AVA)	AVA	5.50	4.00	2.00	8.50%	30.00%	2.55%
Black Hills Corporation (NYSE-BKH)	BKH	3.50	3.50	3.00	8.50%	38.00%	3.23%
CenterPoint Energy, Inc. (NYSE-CNP)	CNP	6.50	6.00	5.50	10.50%	56.00%	5.88%
CMS Energy Corporation (NYSE-CMS)	CMS	5.50	4.00	3.50	16.00%	40.00%	6.40%
Dominion Resources, Inc. (NYSE-D)	D	6.00	0.00	3.00	11.50%	37.00%	4.26%
DTE Energy Company (NYSE-DTE)	DTE	4.50	3.00	1.00	12.50%	38.00%	4.75%
Duke Energy Corporation (NYSE-DUK)	DUK	6.00	3.50	3.50	10.50%	37.00%	3.89%
Entergy Corporation (NYSE-ETR)	ETR	3.00	5.50	4.50	9.50%	39.00%	3.71%
Evergy, Inc. (NYSE-EVRG)	EVRG	7.50	7.00	3.50	10.00%	37.00%	3.70%
Exelon Corporation (NDW-EXC)	EXC	nmf	nmf	nmf	10.00%	40.00%	4.00%
FirstEnergy Corp. (NYSE-FE)	FE	4.50	4.50	5.50	12.50%	37.00%	4.63%
IDACORP, Inc. (NYSE-IDA)	IDA	6.00	5.50	4.50	10.00%	41.00%	4.10%
MGE Energy, Inc. (NYSE-MGEE)	MGEE	7.00	6.50	5.50	10.50%	47.00%	4.94%
Nextera Energy, Inc. (NYSE-NEE)	NEE	8.50	9.50	8.00	14.00%	37.00%	5.18%
NorthWestern Corporation (NYSE-NWE)	NWE	4.50	1.50	2.50	8.00%	36.00%	2.88%
OGE Energy Corp. (NYSE-OGE)	OGE	6.50	3.00	5.50	13.00%	30.00%	3.90%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	5.00	1.50	4.00	9.00%	38.00%	3.42%
Portland General Electric Company (NYSE-POR)	POR	6.50	5.50	4.50	9.50%	35.00%	3.33%
PPL Corporation (NYSE-PPL)	PPL	7.50	-0.50	3.00	9.50%	40.00%	3.80%
Public Service Enterprise Gp. Inc. (NYSE-PEG)	PEG	7.00	6.00	5.50	12.50%	39.00%	4.88%
Sempra Energy (NYSE-SRE)	SRE	5.00	5.50	5.50	10.50%	47.00%	4.94%
Southern Company (NYSE-SO)	SO	6.50	3.50	3.50	14.50%	33.00%	4.79%
WEC Energy Group (NYSE-WEC)	WEC	6.00	7.00	4.00	13.00%	36.00%	4.68%
Xcel Energy Inc. (NYSE-XEL)	XEL	7.00	6.50	5.50	11.00%	40.00%	4.40%
Mean		**5.90**	**4.68**	**4.33**	**11.00%**	**38.80%**	**4.27%**
Median		**6.00**	**5.50**	**4.00**	**10.50%**	**38.00%**	**3.99%**
Median (Exclude EIX, ED, ES, TXNM)		**6.00**	**5.50**	**4.25**			
Average of Median Figures =			**5.17**		**Median =**		**4.26%**
Median EPS Growth Rates =			**6.00**		**Median (Exclude EIX, ED, ES, TXNM) =**		**4.26%**
Average of Median Figures (Exclude EIX, ED, ES, TXNM) =			**5.25**				
Median EPS Growth Rates (Exclude EIX, ED, ES, TXNM) =			**6.00**				

Analyst Projected EPS

Company	Ticker	Zacks	S&P	Mean
Consolidated Edison, Inc. (NYSE-ED)	ED	5.57%	6.12%	5.84%
Edison International (NYSE-EIX)	EIX	7.05%	8.95%	8.00%
Eversource Energy (NYSE-ES)	ES	5.66%	5.69%	5.67%
TXNM Energy, Inc.	TXNM	7.56%	7.82%	7.69%
Alliant Energy Corporation (NYSE-LNT)	LNT	6.59%	6.67%	6.63%
Ameren Corporation (NYSE-AEE)	AEE	6.95%	7.51%	7.23%
American Electric Power Co. (NYSE-AEP)	AEP	6.43%	6.82%	6.63%
Avista Corporation (NYSE-AVA)	AVA	6.07%	5.88%	5.97%
Black Hills Corporation (NYSE-BKH)	BKH	5.26%	5.59%	5.42%
CenterPoint Energy, Inc. (NYSE-CNP)	CNP	7.76%	8.00%	7.88%
CMS Energy Corporation (NYSE-CMS)	CMS	7.84%	7.25%	7.55%
Dominion Resources, Inc. (NYSE-D)	D	13.59%	11.99%	12.79%
DTE Energy Company (NYSE-DTE)	DTE	7.64%	7.85%	7.75%
Duke Energy Corporation (NYSE-DUK)	DUK	6.33%	6.36%	6.35%
Entergy Corporation (NYSE-ETR)	ETR	9.46%	8.88%	9.17%
Evergy, Inc. (NYSE-EVRG)	EVRG	5.70%	5.74%	5.72%
Exelon Corporation (NDW-EXC)	EXC	6.42%	6.36%	6.39%
FirstEnergy Corp. (NYSE-FE)	FE	6.43%	6.52%	6.48%
IDACORP, Inc. (NYSE-IDA)	IDA	8.13%	8.55%	8.34%
MGE Energy, Inc. (NYSE-MGEE)	MGEE			
Nextera Energy, Inc. (NYSE-NEE)	NEE	7.72%	7.76%	7.74%
NorthWestern Corporation (NYSE-NWE)	NWE	6.87%	5.73%	6.30%
OGE Energy Corp. (NYSE-OGE)	OGE	6.32%	6.74%	6.53%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	2.12%	5.25%	3.69%
Portland General Electric Company (NYSE-POR)	POR	3.35%	4.74%	4.04%
PPL Corporation (NYSE-PPL)	PPL	7.46%	7.34%	7.40%
Public Service Enterprise Group Incorporated (NYSE - P	PEG	6.96%	6.49%	6.72%
Sempra Energy (NYSE-SRE)	SRE	7.94%	7.64%	7.79%
Southern Company (NYSE-SO)	SO	6.55%	6.93%	6.74%
WEC Energy Group (NYSE-WEC)	WEC	6.95%	7.09%	7.02%
Xcel Energy Inc. (NYSE-XEL)	XEL	7.52%	7.73%	7.63%
Mean		**6.87%**	**7.07%**	**6.97%**
Median		**6.91%**	**6.88%**	**6.73%**
Mean (Exclude EIX, ED, ES, TXNM)		**6.94%**	**7.05%**	**7.00%**
Median (Exclude EIX, ED, ES, TXNM)		**6.91%**	**6.88%**	**6.73%**

DCF Growth Rate Indicators

DCF Growth Rate Indicator	Electric Proxy Group	Exclude DPS and BVPS Growth rates	Proxy Group (Exclude EIX, ED, ES, TXNM)	Adjusted DCF Model
Historic Value Line Growthin EPS, DPS, and BVPS	4.1%	3.6%	4.1%	3.6%
Projected Value Line Growthin EPS, DPS, and BVPS	5.2%	6.0%	5.3%	6.0%
Sustainable GrowthROE * Retention Rate	4.3%	4.3%	4.3%	4.3%
Projected EPS Growth from Zacks and S&P Cap IQ - Mean	7.0%	7.0%	7.0%	7.0%
Projected EPS Growth from Zacks and S&P Cap IQ - Median	6.7%	6.7%	6.7%	6.7%
Projected EPS Growth from Zacks andS&P Cap IQ - Mean/Median	6.9%	6.9%	6.9%	6.9%
DCF Growth Rate	6.1%	6.3%	6.2%	6.3%

DCF Growth Rate Summary

DCF Growth Rate	Electric Proxy Group	EPS Growth Rate Only	EPS Growth Rate (Exclude EIX, ED, ES, TXNM)	Adjusted DCF Model
Projected Value Line Growth	5.17%	6.00%	5.25%	6.00%
Sustainable Growth	4.26%	4.26%	4.26%	4.26%
Projected EPS Growth	6.85%	6.85%	6.86%	6.86%
Projected Growth Average	5.42%	5.70%	5.46%	5.71%
Projected EPS Growth	6.85%	6.85%	6.86%	6.86%
DCF Growth Rate	6.14%	6.28%	6.16%	6.29%

Beta

Ticker	Value Line Beta	S&P Capital IQ Beta	S&P Capital IQ Blume adjusted Beta	Average
ED	0.65	0.24	0.49	0.57
EIX	0.85	0.75	0.84	0.84
ES	0.85	0.64	0.76	0.80
TXNM	0.65	0.14	0.43	0.54
LNT	0.80	0.56	0.71	0.75
AEE	0.80	0.50	0.66	0.73
AEP	0.70	0.40	0.60	0.65
AVA	0.75	0.39	0.59	0.67
BKH	0.85	0.68	0.79	0.82
CNP	0.85	0.56	0.71	0.78
CMS	0.70	0.37	0.58	0.64
D	0.75	0.55	0.70	0.73
DTE	0.80	0.44	0.63	0.71
DUK	0.65	0.35	0.57	0.61
ETR	0.80	0.57	0.72	0.76
EVRG	0.75	0.48	0.65	0.70
EXC	0.00	0.47	0.64	0.32
FE	0.75	0.37	0.58	0.66
IDA	0.70	0.56	0.71	0.70
MGEE	0.80	0.76	0.84	0.82
NEE	0.90	0.66	0.77	0.84
NWE	0.75	0.37	0.58	0.66
OGE	0.85	0.59	0.72	0.79
PNW	0.80	0.42	0.61	0.71
POR	0.75	0.58	0.72	0.73
PPL	0.85	0.65	0.77	0.81
PEG	0.85	0.50	0.67	0.76
SRE	0.90	0.64	0.76	0.83
SO	0.70	0.37	0.58	0.64
WEC	0.65	0.42	0.62	0.63
XEL	0.75	0.37	0.58	0.67
		Median =		**0.71**
		Median (Exclude EIX, ED, ES, TXNM) =		**0.71**

Appendix R-J

Ellis Model Adjustments (Available on Request)

Appendix R-K

Gorman Financial Leverage

Hamada Adjustment on Gorman CAPM

Company	Risk-Free Rate	Beta	Market Risk Premium	CAPM ROE	CAPM COD	COE - COD	COE - COD > 20% of FERC MRP
Alliant Energy Corporation	4.50%	0.72	7.03%	9.58%	5.89%	3.69%	1
Ameren Corporation	4.50%	0.74	7.03%	9.68%	6.11%	3.57%	1
American Electric Power Company, Inc.	4.50%	0.66	7.03%	9.14%	5.95%	3.19%	1
Avista Corporation	4.50%	0.75	7.03%	9.78%	6.11%	3.67%	1
Black Hills Corporation	4.50%	0.88	7.03%	10.67%	6.11%	4.56%	1
CMS Energy Corporation	4.50%	0.67	7.03%	9.19%	6.11%	3.07%	1
CenterPoint Energy, Inc.	4.50%	0.82	7.03%	10.25%	6.11%	4.14%	1
DTE Energy Company	4.50%	0.75	7.03%	9.77%	6.11%	3.66%	1
Dominion Energy, Inc.	4.50%	0.68	7.03%	9.30%	6.11%	3.18%	1
Duke Energy Corporation	4.50%	0.63	7.03%	8.90%	6.11%	2.78%	1
Entergy Corporation	4.50%	0.79	7.03%	10.03%	6.11%	3.91%	1
Evergy, Inc.	4.50%	0.70	7.03%	9.42%	5.95%	3.47%	1
Exelon Corporation	4.50%	0.78	7.03%	9.97%	6.06%	3.91%	1
IDACORP, Inc.	4.50%	0.67	7.03%	9.24%	6.11%	3.13%	1
NorthWestern Corporation	4.50%	0.79	7.03%	10.04%	6.11%	3.93%	1
OGE Energy Corp.	4.50%	0.85	7.03%	10.49%	6.11%	4.38%	1
PPL Corporation	4.50%	0.83	7.03%	10.36%	5.83%	4.52%	1
Pinnacle West Capital Corporation	4.50%	0.77	7.03%	9.95%	6.06%	3.89%	1
Portland General Electric Company	4.50%	0.72	7.03%	9.58%	6.11%	3.47%	1
Public Service Enterprise Group Incorporated	4.50%	0.82	7.03%	10.23%	6.11%	4.12%	1
Sempra	4.50%	0.87	7.03%	10.58%	6.11%	4.47%	1
The Southern Company	4.50%	0.68	7.03%	9.30%	6.00%	3.30%	1
WEC Energy Group, Inc.	4.50%	0.63	7.03%	8.94%	5.83%	3.11%	1
Xcel Energy Inc.	4.50%	0.67	7.03%	9.18%	5.95%	3.23%	1
Average	4.50%	0.75	7.03%	9.73%			

Brattle Calculation - Hamada Adjustment

Company	Beta	Debt Beta	CAPM Common Equity to Market Value Ratio	CAPM Preferred Equity to Market Value Ratio	CAPM Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Asset Beta Without Taxes	Asset Beta With Taxes
Alliant Energy Corporation	0.72	0.06	61.32%	0.28%	38.41%	27.98%	0.47	0.52
Ameren Corporation	0.74	0.10	59.45%	0.00%	40.55%	27.98%	0.48	0.53
American Electric Power Company, Inc.	0.66	0.07	53.23%	0.00%	46.77%	27.98%	0.38	0.43
Avista Corporation	0.75	0.10	52.14%	0.00%	47.86%	27.98%	0.44	0.49
Black Hills Corporation	0.88	0.10	48.73%	0.00%	51.27%	27.98%	0.48	0.54
CMS Energy Corporation	0.67	0.10	55.90%	0.49%	43.61%	27.98%	0.42	0.46
CenterPoint Energy, Inc.	0.82	0.10	48.77%	2.96%	48.27%	27.98%	0.45	0.50
DTE Energy Company	0.75	0.10	55.04%	0.00%	44.96%	27.98%	0.46	0.51
Dominion Energy, Inc.	0.68	0.10	55.40%	2.26%	42.34%	27.98%	0.42	0.47
Duke Energy Corporation	0.63	0.10	51.66%	1.27%	47.07%	27.98%	0.37	0.41
Entergy Corporation	0.79	0.10	46.92%	0.62%	52.46%	27.98%	0.42	0.48
Evergy, Inc.	0.70	0.07	54.22%	0.00%	45.78%	27.98%	0.41	0.46
Exelon Corporation	0.78	0.09	47.13%	0.00%	52.87%	27.98%	0.41	0.47
IDACORP, Inc.	0.67	0.10	66.94%	0.00%	33.06%	27.98%	0.48	0.52
NorthWestern Corporation	0.79	0.10	54.97%	0.00%	45.03%	27.98%	0.48	0.53
OGE Energy Corp.	0.85	0.10	58.95%	0.00%	41.05%	27.98%	0.54	0.60
PPL Corporation	0.83	0.05	56.55%	0.00%	43.45%	27.98%	0.49	0.55
Pinnacle West Capital Corporation	0.77	0.09	57.94%	0.00%	42.06%	27.98%	0.49	0.54
Portland General Electric Company	0.72	0.10	49.45%	0.00%	50.55%	27.98%	0.41	0.46
Public Service Enterprise Group Incorporated	0.82	0.10	62.82%	0.00%	37.18%	27.98%	0.55	0.60
Sempra	0.87	0.10	59.91%	1.58%	38.51%	27.98%	0.56	0.61
The Southern Company	0.68	0.08	58.30%	0.12%	41.58%	27.98%	0.43	0.48
WEC Energy Group, Inc.	0.63	0.05	63.70%	0.07%	36.23%	27.98%	0.42	0.46
Xcel Energy Inc.	0.67	0.07	58.72%	0.00%	41.28%	27.98%	0.42	0.47
Average	0.74	0.09	55.76%	0.40%	43.84%	27.98%	0.45	0.50

Asset Beta	SCE's Assumed Debt Beta	SCE's Representative Regulatory % Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Equity Beta	Long-Term Risk-Free Rate	Hamada-Adjusted Equity Betas	Ex Ante Market Risk Premium	CAPM Cost of Equity
Asset Beta with Taxes									
At SCE's Requested Capital Structure									
0.50	0.10	49.40%	27.98%	50.60%	**0.79**	4.50%	0.79	7.03%	**10.04%**
At Mr. Gorman's Requested Capital Structure									
0.50	0.10	50.00%	27.98%	50.00%	**0.80**	4.50%	0.80	7.03%	**10.09%**
Asset Beta without Taxes									
At SCE's Requested Capital Structure									
0.45	0.10	49.40%	27.98%	50.60%	**0.80**	4.50%	0.80	7.03%	**10.12%**
At Mr. Gorman's Requested Capital Structure									
0.45	0.10	50.00%	27.98%	50.00%	**0.81**	4.50%	0.81	7.03%	**10.17%**

Financial Leverage on Gorman DCF

Multi-Stage Growth DCF

Company	Credit Ratings	DCF COE	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
Alliant Energy Corporation	BBB+	7.86%	60.37%	6.11%	-	6.11%	39.63%	27.98%	6.49%
Ameren Corporation	BBB+	7.71%	60.14%	6.11%	-	6.11%	39.86%	27.98%	6.39%
American Electric Power Company, Inc.	BBB+	8.40%	56.12%	6.11%	-	6.11%	43.88%	27.98%	6.65%
Avista Corporation	BBB	9.92%	52.87%	6.11%	-	6.11%	47.13%	27.98%	7.32%
Black Hills Corporation	BBB+	9.23%	50.28%	6.11%	-	6.11%	49.72%	27.98%	6.83%
CMS Energy Corporation	BBB+	8.00%	57.45%	6.11%	0.62%	6.11%	41.93%	27.98%	6.48%
CenterPoint Energy, Inc.	BBB+	7.31%	53.77%	6.11%	-	6.11%	46.23%	27.98%	5.97%
DTE Energy Company	BBB+	8.34%	57.45%	6.11%	-	6.11%	42.55%	27.98%	6.66%
Dominion Energy, Inc.	BBB+	12.69%	53.69%	6.11%	1.13%	6.11%	45.18%	27.98%	8.87%
Duke Energy Corporation	BBB+	8.34%	54.27%	6.11%	0.59%	6.11%	45.15%	27.98%	6.55%
Entergy Corporation	BBB+	8.31%	56.60%	6.11%	0.51%	6.11%	42.90%	27.98%	6.62%
Evergy, Inc.	BBB+	8.68%	54.55%	6.11%	-	6.11%	45.45%	27.98%	6.73%
Exelon Corporation	A-	8.44%	50.77%	5.83%	-	5.83%	49.23%	27.98%	6.36%
IDACORP, Inc.	BBB	8.02%	66.03%	6.11%	-	6.11%	33.97%	27.98%	6.79%
NorthWestern Corporation	BBB	9.69%	53.28%	6.11%	-	6.11%	46.72%	27.98%	7.22%
OGE Energy Corp.	BBB+	8.58%	63.17%	6.11%	-	6.11%	36.83%	27.98%	7.04%
PPL Corporation	A-	8.12%	62.85%	5.83%	-	5.83%	37.15%	27.98%	6.67%
Pinnacle West Capital Corporation	BBB+	7.87%	59.29%	6.11%	-	6.11%	40.71%	27.98%	6.46%
Portland General Electric Company	BBB+	8.90%	42.02%	6.11%	-	6.11%	57.98%	27.98%	6.29%
Public Service Enterprise Group Incorporated	BBB+	8.12%	65.75%	6.11%	-	6.11%	34.25%	27.98%	6.85%
Sempra	BBB+	8.78%	58.46%	6.11%	1.08%	6.11%	40.46%	27.98%	6.98%
The Southern Company	A-	8.14%	62.97%	5.83%	-	5.83%	37.03%	27.98%	6.68%
WEC Energy Group, Inc.	A-	8.33%	63.66%	5.83%	0.06%	5.83%	36.28%	27.98%	6.83%
Xcel Energy Inc.	BBB+	8.41%	58.64%	6.11%	-	6.11%	41.36%	27.98%	6.75%
Mean		8.59%	57.27%	6.07%	0.66%	6.07%	42.57%	27.98%	6.80%
Median		8.34%	57.45%	6.11%	0.60%	6.11%	42.24%	27.98%	6.68%

COE - COD	COE - COD > 20% of FERC MRP
1.75%	1
1.60%	1
2.29%	1
3.80%	1
3.12%	1
1.89%	1
1.20%	0
2.23%	1
6.58%	1
2.23%	1
2.20%	1
2.56%	1
2.61%	1
1.91%	1
3.58%	1
2.46%	1
2.29%	1
1.75%	1
2.78%	1
2.01%	1
2.67%	1
2.30%	1
2.49%	1
2.30%	1

