BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of SAN JOSE WATER COMPANY (U168W) for Authority to Adjust Its Cost of Capital and to Reflect That Cost of Capital in Its Rates for the Period from January 1, 2018 through December 31, 2020.	Application 17-04-001 Filed April 3, 2017
And Related Matters	Application 17-04-002 Application 17-04-003 Application 17-04-006

REBUTTAL TESTIMONY OF BENTE VILLADSEN

ON BEHALF OF

CALIFORNIA-AMERICAN WATER COMPANY

****PUBLIC VERSION****

August 22, 2017

TABLE OF CONTENTS

LIST OF EXHIBITS

I. INDRODUCTION AND SUMMARY

Q1. Please state your name, occupation, and business address.

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

Q2. Are you the same Bente Villadsen who filed direct testimony in this proceeding?

A2. Yes.

Q3. What is the purpose of your rebuttal testimony?

A3. I have been asked by California-American Water Company ("California-American Water" or CAW) to respond to the direct testimony of Aaron L. Rothschild ("Rothschild Testimony") and the direct testimony of Mukunda Dawadi ("Dawadi Testimony") on behalf of ORA. I address the Return on Equity (ROE) recommendation of Mr. Rothschild and his critique of my direct testimony. I also address Mr. Dawadi's capital structure, cost of debt and Rate of Return (ROR) recommendation for CAW.

Q4. Please summarize your findings.

A4. Based on my review and analysis of the testimonies filed by ORA's witnesses, my conclusions are as follows.

- Mr. Rothschild's recommended ROE is outside the norm of what financial markets expect and what has recently been allowed water utilities nation-wide and for utilities in California.
- Mr. Rothshild's ROE analysis fails to consider methods other than the DCF. Specifically,
  - He fails to implement a true CAPM,
  - He makes no attempt to implement a risk premium or other models;
- There are multiple inconsistencies in Mr. Rothschild's DCF analysis, as well as technical errors that downwardly bias his results by at least 110 basis points.

- Mr. Rothschild's analysis of economic conditions is unconvincing and fails to take into account increasing interest rates, global economic instability, and the quickness with which financial markets can change.
- Mr. Dawadi's recommended capital structure is based on irrelevant reports pertaining to municipal utilities or U.K. utilities; neither of which have risk characteristics that resemble those of California-American Water Company (CAW).
- Mr. Dawadi makes no attempt to reconcile his recommended capital structure with what CAW is expecting for the period during which rates will be in effect.
- Mr. Rothschild and Mr. Dawadi fail to consider California-American Water's company specific risk – as I showed in my direct testimony and re-iterate below, CAW faces unique and asymmetric risk.
- No convincing critique of my direct testimony was provided by the ORA's witnesses.

Q5. Based on your review and analysis of the submitted testimony, have you changed your recommendation for CAW?

A5. No. I continue to believe that CAW should be placed at the upper end if not above the range for the water utility sample due to its risk characteristics. I also continue to find that 10.8% is a good point estimate.

II. INDUSTRY NORMS – ROE AND CAPITAL STRUCTURE

Q6. What do you cover in this section?

A6. I provide details on how the recommendation in the Rothschild Testimony compare to what has recently been the norm in the industry as well as in California. Specifically, I find that the recommendation of an allowed ROE of 8.23% for California-American Water is significantly below both industry norms and recent California allowed ROEs. Further, the use of a five-year historic average capital structure fails to recognize that rates will be in effect during the 2018-2020 period and thus is irrelevant to the capital structure that CAW forecast for the 2018-2020 period. Finally, ORA's recommended cost of debt fails to consider the unique circumstances surrounding CAW's regulatory assets and the need to fund such assets with mid-term debt that must not be recognized as

part of the long-term debt funding. The direct and rebuttal testimonies of Mr. Jeffrey T. Linam (Linam Testimony and Linam Rebuttal) discuss the low return on regulatory assets, which the Commission excludes from rate base. Mr. Linam's testimonies also discuss the challenges that are unique to California-American Water.

Q7. What is your key concern with ORA's recommended ROE?

A7. My primary concern is that the recommended ROE of 8.23% is too low to meet investor expectations and given that CAW needs to raise capital to cover its current and future required capital expenditure program, it is necessary that it be allowed an opportunity to earn an allowed ROE that meets investor requirements. I note that the ROE recommended by ORA is lower than any ROE recently allowed a water utility across the U.S. as well as below what was recently allowed electric and gas utilities in California. As investors are comparing CAW to other utilities, it is important that CAW's ROE be set at a level that ensures it meet market expectations, which a 8.23% ROE does not. The fact that CAW has a relatively large capex program as shown in my direct testimony, Figures 16 and 17, makes it vital that CAW meet investors return expectations or CAW may not be able to finance its capital needs.

I note that the electric and gas utilities subject to the Commission's jurisdiction recently were allowed ROEs in the range of 10.05% to 10.30% for 2018-2019 with the allowed ROE for 2017 being 5 to 15 basis points higher.[1] Thus, Commission's accepted ROE for other California utilities were 182 to 207 basis points above what Mr. Rothschild is proposing for CAW. Thus, the proposed ROE is completely out of line with what the Commission has accepted in the recent past.

The recommended ROE is also well below what water utilities have recently been granted nation-wide and as a matter of fact would be the lowest ROE on record for 2016-17. To that end, I note that the nation-wide average ROE for water utilities was 9.7% in 2016 and year-to-date has ranged from 9.0% to 9.87% with an average of a 9.6% outside

[1] Details are included in Exhibit BV-R1.

New York.[2] Thus, Mr. Rothschild's focus on two specific water utility ROE's of 9.10% and 9.25% in New York and Virginia[3] is misleading in that the two cited ROEs are among the lowest in the nation and not representative. In addition, I note that the New York ROE of 9.10% was part of a larger settlement. Figure 1 below shows allowed ROEs for water utilities nation-wide. Since May, four other jurisdictions have authorized ROEs in the range of 9.25% to 10.4%, with an average a bit below 9.8%.[4]

Figure 1: Recently Allowed ROEs for Water Utilities: 2016 – May 2017

	Allowed ROE	Equity %
Average	9.6%	50%
Median	9.8%	50%
Range	9.0% - 10.1%	46% - 53%

Source: Regulatory Research Associates, "Water Advisory," June 8, 2017. Data as of May 31, 2017.

Not a single water utility has been awarded a ROE as low as 8.23% and all 39 electric or natural gas utilities whose rate case was determined during the first half of 2017 received a ROE well above what ORA recommends here.[5]

Q8. Why is the allowed ROE for other utilities important?

A8. As noted above, investors compare CAW to other investment opportunities and expect to earn a return that is comparable to what they can earn on other investment of similar risk. As illustrated by Mr. Rothschild, Value Line expects a return on book equity of 10.5% to

[2] Regulatory Research Associates, "Water Advisory," June 8, 2017.

[3] Rothschild Testimony p. 6.

[4] Regulatory Research Associates, "Water Advisory: Water Monthly Regulatory Update – June/July 2017", July 7, 2017 and "Water Advisory: Water Monthly Regulatory Update – July/August 2017", August 7, 2017.

[5] S&P Global Market Intelligence, "RRA Regulatory Focus: Major Rate Case Decisions January – June 2017," July 26, 2017.

14.0% for the sample companies (Average and Median 12%),[6] so it would be entirely unreasonable to assume that investors in CAW expect a return on CAW's equity that is more than 200 basis points lower. Similarly, the fact all electric, natural gas, or water utilities, whose ROE has been determined in 2017 have received a substantially higher ROE, than Mr. Rothschild recommendation, speaks volumes about how far away from the industry norm the ROE recommendation of Mr. Rothschild is.

Q9. Are there other considerations that are important?

A9. Yes. As discussed in my direct testimony CAW has not earned it's allowed ROE for more than 12 years.[7] Instead, it has earned more than ¾ percent less than what it has been allowed in the most recent years. Consequently, it is vital that CAW not only be afforded a ROE that is consistent with investor expectations but also that it be allowed to earn the return. As discussed in my direct testimony, there is an asymmetry in not only the ability to earn the allowed ROE but also in the fact that CAW does not earn the ROR on a substantial regulatory asset balance. Additionally, CAW exhibits a degree of higher operating leverage than the sample companies. As such asymmetries are not captured in the cost of capital,[8] it is important that CAW's allowed ROE be set at the top of the range of my estimated ROE. I discuss these company-specific factors further in Section III below.

Q10. How does Mr. Dawadi derive the capital structure he recommends for CAW?

A10. The Dawadi Testimony recommends that CAW's capital structure be based on a historic average for the period 2013-16 and that the debt used to finance part of CAW's outstanding regulatory assets and acquisition premium should be included as long-term debt and used to cover long-term assets of CAW.[9]

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[6] Rothschild Testimony, Schedule ALR 3, p. 2.

[7] Villadsen Testimony at 993-1012 including Figure 19.

[8] See Bente Villadsen, Michael J. Vilbert, Dan Harris and A. Lawrence Kolbe, "Risk and Return for Regulated Industries," Elsevier 2017 (Villadsen et al. 2017), pp. 227-240 for details.

[9] Dawadi Testimony, pp. 4 and 8-10.

Q11. What is your view on ORA's recommended capital structure for CAW?

A11. I have two concerns with the recommendation. First, the outcome of this proceeding is expected to be in effect for 2018-2020, so a capital structure based on 2013-16 data is clearly out of date and fails to take the expected capital structure into account.[10] Second, as explained in Mr. Pray's Direct Testimony, CAW has debt that finances specific assets.[11] A large regulatory asset related to an outstanding WRAM balance was financed through a five-year debt issuance, and CAW has an acquisition premium on its books. Neither of these two assets are part of rate base[12] and consequently the financing hereof should not be part of the regulatory capital structure.

Q12. What does Mr. Dawadi say about the average capital structure among water utilities?

A12. Mr. Dawadi cites a Brookings report that the average "debt-to-asset was 56% for the 97 largest drinking water utilities in cities across the United States."[13] He also cites a report by OXERA ("OXERA report") that found "that a majority of investors believe that the U.K. water sector's optimal level of debt is in excess of 65% …"[14]

Q13. What is your reaction to these reports?

A13. Neither report is relevant for an investor-owned U.S.-based water utility as neither report look at how U.S. investor-owned water utilities finance (or should finance) their **rate base**. Instead the reports look to the financing of **assets** among municipalities or in the U.K. In both cases, the report authors are focused on the financing of the assets rather than a U.S. utility rate base. This is important because assets may well differ from rate base. To illustrate the point, short-lived assets such as receivables are often offset by

[10] The Direct Testimony of Mr. Todd Pray (Pray Testimony), p. 5 provides the forecasted capital structure for 2018.

[11] Pray Testimony, pp. 7-8.

[12] Acquisition premia are not typically included in rate base and as discussed in the Linam Testimony, p. 8, the regulatory asset is not in rate base.

[13] Dawadi Testimony p. 7.

[14] Dawadi Testimony p. 7.

short-term liabilities such as payables and are hence irrelevant from a rate base perspective. At the same time it is not clear whether the impact on debt or asset is larger, so that a debt-to-asset ratio cannot be compared to debt-to-rate base without analysis. I also note that the OXERA report points out that

> the survey provides some evidence that the water sector may have limited access to the equity market. 40% of the respondents suggested that debt is the relevant source of financing because equity markets will not finance additional CAPEX. Only 18% of the respondents claimed this to be an irrelevant justification for debt financing.[15]

The report goes on to note that restructurings in the U.K. water sector are consistent with this finding.[16] I further note that the report dates to 2002 and as U.K. water regulation recently allowed competition,[17] so any finding that dates to 2002 may well have changed. Also, the U.K. relies on International Financial Reporting Standards (IFRS), so assets may involve a fair value measurement, which is different from original cost, which is how CAW determined its rate base. Second, neither report looks to U.S. investor-owned utilities. In the case of the Brookings report, it focuses on municipal utilities, which may have the financial backing of the municipality and therefore face financing conditions that are very different from those of CAW. In addition, the range of reported debt-to-asset levels range from 4% (Salt Lake City, UT) to 90% (Birmingham, AL),[18] so there is a wide range rather than a central value. Further, some of the municipalities (e.g., owners of water utilities) that are driving the debt-to-asset ratio up are in financial condition that should be avoided. For example, the two municipalities with the highest debt-to-asset ratio have both faced severe financial challenges. Detroit, MI with a debt-to-asset ratio of

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[15] OXERA, "The Capital Structure of Water Companies," prepared for OFWAT, October 11, 2002 (OXERA Report), p. 27.

[16] *Ibid*.

[17] Ofwat, "Guidance on Ofwat's approach to the application of the Competition Act 1998 in the water and wastewater sector in England and Wales," March 2017. Available at https://0980a19b0bb02fe4a86d-0df48efcb31bcf2ed0366d316cab9ab8.ssl.cf3.rackcdn.com/wp-content/uploads/2017/03/Guidance-on-Ofwats-approach-to-the-application-of-the-Competition-Act-1998-in-the-water-and-wastewater-sector-in-England-and-Wales-1.pdf

[18] Brookings, "Investing in Water: Comparing utility finances and economic concerns across U.S. Cities," December 14, 2016, Tables 2 and 3 (cited in the Dawadi Testimony, footnote 5).

89% has faced bankruptcy, while the City of Birmingham, AL with a debt-to-asset ratio of 90% has seen state legislative intervention and legal challenges to its board's composition[19] and the county in which it is situated faced bankruptcy linked to wastewater debt. Hence the two entities that drive up the debt-to-asset level are very different from CAW.

Mr. Dawadi makes no attempt to compare the risk characteristics of the municipal utilities or the UK utilities that he uses for comparison, nor does he investigate the impact of the UK utilities using a different accounting and regulatory system. In addition, he fails to mention the many caveats the cited study lists: the impact of leverage on the cost of equity, the increased risk of default, etc., and that the report dates to 2002.[20] Therefore, a comparison of the capital structure relied upon by those entities and those used for regulatory rate base purposes in California is meaningless. The capital structure and debt issues are covered in significantly more detail in the rebuttal testimony of Mr. Jeffrey Dana.

III. COMPANY SPECIFIC RISKS

Q14. What do you cover in this section?

A14. I discuss Mr. Dawadi and Mr. Rothschild's failure to consider CAW's company specific risks as well as the consequences hereof. Most notably, Mr. Rothschild ignored CAW's higher operating leverage, inability to earn the allowed ROE, and unique regulatory circumstances.

Q15. What do Mr. Dawadi and Mr. Rothschild say about CAW's company-specific risks?

A15. Mr. Dawadi claims that not only should the impact of the regulatory assets be ignored, but the debt used to finance these assets should be added to the capital structure.[21] Mr. Rothschild does not challenge the fact that CAW has experienced a higher operating

[19] Alabama Political Reporter, "Court Rules Against Birmingham Water Works Board," December 19, 2016.

[20] Oxera, "The Capital Structure of Water Companies," December 2002, Summary of the Report (cited in the Dawadi Testimony, footnote 6).

[21] Dawadi Testimony, pp. 15-16.

leverage than the proxy group in recent years or that CAW will have significant capital expenditures going forward, but he claims that I "must prove that these increased capital expenditures increase CAW's non-diversifiable risks."[22]

Q16. What is your response to these statements by Mr. Dawadi and Mr. Rothschild?

A16. For a detailed discussion of the regulatory asset and its treatment, please refer to the direct testimony and rebuttal testimony of company witnesses Mr. Todd Pray and Mr. Jeffrey Dana. I will, however, respond to Mr. Rothschild's comments on operating leverage and capital spending. With regard to operating leverage, I will first explain how operating leverage increases systematic business risk and also demonstrate again that CAW has a higher degree of operating leverage compared to the proxy group. As concerns CAW's capital expenditures, I will also demonstrate that they are expected to be higher in coming years relative to the publicly traded companies in the water sample.