Overall After -Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Regulatory % Preferred Equity	SCE's Cost of Preferred Equity	SCE's Representative Regulatory % Equity	Estimated Return on Equity	Impact of Financial Leverage Adjustment
At SCE's Requested Capital Structure								
6.80%	49.40%	6.11%	27.98%	0.00%	0.00%	50.60%	**9.15%**	2.35%
At Mr. Gorman's Requested Capital Structure								
6.80%	50.00%	6.11%	27.98%	0.00%	0.00%	50.00%	**9.21%**	2.40%

Financial Leverage on Gorman DCF

Constant Growth DCF (Analysts' Growth)

Company	Credit Ratings	DCF COE	DCF Common Equity to Market Value Ratio	Cost of Preferred Equity	DCF Preferred Equity to Market Value Ratio	DCF Cost of Debt	DCF Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Overall Weighted After-Tax Cost of Capital
Alliant Energy Corporation	BBB+	9.83%	60.37%	6.11%	-	6.11%	39.63%	27.98%	7.68%
Ameren Corporation	BBB+	10.00%	60.14%	6.11%	-	6.11%	39.86%	27.98%	7.77%
American Electric Power Company, Inc.	BBB+	10.31%	56.12%	6.11%	-	6.11%	43.88%	27.98%	7.72%
Avista Corporation	BBB	11.50%	52.87%	6.11%	-	6.11%	47.13%	27.98%	8.16%
Black Hills Corporation	BBB+	10.18%	50.28%	6.11%	-	6.11%	49.72%	27.98%	7.31%
CMS Energy Corporation	BBB+	10.85%	57.45%	6.11%	0.62%	6.11%	41.93%	27.98%	8.12%
CenterPoint Energy, Inc.	BBB+	10.57%	53.77%	6.11%	-	6.11%	46.23%	27.98%	7.72%
DTE Energy Company	BBB+	11.23%	57.45%	6.11%	-	6.11%	42.55%	27.98%	8.32%
Dominion Energy, Inc.	BBB+	19.02%	53.69%	6.11%	1.13%	6.11%	45.18%	27.98%	12.27%
Duke Energy Corporation	BBB+	10.17%	54.27%	6.11%	0.59%	6.11%	45.15%	27.98%	7.54%
Entergy Corporation	BBB+	12.58%	56.60%	6.11%	0.51%	6.11%	42.90%	27.98%	9.04%
Evergy, Inc.	BBB+	9.88%	54.55%	6.11%	-	6.11%	45.45%	27.98%	7.39%
Exelon Corporation	A-	11.07%	50.77%	5.83%	-	5.83%	49.23%	27.98%	7.69%
IDACORP, Inc.	BBB	11.06%	66.03%	6.11%	-	6.11%	33.97%	27.98%	8.80%
NorthWestern Corporation	BBB	11.35%	53.28%	6.11%	-	6.11%	46.72%	27.98%	8.10%
OGE Energy Corp.	BBB+	10.17%	63.17%	6.11%	-	6.11%	36.83%	27.98%	8.04%
PPL Corporation	A-	10.84%	62.85%	5.83%	-	5.83%	37.15%	27.98%	8.37%
Pinnacle West Capital Corporation	BBB+	7.02%	59.29%	6.11%	-	6.11%	40.71%	27.98%	5.96%
Portland General Electric Company	BBB+	8.76%	42.02%	6.11%	-	6.11%	57.98%	27.98%	6.23%
Public Service Enterprise Group Incorporated	BBB+	10.78%	65.75%	6.11%	-	6.11%	34.25%	27.98%	8.59%
Sempra	BBB+	11.55%	58.46%	6.11%	1.08%	6.11%	40.46%	27.98%	8.60%
The Southern Company	A-	10.21%	62.97%	5.83%	-	5.83%	37.03%	27.98%	7.99%
WEC Energy Group, Inc.	A-	10.78%	63.66%	5.83%	0.06%	5.83%	36.28%	27.98%	8.39%
Xcel Energy Inc.	BBB+	11.41%	58.64%	6.11%	-	6.11%	41.36%	27.98%	8.51%
Mean		10.88%	57.27%	6.07%	0.66%	6.07%	42.57%	27.98%	8.19%
Median		10.78%	57.45%	6.11%	0.60%	6.11%	42.24%	27.98%	8.10%

COE - COD	COE - COD > 20% of FERC MRP
3.72%	1
3.89%	1
4.20%	1
5.39%	1
4.07%	1
4.74%	1
4.46%	1
5.12%	1
12.91%	1
4.06%	1
6.47%	1
3.77%	1
5.23%	1
4.95%	1
5.24%	1
4.06%	1
5.01%	1
0.91%	0
2.65%	1
4.66%	1
5.44%	1
4.38%	1
4.95%	1
5.30%	1

Overall After -Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Regulatory % Preferred Equity	SCE's Cost of Preferred Equity	SCE's Representative Regulatory % Equity	Estimated Return on Equity	Impact of Financial Leverage Adjustment
At SCE's Requested Capital Structure								
8.19%	49.40%	6.11%	27.98%	0.00%	0.00%	50.60%	**11.89%**	3.70%
At Mr. Gorman's Requested Capital Structure								
8.19%	50.00%	6.11%	27.98%	0.00%	0.00%	50.00%	**11.98%**	3.79%

Gorman - DCFs

Constant Growth DCF (Analysts' Growth) and Multi-Stage Growth DCF

	Constant Growth DCF (Analysts' Growth)	Multi-Stage Growth DCF	Average	Median
Alliant Energy Corporation	9.83%	7.86%	8.85%	8.85%
Ameren Corporation	10.00%	7.71%	8.86%	8.86%
American Electric Power Company, Inc.	10.31%	8.40%	9.36%	9.36%
Avista Corporation	11.50%	9.92%	10.71%	10.71%
Black Hills Corporation	10.18%	9.23%	9.70%	9.70%
CMS Energy Corporation	10.85%	8.00%	9.43%	9.43%
CenterPoint Energy, Inc.	10.57%	7.31%	8.94%	8.94%
DTE Energy Company	11.23%	8.34%	9.78%	9.78%
Dominion Energy, Inc.	19.02%	12.69%	15.86%	15.86%
Duke Energy Corporation	10.17%	8.34%	9.26%	9.26%
Entergy Corporation	12.58%	8.31%	10.44%	10.44%
Evergy, Inc.	9.88%	8.68%	9.28%	9.28%
Exelon Corporation	11.07%	8.44%	9.76%	9.76%
IDACORP, Inc.	11.06%	8.02%	9.54%	9.54%
NorthWestern Corporation	11.35%	9.69%	10.52%	10.52%
OGE Energy Corp.	10.17%	8.58%	9.37%	9.37%
PPL Corporation	10.84%	8.12%	9.48%	9.48%
Pinnacle West Capital Corporation	7.02%	7.87%	7.44%	7.44%
Portland General Electric Company	8.76%	8.90%	8.83%	8.83%
Public Service Enterprise Group Incorporated	10.78%	8.12%	9.45%	9.45%
Sempra	11.55%	8.78%	10.16%	10.16%
The Southern Company	10.21%	8.14%	9.17%	9.17%
WEC Energy Group, Inc.	10.78%	8.33%	9.55%	9.55%
Xcel Energy Inc.	11.41%	8.41%	9.91%	9.91%
Mean	**10.88%**	**8.59%**	**9.74%**	**9.74%**
Median	**10.78%**	**8.34%**	**9.47%**	**9.47%**

Appendix R-L

Woolridge Financial Leverage

Wooldridge - CAPM Calculation

Company	Ticker	Risk-Free Interest Rate	Beta	Ex Ante Market Risk Premium	CAPM Cost of Equity
Alliant Energy Corporation	LNT	5.0%	0.75	5.25%	8.95%
Ameren Corporation	AEE	5.0%	0.73	5.25%	8.84%
American Electric Power Co.	AEP	5.0%	0.65	5.25%	8.42%
Avista Corporation	AVA	5.0%	0.67	5.25%	8.52%
Black Hills Corporation	BKH	5.0%	0.82	5.25%	9.29%
CenterPoint Energy, Inc.	CNP	5.0%	0.78	5.25%	9.09%
CMS Energy Corporation	CMS	5.0%	0.64	5.25%	8.36%
Consolidated Edison, Inc.	ED	5.0%	0.57	5.25%	8.01%
Dominion Energy Inc.	D	5.0%	0.73	5.25%	8.81%
DTE Energy Company	DTE	5.0%	0.71	5.25%	8.74%
Duke Energy Corporation	DUK	5.0%	0.61	5.25%	8.20%
Edison International	EIX	5.0%	0.84	5.25%	9.43%
Entergy Corporation	ETR	5.0%	0.76	5.25%	8.98%
Evergy, Inc.	EVRG	5.0%	0.70	5.25%	8.68%
Eversource Energy	ES	5.0%	0.80	5.25%	9.22%
Exelon Corporation	EXC	5.0%	0.32	5.25%	6.69%
FirstEnergy Corp.	FE	5.0%	0.66	5.25%	8.48%
IDACORP, Inc.	IDA	5.0%	0.70	5.25%	8.69%
MGE Energy, Inc.	MGEE	5.0%	0.82	5.25%	9.30%
NextEra Energy, Inc.	NEE	5.0%	0.84	5.25%	9.39%
NorthWestern Corporation	NWE	5.0%	0.66	5.25%	8.49%
OGE Energy Corp.	OGE	5.0%	0.79	5.25%	9.13%
Pinnacle West Capital Corp.	PNW	5.0%	0.71	5.25%	8.71%
Portland General Electric Company	POR	5.0%	0.73	5.25%	8.86%
PPL Corporation	PPL	5.0%	0.81	5.25%	9.25%
Public Service Enterprise Gp. Inc.	PEG	5.0%	0.76	5.25%	8.98%
Sempra Energy	SRE	5.0%	0.83	5.25%	9.35%
Southern Company	SO	5.0%	0.64	5.25%	8.35%
TXNM Energy, Inc.	TXNM	5.0%	0.54	5.25%	7.82%
WEC Energy Group	WEC	5.0%	0.63	5.25%	8.32%
Xcel Energy Inc.	XEL	5.0%	0.67	5.25%	8.50%
Average		**5.00%**	**0.71**	**5.25%**	**8.77%**

Brattle Calculation - Hamada Adjustment

Company	Ticker	Beta	Debt Beta	CAPM Common Equity to Market Value Ratio	CAPM Preferred Equity to Market Value Ratio	CAPM Debt to Market Value Ratio	SCE's Representative Income Tax Rate	Asset Beta Without Taxes	Asset Beta With Taxes
Alliant Energy Corporation	LNT	0.75	0.06	61.32%	0.28%	38.41%	27.98%	0.49	0.54
Ameren Corporation	AEE	0.73	0.10	59.45%	0.00%	40.55%	27.98%	0.48	0.52
American Electric Power Co.	AEP	0.65	0.07	53.23%	0.00%	46.77%	27.98%	0.38	0.43
Avista Corporation	AVA	0.67	0.10	52.14%	0.00%	47.86%	27.98%	0.40	0.44
Black Hills Corporation	BKH	0.82	0.10	48.73%	0.00%	51.27%	27.98%	0.45	0.51
CenterPoint Energy, Inc.	CNP	0.78	0.10	48.77%	2.96%	48.27%	27.98%	0.43	0.48
CMS Energy Corporation	CMS	0.64	0.10	55.90%	0.49%	43.61%	27.98%	0.40	0.44
Consolidated Edison, Inc.	ED	0.57	0.05	56.81%	0.00%	43.19%	27.98%	0.35	0.39
Dominion Energy Inc.	D	0.73	0.10	55.40%	2.26%	42.34%	27.98%	0.45	0.49
DTE Energy Company	DTE	0.71	0.10	55.04%	0.00%	44.96%	27.98%	0.44	0.49
Duke Energy Corporation	DUK	0.61	0.10	51.66%	1.27%	47.07%	27.98%	0.36	0.40
Edison International	EIX	0.84	0.10	42.51%	2.65%	54.84%	27.98%	0.42	0.47
Entergy Corporation	ETR	0.76	0.10	46.92%	0.62%	52.46%	27.98%	0.41	0.46
Evergy, Inc.	EVRG	0.70	0.07	54.22%	0.00%	45.78%	27.98%	0.41	0.46
Eversource Energy	ES	0.80	0.06	53.65%	0.33%	46.02%	27.98%	0.46	0.52
Exelon Corporation	EXC	0.32	0.09	47.13%	0.00%	52.87%	27.98%	0.20	0.22
FirstEnergy Corp.	FE	0.66	0.11	50.27%	0.00%	49.73%	27.98%	0.39	0.43
IDACORP, Inc.	IDA	0.70	0.10	66.94%	0.00%	33.06%	27.98%	0.50	0.54
MGE Energy, Inc.	MGEE	0.82	0.05	80.41%	0.00%	19.59%	27.98%	0.67	0.70
NextEra Energy, Inc.	NEE	0.84	0.05	68.93%	0.00%	31.07%	27.98%	0.59	0.64
NorthWestern Corporation	NWE	0.66	0.10	54.97%	0.00%	45.03%	27.98%	0.41	0.46
OGE Energy Corp.	OGE	0.79	0.10	58.95%	0.00%	41.05%	27.98%	0.51	0.56
Pinnacle West Capital Corp.	PNW	0.71	0.09	57.94%	0.00%	42.06%	27.98%	0.45	0.49
Portland General Electric Company	POR	0.73	0.10	49.45%	0.00%	50.55%	27.98%	0.41	0.47
PPL Corporation	PPL	0.81	0.05	56.55%	0.00%	43.45%	27.98%	0.48	0.54
Public Service Enterprise Gp. Inc.	PEG	0.76	0.10	62.82%	0.00%	37.18%	27.98%	0.51	0.56
Sempra Energy	SRE	0.83	0.10	59.91%	1.58%	38.51%	27.98%	0.54	0.59
Southern Company	SO	0.64	0.08	58.30%	0.12%	41.58%	27.98%	0.41	0.45
TXNM Energy, Inc.	TXNM	0.54	0.10	48.37%	0.14%	51.49%	27.98%	0.31	0.35
WEC Energy Group	WEC	0.63	0.05	63.70%	0.07%	36.23%	27.98%	0.42	0.46
Xcel Energy Inc.	XEL	0.67	0.07	58.72%	0.00%	41.28%	27.98%	0.42	0.47
Average with Taxes		0.71	0.09	56.10%	0.41%	43.49%	27.98%	0.44	0.49

Asset Beta	SCE's Assumed Debt Beta	SCE's Representative Regulatory % Debt	SCE's Representative Income Tax Rate	SCE's Representative Regulatory % Equity	Estimated Equity Beta	Long-Term Risk-Free Rate	Hamada-Adjusted Equity Betas	Ex Ante Market Risk Premium	CAPM Cost of Equity
Asset Beta with Taxes									
At SCE's Requested Capital Structure									
0.49	0.10	49.4%	27.98%	50.6%	**0.77**	5.00%	0.77	5.25%	**9.03%**
At Dr. Wooldridge's Requested Capital Structure									
0.49	0.10	50.0%	27.98%	50.0%	**0.77**	5.00%	0.77	5.25%	**9.07%**
Asset Beta without Taxes									
At SCE's Requested Capital Structure									
0.44	0.10	49.4%	27.98%	50.6%	**0.78**	5.00%	0.78	5.25%	**9.10%**
At Dr. Wooldridge's Requested Capital Structure									
0.44	0.10	50.0%	27.98%	50.0%	**0.79**	5.00%	0.79	5.25%	**9.14%**

Wooldridge - CAPM Cost of Equity

Financial Leverage

Company	Credit Rating	CAPM Cost of Equity [1]	CAPM Common Equity to Market Value Ratio [2]	Cost of Preferred Equity [3]	CAPM Preferred Equity to Market Value Ratio [4]	CAPM Cost of Debt [5]	CAPM Debt to Market Value Ratio [6]	SCE's Representative Income Tax Rate [7]	Overall Weighted After-Tax Cost of Capital [8]
Alliant Energy Corporation	BBB+	8.95%	61.32%	5.89%	0.28%	5.89%	38.41%	27.98%	7.14%
Ameren Corporation	BBB+	8.84%	59.45%	0.00%	0.00%	6.11%	40.55%	27.98%	7.04%
American Electric Power Co.	BBB+	8.42%	53.23%	0.00%	0.00%	5.95%	46.77%	27.98%	6.48%
Avista Corporation	BBB	8.52%	52.14%	0.00%	0.00%	6.11%	47.86%	27.98%	6.55%
Black Hills Corporation	BBB+	9.29%	48.73%	0.00%	0.00%	6.11%	51.27%	27.98%	6.79%
CenterPoint Energy, Inc.	BBB+	9.09%	48.77%	6.11%	2.96%	6.11%	48.27%	27.98%	6.74%
CMS Energy Corporation	BBB+	8.36%	55.90%	6.11%	0.49%	6.11%	43.61%	27.98%	6.62%
Consolidated Edison, Inc.	A-	8.01%	56.81%	0.00%	0.00%	5.83%	43.19%	27.98%	6.36%
Dominion Energy Inc.	BBB+	8.81%	55.40%	6.11%	2.26%	6.11%	42.34%	27.98%	6.88%
DTE Energy Company	BBB+	8.74%	55.04%	0.00%	0.00%	6.11%	44.96%	27.98%	6.79%
Duke Energy Corporation	BBB+	8.20%	51.66%	6.11%	1.27%	6.11%	47.07%	27.98%	6.38%
Edison International	BBB	9.43%	42.51%	6.11%	2.65%	6.11%	54.84%	27.98%	6.58%
Entergy Corporation	BBB+	8.98%	46.92%	6.11%	0.62%	6.11%	52.46%	27.98%	6.56%
Evergy, Inc.	BBB+	8.68%	54.22%	0.00%	0.00%	5.95%	45.78%	27.98%	6.67%
Eversource Energy	BBB+	9.22%	53.65%	5.89%	0.33%	5.89%	46.02%	27.98%	6.92%
Exelon Corporation	A-	6.69%	47.13%	0.00%	0.00%	6.06%	52.87%	27.98%	5.46%
FirstEnergy Corp.	BBB	8.48%	50.27%	0.00%	0.00%	6.33%	49.73%	27.98%	6.53%
IDACORP, Inc.	BBB	8.69%	66.94%	0.00%	0.00%	6.11%	33.06%	27.98%	7.27%
MGE Energy, Inc.	AA-	9.30%	80.41%	0.00%	0.00%	5.60%	19.59%	27.98%	8.27%
NextEra Energy, Inc.	A-	9.39%	68.93%	0.00%	0.00%	5.83%	31.07%	27.98%	7.78%
NorthWestern Corporation	BBB	8.49%	54.97%	0.00%	0.00%	6.11%	45.03%	27.98%	6.65%
OGE Energy Corp.	BBB+	9.13%	58.95%	0.00%	0.00%	6.11%	41.05%	27.98%	7.19%
Pinnacle West Capital Corp.	BBB+	8.71%	57.94%	0.00%	0.00%	6.06%	42.06%	27.98%	6.88%
Portland General Electric Compar	BBB+	8.86%	49.45%	0.00%	0.00%	6.11%	50.55%	27.98%	6.60%
PPL Corporation	A-	9.25%	56.55%	0.00%	0.00%	5.83%	43.45%	27.98%	7.06%
Public Service Enterprise Gp. Inc.	BBB+	8.98%	62.82%	0.00%	0.00%	6.11%	37.18%	27.98%	7.28%
Sempra Energy	BBB+	9.35%	59.91%	6.11%	1.58%	6.11%	38.51%	27.98%	7.39%
Southern Company	A-	8.35%	58.30%	6.00%	0.12%	6.00%	41.58%	27.98%	6.67%
TXNM Energy, Inc.	BBB	7.82%	48.37%	6.11%	0.14%	6.11%	51.49%	27.98%	6.06%
WEC Energy Group	A-	8.32%	63.70%	5.83%	0.07%	5.83%	36.23%	27.98%	6.83%
Xcel Energy Inc.	BBB+	8.50%	58.72%	0.00%	0.00%	5.95%	41.28%	27.98%	6.76%
Average		8.70%	56.10%	2.34%	0.41%	6.03%	43.49%	27.98%	6.86%

COE - COD	COE - COD > 20% of FERC MRP
3.06%	1
2.73%	1
2.48%	1
2.41%	1
3.18%	1
2.98%	1
2.25%	1
2.17%	1
2.70%	1
2.63%	1
2.09%	1
3.31%	1
2.87%	1
2.73%	1
3.33%	1
0.64%	0
2.15%	1
2.58%	1
3.70%	1
3.56%	1
2.38%	1
3.02%	1
2.65%	1
2.74%	1
3.41%	1
2.87%	1
3.24%	1
2.35%	1
1.71%	1
2.49%	1
2.55%	1

Overall After -Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Regulatory % Preferred Equity	SCE's Cost of Preferred Equity	SCE's Representative Regulatory % Equity	Estimated Return on Equity	Impact of Financial Leverage Adjustment
6.86%	49.40%	6.11%	27.98%	0.00%	0.00%	50.60%	9.25%	2.40%
6.86%	50.00%	6.11%	27.98%	0.00%	0.00%	50.00%	9.31%	2.46%