Q17. Please explain how operating leverage increases the systematic risk of equity.

A17. There is no debate in the academic literature that increased operating leverage increases the cost of capital. As explained in my direct testimony, when a company's cost structure contains a higher proportion of fixed (versus variable) costs, it experiences greater variability of bottom line profits (and cash flows distributable to investors) for a given variability of top line sales revenue. Therefore, companies with higher proportions of fixed costs (i.e., those with higher "operating leverage") have greater business risk. This effect is well established in academic finance and is discussed in standard corporate finance textbooks. Brealey, Myers, and Allen explain as follows.

> Thus, given the cyclicality of revenues…, the asset beta is proportional to the ratio of the present value of fixed costs to the present value of the project. … Other things being equal, the alternative with the higher ratio of fixed costs to project value will have the higher project beta. Empirical tests confirm that companies with high operating leverage actually do have high betas.[23]

[22] Rothschild Testimony, p. 48.

[23] Brealey, Myers, and Allen, *Corporate Finance*, 11th Ed. (2014), p. 228.

The text of Brealey, Myers and Allen goes on to explain how operating leverage impacts the asset beta of a company. Specifically, the asset beta increases in proportion to the higher operating leverage,[24]

$$\beta_{assets}^{subject\ company} = \beta_{assets}^{sample} \times \left(\frac{DOL^{subject}}{DOL^{sample}}\right)$$

Where the β_{assets} assets beta for the sample companies is estimated based on market data and DOL is the estimated "degree of operating leverage" as measured by, for example, the change in earnings before interest and taxes (EBIT or operating profit) relative to the change in volume. The DOL measure is driven by the actual cost structures of the companies: a firm with a higher proportion of fixed costs in its cost structure will have greater variability in operating profits for a given level of variability in revenues.

The assets beta is the market measure of systematic business risk experienced by a company. A company that has a higher assets beta due to having a higher degree of operating leverage therefore experiences a higher degree of systematic business risk all else equal. Thus, there is no question that operating leverage increases the cost of capital.

Q18. Is there empirical evidence that CAW has a higher degree of operating leverage compared to the proxy group?

A18. Yes. Empirical measurement of DOL for CAW and the water sample companies based on the sensitivity of their operating profits to movements in operating revenues over the recent past indicates a DOL of 2.9 for CAW compared to 1.2 for the average company in the water sample.[25] Further, since CAW's capital expenditures are forecast to exceed those of the proxy companies (on a normalized basis) going forward, there is reason to believe CAW's historical elevated DOL will continue or even increase going forward relative to the proxy group.

[24] Brealey, Myers and Allen (2014), pp. 226-229. See also, Gershon N. Mandelker and S. Ghon Rhee, "The Impact of the Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock," *Journal of Financial and Quantitative Analysis* 19, 1984.

[25] Exhibit No. BV-R2.

This suggests that the measured assets beta for the sample group that I applied in my direct testimony CAPM estimates of CAW's cost of equity is actually too low to adequately capture the greater systematic business risk that CAW faces owing to its higher degree of operating leverage. While I do not recommend an explicit numerical adjustment to the assets beta in the CAPM estimates, this analysis provides empirical support for my recommendation that CAW be allowed to earn an ROE near the top end of my range of estimates in recognition of its higher business risks relative to the sample.

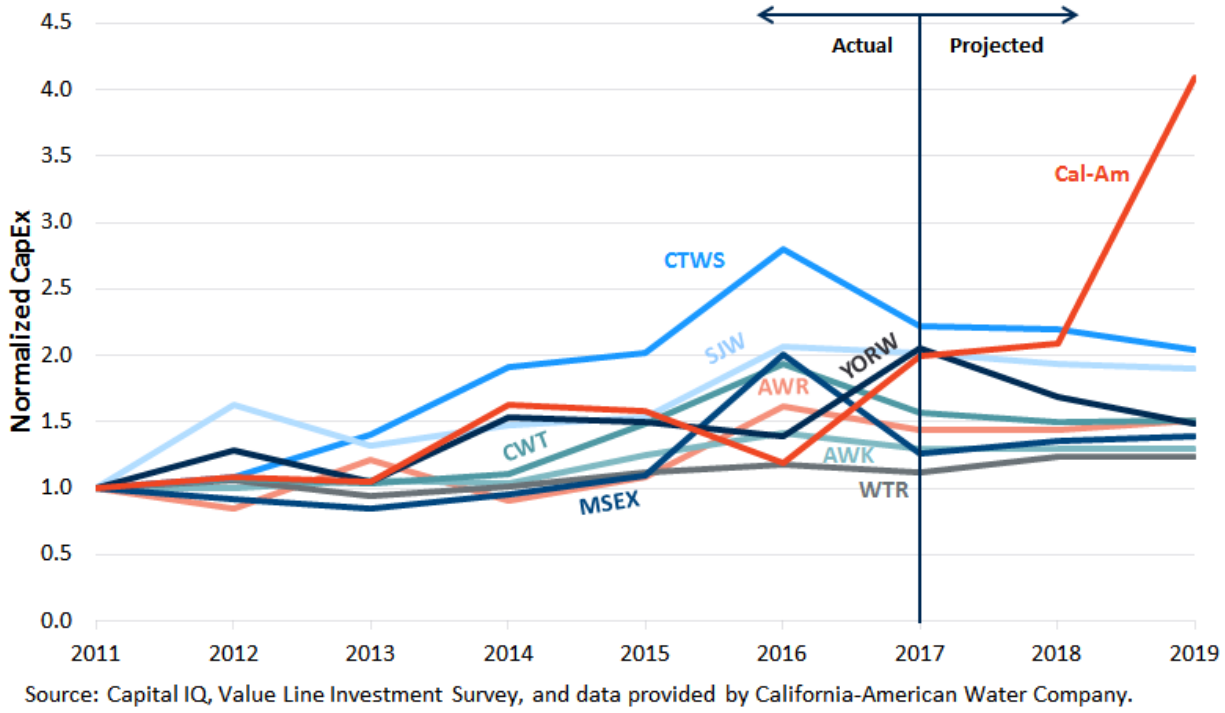
Q19. How do you respond to Mr. Rothschild's assertions that you fail to "demonstrate that CAW's projected capital expenditures are higher than the proxy group"?[26]

A19. I refer to Figure 2 below, which is an updated version of Figure 17 from my direct testimony. In Figure 2 below, I look to Value Line and calculate the forecasted capital spending for the proxy companies as the expected capital spending per share multiplied with the expected number of shares outstanding.[27] As can be seen from Figure 2, CAW is expected to have substantially higher capital spending than the proxy group.

[26] Rothschild Testimony, p. 47.

[27] Value Line forecasts capital expenditures per share and shares outstanding for 2017, 2018, and 2020-2022. I estimate the 2019 capital expenditures for the sample companies by interpolating between Value Line's explicit forecasts.

Figure 2: Capital Expenditures for California-American Water and the Sample Companies[28]



Source: Capital IQ, Value Line Investment Survey, and data provided by California-American Water Company.

Q20. What conclusions do you draw from the analysis above?

A20. Clearly CAW has a higher capital spending than the proxy group going forward and academic research agrees that increased operating leverage increases the cost of equity. Therefore, Mr. Rothschild's criticism that CAW has not demonstrated that it faces elevated capital expenditures and higher operating leverage than the proxy group is not valid and his failure to recognize the impact on CAW's cost of equity downwardly biases his recommended cost of equity.

IV. MR. ROTHSCHILD'S ROE ANALYSIS

Q21. What do you cover in this section?

A21. First, I discuss Mr. Rothschild's failure to use more than one method to inform his cost of equity recommendations. Second, I discuss why Mr. Rothschild's so-called "CAPM-

[28] SJW was mistakenly excluded from Figure 17 in my Direct Testimony, but has been included here. The conclusions of the analysis remain the same.

implementation" fails to estimate a CAPM-based ROE and also address his critique of my CAPM. Third, I address Mr. Rothschild's DCF model and his critique of my DCF models. Fourth, I discuss the deficiencies in Mr. Rothschild's ROE analysis, and focus on three areas: (i) he only implements one method – the DCF, (ii) his "CAPM-implementation" is not a true CAPM and the analysis is inconsistent in its use of data and methodology, and (iii) he fails to consider the impact of CAW-specific risks.

A. USE OF MULTIPLE METHODS

Q22. Why is it important to use more than one method?

A22. As discussed in my direct testimony (Q/A5) any one method may at a given point in time be more or less reliable, and therefore, it is important to consider several. Use of only one method is contrary to both academic advice and regulatory practice.

In my direct testimony, I referenced Professor Myers

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.[29]

Professor Morin concurs

> No one individual method provides the necessary level of precision for determining a fair return, but each method provides useful evidence to facilitate the exercise of an informed judgment.[30]

In this case, Mr. Rothschild relies on a single estimation method – the DCF model. Hence he fails to benefit from the information inherent in other methods.

Q23. What about Mr. Rothschild's comparison to the Dow Jones index?

A23. The comparison to the Dow Jones index is misguided in that it fails to account for differences in risk across industries as discussed below. A much more useful comparison would be a comparison to other utilities of the kind I implemented in my implied risk

[29] Stewart C. Myers, "On the Use of Modern Portfolio theory in Public Utility Rate Cases: Comment," *Financial Management*, Autumn 1978, p. 67. (Villadsen Testimony, p. 3).

[30] Roger A. Morin, "*New Regulatory Finance*," Public Utilities Reports, Inc., 2006, p. 428.

premium analysis[31] as well as in the section above on industry norms. Such an analysis would have indicated that Mr. Rothschild's DCF estimates are way out of line with industry norms.

Q24. What are the consequences of Mr. Rothschild using only one method?

A24. The failure to consider methods other than a specific version of the DCF results in the ROE being significantly under estimated.

B. CAPM DISCUSSION

1. Mr. Rothschild Does Not Perform a CAPM Analysis

Q25. Did Mr. Rothschild derive a CAPM estimate of the cost of equity in this proceeding?

A25. No. Although he discusses the CAPM and its inputs—the risk-free rate, the market risk premium (MRP) and beta[32]—and claims to have "implemented the CAPM,"[33] Mr. Rothschild did not in fact attempt to estimate any of these inputs, nor did he derive a CAPM-based estimate of the cost of equity.

What Mr. Rothschild represents as "an implementation of the CAPM" is a simple average of the forecasted total returns for the 30 individual stocks included in the Dow Jones Industrial Average (DJIA or Dow 30). [34] Mr. Rothschild treats the forecasted Dow 30 return as if it was the expected (CAPM) returns for the stocks included in the DJIA. He then concludes that because the average beta of the Dow 30 stocks is higher than that of the average company in the water sample, it is reasonable to compare the beta-adjusted return on the Dow 30 stocks to his cost of equity estimates of 8.22 – 8.30% and conclude that his range is "conservatively high" relative to the 7.85% he derives for the Dow 30.[35]

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[31] Villadsen Testimony, pp. 43-45.

[32] Rothschild Testimony, p. 43-45

[33] Rothschild Testimony, p. 45, line 11.

[34] Rothschild Testimony, p. 45, lines 12-18 and Schedule ALR 5.

[35] Rothschild Testimony, p. 45, lines 19-20.

Q26. Do you agree with Mr. Rothschild's conclusion?

A26. No, for several reasons. First, Mr. Rothschild makes absolutely no attempt to compare the risks of the Dow 30 and his water sample or CAW. Second, Mr. Rothschild's comparison of Dow 30 and water utility betas is meaningless and misleading, and third, the manner in which Mr. Rothschild obtains his total return estimate is flawed.

Q27. Please address the failure to compare the risks of the Dow 30 and the water sample / CAW.

A27. Mr. Rothschild does not explain how the business, financial, or regulatory risks differ and all of these will impact the cost of capital. Further, Mr. Rothschild's own workpaper (ALR-5) shows that the companies are not representative of the market, as the reported average beta of the group is different from 1.

Importantly, an estimation of the companies cost of equity is impacted by their dividend policy, business risk, and their financial risk—none of which Mr. Rothschild reports. For example, I note that 3M (MMM in ALR-5) bought back shares for at least $2.1 billion in 2016.[36] The second company on Mr. Rothschild's list, American Express (AXP in ALR-5) is a financial company with virtually no fixed assets[37] and very different business risk than a water utility. Finally, the third company on the list, Apple (AAPL in ALR-5) has a capitalization of about $756 billion, but only about $98.5 billion (13%) in debt per Value Line,[38] so clearly very little financial risk relative to CAW or the water sample. These examples clearly illustrate that the companies in the Dow 30 sample are not comparable to a water utility and any reliance on their cost of capital will need to make substantial adjustment to account for the differences in risk. Mr. Rothschild makes none.

[36] https://www.fool.com/investing/2016/09/20/3m-company-bought-back-21-billion-worth-of-stock-i.aspx

[37] American Express' 2016 Annual Report, p. 81 shows total assets of about $158,893 million and fixed property, plant and equipment of only about $4,433 million (or less than 3% of the total)..

[38] *Value Line Investment Survey*, Apple Inc., June 30, 2017.

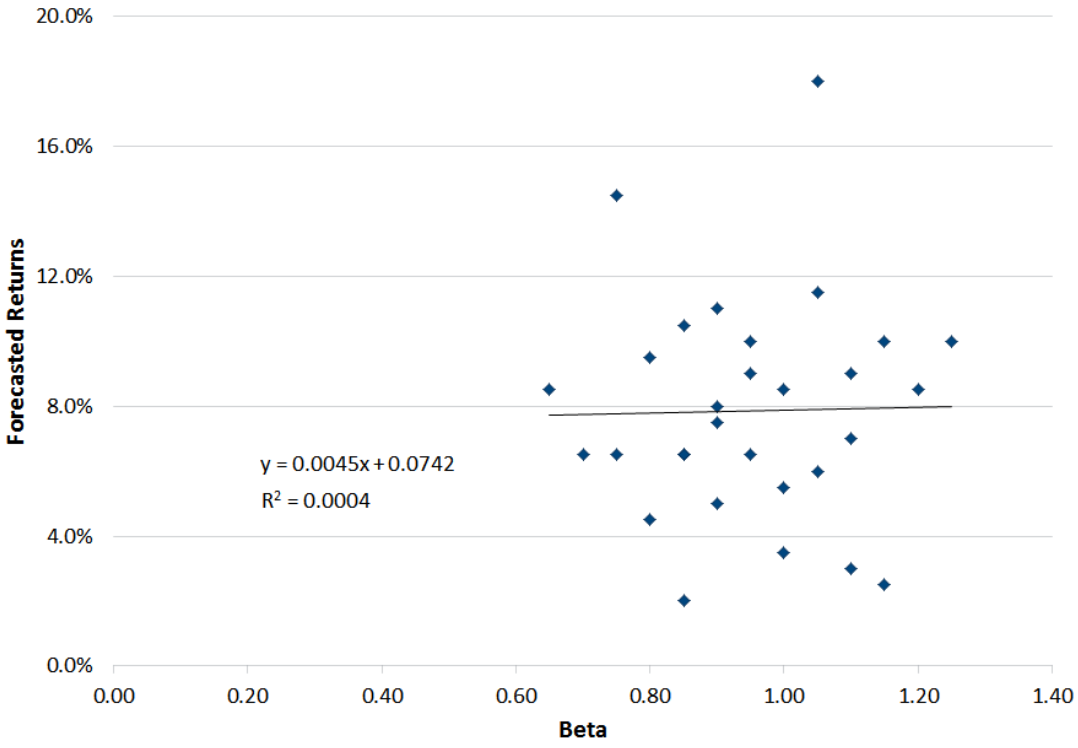
Q28. Why do you say that Mr. Rothschild's comparison of Dow 30 and water utility betas is meaningless?