Wooldridge - DCF Cost of Equity

Financial Leverage

Company	Credit Rating	DCF Cost of Equity [1]	DCF Common Equity to Market Value Ratio [2]	Cost of Preferred Equity [3]	DCF Preferred Equity to Market Value Ratio [4]	DCF Cost of Debt [5]	DCF Debt to Market Value Ratio [6]	SCE's Representative Income Tax Rate [7]	Overall Weighted After-Tax Cost of Capital [8]
Alliant Energy Corporation	BBB+	9.48%	60.37%	6.11%	-	6.11%	39.63%	27.98%	7.47%
Ameren Corporation	BBB+	9.65%	60.14%	6.11%	-	6.11%	39.86%	27.98%	7.55%
American Electric Power Co.	BBB+	9.86%	56.12%	6.11%	-	6.11%	43.88%	27.98%	7.47%
Avista Corporation	BBB	10.31%	52.87%	6.11%	-	6.11%	47.13%	27.98%	7.53%
Black Hills Corporation	BBB+	9.48%	50.28%	6.11%	-	6.11%	49.72%	27.98%	6.95%
CenterPoint Energy, Inc.	BBB+	9.74%	53.77%	6.11%	-	6.11%	46.23%	27.98%	7.27%
CMS Energy Corporation	BBB+	10.00%	57.45%	6.11%	0.62%	6.11%	41.93%	27.98%	7.63%
Consolidated Edison, Inc.	A-	8.77%	62.32%	5.83%	-	5.83%	37.68%	27.98%	7.05%
Dominion Energy Inc.	BBB+	14.71%	53.69%	6.11%	1.13%	6.11%	45.18%	27.98%	9.95%
DTE Energy Company	BBB+	9.84%	57.45%	6.11%	-	6.11%	42.55%	27.98%	7.52%
Duke Energy Corporation	BBB+	9.29%	54.27%	6.11%	0.59%	6.11%	45.15%	27.98%	7.07%
Edison International	BBB	13.32%	32.95%	6.11%	2.80%	6.11%	64.25%	27.98%	7.39%
Entergy Corporation	BBB+	10.46%	56.60%	6.11%	0.51%	6.11%	42.90%	27.98%	7.84%
Evergy, Inc.	BBB+	9.55%	54.55%	6.11%	-	6.11%	45.45%	27.98%	7.21%
Eversource Energy	BBB+	10.32%	47.16%	6.11%	0.31%	6.11%	52.52%	27.98%	7.20%
Exelon Corporation	A-	9.60%	50.77%	5.83%	-	5.83%	49.23%	27.98%	6.94%
FirstEnergy Corp.	BBB	10.42%	48.76%	6.11%	-	6.11%	51.24%	27.98%	7.34%
IDACORP, Inc.	BBB	10.22%	66.03%	6.11%	-	6.11%	33.97%	27.98%	8.25%
MGE Energy, Inc.	AA-	7.66%	82.40%	5.83%	-	5.83%	17.60%	27.98%	7.05%
NextEra Energy, Inc.	A-	10.75%	63.40%	5.83%	-	5.83%	36.60%	27.98%	8.36%
NorthWestern Corporation	BBB	10.15%	53.28%	6.11%	-	6.11%	46.72%	27.98%	7.47%
OGE Energy Corp.	BBB+	9.77%	63.17%	6.11%	-	6.11%	36.83%	27.98%	7.79%
Pinnacle West Capital Corp.	BBB+	7.71%	59.29%	6.11%	-	6.11%	40.71%	27.98%	6.36%
Portland General Electric Company	BBB+	9.30%	42.02%	6.11%	-	6.11%	57.98%	27.98%	6.46%
PPL Corporation	A-	9.40%	62.85%	5.83%	-	5.83%	37.15%	27.98%	7.47%
Public Service Enterprise Gp. Inc.	BBB+	9.50%	65.75%	6.11%	-	6.11%	34.25%	27.98%	7.76%
Sempra Energy	BBB+	10.40%	58.46%	6.11%	1.08%	6.11%	40.46%	27.98%	7.93%
Southern Company	A-	9.46%	62.97%	5.83%	-	5.83%	37.03%	27.98%	7.51%
TXNM Energy, Inc.	BBB	9.71%	48.34%	6.11%	0.11%	6.11%	51.56%	27.98%	6.97%
WEC Energy Group	A-	9.93%	63.66%	5.83%	0.06%	5.83%	36.28%	27.98%	7.85%
Xcel Energy Inc.	BBB+	10.27%	58.64%	6.11%	-	6.11%	41.36%	27.98%	7.84%
Average		9.97%	56.77%	6.05%	0.80%	6.05%	43.00%	27.98%	7.50%

COE - COD	COE - COD > 20% of FERC MRP	Overall After -Tax Cost of Capital	SCE's Representative Regulatory % Debt	Representative Cost of BBB Rated Utility Debt	SCE's Representative Income Tax Rate	SCE's Regulatory % Preferred Equity	SCE's Cost of Preferred Equity	SCE's Representative Regulatory % Equity	Estimated Return on Equity	Impact of Financial Leverage Adjustment
3.36%	1									
3.53%	1									
3.75%	1									
4.20%	1									
3.37%	1									
3.63%	1									
3.89%	1									
2.94%	1									
8.59%	1									
3.73%	1									
3.18%	1									
7.20%	1									
4.34%	1									
3.44%	1									
4.21%	1									
3.77%	1									
4.31%	1									
4.11%	1									
1.83%	1									
4.92%	1									
4.04%	1									
3.66%	1									
1.60%	1									
3.19%	1									
3.57%	1									
3.39%	1									
4.29%	1									
3.63%	1									
3.59%	1									
4.09%	1									
4.16%	1									
		7.50%	49.40%	6.11%	27.98%	0.00%	0.00%	50.60%	10.52%	3.02%
		7.50%	50.00%	6.11%	27.98%	0.00%	0.00%	50.00%	10.59%	3.10%

Wooldridge - Beta Calculation

Company	Ticker	S&P Capital IQ Beta	S&P Capital IQ Beta (Blume-adjusted)	Value Line Beta	Average
Alliant Energy Corporation	LNT	0.56	0.71	0.80	0.75
Ameren Corporation	AEE	0.50	0.66	0.80	0.73
American Electric Power Co.	AEP	0.40	0.60	0.70	0.65
Avista Corporation	AVA	0.39	0.59	0.75	0.67
Black Hills Corporation	BKH	0.68	0.79	0.85	0.82
CenterPoint Energy, Inc.	CNP	0.56	0.71	0.85	0.78
CMS Energy Corporation	CMS	0.37	0.58	0.70	0.64
Consolidated Edison, Inc.	ED	0.24	0.49	0.65	0.57
Dominion Energy Inc.	D	0.55	0.70	0.75	0.73
DTE Energy Company	DTE	0.44	0.63	0.80	0.71
Duke Energy Corporation	DUK	0.35	0.57	0.65	0.61
Edison International	EIX	0.75	0.84	0.85	0.84
Entergy Corporation	ETR	0.57	0.72	0.80	0.76
Evergy, Inc.	EVRG	0.48	0.65	0.75	0.70
Eversource Energy	ES	0.64	0.76	0.85	0.80
Exelon Corporation	EXC	0.47	0.64	0.00	0.32
FirstEnergy Corp.	FE	0.37	0.58	0.75	0.66
IDACORP, Inc.	IDA	0.56	0.71	0.70	0.70
MGE Energy, Inc.	MGEE	0.76	0.84	0.80	0.82
NextEra Energy, Inc.	NEE	0.66	0.77	0.90	0.84
NorthWestern Corporation	NWE	0.37	0.58	0.75	0.66
OGE Energy Corp.	OGE	0.59	0.72	0.85	0.79
Pinnacle West Capital Corp.	PNW	0.42	0.61	0.80	0.71
Portland General Electric Company	POR	0.58	0.72	0.75	0.73
PPL Corporation	PPL	0.65	0.77	0.85	0.81
Public Service Enterprise Gp. Inc.	PEG	0.50	0.67	0.85	0.76
Sempra Energy	SRE	0.64	0.76	0.90	0.83
Southern Company	SO	0.37	0.58	0.70	0.64
TXNM Energy, Inc.	TXNM	0.14	0.43	0.65	0.54
WEC Energy Group	WEC	0.42	0.62	0.65	0.63
Xcel Energy Inc.	XEL	0.37	0.58	0.75	0.67
Average		0.49	0.66	0.75	0.71

Wooldridge - DCF Calculation

Company	Ticker	Dividend Yield	Adjustment	Adjusted Dividend Yield	Growth Rate	DCF Cost of Equity
Alliant Energy Corporation	LNT	3.3%	1.0305	3.40%	6.1%	9.48%
Ameren Corporation	AEE	3.0%	1.0305	3.07%	6.6%	9.65%
American Electric Power Co.	AEP	3.6%	1.0305	3.73%	6.1%	9.86%
Avista Corporation	AVA	5.1%	1.0305	5.26%	5.1%	10.31%
Black Hills Corporation	BKH	4.6%	1.0305	4.77%	4.7%	9.48%
CenterPoint Energy, Inc.	CNP	2.4%	1.0305	2.51%	7.2%	9.74%
CMS Energy Corporation	CMS	3.1%	1.0305	3.18%	6.8%	10.00%
Consolidated Edison, Inc.	ED	3.4%	1.0305	3.47%	5.3%	8.77%
Dominion Energy Inc.	D	4.8%	1.0305	4.96%	9.7%	14.71%
DTE Energy Company	DTE	3.3%	1.0305	3.40%	6.4%	9.84%
Duke Energy Corporation	DUK	3.6%	1.0305	3.69%	5.6%	9.29%
Edison International	EIX	5.9%	1.0305	6.11%	7.2%	13.32%
Entergy Corporation	ETR	2.9%	1.0305	3.01%	7.5%	10.46%
Evergy, Inc.	EVRG	4.0%	1.0305	4.12%	5.4%	9.55%
Eversource Energy	ES	4.9%	1.0305	5.02%	5.3%	10.32%
Exelon Corporation	EXC	3.7%	1.0305	3.81%	5.8%	9.60%
FirstEnergy Corp.	FE	4.4%	1.0305	4.53%	5.9%	10.42%
IDACORP, Inc.	IDA	3.0%	1.0305	3.09%	7.1%	10.22%
MGE Energy, Inc.	MGEE	2.0%	1.0305	2.04%	5.6%	7.66%
NextEra Energy, Inc.	NEE	3.2%	1.0305	3.28%	7.5%	10.75%
NorthWestern Corporation	NWE	4.9%	1.0305	5.00%	5.2%	10.15%
OGE Energy Corp.	OGE	3.8%	1.0305	3.93%	5.8%	9.77%
Pinnacle West Capital Corp.	PNW	4.0%	1.0305	4.10%	3.6%	7.71%
Portland General Electric Company	POR	5.0%	1.0305	5.14%	4.2%	9.30%
PPL Corporation	PPL	3.2%	1.0305	3.28%	6.1%	9.40%
Public Service Enterprise Gp. Inc.	PEG	3.1%	1.0305	3.18%	6.3%	9.50%
Sempra Energy	SRE	3.4%	1.0305	3.50%	6.9%	10.40%
Southern Company	SO	3.3%	1.0305	3.42%	6.0%	9.46%
TXNM Energy, Inc.	TXNM	3.0%	1.0305	3.11%	6.6%	9.71%
WEC Energy Group	WEC	3.4%	1.0305	3.52%	6.4%	9.93%
Xcel Energy Inc.	XEL	3.3%	1.0305	3.40%	6.9%	10.27%
Average		**3.70%**	**1.03050**	**3.81%**	**6.16%**	**9.97%**

Dividend Yields

Wooldridge - DCF Dividend Yields

Company		Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day	Mean	Median	Average of Mean/Median
Alliant Energy Corporation	LNT	$2.03	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Ameren Corporation	AEE	$2.84	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%
American Electric Power Co.	AEP	$3.72	3.6%	3.6%	3.7%	3.6%	3.6%	3.6%
Avista Corporation	AVA	$1.96	5.2%	5.0%	5.1%	5.1%	5.1%	5.1%
Black Hills Corporation	BKH	$2.70	4.8%	4.6%	4.6%	4.7%	4.6%	4.6%
CenterPoint Energy, Inc.	CNP	$0.88	2.4%	2.4%	2.6%	2.5%	2.4%	2.4%
CMS Energy Corporation	CMS	$2.17	3.1%	3.0%	3.1%	3.1%	3.1%	3.1%
Consolidated Edison, Inc.	ED	$3.40	3.4%	3.2%	3.4%	3.3%	3.4%	3.4%
Dominion Energy Inc.	D	$2.67	4.8%	4.9%	4.8%	4.8%	4.8%	4.8%
DTE Energy Company	DTE	$4.36	3.3%	3.2%	3.4%	3.3%	3.3%	3.3%
Duke Energy Corporation	DUK	$4.18	3.6%	3.5%	3.6%	3.6%	3.6%	3.6%
Edison International	EIX	$3.31	6.4%	6.0%	5.2%	5.9%	6.0%	5.9%
Entergy Corporation	ETR	$2.40	2.9%	2.9%	3.0%	2.9%	2.9%	2.9%
Evergy, Inc.	EVRG	$2.67	3.9%	4.0%	4.1%	4.0%	4.0%	4.0%
Eversource Energy	ES	$3.01	4.7%	4.9%	4.9%	4.8%	4.9%	4.9%
Exelon Corporation	EXC	$1.60	3.7%	3.6%	3.8%	3.7%	3.7%	3.7%
FirstEnergy Corp.	FE	$1.78	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
IDACORP, Inc.	IDA	$3.44	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
MGE Energy, Inc.	MGEE	$1.80	2.0%	2.0%	1.9%	2.0%	2.0%	2.0%
NextEra Energy, Inc.	NEE	$2.27	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%
NorthWestern Corporation	NWE	$2.64	5.1%	4.8%	4.8%	4.9%	4.8%	4.9%
OGE Energy Corp.	OGE	$1.69	3.8%	3.8%	3.9%	3.8%	3.8%	3.8%
Pinnacle West Capital Corp.	PNW	$3.58	4.0%	3.9%	4.0%	4.0%	4.0%	4.0%
Portland General Electric Company	POR	$2.10	5.1%	5.0%	4.8%	5.0%	5.0%	5.0%
PPL Corporation	PPL	$1.09	3.2%	3.1%	3.2%	3.2%	3.2%	3.2%
Public Service Enterprise Gp. Inc.	PEG	$2.52	3.1%	3.1%	3.0%	3.1%	3.1%	3.1%
Sempra Energy	SRE	$2.60	3.4%	3.5%	3.3%	3.4%	3.4%	3.4%
Southern Company	SO	$2.96	3.3%	3.3%	3.4%	3.3%	3.3%	3.3%
TXNM Energy, Inc.	TXNM	$1.63	2.9%	3.0%	3.2%	3.0%	3.0%	3.0%
WEC Energy Group	WEC	$3.57	3.4%	3.4%	3.5%	3.4%	3.4%	3.4%
Xcel Energy Inc.	XEL	$2.28	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Mean			**3.7%**	**3.7%**	**3.7%**			
Median			**3.4%**	**3.4%**	**3.4%**			
		3.55%						

Data Sources: S&P Cap IQ., July 12, 2025.

Wooldridge - DCF Growth Rates

Company	Ticker	Historic Growth Rates (VL)						Projected Growth Rates (VL)			Sustainable Growth Rate (VL)			Projected EPS Growth Rate			Mean of Selected Growth Rates
		Earnings (Past 10 Years)	Dividends (Past 10 Years)	Book Value (Past 10 Years)	Earnings (Past 5 Years)	Dividends (Past 5 Years)	Book Value (Past 5 Years)	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth	Zacks	S&P	Mean	
Alliant Energy Corporation	LNT	5.5%	6.5%	6.0%	4.5%	6.0%	6.0%	6.0%	6.0%	4.0%	12.0%	38.0%	4.6%	6.6%	6.7%	6.6%	6.1%
Ameren Corporation	AEE	4.0%	3.5%	2.0%	8.0%	5.0%	5.5%	6.5%	6.5%	6.5%	10.0%	40.0%	4.0%	7.0%	7.5%	7.2%	6.6%
American Electric Power Co.	AEP	5.0%	5.0%	3.5%	4.0%	5.0%	3.5%	6.5%	5.5%	6.0%	11.0%	39.0%	4.3%	6.4%	6.8%	6.6%	6.1%
Avista Corporation	AVA	3.0%	4.0%	3.5%	-1.0%	4.0%	3.0%	5.5%	4.0%	2.0%	8.5%	30.0%	2.6%	6.1%	5.9%	6.0%	5.1%
Black Hills Corporation	BKH	4.5%	5.0%	4.5%	2.5%	5.0%	5.5%	3.5%	3.5%	3.0%	8.5%	38.0%	3.2%	5.3%	5.6%	5.4%	4.7%
CenterPoint Energy, Inc.	CNP	1.0%	-1.0%	4.0%	3.5%	-7.0%	5.0%	6.5%	6.0%	5.5%	10.5%	56.0%	5.9%	7.8%	8.0%	7.9%	7.2%
CMS Energy Corporation	CMS	6.5%	6.5%	7.0%	6.0%	6.5%	8.5%	5.5%	4.0%	3.5%	16.0%	40.0%	6.4%	7.8%	7.3%	7.5%	6.8%
Consolidated Edison, Inc.	ED	3.0%	3.0%	4.0%	3.0%	2.5%	3.0%	6.0%	4.5%	4.0%	9.0%	40.0%	3.6%	5.6%	6.1%	5.8%	5.3%
Dominion Energy Inc.	D		1.5%	5.0%	-5.5%	-4.5%	0.5%	6.0%	0.0%	3.0%	11.5%	37.0%	4.3%	13.6%	12.0%	12.8%	9.7%
DTE Energy Company	DTE	4.0%	5.5%	3.0%	2.5%	5.5%	1.5%	4.5%	3.0%	1.0%	12.5%	38.0%	4.8%	7.6%	7.9%	7.7%	6.4%
Duke Energy Corporation	DUK	3.5%	3.0%	0.5%	3.5%	2.5%	0.5%	6.0%	3.5%	3.5%	10.5%	37.0%	3.9%	6.3%	6.4%	6.3%	5.6%
Edison International	EIX	1.0%	8.0%	1.5%	12.5%	4.5%	0.5%	6.5%	5.5%	6.0%	14.0%	37.0%	5.2%	7.1%	9.0%	8.0%	7.2%
Entergy Corporation	ETR	2.5%	2.5%	2.0%	4.0%	4.0%	7.0%	3.0%	5.5%	4.5%	9.5%	39.0%	3.7%	9.5%	8.9%	9.2%	7.5%
Evergy, Inc.	EVRG							7.5%	7.0%	3.5%	10.0%	37.0%	3.7%	5.7%	5.7%	5.7%	5.4%
Eversource Energy	ES	6.5%	6.5%	3.5%	6.0%	6.0%	3.0%	5.5%	5.5%	3.5%	11.5%	37.0%	4.3%	5.7%	5.7%	5.7%	5.3%
Exelon Corporation	EXC	-0.5%	-3.0%	4.5%	2.5%	4.0%	3.5%	nmf	nmf	nmf	10.0%	40.0%	4.0%	6.4%	6.4%	6.4%	5.8%
FirstEnergy Corp.	FE		-1.0%	-4.5%	-0.5%	0.5%	10.5%	4.5%	4.5%	5.5%	12.5%	37.0%	4.6%	6.4%	6.5%	6.5%	5.9%
IDACORP, Inc.	IDA	4.0%	7.5%	4.5%	3.5%	6.0%	4.5%	6.0%	5.5%	4.5%	10.0%	41.0%	4.1%	8.1%	8.6%	8.3%	7.1%
MGE Energy, Inc.	MGEE	4.5%	4.5%	6.0%	6.0%	5.0%	6.0%	7.0%	6.5%	5.5%	10.5%	47.0%	4.9%				5.6%
NextEra Energy, Inc.	NEE	9.5%	11.0%	8.0%	12.5%	11.0%	5.5%	8.5%	9.5%	8.0%	14.0%	37.0%	5.2%	7.7%	7.8%	7.7%	7.5%
NorthWestern Corporation	NWE	2.5%	5.5%	5.0%	-1.0%	3.0%	3.5%	4.5%	1.5%	2.5%	8.0%	36.0%	2.9%	6.9%	5.7%	6.3%	5.2%
OGE Energy Corp.	OGE	3.0%	7.5%	4.0%	4.5%	8.5%	1.5%	6.5%	3.0%	5.5%	13.0%	30.0%	3.9%	6.3%	6.7%	6.5%	5.8%
Pinnacle West Capital Corp.	PNW	2.5%	4.0%	4.0%		4.0%	3.5%	5.0%	1.5%	4.0%	9.0%	38.0%	3.4%	2.1%	5.3%	3.7%	3.6%
Portland General Electric Company	POR	3.5%	5.5%	3.5%	3.0%	5.5%	3.0%	6.5%	5.5%	4.5%	9.5%	35.0%	3.3%	3.4%	4.7%	4.0%	4.2%
PPL Corporation	PPL	-9.0%	-1.0%		-17.0%	-4.5%	4.0%	7.5%	-0.5%	3.0%	9.5%	40.0%	3.8%	7.5%	7.3%	7.4%	6.1%
Public Service Enterprise Gp. Inc.	PEG	3.0%	4.5%	3.0%	3.0%	5.0%	1.0%	7.0%	6.0%	5.5%	12.5%	39.0%	4.9%	7.0%	6.5%	6.7%	6.3%
Sempra Energy	SRE	7.5%	6.5%	7.0%	11.5%	6.0%	10.0%	5.0%	5.5%	5.5%	10.5%	47.0%	4.9%	7.9%	7.6%	7.8%	6.9%
Southern Company	SO	3.0%	3.5%	3.0%	3.0%	3.5%	2.5%	6.5%	3.5%	3.5%	14.5%	33.0%	4.8%	6.6%	6.9%	6.7%	6.0%
TXNM Energy, Inc.	TXNM	7.0%	8.0%	2.0%	6.5%	6.0%	4.0%	4.5%	5.0%	3.5%	10.0%	45.0%	4.5%	7.6%	7.8%	7.7%	6.6%
WEC Energy Group	WEC	6.5%	10.0%	7.0%	7.0%	6.5%	3.5%	6.0%	7.0%	4.0%	13.0%	36.0%	4.7%	7.0%	7.1%	7.0%	6.4%
Xcel Energy Inc.	XEL	5.5%	6.5%	5.5%	6.0%	6.5%	6.0%	7.0%	6.5%	5.5%	11.0%	40.0%	4.4%	7.5%	7.7%	7.6%	6.9%
Mean		3.7%	4.6%	3.9%	3.6%	4.1%	4.2%	5.9%	4.7%	4.3%	11.0%	38.8%	4.3%	6.9%	7.1%	7.0%	6.2%
Median		3.8%	5.0%	4.0%	3.5%	5.0%	3.5%	6.0%	5.5%	4.0%	10.5%	38.0%	4.3%	6.9%	6.9%	6.7%	6.1%