A28. The CAPM predicts that securities with higher betas are expected to generate higher returns, the Dow 30 total return numbers derived by Mr. Rothschild were not based on the CAPM. Value Line (to my knowledge) does not explain, how it calculates its price appreciation or dividend forecasts, but based on Mr. Rothschild's data it seems highly unlikely that they result from an application of the CAPM.

Figure 3 below plots Mr. Rothschild's *Value Line* "mid-point" forecast returns for the Dow 30 companies versus the *Value Line* betas for those companies. Rather than falling along a straight and upward sloping line in the manner of the Securities Market Line[39] as they would if the estimates were based on the CAPM, the forecasted returns that form the basis of Mr. Rothschild's so-called "CAPM implementation" exhibit barely any statistical correlation with the corresponding *Value Line* betas.

[39] Villadsen Testimony, p. 7, Figure 1.

Figure 3
Mr. Rothschild's "Mid-Point" *Value Line* Forecast Returns and *Value Line* Betas
For the Dow 30 Companies



Source: Rothschild Workpapers, ALR 5. Value Line as of April 14, 2017.

Since the Dow 30 forecasted returns used by Mr. Rothschild do not conform to the CAPM's predicted relationship between expected returns and betas, Mr. Rothschild's attempt to benchmark expected returns for the water utilities against the Dow 30 forecasted returns *based on a comparison of betas* is not logically sound. It is certainly not representative of the results of the CAPM. For these reasons the comparison of DJIA and water utility betas is misleading and does not support his conclusion.

Q29. Do you have other comments on Mr. Rothschild's use of Value Line's data?

A29. Yes. The equity betas reported by Value Line reflect not only business risk but also financial risk commensurate with the financial leverage inherent in a given company's market value capital structure. Consequently, these betas do not provide an apples-to-apples comparison of the DJIA companies and the water utilities unless the betas are

unlevered to obtain an asset beta and then relevered to be comparable to the financial risk of the water utilities.[40] Furthermore, the assets betas for the water utility sample companies must be relevered at the target company's regulatory capital structure before they can properly be used to derive a CAPM estimate of the cost of equity.[41]

Mr. Rothschild's failure to take the characteristics of the DJIA versus the water utility characteristics into account renders his analysis meaningless.

Q30. Do you agree with Mr. Rothschild's total return estimation?

A30. No. The total return estimates Mr. Rothschild uses to compute his 7.85% average are actually the mid-points of "high" and "low" forecasts provided by a single investor service (Value Line). The ranges between the high and low *Value Line* forecasts for the individual Dow 30 companies are between 4 to 9 percentage points in Mr. Rothschild's data, and thus reflects a high degree of imprecision. Furthermore, Mr. Rothschild does not explain why he considers Value Line's price appreciation and dividend forecasts reliable while simultaneously criticize EPS growth forecasts by Value Line and similar investment analysts' services as biased and unreliable.[42]

Q31. Do you have other comments on Mr. Rothschild's so-called "CAPM Implementation"?

A31. Yes. Assuming the Value Line's forecasts are accurate, the DJIA consists of 30 selected stocks compared to the thousands that are publicly traded on U.S. stock exchanges, the 500 companies that are part of the S&P 500, and the approximately 1700 that Value Line

[40] The average debt to enterprise value for the Dow 30 companies is approximately 17%, as estimated using Value Line data for Market Capitalization and Long-term Debt as of August 11, 2017. This indicates lower financial leverage and correspondingly lower financial risk for the Dow 30 companies relative to the water sample average debt to value ratio of approximately 27%, and compared to what is in the California water utilities' regulatory capital structures (over 40% debt). The lower financial leverage for the Dow 30 companies compared to the water sample companies indicates that the difference between the *asset* betas of the two groups is smaller than the difference in levered equity betas reported by Mr. Rothschild. The unlevering relevering can be accomplished using the widely cited Hamada method; Villadsen Testimony p. 10, lines 225-231.

[41] Villadsen Direct Testimony, p. 10, lines 225-231.

[42] Rothschild Testimony, p. 52, lines 15-16.

follows. Although the average company in the DJIA is large, the combined market capitalization of the index is only about 1/4 of the S&P500.[43] Additionally, Mr. Rothschild's decision to calculate a simple average of forecasted returns for the individual companies ignores the fact that the Dow 30 companies vary substantially in size. One percentage point's worth of return on the stock of Apple Inc. (AAPL)—with a market capitalization of approximately $756 billion[44]—has a much more significant impact on the stock market as a whole than an equivalent return on the stock of The Travelers Companies, Inc. (TRV)—another DJIA constituent with a market cap of just $35 billion[45]. Calculating returns on a market-weighted basis would recognize the more than 20 times greater impact of equivalent returns on AAPL versus TRV stock, but taking a simple average as Mr. Rothschild does attributes equal weight to the returns of both companies.

Q32. Are there more reliable indicators of expected market returns based on these market-value weighted indexes?

A32. Yes. For example, Bloomberg derives its estimate of the forward-looking market risk premium by performing a market-weighted DCF analysis on dividend paying stocks in the S&P500. Incidentally, Bloomberg's DCF methodology conforms to many if not all of Mr. Rothschild's stated preferences, since it constrains dividends to follow a multi-stage growth trajectory constrained by an assumed declining retention ratio.[46] While mechanical application of such a method in the current environment of relatively high P/E ratios may not be representative of the expected market returns and required risk premiums in the future, Bloomberg's DCF-implied market return based on the S&P500 has recently been at approximately 9.4% for companies that on average have a much higher proportion of equity financing than the water sample.[47]

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[43] Bloomberg accessed as of August 16, 2017.

[44] *Value Line Investment Survey*, Apple Inc., June 30, 2017.

[45] *Value Line Investment Survey*, The Travelers Co., June 9, 2017.

[46] Bloomberg help page documentation.

[47] Bloomberg as of August 16, 2017.

2. Mr. Rothschild's Other Comments about CAPM Inputs

Q33. What comments or critiques does Mr. Rothschild raise regarding your CAPM analysis?

A33. Importantly, Mr. Rothschild recognizes that "the risk premium component" of the CAPM can be estimated based on historical measurements or forward-looking market data.[48] This is consistent with my approach in my direct testimony, where my CAPM analysis considered both the average annual historical market risk premium observed over a long time series as well as market-based forward-looking indicators of investors' expected market returns. Mr. Rothschild also notes that risk premiums "can be the difference between any financial instrument in different risk categories such as the difference between U.S. Treasury bonds, corporate bonds, preferred stock or common stock."[49] This observation is consistent with the evidence on credit spreads that I presented in my direct testimony. Indeed, data presented in Mr. Rothschild's testimony—specifically in his Chart 7[50]—corroborates my analysis of spreads that lead to finding that yield-spreads remain elevated over the level prior to the financial crisis.[51] As Mr. Rothschild's recognizes "[in]vestments with more uncertain returns […] require higher compensation to induce investors to take on additional risk,"[52] so the fact that the risk premium on corporate bonds is elevated relative to historical levels suggests that risk premiums on equities (i.e., the market risk premium employed in the CAPM) is also elevated, and likely to a greater degree.[53]

Q34. Did Mr. Rothschild comment on the risk-free rate?

A34. Yes. While he does not opine on the current numerical value of the risk free rate in the CAPM, he claims that long term Treasury bonds are "not truly risk-free" and that "a

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[48] Rothschild Testimony, p. 43.

[49] Rothschild Testimony, p. 44.

[50] Rothschild Testimony, p. 18.

[51] Villadsen Direct Testimony, p. 12, lines 276-279 and p. 14, lines 285-288.

[52] Rothschild Testimony, p. 44.

[53] Villadsen Direct Testimony, p. 15, lines 312-315.

CAPM that uses a 20 or 30-year U.S. Treasury yield as its risk free rate may overstate the cost of equity…."[54] He bases this view on the notion that longer term bonds are subject to interest rate risk and on the fact that non-zero betas have been measured for such bonds.[55]

Q35. What are your reactions?