Mean of Projected EPS Growth Rates	7.0%
Median of Projected EPS Growth Rates	6.7%
Average of Mean/Median Projected EPS Growth Rates	6.9%
Average of Projected Growth Rate Medians	5.2%
Median of Sustainable Growth Rates	4.3%
Average of Mean/Median Projected EPS Growth Rates	6.9%
Average of Projected Growth Rates	5.4%
DCF Growth Rate	**6.1%**

Value Line Historic Growth Rates

Wooldridge - DCF Growth Rates

		Past 10 Years			Past 5 Years		
Company	Ticker	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Alliant Energy Corporation	LNT	5.5	6.5	6.0	4.5	6.0	6.0
Ameren Corporation	AEE	4.0	3.5	2.0	8.0	5.0	5.5
American Electric Power Co.	AEP	5.0	5.0	3.5	4.0	5.0	3.5
Avista Corporation	AVA	3.0	4.0	3.5	-1.0	4.0	3.0
Black Hills Corporation	BKH	4.5	5.0	4.5	2.5	5.0	5.5
CenterPoint Energy, Inc.	CNP	1.0	-1.0	4.0	3.5	-7.0	5.0
CMS Energy Corporation	CMS	6.5	6.5	7.0	6.0	6.5	8.5
Consolidated Edison, Inc.	ED	3.0	3.0	4.0	3.0	2.5	3.0
Dominion Energy Inc.	D		1.5	5.0	-5.5	-4.5	0.5
DTE Energy Company	DTE	4.0	5.5	3.0	2.5	5.5	1.5
Duke Energy Corporation	DUK	3.5	3.0	0.5	3.5	2.5	0.5
Edison International	EIX	1.0	8.0	1.5	12.5	4.5	0.5
Entergy Corporation	ETR	2.5	2.5	2.0	4.0	4.0	7.0
Evergy, Inc.	EVRG						
Eversource Energy	ES	6.5	6.5	3.5	6.0	6.0	3.0
Exelon Corporation	EXC	-0.5	-3.0	4.5	2.5	4.0	3.5
FirstEnergy Corp.	FE		-1.0	-4.5	-0.5	0.5	10.5
IDACORP, Inc.	IDA	4.0	7.5	4.5	3.5	6.0	4.5
MGE Energy, Inc.	MGEE	4.5	4.5	6.0	6.0	5.0	6.0
NextEra Energy, Inc.	NEE	9.5	11.0	8.0	12.5	11.0	5.5
NorthWestern Corporation	NWE	2.5	5.5	5.0	-1.0	3.0	3.5
OGE Energy Corp.	OGE	3.0	7.5	4.0	4.5	8.5	1.5
Pinnacle West Capital Corp.	PNW	2.5	4.0	4.0		4.0	3.5
Portland General Electric Company	POR	3.5	5.5	3.5	3.0	5.5	3.0
PPL Corporation	PPL	-9.0	-1.0		-17.0	-4.5	4.0
Public Service Enterprise Gp. Inc.	PEG	3.0	4.5	3.0	3.0	5.0	1.0
Sempra Energy	SRE	7.5	6.5	7.0	11.5	6.0	10.0
Southern Company	SO	3.0	3.5	3.0	3.0	3.5	2.5
TXNM Energy, Inc.	TXNM	7.0	8.0	2.0	6.5	6.0	4.0
WEC Energy Group	WEC	6.5	10.0	7.0	7.0	6.5	3.5
Xcel Energy Inc.	XEL	5.5	6.5	5.5	6.0	6.5	6.0
Mean		3.7	4.6	3.9	3.6	4.1	4.2
Median		3.8	5.0	4.0	3.5	5.0	3.5
Average of Median	**4.1**						

Data Source: Value Line Investment Survey.

Value Line Projected Growth Rates and Sustainable Growth Rates

Wooldridge - DCF Growth Rates

		Projected Growth Rate			Sustainable Growth Rate		
Company	Ticker	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Alliant Energy Corporation	LNT	6.0	6.0	4.0	12.0%	38.0%	4.6%
Ameren Corporation	AEE	6.5	6.5	6.5	10.0%	40.0%	4.0%
American Electric Power Co.	AEP	6.5	5.5	6.0	11.0%	39.0%	4.3%
Avista Corporation	AVA	5.5	4.0	2.0	8.5%	30.0%	2.6%
Black Hills Corporation	BKH	3.5	3.5	3.0	8.5%	38.0%	3.2%
CenterPoint Energy, Inc.	CNP	6.5	6.0	5.5	10.5%	56.0%	5.9%
CMS Energy Corporation	CMS	5.5	4.0	3.5	16.0%	40.0%	6.4%
Consolidated Edison, Inc.	ED	6.0	4.5	4.0	9.0%	40.0%	3.6%
Dominion Energy Inc.	D	6	0.0	3.0	11.5%	37.0%	4.3%
DTE Energy Company	DTE	4.5	3.0	1.0	12.5%	38.0%	4.8%
Duke Energy Corporation	DUK	6.0	3.5	3.5	10.5%	37.0%	3.9%
Edison International	EIX	6.5	5.5	6.0	14.0%	37.0%	5.2%
Entergy Corporation	ETR	3.0	5.5	4.5	9.5%	39.0%	3.7%
Evergy, Inc.	EVRG	7.5	7	3.5	10.0%	37.0%	3.7%
Eversource Energy	ES	5.5	5.5	3.5	11.5%	37.0%	4.3%
Exelon Corporation	EXC	nmf	nmf	nmf	10.0%	40.0%	4.0%
FirstEnergy Corp.	FE	4.5	4.5	5.5	12.5%	37.0%	4.6%
IDACORP, Inc.	IDA	6.0	5.5	4.5	10.0%	41.0%	4.1%
MGE Energy, Inc.	MGEE	7.0	6.5	5.5	10.5%	47.0%	4.9%
NextEra Energy, Inc.	NEE	8.5	9.5	8.0	14.0%	37.0%	5.2%
NorthWestern Corporation	NWE	4.5	1.5	2.5	8.0%	36.0%	2.9%
OGE Energy Corp.	OGE	6.5	3.0	5.5	13.0%	30.0%	3.9%
Pinnacle West Capital Corp.	PNW	5.0	1.5	4.0	9.0%	38.0%	3.4%
Portland General Electric Company	POR	6.5	5.5	4.5	9.5%	35.0%	3.3%
PPL Corporation	PPL	7.5	-0.5	3	9.5%	40.0%	3.8%
Public Service Enterprise Gp. Inc.	PEG	7.0	6.0	5.5	12.5%	39.0%	4.9%
Sempra Energy	SRE	5.0	5.5	5.5	10.5%	47.0%	4.9%
Southern Company	SO	6.5	3.5	3.5	14.5%	33.0%	4.8%
TXNM Energy, Inc.	TXNM	4.5	5.0	3.5	10.0%	45.0%	4.5%
WEC Energy Group	WEC	6.0	7.0	4.0	13.0%	36.0%	4.7%
Xcel Energy Inc.	XEL	7.0	6.5	5.5	11.0%	40.0%	4.4%
Mean		5.9	4.7	4.3	11.0%	38.8%	4.3%
Median		6.0	5.5	4.0	10.5%	38.0%	4.3%
Average of Median			**5.2**			**Median**	**4.3%**

* 'Est'd. '22-'24 to '28-'30 is the estimated growth rate from the base period 2023 to 2024 until the future period 2028 to 2030.
Data Source: Value Line Investment Survey.

Zacks and S&P Projected EPS Growth Rates

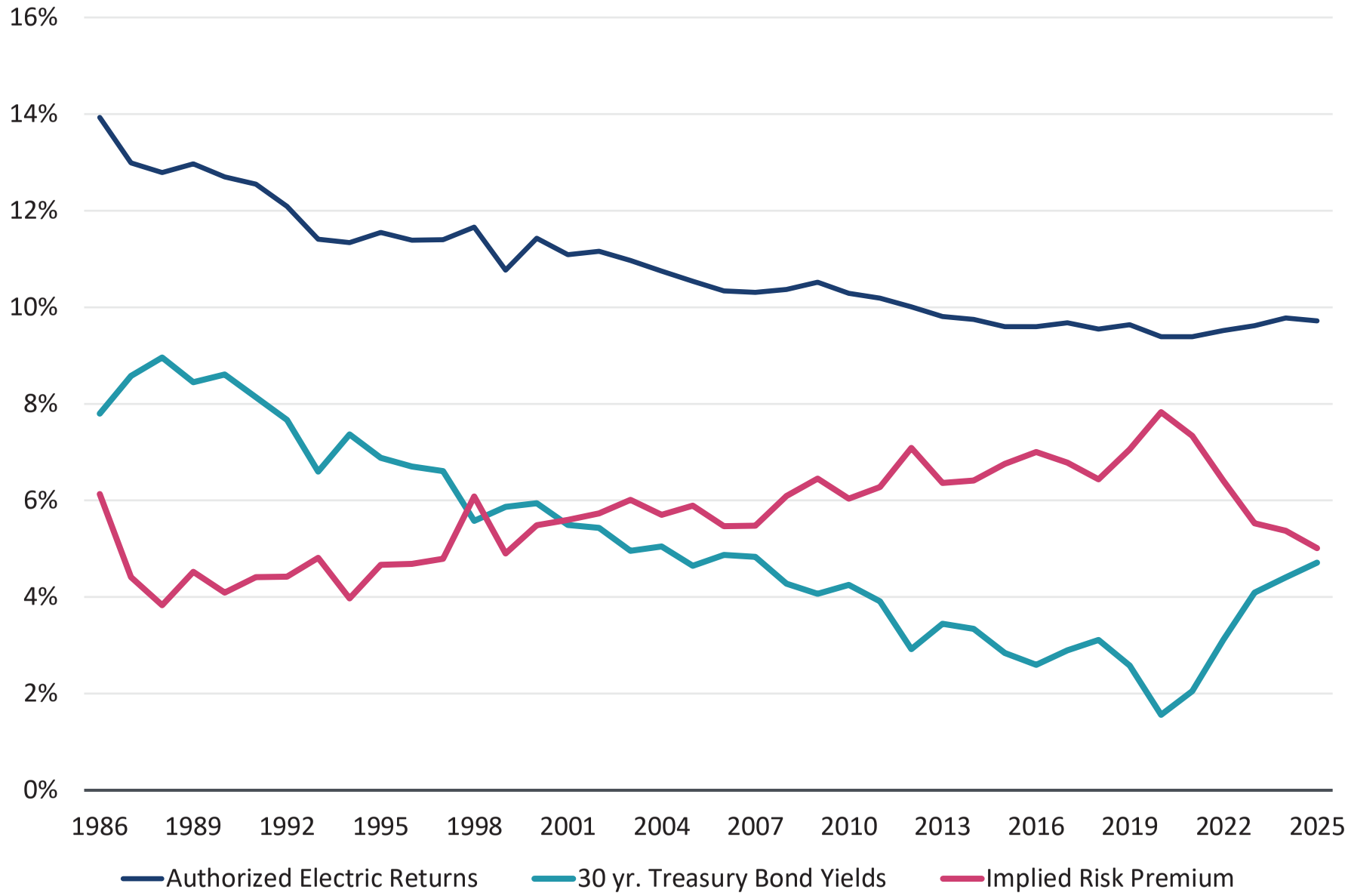
Wooldridge - DCF Growth Rates

Company	Ticker	Zacks	S&P	Mean
Alliant Energy Corporation	LNT	6.6%	6.7%	6.6%
Ameren Corporation	AEE	7.0%	7.5%	7.2%
American Electric Power Co.	AEP	6.4%	6.8%	6.6%
Avista Corporation	AVA	6.1%	5.9%	6.0%
Black Hills Corporation	BKH	5.3%	5.6%	5.4%
CenterPoint Energy, Inc.	CNP	7.8%	8.0%	7.9%
CMS Energy Corporation	CMS	7.8%	7.3%	7.5%
Consolidated Edison, Inc.	ED	5.6%	6.1%	5.8%
Dominion Energy Inc.	D	13.6%	12.0%	12.8%
DTE Energy Company	DTE	7.6%	7.9%	7.7%
Duke Energy Corporation	DUK	6.3%	6.4%	6.3%
Edison International	EIX	7.1%	9.0%	8.0%
Entergy Corporation	ETR	9.5%	8.9%	9.2%
Evergy, Inc.	EVRG	5.7%	5.7%	5.7%
Eversource Energy	ES	5.7%	5.7%	5.7%
Exelon Corporation	EXC	6.4%	6.4%	6.4%
FirstEnergy Corp.	FE	6.4%	6.5%	6.5%
IDACORP, Inc.	IDA	8.1%	8.6%	8.3%
MGE Energy, Inc.	MGEE			
NextEra Energy, Inc.	NEE	7.7%	7.8%	7.7%
NorthWestern Corporation	NWE	6.9%	5.7%	6.3%
OGE Energy Corp.	OGE	6.3%	6.7%	6.5%
Pinnacle West Capital Corp.	PNW	2.1%	5.3%	3.7%
Portland General Electric Company	POR	3.4%	4.7%	4.0%
PPL Corporation	PPL	7.5%	7.3%	7.4%
Public Service Enterprise Gp. Inc.	PEG	7.0%	6.5%	6.7%
Sempra Energy	SRE	7.9%	7.6%	7.8%
Southern Company	SO	6.6%	6.9%	6.7%
TXNM Energy, Inc.	TXNM	7.6%	7.8%	7.7%
WEC Energy Group	WEC	7.0%	7.1%	7.0%
Xcel Energy Inc.	XEL	7.5%	7.7%	7.6%
Mean		6.9%	7.1%	7.0%
Median		6.9%	6.9%	6.7%
			Average	**6.9%**

Data Source: www.https://finance.yahoo.com/, https://zacks.com/, S&P Cap IQ, July 15, 2025.

Appendix R-M

Gorman Risk Premium


16%
14%
12%
10%
8%
6%
4%
2%
0%
1986
1989
1992
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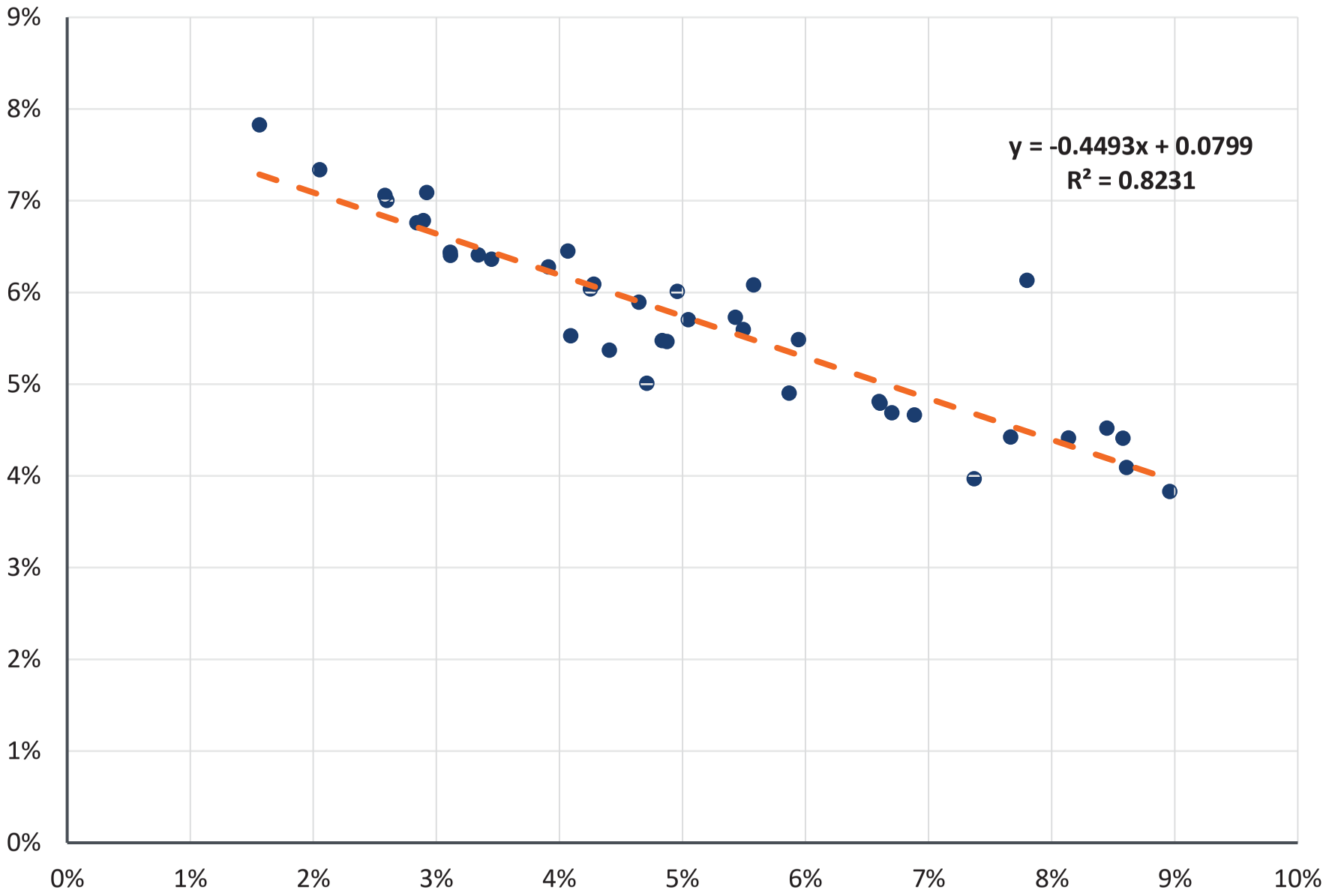
1998
2001
2004
2007
2010
2013
2016
2019
2022
2025
Authorized Electric Returns
30 yr. Treasury Bond Yields
Implied Risk Premium


y = -0.4493x + 0.0799
R² = 0.8231
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
0%
1%
2%
3%
4%
5%
6%
7%
8%
9%
10%

Gorman Risk Premium Using OLS Regression
(30-Year Treasury Yields)

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.823
Estimate of Intercept (A_0)	0.080
Estimate of Slope (A_1)	-0.449

Predicted Risk Premium	+	Projected 30-Year Treasury Bond Yield	=	Est. Cost of Equity for Electric Utilities
5.97%		4.50%		10.47%

Sources and Notes:
A0, A1, and R^2 are derived from an OLS regression analyzing the relationship between 30-year Treasury yields and risk premiums.
Projected 30-Year Treasury Bond Yield is from Gorman Direct Testimony, p. 91.

Gorman Risk Premium Using OLS Regression
(A-Rated Utility Bond Yields)

Risk Premium = A_0 + (A_1 x Treasury Bond Rate)

R Squared	0.853
Estimate of Intercept (A_0)	0.073
Estimate of Slope (A_1)	-0.461

Predicted Risk Premium	+	3-Month Average A-Rated Utility Bond Yield	=	Est. Cost of Equity for Electric Utilities
4.60%		5.89%		10.49%

Sources and Notes:
A0, A1, and R^2 are derived from an OLS regression analyzing the relationship between 30-year Treasury yields and risk premiums.
3-M Average A-Rated Utility Bond Yield is from Gorman Direct Testimony, p. 91.

Appendix R-N

Intervenor Inputs

Summary of Recommended Ranges and ROEs

	Equity	Preferred Equity	Debt	ROE Range	ROE
Villadsen (SCE)	52.00%	5.00%	43.00%	10.75 11.75%	11.75%
Gorman (EPUC/IS/TURN)	50.00%	5.00%	45.00%	9.25-9.75%	9.50%
Dowdell (TURN)	Adopts Gorman	Adopts Gorman	Adopts Gorman	Adopts Gorman	Adopts Gorman
Wooldridge (Cal Advocates)	50.00%	5.21%	44.79%	N/A	9.38%
McCann (EDF)	N/A	N/A	N/A	5.09-6.66%	5.09%
Ellis (SC/PCF)	54.70%	0.00%	45.30%	N/A	6.11%
Rothschild (WTF)	50.00%	5.00%	45.00%	7.10-8.30%	8.30%
Current	52.00%	5.00%	43.00%	N/A	10.33%

Intervener Inputs

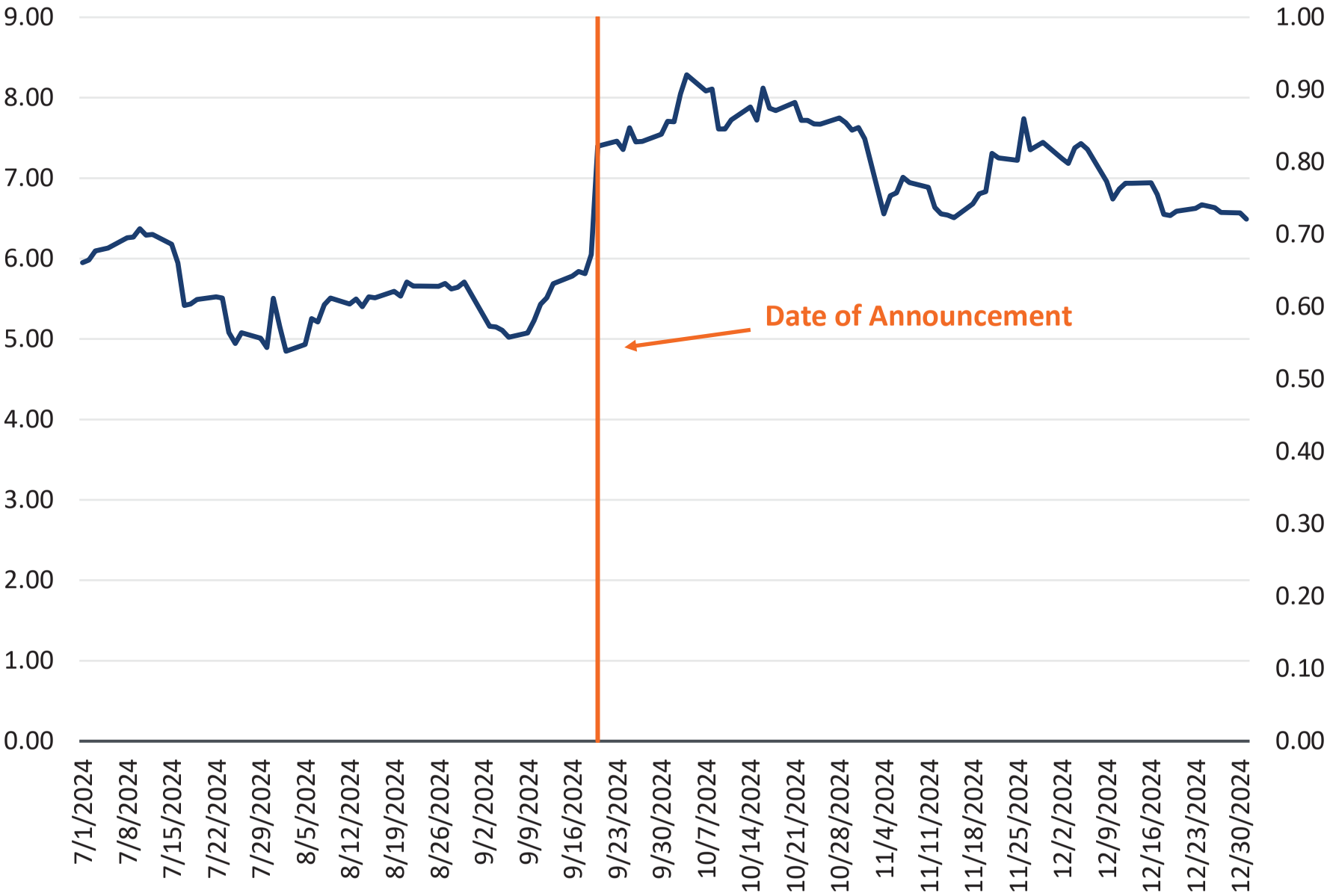
	Gorman	Dowdell	Wooldridge	McCann	Ellis	Rothschild	Villadsen
2025 Rate Case							
Equity (%)	50.00%	Adopts Gorman	50.00%	N/A	54.70%	50.00%	52.00%
Preferred Equity (%)	5.00%	Adopts Gorman	5.21%	N/A	0.00%	5.00%	5.00%
Debt (%)	45.00%	Adopts Gorman	44.79%	N/A	45.30%	45.00%	43.00%
ROE Range	9.25-9.75%	Adopts Gorman	N/A	5.09-6.66%	N/A	7.10-8.30%	10.75 11.75%
Recommended ROE	9.50%	Adopts Gorman	9.38%	5.09%	6.11%	8.30%	11.75%
ROR	7.24%	Adopts Gorman	7.18%	N/A	5.47%	6.66%	8.50%
Beta	0.75	Adopts Gorman	0.71 (Electric)	N/A	0.57	0.56	0.95
MRP	7.03%	Adopts Gorman	5.25%	N/A	0.92%	4.16%	7.17% and 5.00%
2022 Rate Case							
ROE Ranges	9.20-9.80%	N/A	7.40-8.90%	8.40-8.90%	N/A	7.41-8.74%	10.00-10.75%
Risk Adjustment	N/A	N/A	0.25%	N/A	N/A	N/A	N/A
Recommended ROE	9.50%	N/A	9.15%	8.70%	N/A	8.08%	10.53%

Proxy Group

		Gorman	Woolridge	Ellis	Rothchild	Villadsen
Count		24	31	25	27	26
Electric						
Alliant Energy	[1]	x	x	x	x	x
Amer. Elec. Power	[2]	x	x	x	x	x
Ameren Corp.	[3]	x	x	x	x	x
Avista Corp.	[4]	x	x	x	x	x
Black Hills	[5]	x	x	x	x	x
CenterPoint Energy	[6]	x	x	x		x
CMS Energy Corp.	[7]	x	x	x	x	x
Con. Edison	[8]		x		x	
Dominion Energy	[9]	x	x	x		x
DTE Energy	[10]	x	x	x	x	x
Duke Energy	[11]	x	x	x	x	x
Edison Internat'L	[12]		x		x	
Entergy Corp.	[13]	x	x	x	x	x
Evergy Inc.	[14]	x	x	x	x	x
Eversource Energy	[15]		x			
Exelon Corp.	[16]	x	x	x	x	x
First Energy	[17]		x		x	
IDACORP Inc.	[18]	x	x	x	x	x
MGE Energy	[19]		x	x		x
NextEra Energy	[20]		x		x	
NorthWestern Corp.	[21]	x	x	x	x	x
OGE Energy	[22]	x	x	x	x	x
Pinnacle West Capital	[23]	x	x	x	x	x
PNM Resources (TXNM)	[24]		x	x	x	x
Portland General	[25]	x	x	x	x	x
PPL Corp.	[26]	x	x	x	x	x
Public Serv. Enterprise	[27]	x	x	x	x	x
Sempra Energy	[28]	x	x	x	x	x
Southern Co.	[29]	x	x	x	x	x
WEC Energy Group	[30]	x	x	x	x	x
Xcel Energy Inc.	[31]	x	x		x	x

Appendix R-O Market-to-Book Value

Announcements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0.70
0.60
0.50
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0.30
0.20
0.10
0.00
Date of Announcement
7/1/2024
7/8/2024
7/15/2024
7/22/2024
7/29/2024
8/5/2024
8/12/2024
8/19/2024
8/26/2024
9/2/2024
9/9/2024
9/16/2024
9/23/2024
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10/28/2024
11/4/2024
11/11/2024
11/18/2024
11/25/2024
12/2/2024
12/9/2024
12/16/2024
12/23/2024
12/30/2024

Appendix R-P

S&P 500 Equity Ratio

S&P 500 - Equity Ratio

As of 08/10/2025

No.	Company	Ticker	Total Debt ($M)	Market Cap ($M)	Equity/Market Cap
All Constituents - Total			12,181,952	56,345,335	82.22%
All Constituents - Average			24,219	112,917	82.34%
1	3M Company	NYSE:MMM	13,659	81,652	85.67%
2	A. O. Smith Corporation	NYSE:AOS	229	9,925	97.75%
3	Abbott Laboratories	NYSE:ABT	15,275	233,709	93.87%
4	AbbVie Inc.	NYSE:ABBV	68,019	349,867	83.72%
5	Accenture plc	NYSE:ACN	4,121	149,745	97.32%
6	Adobe Inc.	NasdaqGS:ADBE	6,056	144,673	95.98%
7	Advanced Micro Devices, Inc.	NasdaqGS:AMD	2,321	280,362	99.18%
8	Aflac Incorporated	NYSE:AFL	9,864	55,366	84.88%
9	Agilent Technologies, Inc.	NYSE:A	3,574	32,559	90.11%
10	Air Products and Chemicals, Inc.	NYSE:APD	15,048	64,260	81.03%
11	Airbnb, Inc.	NasdaqGS:ABNB	2,294	74,093	97.00%
12	Akamai Technologies, Inc.	NasdaqGS:AKAM	4,635	10,113	68.57%
13	Albemarle Corporation	NYSE:ALB	3,648	8,883	70.89%
14	Alexandria Real Estate Equities, Inc.	NYSE:ARE	12,752	12,835	50.16%
15	Align Technology, Inc.	NasdaqGS:ALGN	119	10,139	98.84%
16	Allegion plc	NYSE:ALLE	2,151	14,055	86.73%
17	Alliant Energy Corporation	NasdaqGS:LNT	10,617	16,867	61.37%
18	Alphabet Inc.	NasdaqGS:GOOG	28,137	NA	N/A
19	Alphabet Inc.	NasdaqGS:GOOGL	28,137	2,439,612	98.86%
20	Altria Group, Inc.	NYSE:MO	24,926	107,832	81.22%
21	Amazon.com, Inc.	NasdaqGS:AMZN	155,401	2,374,969	93.86%
22	Amcor plc	NYSE:AMCR	7,393	22,283	75.09%
23	Ameren Corporation	NYSE:AEE	18,794	27,417	59.33%
24	American Electric Power Company, Inc.	NasdaqGS:AEP	45,998	60,164	56.67%
25	American Express Company	NYSE:AXP	55,483	206,976	78.86%
26	American International Group, Inc.	NYSE:AIG	9,790	43,284	81.55%
27	American Tower Corporation	NYSE:AMT	43,954	96,699	68.75%
28	American Water Works Company, Inc.	NYSE:AWK	14,124	29,383	67.54%
29	Ameriprise Financial, Inc.	NYSE:AMP	3,680	47,603	92.82%
30	AMETEK, Inc.	NYSE:AME	2,324	42,052	94.76%
31	Amgen Inc.	NasdaqGS:AMGN	60,879	155,172	71.82%
32	Amphenol Corporation	NYSE:APH	7,280	134,277	94.86%
33	Analog Devices, Inc.	NasdaqGS:ADI	8,005	111,135	93.28%
34	Aon plc	NYSE:AON	17,892	79,006	81.54%
35	APA Corporation	NasdaqGS:APA	6,417	7,159	52.73%
36	Apollo Global Management, Inc.	NYSE:APO	33,128	81,211	71.03%
37	Apple Inc.	NasdaqGS:AAPL	119,059	3,403,643	96.62%
38	Applied Materials, Inc.	NasdaqGS:AMAT	6,605	148,358	95.74%
39	Aptiv PLC	NYSE:APTV	8,888	14,568	62.11%
40	Arch Capital Group Ltd.	NasdaqGS:ACGL	2,891	33,017	91.95%
41	Archer-Daniels-Midland Company	NYSE:ADM	11,538	27,790	70.66%
42	Arista Networks Inc	NYSE:ANET	60	174,931	99.97%
43	Arthur J. Gallagher & Co.	NYSE:AJG	13,577	74,202	84.53%
44	Assurant, Inc.	NYSE:AIZ	2,146	10,257	82.70%
45	AT&T Inc.	NYSE:T	145,155	200,783	58.04%
46	Atmos Energy Corporation	NYSE:ATO	8,129	26,372	76.44%
47	Autodesk, Inc.	NasdaqGS:ADSK	2,559	62,189	96.05%

48	Automatic Data Processing, Inc.	NasdaqGS:ADP	9,206	123,872	93.08%
49	AutoZone, Inc.	NYSE:AZO	12,651	67,503	84.22%
50	AvalonBay Communities, Inc.	NYSE:AVB	8,251	26,562	76.30%
51	Avery Dennison Corporation	NYSE:AVY	3,378	13,320	79.77%
52	Axon Enterprise, Inc.	NasdaqGS:AXON	731	66,140	98.91%
53	Baker Hughes Company	NasdaqGS:BKR	6,696	42,679	86.44%
54	Ball Corporation	NYSE:BALL	6,017	14,712	70.97%
55	Bank of America Corporation	NYSE:BAC	717,447	340,794	32.20%
56	Baxter International Inc.	NYSE:BAX	13,449	12,168	47.50%
57	Becton, Dickinson and Company	NYSE:BDX	20,919	55,462	72.61%
58	Berkshire Hathaway Inc.	NYSE:BRK.B	130,758	NA	N/A
59	Best Buy Co., Inc.	NYSE:BBY	4,067	14,577	78.19%
60	Bio-Techne Corporation	NasdaqGS:TECH	444	7,904	94.68%
61	Biogen Inc.	NasdaqGS:BIIB	6,717	19,158	74.04%
62	BlackRock, Inc.	NYSE:BLK	14,222	174,205	92.45%
63	Blackstone Inc.	NYSE:BX	13,362	132,183	90.82%
64	Block, Inc.	NYSE:XYZ	7,919	44,737	84.96%
65	Booking Holdings Inc.	NasdaqGS:BKNG	17,236	175,205	91.04%
66	Boston Scientific Corporation	NYSE:BSX	11,228	152,828	93.16%
67	Bristol-Myers Squibb Company	NYSE:BMY	51,257	93,528	64.60%
68	Broadcom Inc.	NasdaqGS:AVGO	68,916	1,434,418	95.42%
69	Broadridge Financial Solutions, Inc.	NYSE:BR	3,459	31,149	90.01%
70	Brown & Brown, Inc.	NYSE:BRO	4,060	30,890	88.38%
71	Brown-Forman Corporation	NYSE:BF.B	2,837	14,492	83.63%
72	Builders FirstSource, Inc.	NYSE:BLDR	4,333	14,614	77.13%
73	Bunge Global SA	NYSE:BG	7,119	16,593	69.98%
74	BXP, Inc.	NYSE:BXP	16,984	10,017	37.10%
75	C.H. Robinson Worldwide, Inc.	NasdaqGS:CHRW	1,741	13,791	88.79%
76	Cadence Design Systems, Inc.	NasdaqGS:CDNS	2,627	95,933	97.33%
77	Caesars Entertainment, Inc.	NasdaqGS:CZR	25,778	5,000	16.25%
78	Camden Property Trust	NYSE:CPT	3,489	11,275	76.37%
79	Capital One Financial Corporation	NYSE:COF	48,544	133,167	73.29%
80	Cardinal Health, Inc.	NYSE:CAH	5,703	37,570	86.82%
81	CarMax, Inc.	NYSE:KMX	19,426	8,248	29.80%
82	Carnival Corporation & plc	NYSE:CCL	28,880	37,005	56.17%
83	Carrier Global Corporation	NYSE:CARR	12,845	56,193	81.39%
84	Caterpillar Inc.	NYSE:CAT	39,011	195,131	83.34%
85	Cboe Global Markets, Inc.	BATS:CBOE	1,599	26,417	94.29%
86	CBRE Group, Inc.	NYSE:CBRE	5,859	45,547	88.60%
87	CDW Corporation	NasdaqGS:CDW	6,379	21,352	77.00%
88	Cencora, Inc.	NYSE:COR	5,623	55,280	90.77%
89	Centene Corporation	NYSE:CNC	19,429	12,568	39.28%
90	CenterPoint Energy, Inc.	NYSE:CNP	20,991	25,351	54.70%
91	CF Industries Holdings, Inc.	NYSE:CF	3,246	13,105	80.15%
92	Charles River Laboratories International, Inc.	NYSE:CRL	2,781	7,320	72.47%
93	Charter Communications, Inc.	NasdaqGS:CHTR	97,176	35,045	26.50%
94	Chevron Corporation	NYSE:CVX	29,611	314,553	91.40%
95	Chipotle Mexican Grill, Inc.	NYSE:CMG	4,541	55,566	92.45%
96	Chubb Limited	NYSE:CB	20,716	108,141	83.92%
97	Church & Dwight Co., Inc.	NYSE:CHD	2,406	22,149	90.20%
98	Cincinnati Financial Corporation	NasdaqGS:CINF	875	23,477	96.41%
99	Cintas Corporation	NasdaqGS:CTAS	2,654	91,182	97.17%
100	Cisco Systems, Inc.	NasdaqGS:CSCO	32,243	284,288	89.81%
101	Citigroup Inc.	NYSE:C	641,871	170,706	21.01%
102	Citizens Financial Group, Inc.	NYSE:CFG	14,577	20,394	58.32%

103	CME Group Inc.	NasdaqGS:CME	3,821	101,703	96.38%
104	CMS Energy Corporation	NYSE:CMS	16,590	21,995	57.00%
105	Cognizant Technology Solutions Corporation	NasdaqGS:CTSH	1,503	33,983	95.76%
106	Coinbase Global, Inc.	NasdaqGS:COIN	4,630	79,790	94.52%
107	Colgate-Palmolive Company	NYSE:CL	8,512	68,448	88.94%
108	Comcast Corporation	NasdaqGS:CMCSA	105,413	116,932	52.59%
109	Conagra Brands, Inc.	NYSE:CAG	8,311	9,222	52.60%
110	ConocoPhillips	NYSE:COP	25,348	117,288	82.23%
111	Consolidated Edison, Inc.	NYSE:ED	27,829	37,681	57.52%
112	Constellation Brands, Inc.	NYSE:STZ	12,114	30,071	71.28%
113	Constellation Energy Corporation	NasdaqGS:CEG	8,995	104,895	92.10%
114	Copart, Inc.	NasdaqGS:CPRT	119	44,658	99.73%
115	Corning Incorporated	NYSE:GLW	8,091	56,340	87.44%
116	Corpay, Inc.	NYSE:CPAY	8,100	21,304	72.45%
117	Corteva, Inc.	NYSE:CTVA	3,179	48,155	93.81%
118	CoStar Group, Inc.	NasdaqGS:CSGP	1,128	40,035	97.26%
119	Costco Wholesale Corporation	NasdaqGS:COST	9,949	435,042	97.76%
120	Coterra Energy Inc.	NYSE:CTRA	3,802	18,331	82.82%
121	CrowdStrike Holdings, Inc.	NasdaqGS:CRWD	789	105,803	99.26%
122	Crown Castle Inc.	NYSE:CCI	29,613	45,507	60.58%
123	CSX Corporation	NasdaqGS:CSX	19,185	66,051	77.49%
124	Cummins Inc.	NYSE:CMI	7,687	53,327	87.40%
125	CVS Health Corporation	NYSE:CVS	82,920	83,126	50.06%
126	D.R. Horton, Inc.	NYSE:DHI	6,034	46,656	88.55%
127	Danaher Corporation	NYSE:DHR	17,146	143,611	89.33%
128	Darden Restaurants, Inc.	NYSE:DRI	7,814	23,641	75.16%
129	Datadog, Inc.	NasdaqGS:DDOG	1,842	45,654	96.12%
130	DaVita Inc.	NYSE:DVA	12,067	9,259	43.42%
131	Dayforce Inc.	NYSE:DAY	1,233	8,171	86.89%
132	Deckers Outdoor Corporation	NYSE:DECK	277	15,084	98.20%
133	Deere & Company	NYSE:DE	66,025	138,222	67.67%
134	Dell Technologies Inc.	NYSE:DELL	25,368	93,077	78.58%
135	Delta Air Lines, Inc.	NYSE:DAL	23,871	34,792	59.31%
136	Devon Energy Corporation	NYSE:DVN	9,256	21,126	69.53%
137	DexCom, Inc.	NasdaqGS:DXCM	2,594	30,925	92.26%
138	Diamondback Energy, Inc.	NasdaqGS:FANG	13,099	41,116	75.84%
139	Digital Realty Trust, Inc.	NYSE:DLR	18,415	57,948	75.89%
140	Dollar General Corporation	NYSE:DG	17,463	25,599	59.45%
141	Dollar Tree, Inc.	NasdaqGS:DLTR	7,831	24,234	75.58%
142	Dominion Energy, Inc.	NYSE:D	42,627	52,751	55.31%
143	Domino's Pizza, Inc.	NasdaqGS:DPZ	5,197	14,939	74.19%
144	DoorDash, Inc.	NasdaqGS:DASH	536	110,725	99.52%
145	Dover Corporation	NYSE:DOV	3,163	23,796	88.27%
146	Dow Inc.	NYSE:DOW	17,672	15,042	45.98%
147	DTE Energy Company	NYSE:DTE	23,241	29,116	55.61%
148	Duke Energy Corporation	NYSE:DUK	85,438	97,452	53.28%
149	DuPont de Nemours, Inc.	NYSE:DD	7,577	29,507	79.57%
150	Eastman Chemical Company	NYSE:EMN	5,220	7,073	57.54%
151	Eaton Corporation plc	NYSE:ETN	9,985	141,254	93.40%
152	eBay Inc.	NasdaqGS:EBAY	7,863	42,565	84.41%
153	Ecolab Inc.	NYSE:ECL	8,283	77,393	90.33%
154	Edison International	NYSE:EIX	37,761	20,693	35.40%
155	Edwards Lifesciences Corporation	NYSE:EW	700	45,999	98.50%
156	Electronic Arts Inc.	NasdaqGS:EA	2,218	41,945	94.98%
157	Elevance Health, Inc.	NYSE:ELV	32,043	66,200	67.38%