A35. Mr. Rothschild's assertion that a long-term Treasury bond is subject to interest risk is only true if the investment horizon does not match the tenor of the bond. If an investor holds a default free Treasury bond to maturity, any interim fluctuations in the price of the bond that may occur due to shorter term changes in market interest rates are irrelevant. Since equity has a perpetual life and utilities invest in and operate infrastructure over long horizons, for purposes of deriving a CAPM estimate of the cost of equity in this proceeding, it is appropriate to treat long-term government bond yields as an unbiased estimate of the risk-free rate of return that an investor could achieve (by holding the bond to maturity) over that horizon. The Commission has in past energy decisions stated that "the risk-free rate is based on long-term treasuries."[56]

It is also worth noting that Mr. Rothschild's example of long-term Treasury bonds having a nonzero beta goes counter to his conclusion. The beta he cites for Barclay's 20+ year Treasury bond ETF is *negative* (specifically -0.27),[57] which would indicate this security earns a return *below* the risk-free rate, since the CAPM defines the risk-free level of interest as the return expected on a security or portfolio with zero beta, and a negative beta indicates a security that actually contributes to *decrease* risk when included in the market portfolio.

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[54] Rothschild Testimony, p. 44.

[55] Rothschild Testimony, p. 44. The beta reported in Mr. Rothschild's footnote 82 is for an exchange traded fund (ETF) that tracks long-dated Treasury bonds.

[56] Decision 07-12-049, December 20, 2007, p. 16. See also Decision 12-12-034, p.24, where the Commission characterizes the CAPM result as being the sum of a **risk-free bond** and a risk premium.

[57] Rothschild Testimony, p. 44, footnote 82.

C. MR. ROTHSCHILD'S DCF BASED ESTIMATES

Q36. Have you reviewed Mr. Rothschild's "sustainable growth" and "non-constant growth" DCF cost of equity calculations?

A36. Yes. In cooperation with my Brattle partner and fellow Brattle principal, Dr. Vilbert, I analyzed Mr. Rothschild's implementations of the DCF models. With respect to Mr. Rothschild's $br + sv$ "sustainable growth" calculations, we identified several conceptual inconsistencies in his implementation, as well as certain technical flaws and mathematical errors that create a downward bias of approximately 110 basis points in Mr. Rothschild's results. Dr. Vilbert's rebuttal testimony provides detailed descriptions of these flaws and errors, as well as a detailed analysis showing the impact of these flaws and errors downwardly bias Mr. Rothschild's results.

With respect to Mr. Rothschild's "non-constant growth" DCF calculations, Dr. Vilbert and I identified certain implicit assumptions in Mr. Rothschild's methodology that do not make sense and cast doubt on the validity of his non-constant growth DCF model and cost of equity estimates. Dr. Vilbert's rebuttal testimony explains these flawed assumptions in detail and also critiques Mr. Rothschild's non-constant growth DCF results for the water sample companies, some of which are barely higher than the cost of debt and thus not credible estimates of the cost of equity.

Q37. Please summarize your conclusions based on your and Dr. Vilbert's analysis of Mr. Rothschild's sustainable growth DCF calculations.

A37. First, as described in Dr. Vilbert's testimony, Mr. Rothschild's sustainable growth DCF analysis is inherently and inconsistent with his recommended cost of equity in this case, because it assumes a return on book equity for the water sample companies that is approximately 275 to 375 basis points higher than what he recommends the California Class A Water Companies be allowed to earn. Put differently, Mr. Rothschild's inputs assume the water utilities in the proxy group will earn a return on book equity of 11-12%, but he recommends 8.23% for CAW. Additionally, Mr. Rothschild's claims that his sustainable growth rate calculations reflect investors' expectations of dividends and return on book equity are inconsistent with his calculations that rely largely on historical

inputs. This assumption also makes his criticisms of my reliance on growth forecasts difficult to reconcile with his own reliance on Value Line's forecast of return on book equity.

Furthermore,setting aside the fundamental inconsistencies in Mr. Rothschild's sustainable growth DCF implementation, his results are biased downward by at least 110 basis points due to technical flaws, including his reliance on a mathematically erroneous and unsupportable external financing rate and an inconsistent treatment of York Water Company, which produces an illogical negative sustainable growth rate and anomalously low DCF results using Mr. Rothschild's methodology and so York Water should properly be excluded from the proxy group for purposes of his analysis.

As Dr. Vilbert's rebuttal testimony shows, Mr. Rothschild's constant growth DCF model, implemented using Mr. Rothschild's recommended inputs and formulas, but correcting mathematical errors and excluding illogical and anomalous inputs in a manner consistent with Mr. Rothschild's stated principles that cost of equity estimates should reflect investors' forward looking expectations, produces estimates in the range of 9.7% to 9.8%, which exceed his cost of equity recommendations by approximately 150 basis points.

V. MR. ROTHSCHILD'S CRITICISMS OF MY COST OF EQUITY RECOMMENDATION

Q38. Please summarize Mr. Rothschild's main criticisms of your ROE recommendation.

A38. Mr. Rothschild's testimony makes a broad brush claim that my cost of equity recommendation for CAW and those of the other companies' witnesses in this proceeding "cannot be considered market based."[58] He somehow believes that forecasted Treasury bond yields, such as those used in my CAPM-based and risk premium analyses are not valid market indicators of what the risk free rate of interest will be during the period rates are in effect.[59] He also explicitly criticizes me and my partner at Brattle, Dr. Vilbert, for interpreting our DCF-based cost of equity results in the context of current financial

[58] Rothschild Testimony, p. 49.

[59] Rothschild Testimony, p. 49.

market conditions. He further critiques my caution against relying on a simple mechanical implementation of cost of equity models as the best indicators of what the cost of equity will be over the entire 2018-2020 period. [60]

In addition to claiming that my cost of equity recommendations are not "market based", Mr. Rothschild lists as additional "concerns" about my (and Dr. Vilbert's) analyses that we (i) employ analyst estimates of EPS growth rates—which Mr. Rothschild asserts are upwardly biased—in the DCF calculations and (ii) "combine [our] cost of equity estimates with market value capital structures."[61]

I note that much this section is similar to material in Dr. Vilbert's rebuttal testimony, in part because Mr. Rothschild addresses our direct testimony recommendations and analyses as if they were one and the same, and in part because Dr. Vilbert and I worked jointly on non-company specific parts of the rebuttal.

A. MARKET-BASED COST OF EQUITY RECOMMENDATIONS

Q39. What is your reaction to Mr. Rothschild's critique that your results are not market-based?

A39. Mr. Rothschild's characterization is inaccurate and unsupported. The data and inputs I use for my model implementation are, unlike Mr. Rothschild's use of some historic growth rates,[62] market-based. The data are obtained either from trading platforms or from publications such as Blue Chip Economic Indicators, Thomson Reuters IBES, and Value Line that aggregate financial market measurements and consensus economic forecasts of investment brokerage analysts who are themselves participants in and influencers of the markets.

As a result, Mr. Rothschild real disagreement seems to relate to the use of forecasts, which I use to inform my implementation of the models and interpretation of the results.

[60] Rothschild Testimony, p. 49-50.

[61] Rothschild Testimony, p. 52.

[62] Historic growth in, for example, dividends is based on accounting data rather than markets.

Mr. Rothschild in contrast prefers a mechanical implementation of his unique models,[63] where he picks and chooses from forecasted and historical / accounting and market data.

Q40. Why do you believe it is important to use forward-looking measures?.

A40. The cost of equity is a forward-looking concept—the expected rate of return that market participants require to take on the risk of investing in a particular stock. It is not directly observable, and estimating it requires the application of judgment on the part of the analyst—both in selecting the inputs to estimation methodologies such as the CAPM and DCF models, and in interpreting the results of the models as indicators of the forward-looking expected returns investors require. The models *require* estimates of what capital market conditions will prevail at the times market participants consider whether to buy the stock. In the context of this proceeding, it is important to consider not only the expected returns required by potential investors right now, but also investors who may decide to invest (or not) *at any time during the period rates will be in effect* (i.e., 2018-2020).