158	Eli Lilly and Company	NYSE:LLY	34,911	561,668	94.15%
159	Emerson Electric Co.	NYSE:EMR	8,356	74,706	89.94%
160	Enphase Energy, Inc.	NasdaqGM:ENPH	1,331	4,242	76.11%
161	Entergy Corporation	NYSE:ETR	29,311	40,387	57.95%
162	EOG Resources, Inc.	NYSE:EOG	5,792	63,488	91.64%
163	EPAM Systems, Inc.	NYSE:EPAM	163	8,800	98.18%
164	EQT Corporation	NYSE:EQT	9,425	32,008	77.25%
165	Equifax Inc.	NYSE:EFX	5,168	29,688	85.17%
166	Equinix, Inc.	NasdaqGS:EQIX	18,961	75,962	80.02%
167	Equity Residential	NYSE:EQR	8,427	24,136	74.12%
168	Erie Indemnity Company	NasdaqGS:ERIE	8	18,684	99.96%
169	Essex Property Trust, Inc.	NYSE:ESS	6,654	16,397	71.13%
170	Everest Group, Ltd.	NYSE:EG	3,713	13,833	78.84%
171	Evergy, Inc.	NasdaqGS:EVRG	14,216	16,668	53.97%
172	Eversource Energy	NYSE:ES	29,239	24,137	45.22%
173	Exelon Corporation	NasdaqGS:EXC	46,905	45,773	49.39%
174	Expand Energy Corporation	NasdaqGS:EXE	5,825	23,540	80.16%
175	Expedia Group, Inc.	NasdaqGS:EXPE	6,594	24,157	78.56%
176	Expeditors International of Washington, Inc.	NYSE:EXPD	569	15,895	96.54%
177	Extra Space Storage Inc.	NYSE:EXR	13,170	28,943	68.73%
178	Exxon Mobil Corporation	NYSE:XOM	48,309	455,315	90.41%
179	F5, Inc.	NasdaqGS:FFIV	250	18,485	98.67%
180	FactSet Research Systems Inc.	NYSE:FDS	1,575	14,458	90.18%
181	Fair Isaac Corporation	NYSE:FICO	2,253	31,706	93.37%
182	Fastenal Company	NasdaqGS:FAST	485	55,075	99.13%
183	Federal Realty Investment Trust	NYSE:FRT	4,561	7,876	63.33%
184	FedEx Corporation	NYSE:FDX	37,416	53,797	58.98%
185	Fidelity National Information Services, Inc.	NYSE:FIS	11,541	37,172	76.31%
186	Fifth Third Bancorp	NasdaqGS:FITB	22,395	27,561	55.17%
187	First Solar, Inc.	NasdaqGS:FSLR	719	19,803	96.50%
188	FirstEnergy Corp.	NYSE:FE	24,266	24,978	50.72%
189	Fiserv, Inc.	NYSE:FI	25,610	72,428	73.88%
190	Ford Motor Company	NYSE:F	160,862	45,052	21.88%
191	Fortinet, Inc.	NasdaqGS:FTNT	1,073	57,003	98.15%
192	Fortive Corporation	NYSE:FTV	3,877	15,936	80.43%
193	Fox Corporation	NasdaqGS:FOX	7,465	NA	N/A
194	Fox Corporation	NasdaqGS:FOXA	7,465	22,930	75.44%
195	Franklin Resources, Inc.	NYSE:BEN	3,745	12,975	77.60%
196	Freeport-McMoRan Inc.	NYSE:FCX	9,738	60,116	86.06%
197	Garmin Ltd.	NYSE:GRMN	163	44,732	99.64%
198	Gartner, Inc.	NYSE:IT	2,900	17,343	85.67%
199	GE HealthCare Technologies Inc.	NasdaqGS:GEHC	9,376	32,872	77.81%
200	GE Vernova Inc.	NYSE:GEV	1,061	176,698	99.40%
201	Gen Digital Inc.	NasdaqGS:GEN	8,315	18,886	69.43%
202	Generac Holdings Inc.	NYSE:GNRC	1,393	11,514	89.21%
203	General Dynamics Corporation	NYSE:GD	10,676	84,372	88.77%
204	General Electric Company	NYSE:GE	20,378	291,631	93.47%
205	General Mills, Inc.	NYSE:GIS	15,297	27,029	63.86%
206	General Motors Company	NYSE:GM	130,947	50,965	28.02%
207	Genuine Parts Company	NYSE:GPC	6,086	18,512	75.26%
208	Gilead Sciences, Inc.	NasdaqGS:GILD	27,322	148,165	84.43%
209	Global Payments Inc.	NYSE:GPN	17,178	19,651	53.36%
210	Globe Life Inc.	NYSE:GL	3,112	11,385	78.54%
211	GoDaddy Inc.	NYSE:GDDY	3,895	18,462	82.58%
212	Halliburton Company	NYSE:HAL	8,772	17,819	67.01%

213	Hasbro, Inc.	NasdaqGS:HAS	3,525	10,867	75.51%
214	HCA Healthcare, Inc.	NYSE:HCA	45,237	89,294	66.37%
215	Healthpeak Properties, Inc.	NYSE:DOC	9,023	11,786	56.64%
216	Henry Schein, Inc.	NasdaqGS:HSIC	2,873	7,996	73.57%
217	Hewlett Packard Enterprise Company	NYSE:HPE	19,874	27,307	57.88%
218	Hilton Worldwide Holdings Inc.	NYSE:HLT	12,003	61,691	83.71%
219	Hologic, Inc.	NasdaqGS:HOLX	2,658	15,138	85.06%
220	Honeywell International Inc.	NasdaqGS:HON	32,225	137,334	80.99%
221	Hormel Foods Corporation	NYSE:HRL	3,012	15,661	83.87%
222	Host Hotels & Resorts, Inc.	NasdaqGS:HST	5,643	10,554	65.16%
223	Howmet Aerospace Inc.	NYSE:HWM	3,471	72,865	95.45%
224	HP Inc.	NYSE:HPQ	10,921	24,524	69.19%
225	Hubbell Incorporated	NYSE:HUBB	1,720	22,247	92.83%
226	Humana Inc.	NYSE:HUM	12,646	32,074	71.72%
227	Huntington Bancshares Incorporated	NasdaqGS:HBAN	17,576	23,586	57.30%
228	Huntington Ingalls Industries, Inc.	NYSE:HII	3,459	10,387	75.02%
229	IDEX Corporation	NYSE:IEX	2,088	11,915	85.09%
230	IDEXX Laboratories, Inc.	NasdaqGS:IDXX	987	52,648	98.16%
231	Illinois Tool Works Inc.	NYSE:ITW	8,078	74,913	90.27%
232	Incyte Corporation	NasdaqGS:INCY	60	15,308	99.61%
233	Ingersoll Rand Inc.	NYSE:IR	4,980	30,163	85.83%
234	Insulet Corporation	NasdaqGS:PODD	1,434	21,618	93.78%
235	Intel Corporation	NasdaqGS:INTC	50,706	87,321	63.26%
236	Intercontinental Exchange, Inc.	NYSE:ICE	20,740	106,700	83.73%
237	International Business Machines Corporation	NYSE:IBM	58,396	225,679	79.44%
238	International Flavors & Fragrances Inc.	NYSE:IFF	9,621	16,290	62.87%
239	International Paper Company	NYSE:IP	6,009	25,106	80.69%
240	Intuit Inc.	NasdaqGS:INTU	6,567	208,931	96.95%
241	Intuitive Surgical, Inc.	NasdaqGS:ISRG	146	168,513	99.91%
242	Invesco Ltd.	NYSE:IVZ	1,346	9,240	87.29%
243	Invitation Homes Inc.	NYSE:INVH	8,233	18,360	69.04%
244	IQVIA Holdings Inc.	NYSE:IQV	14,484	30,576	67.86%
245	Iron Mountain Incorporated	NYSE:IRM	16,375	26,629	61.92%
246	J.B. Hunt Transport Services, Inc.	NasdaqGS:JBHT	1,790	13,498	88.29%
247	Jabil Inc.	NYSE:JBL	3,611	24,076	86.96%
248	Jack Henry & Associates, Inc.	NasdaqGS:JKHY	210	11,764	98.25%
249	Jacobs Solutions Inc.	NYSE:J	2,752	17,711	86.55%
250	Johnson & Johnson	NYSE:JNJ	37,834	417,437	91.69%
251	Johnson Controls International plc	NYSE:JCI	10,703	69,070	86.58%
252	JPMorgan Chase & Co.	NYSE:JPM	827,030	794,019	48.98%
253	Kellanova	NYSE:K	6,392	27,838	81.33%
254	Kenvue Inc.	NYSE:KVUE	8,719	40,953	82.45%
255	Keurig Dr Pepper Inc.	NasdaqGS:KDP	18,330	46,757	71.84%
256	KeyCorp	NYSE:KEY	15,783	19,310	55.02%
257	Keysight Technologies, Inc.	NYSE:KEYS	2,030	28,391	93.33%
258	Kimberly-Clark Corporation	NasdaqGS:KMB	7,916	45,175	85.09%
259	Kimco Realty Corporation	NYSE:KIM	8,603	14,093	62.10%
260	Kinder Morgan, Inc.	NYSE:KMI	32,399	59,752	64.84%
261	KKR & Co. Inc.	NYSE:KKR	51,337	127,112	71.23%
262	KLA Corporation	NasdaqGS:KLAC	6,088	120,718	95.20%
263	L3Harris Technologies, Inc.	NYSE:LHX	12,980	50,463	79.54%
264	Labcorp Holdings Inc.	NYSE:LH	7,350	22,092	75.04%
265	Lam Research Corporation	NasdaqGS:LRCX	4,485	129,094	96.64%
266	Lamb Weston Holdings, Inc.	NYSE:LW	4,254	7,184	62.81%
267	Las Vegas Sands Corp.	NYSE:LVS	13,940	36,127	72.16%

268	Leidos Holdings, Inc.	NYSE:LDOS	5,414	22,644	80.70%
269	Lennar Corporation	NYSE:LEN	4,451	31,144	87.49%
270	Lennox International Inc.	NYSE:LII	1,489	20,449	93.21%
271	Linde plc	NasdaqGS:LIN	22,609	221,522	90.74%
272	Live Nation Entertainment, Inc.	NYSE:LYV	8,272	35,519	81.11%
273	LKQ Corporation	NasdaqGS:LKQ	5,610	7,580	57.47%
274	Lockheed Martin Corporation	NYSE:LMT	21,418	99,370	82.27%
275	Loews Corporation	NYSE:L	9,350	19,450	67.54%
276	Lowe's Companies, Inc.	NYSE:LOW	39,713	135,150	77.29%
277	lululemon athletica inc.	NasdaqGS:LULU	1,576	22,672	93.50%
278	LyondellBasell Industries N.V.	NYSE:LYB	13,069	15,780	54.70%
279	M&T Bank Corporation	NYSE:MTB	15,164	29,249	65.86%
280	Marathon Petroleum Corporation	NYSE:MPC	28,758	48,899	62.97%
281	MarketAxess Holdings Inc.	NasdaqGS:MKTX	73	6,987	98.97%
282	Marriott International, Inc.	NasdaqGS:MAR	15,345	70,557	82.14%
283	Marsh & McLennan Companies, Inc.	NYSE:MMC	21,862	100,129	82.08%
284	Martin Marietta Materials, Inc.	NYSE:MLM	6,025	36,842	85.94%
285	Masco Corporation	NYSE:MAS	3,214	14,507	81.86%
286	Mastercard Incorporated	NYSE:MA	18,986	519,192	96.47%
287	Match Group, Inc.	NasdaqGS:MTCH	3,953	8,684	68.72%
288	McCormick & Company, Incorporated	NYSE:MKC	4,602	18,874	80.40%
289	McDonald's Corporation	NYSE:MCD	51,988	217,970	80.74%
290	McKesson Corporation	NYSE:MCK	7,414	83,161	91.81%
291	Medtronic plc	NYSE:MDT	29,626	119,004	80.07%
292	Merck & Co., Inc.	NYSE:MRK	38,270	201,546	84.04%
293	Meta Platforms, Inc.	NasdaqGS:META	49,769	1,932,590	97.49%
294	MetLife, Inc.	NYSE:MET	64,662	50,722	43.96%
295	Mettler-Toledo International Inc.	NYSE:MTD	2,131	25,872	92.39%
296	MGM Resorts International	NYSE:MGM	31,854	9,303	22.60%
297	Microchip Technology Incorporated	NasdaqGS:MCHP	5,781	33,390	85.24%
298	Micron Technology, Inc.	NasdaqGS:MU	14,078	133,053	90.43%
299	Microsoft Corporation	NasdaqGS:MSFT	112,184	3,880,410	97.19%
300	Mid-America Apartment Communities, Inc.	NYSE:MAA	5,007	16,446	76.66%
301	Moderna, Inc.	NasdaqGS:MRNA	747	10,163	93.15%
302	Mohawk Industries, Inc.	NYSE:MHK	2,628	7,494	74.03%
303	Molina Healthcare, Inc.	NYSE:MOH	3,224	8,504	72.51%
304	Molson Coors Beverage Company	NYSE:TAP	6,354	10,029	61.22%
305	Mondelez International, Inc.	NasdaqGS:MDLZ	18,544	80,005	81.18%
306	Monolithic Power Systems, Inc.	NasdaqGS:MPWR	16	38,519	99.96%
307	Monster Beverage Corporation	NasdaqGS:MNST	435	63,165	99.32%
308	Moody's Corporation	NYSE:MCO	7,915	92,443	92.11%
309	Morgan Stanley	NYSE:MS	418,581	228,563	35.32%
310	Motorola Solutions, Inc.	NYSE:MSI	6,551	75,540	92.02%
311	MSCI Inc.	NYSE:MSCI	4,657	42,294	90.08%
312	Nasdaq, Inc.	NasdaqGS:NDAQ	9,923	55,572	84.85%
313	NetApp, Inc.	NasdaqGS:NTAP	3,491	21,253	85.89%
314	Netflix, Inc.	NasdaqGS:NFLX	17,995	514,858	96.62%
315	Newmont Corporation	NYSE:NEM	9,059	75,744	89.32%
316	News Corporation	NasdaqGS:NWS	2,940	NA	N/A
317	News Corporation	NasdaqGS:NWSA	2,940	16,946	85.22%
318	NextEra Energy, Inc.	NYSE:NEE	83,560	149,113	64.09%
319	NIKE, Inc.	NYSE:NKE	11,021	109,571	90.86%
320	NiSource Inc.	NYSE:NI	13,988	19,908	58.73%
321	Nordson Corporation	NasdaqGS:NDSN	2,320	11,926	83.71%
322	Norfolk Southern Corporation	NYSE:NSC	18,012	62,826	77.72%

323	Northern Trust Corporation	NasdaqGS:NTRS	17,601	23,957	57.65%
324	Northrop Grumman Corporation	NYSE:NOC	18,396	83,205	81.89%
325	Norwegian Cruise Line Holdings Ltd.	NYSE:NCLH	13,916	10,846	43.80%
326	NRG Energy, Inc.	NYSE:NRG	10,994	29,506	72.85%
327	Nucor Corporation	NYSE:NUE	7,067	32,070	81.94%
328	NVIDIA Corporation	NasdaqGS:NVDA	10,270	4,457,880	99.77%
329	NVR, Inc.	NYSE:NVR	1,061	22,553	95.51%
330	NXP Semiconductors N.V.	NasdaqGS:NXPI	11,146	52,228	82.41%
331	O'Reilly Automotive, Inc.	NasdaqGS:ORLY	7,921	87,675	91.71%
332	Occidental Petroleum Corporation	NYSE:OXY	27,104	43,630	61.68%
333	Old Dominion Freight Line, Inc.	NasdaqGS:ODFL	168	30,361	99.45%
334	Omnicom Group Inc.	NYSE:OMC	7,197	14,130	66.25%
335	ON Semiconductor Corporation	NasdaqGS:ON	3,643	19,492	84.25%
336	ONEOK, Inc.	NYSE:OKE	32,293	46,892	59.22%
337	Oracle Corporation	NYSE:ORCL	108,952	702,349	86.57%
338	Otis Worldwide Corporation	NYSE:OTIS	8,742	34,330	79.70%
339	PACCAR Inc	NasdaqGS:PCAR	16,009	51,114	76.15%
340	Packaging Corporation of America	NYSE:PKG	2,772	17,554	86.36%
341	Palantir Technologies Inc.	NasdaqGS:PLTR	239	443,533	99.95%
342	Palo Alto Networks, Inc.	NasdaqGS:PANW	1,410	111,585	98.75%
343	Paramount Global	NasdaqGS:PSKY	15,833	11,521	42.12%
344	Parker-Hannifin Corporation	NYSE:PH	9,285	92,989	90.92%
345	Paychex, Inc.	NasdaqGS:PAYX	5,045	50,863	90.98%
346	Paycom Software, Inc.	NYSE:PAYC	83	12,931	99.36%
347	PayPal Holdings, Inc.	NasdaqGS:PYPL	11,857	64,631	84.50%
348	Pentair plc	NYSE:PNR	1,767	16,839	90.50%
349	PepsiCo, Inc.	NasdaqGS:PEP	47,751	198,804	80.63%
350	Pfizer Inc.	NYSE:PFE	67,418	139,751	67.46%
351	PG&E Corporation	NYSE:PCG	58,343	32,968	36.10%
352	Philip Morris International Inc.	NYSE:PM	46,352	264,900	85.11%
353	Phillips 66	NYSE:PSX	21,417	48,143	69.21%
354	Pinnacle West Capital Corporation	NYSE:PNW	11,048	11,061	50.03%
355	Pool Corporation	NasdaqGS:POOL	1,272	11,407	89.97%
356	PPG Industries, Inc.	NYSE:PPG	6,411	24,139	79.01%
357	PPL Corporation	NYSE:PPL	16,965	26,881	61.31%
358	Principal Financial Group, Inc.	NasdaqGS:PFG	4,658	17,062	78.56%
359	Prologis, Inc.	NYSE:PLD	31,495	98,078	75.69%
360	Prudential Financial, Inc.	NYSE:PRU	38,395	36,351	48.63%
361	PTC Inc.	NasdaqGS:PTC	1,930	24,608	92.73%
362	Public Service Enterprise Group Incorporated	NYSE:PEG	22,888	43,759	65.66%
363	Public Storage	NYSE:PSA	9,353	49,432	84.09%
364	PulteGroup, Inc.	NYSE:PHM	2,382	23,999	90.97%
365	QUALCOMM Incorporated	NasdaqGS:QCOM	15,440	159,238	91.16%
366	Quanta Services, Inc.	NYSE:PWR	4,479	57,539	92.78%
367	Quest Diagnostics Incorporated	NYSE:DGX	7,121	19,788	73.54%
368	Ralph Lauren Corporation	NYSE:RL	2,668	17,461	86.75%
369	Raymond James Financial, Inc.	NYSE:RJF	4,784	32,882	87.30%
370	Realty Income Corporation	NYSE:O	26,677	52,518	66.31%
371	Regency Centers Corporation	NasdaqGS:REG	4,654	13,022	73.67%
372	Regeneron Pharmaceuticals, Inc.	NasdaqGS:REGN	2,939	58,376	95.21%
373	Regions Financial Corporation	NYSE:RF	9,571	22,236	69.91%
374	Republic Services, Inc.	NYSE:RSG	12,957	73,436	85.00%
375	ResMed Inc.	NYSE:RMD	852	41,567	97.99%
376	Revvity, Inc.	NYSE:RVTY	3,326	10,236	75.48%
377	Rockwell Automation, Inc.	NYSE:ROK	4,085	37,467	90.17%