Mr. Rothschild admits in his testimony, "[i]f the cost of equity and overall cost of capital is [sic] set too low, the [California Class A Water Companies] will not be able to access the capital needed to provide safe and reliable service."[64] However, he restricts his recommendations for the cost of capital to what he can measure using a mechanical implementation of his version of the models based primarily on accounting or historic market information. . This decision necessarily reflects one of two views. Either Mr. Rothschild believes that the cost of capital throughout the 2018-2020 period is not relevant, or he believes that estimates made using mechanical implementations of the models using historic or contemporaneous capital market information reflect future capital market conditions. Both of these views are misguided.

[63] In contrast, the Commission in Decision 12-12-034, p. 28 noted that "the models should not be used rigidly or as definitive proxies for the determination of the investor-required ROE."

[64] Rothschild Testimony, p. 7.

Q41. What is Mr. Rothschild's general assessment of current capital market conditions?

A41. Mr. Rothschild places a great deal of emphasis on his view that the U.S. is currently experiencing a "Goldilocks economy" in which interest rates and volatility are low and demand for stocks (as indicated by P/E ratios) is high.[65] He asserts repeatedly—without or against evidence—that markets expect these conditions to continue,[66] and all of his recommendations are based on his view that mechanical implementations of his models based on prevailing market interest rates, prices, and other model inputs produce results that are representative of the cost of capital going forward.

Q42. Do you agree with Mr. Rothschild's view that these conditions are likely to continue for the next several years?

A42. No. The recent past is a poor guide to the future as the dramatic changes in the stock market has revealed. For example, between January 2003 and July 2007, the S&P 500 increased by more than 50% and then declined by almost 40% between July 2008 and April 2009.[67] Even the article Mr. Rothschild cites for the "Goldilocks Economy" reference notes that "[t]he fact that everything's been awesome recently is little guide to the future of the economy or inflation -- and the rise in stocks makes it less likely the general awesomeness will continue."[68]

While current government bond yields are near historically low levels, this is the result of unprecedented global capital market events such as the financial crisis of 2008-09 and the subsequent policies of central banks, , that were and are explicitly designed to bring down interest rates, particularly on long-term securities. According to the Federal Reserve it continues to hold substantial treasury securities and mortgage backed bonds, which it expects to unwind gradually. Statements by the U.S. Federal Reserve indicate a gradual

[65] Rothschild Testimony, pp. 7-9.

[66] See, for example, Rothschild Testimony, p. 17.

[67] Yahoo Finance .

[68] Everything Is Awesome! Now Is the Time to Sell", Wall Street Journal, July 6, 2017.

unwinding of these policies that will lead to higher rates in the future.[69] As noted above, credit spreads remain depressed relative to their long-term historical levels—indicating either that risk premiums are elevated or that risk-free rates are artificially depressed, or both.[70] All indications are that interest rates will not remain at historically low levels forever, and market participants expect them to increase modestly in the near future as reflected in the forecasts I rely on in selecting the inputs to my risk positioning models.

Lastly, I note that my analysis of P/E ratios showed that the ratio statistically is inversely related to interest rates,[71] so that the level is likely to change as interest rates change over the next few years.

B. INTEREST RATE FORECASTS AND THE RISK-FREE RATE

Q43. Is your analysis based on your "opinion" that interest rates are likely to increase?

A43. No. My analysis is based on market evidence that interest rates are expected to increase. This evidence includes the current levels of credit spreads as well as consensus estimates of U.S. Treasury bond yields for 2018. I note further that market-traded swaps also indicate an increase in interest rates.

Q44. Do you agree with Mr. Rothschild that forecasted interest rates have been "proven inaccurate"?[72]

A44. No. While economic forecasts or indications of future expectations inferred from securities prices are not perfect predictors of the future, the relevant question is not whether they are perfectly accurate all of the time, but rather whether they can be expected to be unbiased predictors on average. Mr. Rothschild purports to show in his testimony that Blue Chip forecasts have tended to over-predict interest rates, but his

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[69] Federal Reserve Press Release, "Addendum to the Policy Noarmalization Principles and Plans," June 14, 2017.

[70] Villadsen Direct Testimony, pp. 16-17.

[71] Villadsen Direct Testimony, pp. 19-21.

[72] Rothschild Testimony, p. 20.

analysis is limited to a small number of very long-range projections made in 2010.[73] This is hardly conclusive evidence, especially with respect to the shorter range (approximately 1-year) projections of Treasury yields I relied on in my direct testimony. In data responses, Mr. Rothschild admits he has not analyzed such closer-range projections, nor has he conducted a systematic study of the accuracy of interest rate forecasts in rising as well as falling interest rate environments.[74] As a result, Mr. Rothschild has not presented evidence that the reliance on forecasted interest rates introduce any form of bias in the results.

Q45. Is there any academic evidence about the accuracy of interest rate projections?

A45. 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. [75] Unlike Mr. Rothschild, 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. Since interest rates have generally followed a downward trajectory since the financial crisis (and indeed, as Mr. Rothschild notes, since the early 1980s for long-term yields), it is then not surprising that the handful of forecasts Mr. Rothschild analyzed—made very close on the heels of the crisis itself—have tended to predict higher yields than were eventually realized. 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.

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[73] Rothschild testimony, p. 21-22.

[74] Mr. Rothschild's response to CWS Data Request # CSW-001, Question #8.

[75] 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.

Q46. What about Mr. Rothschild's assertion that "[a]ny expected rise or decline in interest rates is already incorporated in the current market yield"?[76]

A46. It is unclear precisely what Mr. Rothschild means by this. If he means that future rates cannot be expected to rise above the level of current yields, this is simply untrue and contradicted by Mr. Rothschild's own testimony with respect to the yield curve.[77] Additionally, the yield curve itself is not static, rather it changes over time. At any point in time, the market is evaluating the probability of a change in interest rates and the yield curve changes as the probability of the magnitude and likelihood of changes in interest rates change. Evidence of such evaluation can be found in traded swap data, which indicate the yield curve is likely to change. The fact that the market is aware of possible interest rate changes does not mean that interest rates cannot change more (or less) than anticipated by the current yield curve.

C. MR. ROTHSCHILD'S CRITICISMS OF EPS GROWTH RATE FORECASTS AND OF FORECASTS IN GENERAL

Q47. How do you respond to Mr. Rothschild's claims that the EPS growth rate forecasts you employ in your DCF analysis are upwardly biased?

A47. I find Mr. Rothschild's arguments on this point unconvincing. For one thing, Mr. Rothschild has not presented any academic evidence that an upward or "optimistic" bias in the earnings forecasts of equity analysts currently applies in the context of regulated utilities. Importantly, more recent academic research has not only found that "the median forecast bias [has] essentially disappeared,"[78] but also studied how industry

[76] Rothschild Testimony, p. 9.

[77] Rothschild Testimony, p. 17. The fact that the yield curve is upward sloping such that longer-term bond yields are higher than yields on 1-year T-bills means—according to the expectation hypothesis—that the market expects rates to be higher 1-year from now than today. This is true both for T-bill yields themselves as demonstrated in Mr. Rothschild's footnote 41, as well as for longer-term Treasury bonds such as the 20-yr and 30-yr.

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

characteristics impact analysts' forecasts. The findings of several academic studies[79] show that analyst earnings forecasts 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. These are not characteristics of water utilities.

I also find Mr. Rothschild's criticisms inconsistent with the fact that his own calculations of forward-looking sustainable growth rates for the water sample companies are completely in line—and even higher on average—than the analyst EPS growth forecasts I used in my direct testimony.

Q48. Do you have any other reactions to Mr. Rothschild's repeated criticisms of financial forecasts in general?

A48. As noted above, Mr. Rothschild is critical of my use of consensus forecasts for both interest rates and company growth rates, and he makes repeated reference to the notion that financial forecasting in general tends to be inaccurate or unreliable. For example, he references research indicating that "predicting capital markets (e.g. interest rates, stock prices) is not done well[80]." However, Mr. Rothschild's reliance on capital market forecast to inform his own analysis and recommendations renders that criticism meaningless. For example, after stating that capital market predictions are "not done well", Mr. Rothschild references capital market predictions by Charles Schwab and McKinsey Global Institute in support of his recommendations on the very next page of his testimony.[81] Additionally, as discussed above, Mr. Rothschild relies on Value Line predictions of total returns for the Dow 30 companies to inform his so-called CAPM

[79] These studies include the following: (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.