378	Rollins, Inc.	NYSE:ROL	813	28,419	97.22%
379	Roper Technologies, Inc.	NasdaqGS:ROP	7,824	57,507	88.02%
380	Ross Stores, Inc.	NasdaqGS:ROST	5,682	47,497	89.31%
381	Royal Caribbean Cruises Ltd.	NYSE:RCL	20,820	81,879	79.73%
382	RTX Corporation	NYSE:RTX	43,260	207,287	82.73%
383	S&P Global Inc.	NYSE:SPGI	12,042	170,002	93.39%
384	Salesforce, Inc.	NYSE:CRM	12,070	229,928	95.01%
385	SBA Communications Corporation	NasdaqGS:SBAC	15,756	23,715	60.08%
386	Schlumberger Limited	NYSE:SLB	12,999	49,041	79.05%
387	Seagate Technology Holdings plc	NasdaqGS:STX	5,373	31,997	85.62%
388	Sempra	NYSE:SRE	37,310	53,314	58.83%
389	ServiceNow, Inc.	NYSE:NOW	2,278	181,062	98.76%
390	Simon Property Group, Inc.	NYSE:SPG	24,785	53,848	68.48%
391	Skyworks Solutions, Inc.	NasdaqGS:SWKS	1,200	10,550	89.78%
392	Smurfit Westrock Plc	NYSE:SW	14,614	22,717	60.85%
393	Snap-on Incorporated	NYSE:SNA	1,294	16,786	92.84%
394	Solventum Corporation	NYSE:SOLV	8,183	12,725	60.86%
395	Southwest Airlines Co.	NYSE:LUV	8,058	15,556	65.88%
396	Stanley Black & Decker, Inc.	NYSE:SWK	6,595	10,730	61.93%
397	Starbucks Corporation	NasdaqGS:SBUX	25,822	104,713	80.22%
398	State Street Corporation	NYSE:STT	58,558	31,513	34.99%
399	Steel Dynamics, Inc.	NasdaqGS:STLD	3,345	18,263	84.52%
400	STERIS plc	NYSE:STE	2,203	23,918	91.57%
401	Stryker Corporation	NYSE:SYK	14,120	144,352	91.09%
402	Super Micro Computer, Inc.	NasdaqGS:SMCI	5,084	26,618	83.96%
403	Synchrony Financial	NYSE:SYF	15,462	25,832	62.56%
404	Synopsys, Inc.	NasdaqGS:SNPS	684	114,620	99.41%
405	Sysco Corporation	NYSE:SYY	14,494	38,510	72.65%
406	T-Mobile US, Inc.	NasdaqGS:TMUS	114,958	275,705	70.57%
407	T. Rowe Price Group, Inc.	NasdaqGS:TROW	338	23,083	98.56%
408	Take-Two Interactive Software, Inc.	NasdaqGS:TTWO	4,106	40,098	90.71%
409	Tapestry, Inc.	NYSE:TPR	8,766	22,657	72.10%
410	Targa Resources Corp.	NYSE:TRGP	14,290	35,526	71.31%
411	Target Corporation	NYSE:TGT	19,875	47,890	70.67%
412	TE Connectivity plc	NYSE:TEL	4,743	59,681	92.64%
413	Teledyne Technologies Incorporated	NYSE:TDY	2,789	25,598	90.18%
414	Teradyne, Inc.	NasdaqGS:TER	77	17,096	99.55%
415	Tesla, Inc.	NasdaqGS:TSLA	13,623	1,063,269	98.73%
416	Texas Instruments Incorporated	NasdaqGS:TXN	14,377	170,209	92.21%
417	Texas Pacific Land Corporation	NYSE:TPL	1	19,817	99.99%
418	Textron Inc.	NYSE:TXT	3,959	13,725	77.61%
419	The AES Corporation	NYSE:AES	30,353	9,342	23.53%
420	The Allstate Corporation	NYSE:ALL	8,321	54,493	86.75%
421	The Bank of New York Mellon Corporation	NYSE:BK	69,714	72,703	51.05%
422	The Boeing Company	NYSE:BA	55,958	173,251	75.59%
423	The Campbell's Company	NasdaqGS:CPB	7,542	9,671	56.19%
424	The Charles Schwab Corporation	NYSE:SCHW	59,011	176,221	74.91%
425	The Cigna Group	NYSE:CI	31,972	73,379	69.65%
426	The Clorox Company	NYSE:CLX	2,916	15,273	83.97%
427	The Coca-Cola Company	NYSE:KO	46,657	302,720	86.65%
428	The Cooper Companies, Inc.	NasdaqGS:COO	2,853	14,024	83.09%
429	The Estée Lauder Companies Inc.	NYSE:EL	9,826	32,626	76.85%
430	The Goldman Sachs Group, Inc.	NYSE:GS	747,975	208,396	21.79%
431	The Hartford Insurance Group, Inc.	NYSE:HIG	4,511	36,035	88.87%
432	The Hershey Company	NYSE:HSY	5,448	37,356	87.27%

433	The Home Depot, Inc.	NYSE:HD	63,085	385,883	85.95%
434	The Interpublic Group of Companies, Inc.	NYSE:IPG	4,255	9,124	68.20%
435	The J. M. Smucker Company	NYSE:SJM	7,812	11,812	60.19%
436	The Kraft Heinz Company	NasdaqGS:KHC	20,450	32,857	61.64%
437	The Kroger Co.	NYSE:KR	25,082	49,084	66.18%
438	The Mosaic Company	NYSE:MOS	4,450	10,150	69.52%
439	The PNC Financial Services Group, Inc.	NYSE:PNC	66,711	74,721	52.83%
440	The Procter & Gamble Company	NYSE:PG	36,526	359,577	90.78%
441	The Progressive Corporation	NYSE:PGR	7,089	144,506	95.32%
442	The Sherwin-Williams Company	NYSE:SHW	12,868	87,558	87.19%
443	The Southern Company	NYSE:SO	66,277	104,163	61.11%
444	The TJX Companies, Inc.	NYSE:TJX	12,778	146,558	91.98%
445	The Trade Desk, Inc.	NasdaqGM:TTD	312	26,515	98.84%
446	The Travelers Companies, Inc.	NYSE:TRV	8,308	59,631	87.77%
447	The Walt Disney Company	NYSE:DIS	49,517	202,142	80.32%
448	The Williams Companies, Inc.	NYSE:WMB	27,079	70,694	72.30%
449	Thermo Fisher Scientific Inc.	NYSE:TMO	32,832	173,973	84.12%
450	TKO Group Holdings, Inc.	NYSE:TKO	3,035	13,412	81.55%
451	Tractor Supply Company	NasdaqGS:TSCO	5,424	31,405	85.27%
452	Trane Technologies plc	NYSE:TT	5,385	95,702	94.67%
453	TransDigm Group Incorporated	NYSE:TDG	24,950	78,314	75.84%
454	Trimble Inc.	NasdaqGS:TRMB	1,535	19,935	92.85%
455	Truist Financial Corporation	NYSE:TFC	67,748	55,536	45.05%
456	Tyler Technologies, Inc.	NYSE:TYL	638	25,713	97.58%
457	Tyson Foods, Inc.	NYSE:TSN	10,481	20,293	65.94%
458	U.S. Bancorp	NYSE:USB	80,100	69,811	46.57%
459	Uber Technologies, Inc.	NYSE:UBER	11,436	186,770	94.23%
460	UDR, Inc.	NYSE:UDR	6,009	12,621	67.74%
461	Ulta Beauty, Inc.	NasdaqGS:ULTA	1,923	22,392	92.09%
462	Union Pacific Corporation	NYSE:UNP	32,463	131,797	80.24%
463	United Airlines Holdings, Inc.	NasdaqGS:UAL	33,633	28,906	46.22%
464	United Parcel Service, Inc.	NYSE:UPS	25,652	73,459	74.12%
465	United Rentals, Inc.	NYSE:URI	14,789	55,267	78.89%
466	UnitedHealth Group Incorporated	NYSE:UNH	81,793	227,592	73.56%
467	Universal Health Services, Inc.	NYSE:UHS	4,955	10,965	68.87%
468	Valero Energy Corporation	NYSE:VLO	11,540	41,407	78.20%
469	Ventas, Inc.	NYSE:VTR	13,741	31,144	69.39%
470	Veralto Corporation	NYSE:VLTO	2,767	26,727	90.62%
471	VeriSign, Inc.	NasdaqGS:VRSN	1,802	25,397	93.38%
472	Verisk Analytics, Inc.	NasdaqGS:VRSK	3,246	37,030	91.94%
473	Verizon Communications Inc.	NYSE:VZ	171,695	181,934	51.45%
474	Vertex Pharmaceuticals Incorporated	NasdaqGS:VRTX	1,750	93,977	98.17%
475	Viatris Inc.	NasdaqGS:VTRS	14,306	11,309	44.15%
476	VICI Properties Inc.	NYSE:VICI	17,650	35,084	66.53%
477	Visa Inc.	NYSE:V	21,804	648,841	96.75%
478	Vistra Corp.	NYSE:VST	17,413	68,482	79.73%
479	Vulcan Materials Company	NYSE:VMC	5,899	37,856	86.52%
480	W. R. Berkley Corporation	NYSE:WRB	3,059	26,789	89.75%
481	W.W. Grainger, Inc.	NYSE:GWW	3,183	45,447	93.45%
482	Walgreens Boots Alliance, Inc.	NasdaqGS:WBA	33,848	10,335	23.39%
483	Walmart Inc.	NYSE:WMT	62,113	827,809	93.02%
484	Warner Bros. Discovery, Inc.	NasdaqGS:WBD	43,006	27,011	38.58%
485	Waste Management, Inc.	NYSE:WM	24,940	94,701	79.15%
486	Waters Corporation	NYSE:WAT	1,703	16,738	90.77%
487	WEC Energy Group, Inc.	NYSE:WEC	20,369	35,518	63.55%

488	Wells Fargo & Company	NYSE:WFC	302,642	249,388	45.18%
489	Welltower Inc.	NYSE:WELL	16,771	112,383	87.01%
490	West Pharmaceutical Services, Inc.	NYSE:WST	305	17,328	98.27%
491	Western Digital Corporation	NasdaqGS:WDC	4,711	26,155	84.74%
492	Westinghouse Air Brake Technologies Corporation	NYSE:WAB	4,288	32,724	88.41%
493	Weyerhaeuser Company	NYSE:WY	5,234	18,384	77.84%
494	Williams-Sonoma, Inc.	NYSE:WSM	1,347	24,528	94.79%
495	Willis Towers Watson Public Limited Company	NasdaqGS:WTW	5,936	31,981	84.34%
496	Workday, Inc.	NasdaqGS:WDAY	3,362	59,259	94.63%
497	Wynn Resorts, Limited	NasdaqGS:WYNN	12,266	10,956	47.18%
498	Xcel Energy Inc.	NasdaqGS:XEL	30,270	43,369	58.89%
499	Xylem Inc.	NYSE:XYL	2,443	34,722	93.43%
500	Yum! Brands, Inc.	NYSE:YUM	12,286	39,210	76.14%
501	Zebra Technologies Corporation	NasdaqGS:ZBRA	2,362	16,151	87.24%
502	Zimmer Biomet Holdings, Inc.	NYSE:ZBH	6,621	19,663	74.81%
503	Zoetis Inc.	NYSE:ZTS	6,829	65,303	90.53%

Appendix R-Q

S&P Composite 1500 Utilities

S&P Composite 1500 Utilities

490.84 USD | -0.33% 1 Day

Quick Facts

Weighting Method	**Float-adjusted market cap weighted**
Rebalancing Frequency	**Quarterly in March, June, September, and December**
Calculation Frequency	**Real-time**
Calculation Currencies	**USD**
Launch Date	**Dec 30, 1994**
First Value Date	**Dec 30, 1994**
Regulatory Authorization	**European Union - Endorsed**
Methodology	**S&P U.S. Indices Methodology**

Characteristics

Number of Constituents	**59**
Constituent Total Market Cap	
Largest Market Cap	**146,286.32**
Smallest Market Cap	**838.23**
Mean Market Cap	**24,371.65**
Median Market Cap	**10,819.94**
Weight Largest Constituent (%)	**10.2**
Weight Top 10 Constituents (%)	**54.3**

ESG Characteristics	
Carbon to Value Invested (metric tons CO_2e/$1M invested)*	329.88
Carbon to Revenue (metric tons CO_2e/$1M revenues)*	1,678.46
Weighted Average Carbon Intensity (metric tons CO_2e/$1M revenues)*	1,856.02
Fossil Fuel Reserve Emissions (metric tons CO_2/$1M invested)	760.54

*Operational and first-tier supply chain greenhouse gas emissions. For more information, please visit: www.spglobal.com/spdji/en/esg-metrics.
As of Jul 31, 2025

S&P Global S&P Dow Jones Indices

ON THIS PAGE

Download Factsheet

Constituents

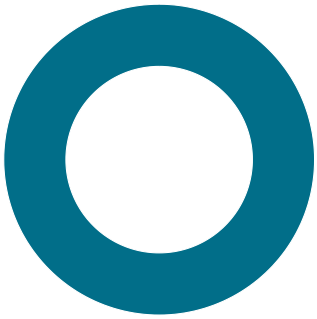
Top 10 Constituents by Index Weight

CONSTITUENT	SYMBOL	SECTOR*
Constituent NextEra Energy Inc	Symbol NEE	Sector Utilities
Constituent Constellation Energy Corp	Symbol CEG	Sector Utilities
Constituent Southern Co	Symbol SO	Sector Utilities
Constituent Duke Energy Corp	Symbol DUK	Sector Utilities
Constituent Vistra Corp.	Symbol VST	Sector Utilities
Constituent American Electric Power	Symbol AEP	Sector Utilities
Constituent Sempra	Symbol SRE	Sector Utilities
Constituent Dominion Energy Inc	Symbol D	Sector Utilities
Constituent Exelon Corp	Symbol EXC	Sector Utilities
Constituent Public Service Enterprise Grp	Symbol PEG	Sector Utilities

*Based on GICS® sectors
As of Jul 31, 2025

Sector Breakdown

SECTOR	INDEX WEIGHT
Utilities	100.0%



The weightings for each sector of the index are rounded to the nearest tenth of a percent; therefore, the aggregate weights for the index may not equal 100%.
Based on GICS® sectors
As of Jul 31, 2025

Country Breakdown

COUNTRY/REGION		NUMBER OF CONSTITUENTS		TOTAL MARKET CAP		INDEX WEIGHT
Country/Region	United States	Number of Constituents	59	Total Market Cap	1,437,927.24	Index Weight	100.0%

As of Jul 31, 2025

Tickers

	BLOOMBERG TICKER	REUTERS
Total Return	SPTRSC55	.TR15GSPU
Price Return	S15UTIL	.SPCOMU

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Appendix R-R

PE Ratios

S&P 500 Utilities

S5UTIL · CFDs on S&P indices

435.55 USD
−1.57 −0.36%
At close at Aug 11, 16:00 GMT-4

Overview News Ideas Discussions Technicals Seasonals Components

S5UTIL components

The S&P 500 Utilities constituents can be found in the table below. Sort S5UTIL stock components by various financial metrics and data such as performance, dividends, income statement and balance sheet.

Overview Performance Valuation Dividends Profitability Income Statement Balance Sheet Cash Flow Technicals

Symbol 31		Market cap ↓	Price	Change %	Volume	Rel Volume	P/E	
NEE	NextEra Energy, Inc. D	149.2 B USD	72.45 USD	+0.06%	8.42 M	1.16	25.24	2.87 USD	−6.80%	2.99%	Ut
SO	Southern Company (The) D	104.03 B USD	94.57 USD	−0.13%	4.31 M	0.70	24.42	3.87 USD	−7.67%	3.07%	Ut
CEG	Constellation Energy Corpo... D	103.56 B USD	331.49 USD	−1.27%	1.83 M	0.64	34.59	9.58 USD	+27.71%	0.45%	Ut
DUK	Duke Energy Corporation (... D	97.64 B USD	125.56 USD	+0.19%	2.24 M	0.57	20.53	6.12 USD	+9.90%	3.33%	Ut
VST	Vistra Corp. D	67.79 B USD	200.08 USD	−1.01%	3.69 M	0.68	31.74	6.30 USD	+394.50%	0.44%	Ut
AEP	American Electric Power C... D	59.9 B USD	112.00 USD	−0.44%	2.03 M	0.45	16.41	6.83 USD	+36.22%	3.28%	Ut
SRE	DBA Sempra D	52.79 B USD	80.90 USD	−0.99%	3.91 M	0.95	19.59	4.13 USD	−11.82%	3.13%	Ut
D	Dominion Energy, Inc. D	52.48 B USD	61.49 USD	−0.52%	4.15 M	0.71	21.24	2.89 USD	+55.95%	4.34%	Ut
EXC	Exelon Corporation D	45.16 B USD	44.71 USD	−1.35%	4.4 M	0.63	16.97	2.63 USD	+8.64%	3.49%	Ut
PEG	Public Service Enterprise G... D	43.19 B USD	86.54 USD	−1.30%	3.12 M	1.17	21.85	3.96 USD	+19.93%	2.84%	Ut
XEL	Xcel Energy Inc. D	42.98 B USD	72.68 USD	−0.89%	2.48 M	0.62	20.16	3.60 USD	+7.72%	3.08%	Ut
ETR	Entergy Corporation D	40.22 B USD	90.09 USD	−0.42%	1.92 M	0.62	22.42	4.02 USD	−3.96%	2.63%	Ut
ED	Consolidated Edison, Inc. D	37.55 B USD	104.12 USD	−0.34%	2.36 M	1.03	18.88	5.52 USD	+7.26%	3.23%	Ut
WEC	WEC Energy Group, Inc. D	35.3 B USD	109.67 USD	−0.62%	1.7 M	0.70	21.02	5.22 USD	+20.46%	3.15%	Ut
PCG	Pacific Gas & Electric Co. D	33.21 B USD	15.11 USD	+0.73%	21.77 M	0.72	13.98	1.08 USD	−8.24%	0.56%	Ut
AWK	American Water Works Com... D	29.42 B USD	145.55 USD	+0.13%	1.09 M	0.51	26.20	5.55 USD	+13.29%	2.15%	Ut

Symbol 31		↓ Market cap	Price	Change %	Volume	Rel Volume	P/E	EPS dil TTM	EPS dil growth TTM YoY	Div yield % TTM	Se
NRG	NRG Energy, Inc. D	29.41 B USD	152.03 USD	−0.33%	2.78 M	0.72	64.33	2.36 USD	−74.65%	1.11%	Ut
DTE	DTE Energy Company D	29.05 B USD	139.92 USD	−0.24%	1.2 M	0.79	20.13	6.95 USD	+3.74%	3.07%	Ut
AEE	Ameren Corporation D	27.41 B USD	101.36 USD	−0.03%	1.56 M	0.96	22.26	4.55 USD	+3.12%	2.72%	Ut
PPL	PPL Corporation D	26.83 B USD	36.28 USD	−0.19%	29.78 M	5.28	27.27	1.33 USD	+17.13%	2.92%	Ut
ATO	Atmos Energy Corporation D	26.49 B USD	165.04 USD	+0.46%	1.31 M	1.21	22.79	7.24 USD	+6.39%	2.07%	Ut
CNP	CenterPoint Energy, Inc (Ho… D	25.18 B USD	38.57 USD	−0.67%	5.53 M	0.91	26.88	1.43 USD	−11.20%	2.20%	Ut
FE	FirstEnergy Corp. D	25.02 B USD	43.33 USD	+0.16%	2.59 M	0.57	19.13	2.27 USD	+49.14%	3.97%	Ut
ES	Eversource Energy (D/B/A) D	24.38 B USD	65.69 USD	+1.00%	2.16 M	0.97	28.27	2.32 USD	—	4.47%	Ut
CMS	CMS Energy Corporation D	21.83 B USD	72.92 USD	−0.76%	2.4 M	0.94	21.52	3.39 USD	+4.31%	2.90%	Ut
EIX	Edison International D	21.26 B USD	55.25 USD	+2.75%	3.62 M	0.77	8.12	6.81 USD	+173.60%	5.90%	Ut
NI	NiSource Inc D	19.85 B USD	42.15 USD	−0.31%	3.32 M	0.69	22.40	1.88 USD	+15.46%	2.62%	Ut
LNT	Alliant Energy Corporation D	16.78 B USD	65.32 USD	−0.49%	1.6 M	0.87	20.19	3.24 USD	+32.19%	3.07%	Ut
EVRG	Evergy, Inc. D	16.67 B USD	72.42 USD	0.00%	2.25 M	0.77	19.93	3.63 USD	+13.16%	3.65%	Ut
PNW	Pinnacle West Capital Corp… D	11.04 B USD	92.48 USD	−0.15%	698.36 K	0.54	19.05	4.85 USD	−10.20%	3.85%	Ut
AES	The AES Corporation D	9.11 B USD	12.80 USD	−2.44%	6.24 M	0.58	9.04	1.42 USD	+35.10%	5.44%	Ut

LOOK FIRST / THEN LEAP.

Appendix R-S SCE Proxies

Share Buybacks

Share Buybacks

Prior 10 Years

Ticker	Company	Years Share Repurchase Occurred	Total Shares Repurchased	Total Share Repurchase Value ($ Million)
Electric Proxies				
LNT	Alliant Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	491,700	$22
AEP	Amer. Elec. Power		0	$0
AEE	Ameren Corp.	2015, 2016, 2017, 2018	2,022,200	$97
AVA	Avista Corp.		0	$0
BKH	Black Hills	2023, 2024, 2025	14,100	$1
CMS	CMS Energy Corp.	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	3,051,700	$161
CNP	CenterPoint Energy		0	$0
DTE	DTE Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	4,598,900	$473
D	Dominion Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	40,515,700	$3,152
DUK	Duke Energy	2015	19,803,100	$1,500
ETR	Entergy Corp.	2015	2,938,000	$100
EVRG	Evergy Inc.	2022, 2023, 2024, 2025	70,600	$4
EXC	Exelon Corp.		0	$0
IDA	IDACORP Inc.	2015, 2016, 2017, 2018, 2019	220,600	$18
MGEE	MGE Energy	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022	2,519,200	$153
NWE	NorthWestern Corp.		5,800	$0
OGE	OGE Energy	2015, 2016, 2020	154,200	$5
TXNM	PNM Resources		0	$0
PPL	PPL Corp.	2015	37,100	$1
PNW	Pinnacle West Capital	2015, 2016	226,800	$15
POR	Portland General		0	$0
PEG	Public Serv. Enterprise	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023	14,241,800	$723
SRE	Sempra Energy	2025	6,700	$1
SO	Southern Co.	2015	2,599,400	$115
WEC	WEC Energy Group	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	1,396,700	$129
XEL	Xcel Energy Inc.	2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025	1,014,800	$41

Sources and Notes:
Bloomberg, accessed 08/12/2025.

Share Buybacks - Intermediate

Prior 10 Years

	LNT		AEP		AEE	
	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
2025	18,700	1.01	-	-	-	-
2024	41,100	2.19	-	-	-	-
2023	47,400	2.52	-	-	-	-
2022	30,300	1.75	-	-	-	-
2021	36,100	1.92	-	-	-	-
2020	20,700	1.09	-	-	-	-
2019	53,700	2.56	-	-	-	-
2018	70,000	2.80	-	-	24,600	1.43
2017	73,700	2.92	-	-	468,400	25.62
2016	27,300	1.15	-	-	1,110,100	52.44
2015	72,700	2.59	-	-	419,100	17.63
Total	**491,700**	**22**	**-**	**-**	**2,022,200**	**97**

AVA		BKH		CMS	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	700	0.04	353,900	25.12
-	-	3,300	0.20	180,600	10.47
-	-	10,100	0.56	233,100	15.12
-	-	-	-	301,000	19.58
-	-	-	-	156,900	9.22
-	-	-	-	215,600	12.76
-	-	-	-	180,900	9.74
-	-	-	-	223,600	9.85
-	-	-	-	607,700	26.46
-	-	-	-	292,000	10.87
-	-	-	-	306,400	11.42
-	**-**	**14,100**	**1**	**3,051,700**	**161**

CNP		DTE		D	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	43,900	5.20	88,600	4.95
-	-	65,200	7.19	171,200	8.96
-	-	84,600	9.95	143,200	7.49
-	-	530,700	64.10	150,700	11.22
-	-	1,083,100	129.70	154,800	11.26
-	-	65,000	8.66	39,074,000	3,055.07
-	-	58,500	6.80	135,800	10.04
-	-	68,700	6.96	127,900	9.42
-	-	1,173,000	114.89	112,700	8.31
-	-	1,350,300	113.89	127,300	9.01
-	-	75,900	6.09	229,500	16.36
-	**-**	**4,598,900**	**473**	**40,515,700**	**3,152**

DUK		EIX		ETR	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	4,800,200	129.22	-	-
-	-	1,975,000	122.33	-	-
-	-	2,111,000	134.37	-	-
-	-	6,816,100	513.49	-	-
-	-	4,432,100	308.82	-	-
19,803,100	1,500.08	3,694,900	235.97	2,938,000	99.81
19,803,100	**1,500**	**23,829,300**	**1,444**	**2,938,000**	**100**

EVRG		EXC		IDA	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
500	0.03	-	-	-	-
14,300	0.84	-	-	-	-
41,500	2.49	-	-	-	-
14,300	0.92	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	42,700	4.16
-	-	-	-	42,000	3.62
-	-	-	-	38,700	3.19
-	-	-	-	46,000	3.29
-	-	-	-	51,200	3.28
70,600	**4**	**-**	**-**	**220,600**	**18**

MGEE		NWE		OGE	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	-	-
-	-	5,800	-	-	-
-	-	-	-	-	-
102,500	7.88	-	-	-	-
240,800	18.06	-	-	-	-
303,100	21.68	-	-	150,000	4.97
286,700	20.50	-	-	-	-
275,600	17.16	-	-	-	-
362,200	23.45	-	-	-	-
387,500	21.32	-	-	2,000	0.06
560,800	23.09	-	-	2,200	0.07
2,519,200	**153**	**5,800**	**-**	**154,200**	**5**

TXNM		PPL		PNW	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	72,000	4.88
-	-	37,100	1.27	154,800	10.14
-	**-**	**37,100**	**1**	**226,800**	**15**

POR		PEG		SRE	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	6,700	0.99
-	-	-	-	-	-
-	-	410,000	25.42	-	-
-	-	2,000,000	112.44	-	-
-	-	1,000,000	56.22	-	-
-	-	1,680,000	98.28	-	-
-	-	1,800,000	92.07	-	-
-	-	2,600,000	130.00	-	-
-	-	1,710,600	77.40	-	-
-	-	1,761,800	76.98	-	-
-	-	1,279,400	53.98	-	-
-	**-**	**14,241,800**	**723**	**6,700**	**1**

SO		WEC		XEL	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	13,800	1.31	300	0.02
-	-	33,200	2.85	800	0.04
-	-	18,500	1.74	800	0.05
-	-	23,900	2.35	2,400	0.16
-	-	17,500	1.59	4,400	0.26
-	-	1,068,600	105.44	6,400	0.40
-	-	112,000	7.88	13,800	0.76
-	-	24,300	1.56	68,200	2.95
-	-	25,600	1.49	88,100	3.69
-	-	46,800	2.61	817,500	32.63
2,599,400	114.96	12,500	0.66	12,100	0.46
2,599,400	**115**	**1,396,700**	**129**	**1,014,800**	**41**

ATO		CPK		NJR	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	1,200	0.15	-	-
-	-	2,500	0.34	-	-
-	-	2,100	0.24	-	-
-	-	1,800	0.24	-	-
-	-	3,100	0.38	746,000	27.11
-	-	2,000	0.17	-	-
-	-	1,600	0.15	-	-
-	-	1,600	0.13	-	-
-	-	1,600	0.12	-	-
-	-	1,600	0.10	196,900	3.02
-	-	1,400	0.07	274,500	7.65
-	**-**	**20,500**	**2**	**1,217,400**	**38**

NI		NWN		OGS	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	21,800	1.15	-	-
-	-	17,100	0.86	-	-
-	-	8,600	0.56	-	-
-	-	11,400	0.75	-	-
-	-	144,300	9.04	-	-
-	-	127,200	7.83	256,200	17.51
-	-	105,700	5.84	407,200	24.07
-	-	115,200	5.52	-	-
-	**-**	**551,300**	**32**	**663,400**	**42**

SWX		SR		AWR	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	2,200	0.17	27,300	2.10
-	-	24,300	1.77	48,300	3.73
-	-	24,800	1.51	58,000	4.95
-	-	18,600	1.34	32,500	2.71
-	-	28,800	9.25	21,000	1.83
-	-	17,600	1.15	73,100	5.75
-	-	39,200	3.04	95,000	7.16
-	-	28,000	2.21	310,400	17.98
-	-	35,200	2.85	355,300	16.92
-	-	33,700	2.15	440,100	17.88
-	-	29,400	1.67	2,464,600	94.77
-	**-**	**281,800**	**27**	**3,925,600**	**176**

AWK		ARTNA		CWT	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
350,000	35.54	-	-	-	-
1,720,000	134.32	-	-	-	-
700,000	54.21	-	-	-	-
1,000,000	64.99	-	-	-	-
2,250,000	125.58	-	-	-	-
6,020,000	**415**	**-**	**-**	**-**	**-**

WTRG		GWRS		MSEX	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
123,000	2.24	-	-	-	-
125,800	2.23	-	-	-	-
89,100	3.96	-	-	-	-
25,000	1.19	-	-	-	-
76,800	3.29	-	-	-	-
81,800	4.34	-	-	-	-
52,300	1.86	-	-	-	-
73,800	2.55	-	-	-	-
69,300	2.16	-	-	-	-
97,400	3.03	-	-	-	-
981,600	25.24	-	-	-	-
1,795,900	**52**	**-**	**-**	**-**	**-**

HTO		YORW	
Shares Repurchased	Shares Repurchased ($M)	Shares Repurchased	Shares Repurchased ($M)
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	37,200	1.26
-	-	46,700	1.34
-	-	121,000	2.55
-	**-**	**204,900**	**5**

Appendix R-T

Debt Beta

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.143293475
R Square	0.02053302
Adjusted R Square	0.016780273
Standard Error	0.001174382
Observations	263

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7.5461E-06	7.5461E-06	5.471463892	0.020084244
Residual	261	0.000359964	1.37917E-06		
Total	262	0.000367511			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000165373	7.29442E-05	2.267117046	0.024201412	2.1739E-05	0.000309007	2.1739E-05	0.000309007
X Variable 1	-0.007301797	0.003121605	-2.339116049	0.020084244	-0.013448533	-0.00115506	-0.013448533	-0.00115506

Debt Beta

20-Year Weekly Yield On S&P 500 Weekly Return

Date	S&P 500 Return	DGS20 Yield Change
8/2/2020	2.45%	-0.05%
8/9/2020	0.64%	0.03%
8/16/2020	0.72%	0.20%
8/23/2020	3.26%	-0.08%
8/30/2020	-2.31%	0.16%
9/6/2020	-2.51%	-0.04%
9/13/2020	-0.64%	-0.04%
9/20/2020	-0.63%	0.03%
9/27/2020	1.52%	-0.05%
10/4/2020	3.84%	0.06%
10/11/2020	0.19%	0.09%
10/18/2020	-0.53%	-0.04%
10/25/2020	-5.64%	0.11%
11/1/2020	7.32%	0.02%
11/8/2020	2.16%	-0.06%
11/15/2020	-0.77%	0.06%
11/22/2020	2.27%	-0.10%
11/29/2020	1.67%	0.03%
12/6/2020	-0.96%	0.17%
12/13/2020	1.25%	-0.11%
12/20/2020	-0.17%	0.07%
12/27/2020	1.43%	-0.03%
1/3/2021	1.83%	-0.01%
1/10/2021	-1.48%	0.22%
1/17/2021	1.94%	-0.01%
1/24/2021	-3.31%	0.00%
1/31/2021	4.65%	0.02%

2/7/2021	1.23%	0.11%
2/14/2021	-0.71%	0.04%
2/21/2021	-2.45%	0.15%
2/28/2021	0.81%	0.10%
3/7/2021	2.64%	0.10%
3/14/2021	-0.77%	0.13%
3/21/2021	1.57%	0.05%
3/28/2021	1.14%	-0.09%
4/4/2021	2.71%	0.00%
4/11/2021	1.37%	-0.04%
4/18/2021	-0.13%	-0.08%
4/25/2021	0.02%	-0.01%
5/2/2021	1.23%	0.05%
5/9/2021	-1.39%	-0.02%
5/16/2021	-0.43%	0.08%
5/23/2021	1.16%	-0.01%
5/30/2021	0.61%	-0.06%
6/6/2021	0.41%	-0.02%
6/13/2021	-1.91%	-0.08%
6/20/2021	2.74%	-0.11%
6/27/2021	1.67%	0.12%
7/4/2021	0.40%	-0.11%
7/11/2021	-0.97%	-0.07%
7/18/2021	1.96%	-0.05%
7/25/2021	-0.37%	-0.01%
8/1/2021	0.94%	-0.04%
8/8/2021	0.71%	0.04%
8/15/2021	-0.59%	0.00%
8/22/2021	1.52%	-0.06%
8/29/2021	0.58%	0.05%
9/5/2021	-1.69%	0.03%
9/12/2021	-0.57%	-0.01%

9/19/2021	0.51%	-0.01%
9/26/2021	-2.21%	0.09%
10/3/2021	0.79%	0.05%
10/10/2021	1.82%	0.12%
10/17/2021	1.64%	-0.09%
10/24/2021	1.33%	0.04%
10/31/2021	2.00%	-0.08%
11/7/2021	-0.31%	-0.10%
11/14/2021	0.32%	0.11%
11/21/2021	-2.20%	-0.04%
11/28/2021	-1.22%	-0.06%
12/5/2021	3.82%	-0.12%
12/12/2021	-1.94%	0.14%
12/19/2021	2.28%	-0.04%
12/26/2021	0.85%	0.07%
1/2/2022	-1.87%	0.00%
1/9/2022	-0.30%	0.21%
1/16/2022	-5.68%	0.03%
1/23/2022	0.77%	-0.05%
1/30/2022	1.55%	0.01%
2/6/2022	-1.82%	0.15%
2/13/2022	-1.58%	0.01%
2/20/2022	0.82%	0.00%
2/27/2022	-1.27%	0.07%
3/6/2022	-2.88%	-0.14%
3/13/2022	6.16%	0.22%
3/20/2022	1.79%	0.08%
3/27/2022	0.06%	0.21%
4/3/2022	-1.27%	-0.14%
4/10/2022	-2.13%	0.34%
4/17/2022	-2.75%	0.15%
4/24/2022	-3.27%	0.05%

5/1/2022	-0.21%	0.00%
5/8/2022	-2.41%	0.29%
5/15/2022	-3.05%	-0.11%
5/22/2022	6.58%	-0.15%
5/29/2022	-1.20%	-0.01%
6/5/2022	-5.05%	0.17%
6/12/2022	-5.79%	0.12%
6/19/2022	6.45%	0.10%
6/26/2022	-2.21%	-0.04%
7/3/2022	1.94%	-0.16%
7/10/2022	-0.93%	0.18%
7/17/2022	2.55%	-0.19%
7/24/2022	4.26%	-0.11%
7/31/2022	0.36%	-0.03%
8/7/2022	3.26%	0.07%
8/14/2022	-1.21%	0.07%
8/21/2022	-4.04%	0.10%
8/28/2022	-3.29%	0.00%
9/4/2022	3.65%	0.17%
9/11/2022	-4.77%	0.10%
9/18/2022	-4.65%	0.08%
9/25/2022	-2.91%	0.08%
10/2/2022	1.51%	0.21%
10/9/2022	-1.55%	0.05%
10/16/2022	4.74%	0.13%
10/23/2022	3.95%	0.28%
10/30/2022	-3.35%	-0.16%
11/6/2022	5.90%	0.11%
11/13/2022	-0.69%	-0.25%
11/20/2022	1.53%	-0.11%
11/27/2022	1.13%	-0.16%
12/4/2022	-3.37%	-0.18%

12/11/2022	-2.08%	0.03%
12/18/2022	-0.20%	-0.09%
12/25/2022	-0.14%	0.26%
1/1/2023	1.45%	0.15%
1/8/2023	2.67%	-0.30%
1/15/2023	-0.66%	-0.05%
1/22/2023	2.47%	-0.02%
1/29/2023	1.62%	0.00%
2/5/2023	-1.11%	0.00%
2/12/2023	-0.28%	0.19%
2/19/2023	-2.67%	0.05%
2/26/2023	1.90%	0.10%
3/5/2023	-4.55%	0.01%
3/12/2023	1.43%	-0.22%
3/19/2023	1.39%	-0.14%
3/26/2023	3.48%	0.01%
4/2/2023	-0.10%	0.04%
4/9/2023	0.79%	-0.08%
4/16/2023	-0.10%	0.12%
4/23/2023	0.87%	0.05%
4/30/2023	-0.80%	-0.10%
5/7/2023	-0.29%	0.05%
5/14/2023	1.65%	0.02%
5/21/2023	0.32%	0.20%
5/28/2023	1.83%	0.06%
6/4/2023	0.39%	-0.10%
6/11/2023	2.58%	0.02%
6/18/2023	-1.39%	0.00%
6/25/2023	2.35%	-0.04%
7/2/2023	-1.16%	0.05%
7/9/2023	2.42%	0.21%
7/16/2023	0.69%	-0.16%

7/23/2023	1.01%	-0.01%
7/30/2023	-2.27%	0.12%
8/6/2023	-0.31%	0.14%
8/13/2023	-2.11%	0.09%
8/20/2023	0.82%	0.10%
8/27/2023	2.50%	-0.05%
9/3/2023	-1.29%	-0.02%
9/10/2023	-0.16%	0.04%
9/17/2023	-2.93%	0.07%
9/24/2023	-0.74%	0.11%
10/1/2023	0.48%	0.22%
10/8/2023	0.45%	0.21%
10/15/2023	-2.39%	-0.16%
10/22/2023	-2.53%	0.30%
10/29/2023	5.85%	-0.08%
11/5/2023	1.31%	-0.26%
11/12/2023	2.24%	0.00%
11/19/2023	1.00%	-0.13%
11/26/2023	0.77%	-0.01%
12/3/2023	0.21%	-0.21%
12/10/2023	2.49%	-0.09%
12/17/2023	0.75%	-0.30%
12/24/2023	0.32%	0.02%
12/31/2023	-1.52%	-0.01%
1/7/2024	1.84%	0.17%
1/14/2024	1.17%	-0.05%
1/21/2024	1.06%	0.15%
1/28/2024	1.38%	0.02%
2/4/2024	1.37%	-0.16%
2/11/2024	-0.42%	0.15%
2/18/2024	1.66%	0.10%
2/25/2024	0.95%	-0.07%

3/3/2024	-0.26%	-0.05%
3/10/2024	-0.13%	-0.10%
3/17/2024	2.29%	0.19%
3/24/2024	0.39%	-0.08%
3/31/2024	-0.95%	-0.02%
4/7/2024	-1.56%	0.20%
4/14/2024	-3.05%	0.08%
4/21/2024	2.67%	0.10%
4/28/2024	0.55%	0.06%
5/5/2024	1.85%	-0.14%
5/12/2024	1.54%	-0.01%
5/19/2024	0.03%	-0.08%
5/26/2024	-0.51%	-0.01%
6/2/2024	1.32%	0.08%
6/9/2024	1.58%	-0.09%
6/16/2024	0.61%	-0.18%
6/23/2024	-0.08%	0.03%
6/30/2024	1.95%	0.12%
7/7/2024	0.87%	-0.04%
7/14/2024	-1.97%	-0.07%
7/21/2024	-0.83%	0.05%
7/28/2024	-2.06%	-0.02%
8/4/2024	-0.04%	-0.34%
8/11/2024	3.93%	0.14%
8/18/2024	1.45%	-0.07%
8/25/2024	0.24%	-0.08%
9/1/2024	-4.25%	0.10%
9/8/2024	4.02%	-0.18%
9/15/2024	1.36%	-0.05%
9/22/2024	0.62%	0.05%
9/29/2024	0.22%	0.05%
10/6/2024	1.11%	0.18%

10/13/2024	0.85%	0.11%
10/20/2024	-0.96%	0.00%
10/27/2024	-1.37%	0.14%
11/3/2024	4.66%	0.10%
11/10/2024	-2.08%	-0.10%
11/17/2024	1.68%	0.12%
11/24/2024	1.06%	-0.03%
12/1/2024	0.96%	-0.22%
12/8/2024	-0.64%	-0.03%
12/15/2024	-1.99%	0.27%
12/22/2024	0.67%	0.10%
12/29/2024	-0.48%	0.10%
1/5/2025	-1.94%	-0.01%
1/12/2025	2.91%	0.16%
1/19/2025	1.74%	-0.13%
1/26/2025	-1.00%	0.00%
2/2/2025	-0.24%	-0.03%
2/9/2025	1.47%	-0.13%
2/16/2025	-1.66%	0.00%
2/23/2025	-0.98%	-0.06%
3/2/2025	-3.10%	-0.14%
3/9/2025	-2.27%	0.11%
3/16/2025	0.51%	-0.01%
3/23/2025	-1.53%	-0.05%
3/30/2025	-9.08%	0.05%
4/6/2025	5.70%	-0.21%
4/13/2025	-1.50%	0.47%
4/20/2025	4.59%	-0.09%
4/27/2025	2.92%	-0.07%
5/4/2025	-0.47%	0.06%
5/11/2025	5.27%	0.05%
5/18/2025	-2.61%	0.06%

5/25/2025	1.88%	0.11%
6/1/2025	1.50%	-0.10%
6/8/2025	-0.39%	0.06%
6/15/2025	-0.15%	-0.06%
6/22/2025	3.44%	-0.03%
6/29/2025	1.72%	-0.05%
7/6/2025	-0.31%	0.02%
7/13/2025	0.59%	0.09%
7/20/2025	1.46%	0.03%
7/27/2025	-2.36%	-0.07%
8/3/2025	2.43%	-0.13%
8/10/2025	-0.25%	0.05%