[80] Rothschild Testimony, p. 5. In response to data requests, Mr. Rothschild indicated that the specific types and categories of capital market prediction were those he referred to in that quote: i.e., interest rates and stock prices. *See* Mr. Rothschild's response to CWS Data Request # CSW-001, Question #4.

[81] Rothschild Testimony, p. 6, Table 6.

analysis. Similarly, Mr. Rothschild relies on Value Line forecasts for his DCF calculations, including medium term predictions of dividends, returns on book equity, price appreciation, book value, and shares outstanding.[82] Nowhere in his testimony does Mr. Rothschild explain how or why the extensive capital market predictions he relies upon are any better or more reliable than the market forecasts and estimates I use in my cost of equity analysis.

D. USE OF MARKET VALUE CAPITAL STRUCTURES IN COST OF EQUITY ANALYSIS

Q49. What is your reaction to Mr. Rothschild's "concern" about your use of market value capital structures in deriving your cost of equity estimates?

A49. While Mr. Rothschild does not say what in particular concerns him about this aspect of my analysis, I find it inconsistent of Mr. Rothschild to criticize my analysis for using market values in the same section of his testimony that he claims my recommendations are not "market-based". The dividends yields and betas that are inputs to my cost of equity estimation methods for the publicly traded companies in the water sample are based on market values (i.e., market stock prices determine the dividend yield and market stock returns are used to estimate betas), so it should be intuitive that I rely on the corresponding market-value measures of capital structure, which is what I have done.

As to my use of market value capital structures in computing the overall weighted average cost of capital and assets beta estimates for the water sample companies, I simply use the standard textbook approach, which is taught in every corporate finance textbook of which I am aware.[83] I also note that this is the approach taken by Value Line, as well as in the OXERA report cited by Mr. Dawadi.[84] The fact that financial risk is a function of market value financial leverage and that a company's weighted average cost of capital

[82] Rothschild Testimony Schedules ALR 3, ALR 4, and ALR 6.

[83] See, for example Richard A. Brealey, Stewart C. Myers, and Franklin Allen, *Principles of Corporate Finance,*12th Edition, 2017, pp. 505-507; Jonathan Berk and Peter DeMarzo, *Corporate Finance*, 3rd Edition, 2014, pp. 492-494; Stephen Ross, Randolph W. Westerfield, and Jeffrey E. Jaffe, *Corporate Finance*, 10th Edition, 2013, pp. 571-574; Leonardo R. Giacchino and Jonathan A. Lesser, *Principles of Utility Corporate Finance*, 2011, pp. 229-232.

[84] See *Value Line Investment Survey's* capital structure / market cap calculations on the tear sheets for AWK, AWR, CTWS, CWT, MSEX, SJW, WTR and YORW and the OXERA Report.

is based on its market value capital structure is not a matter of any academic controversy or debate.

Q50. Does this conclude your rebuttal testimony?

A50. Yes.

Recent Allowed ROEs and Capital Structures for CPUC Jurisdictional Electric and Gas Utilities

California Utility	Allowed ROE (2017)	Allowed ROE (2018-2019)	Equity Ratio (2017)
	[1]	[2]	[3]
PG&E	10.40%	10.25%	52.0%
SCE	10.45%	10.30%	48.0%
SDG&E	10.30%	10.20%	50.5%
SoCalGas	10.10%	10.05%	52.0%

Sources:
[1][3]: CPUC Decision 12-12-034, December 20, 2012.
[2]: CPUC Proposed Decision for Application 12-04-015, 12-04-016, 12-04-017, 12-04-018, Joint Petition for PG&E, SCE, SDG&E, and SoCalGas, April 22, 2017.

Operating Leverage Calculation

	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
						Absolute											*Natural Logarithm*					
Utility Operating Revenues ($ millions)																						
AWR	436	459	466	472	467	420	400	353	311	301	269	6.1	6.1	6.1	6.2	6.1	6.0	6.0	5.9	5.7	5.7	5.6
AWK	3,302	3,159	3,011	2,879	2,854	2,666	2,555	2,290	2,337	2,214	2,093	8.1	8.1	8.0	8.0	8.0	7.9	7.8	7.7	7.8	7.7	7.6
WTR	820	814	780	762	751	687	660	633	627	602	533	6.7	6.7	6.7	6.6	6.6	6.5	6.5	6.5	6.4	6.4	6.3
CWT	609	588	597	584	560	502	460	449	410	367	335	6.4	6.4	6.4	6.4	6.3	6.2	6.1	6.1	6.0	5.9	5.8
CTWS	99	96	94	91	84	69	66	59	61	59	47	4.6	4.6	4.5	4.5	4.4	4.2	4.2	4.1	4.1	4.1	3.8
MSEX	133	126	117	115	110	102	103	91	91	86	81	4.9	4.8	4.8	4.7	4.7	4.6	4.6	4.5	4.5	4.5	4.4
SJW	340	305	320	277	262	239	216	216	220	207	189	5.8	5.7	5.8	5.6	5.6	5.5	5.4	5.4	5.4	5.3	5.2
YORW	48	47	46	42	41	41	39	37	33	31	29	3.9	3.9	3.8	3.7	3.7	3.7	3.7	3.6	3.5	3.4	3.4
Cal Am	209	198	204	204	192	158	155	140	128	123	113	5.3	5.3	5.3	5.3	5.3	5.1	5.0	4.9	4.8	4.8	4.7
Net Utility Operating Income ($ millions)																						
AWR	115	118	119	119	111	95	90	73	62	67	57	4.7	4.8	4.8	4.8	4.7	4.6	4.5	4.3	4.1	4.2	4.0
AWK	1,148	1,072	1,001	949	922	802	731	614	563	517	474	7.0	7.0	6.9	6.9	6.8	6.7	6.6	6.4	6.3	6.2	6.2
WTR	326	323	314	302	318	281	257	228	226	216	206	5.8	5.8	5.8	5.7	5.8	5.6	5.6	5.4	5.4	5.4	5.3
CWT	101	95	108	93	93	90	84	82	81	62	56	4.6	4.6	4.7	4.5	4.5	4.5	4.4	4.4	4.4	4.1	4.0
CTWS	29	26	29	28	26	23	20	15	17	17	9	3.4	3.3	3.4	3.3	3.3	3.1	3.0	2.7	2.8	2.8	2.2
MSEX	41	36	34	31	28	24	27	20	24	23	21	3.7	3.6	3.5	3.4	3.3	3.2	3.3	3.0	3.2	3.1	3.1
SJW	93	80	93	53	55	54	42	40	46	42	47	4.5	4.4	4.5	4.0	4.0	4.0	3.7	3.7	3.8	3.7	3.8
YORW	23	23	22	21	21	20	20	17	15	14	13	3.1	3.1	3.1	3.0	3.0	3.0	3.0	2.9	2.7	2.6	2.6
Cal Am	66	63	59	64	57	30	29	19	10	15	10	4.2	4.1	4.1	4.2	4.1	3.4	3.3	2.9	2.3	2.7	2.3

Operating Leverage (Net Utility Operating Income/Operating Revenue)

	2011 - 2016 (A)	2006 - 2016 (A)
AWR	1.51	1.39
AWK	1.62	2.01
WTR	0.79	1.24
CWT	0.68	0.91
CTWS	0.65	1.37
MSEX	1.95	1.35
SJW	1.89	1.49
YORW	0.83	1.19
Cal Am	**2.86**	**3.29**
Sample Average	1.24	1.37
Sample Median	1.17	1.36

Source: S&P Capital IQ. Cal Am data provided by CPUC Annual Reports.

Confidential Exhibit BV-R3

Submitted under the protection of Cal. Evidence Code Section 1060, General Order 66-C Section 2.1 and Public Utilities Code Section 583.