BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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)	Application No. A17-04-___
)	Filed _____
)	

CALIFORNIA-AMEIRCAN WATER COMPANY

DIRECT TESTIMONY OF BENTE VILLADSEN

April 3, 2017

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LIST OF EXHIBITS

I. INTRODUCTION AND QUALIFICATIONS

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 44 Brattle Street, Cambridge, Massachusetts 02138.

Q2. Please summarize your professional qualifications.

A2. I have more than 16 years of experience working with regulated utilities on cost of capital and related matters. My practice focuses on cost of capital, regulatory finance, and accounting issues. I have testified or filed expert reports on cost of capital before regulators in Arizona, Alaska, California, Illinois, New Mexico, and Oregon as well as before the Bonneville Power Administration, the Surface Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board. I have also provided white papers or other non-testimonial analyzes concerning cost of capital to the British Columbia Utilities Commission, the Canadian Transportation Agency as well as to European and Australian regulators. I have also testified or filed testimony on regulatory accounting issues before the Federal Energy Regulatory Commission ("FERC") and the Michigan Public Service Commission as well as in international and U.S. arbitrations. I regularly provide advice to utilities on regulatory matters and risk management. I hold a Ph.D. from Yale University's School of Management with a concentration in accounting, and a BS/MS in Economics and Mathematics from University of Aarhus in Denmark. My Exhibit ("Ex") BV-1 contains more information on my professional qualifications as well as a list of my prior testimonies.

II. PURPOSE AND SUMMARY OF CONCLUSIONS

Q3. What are the purpose and primary conclusions of your testimony?

A3. The California-American Water Company ("California-American Water" or "the Company") has asked in the context of its request for a general update of its rates that I determine its cost of equity—i.e., the rate of return that capital markets would require for an equity investment in California-American Water. I find that an allowed return on equity

("ROE") of 10.8 percent is reasonable, taking into account the characteristics of California-American Water and the competing opportunities for investment in the equity markets. An overall return on rate base based on such an ROE, taking into account California-American Water's requested regulatory capital structure of approximately 55.4 percent equity and 44.6 percent debt, fairly reflects California-American Water's overall costs of capital in the test year.

Q4. Would you please summarize the analysis and considerations that lead to these conclusions?

A4. To determine the cost of capital for California-American Water, I selected, based on objective criteria, a sample of publicly-traded water utilities that are subject to rate regulation and calculated the cost of equity for the sample using standard models and methods such as the Capital Asset Pricing Models ("CAPM"), the Discounted Cash Flow ("DCF") models and a Risk Premium model. Applying each of these models to my proxy group companies, I derived the following ranges of reasonable ROE estimates for a generic water utility with approximately 55 percent equity, which inform my decision to recommend an allowed ROE of 10.8 percent for California-American Water.

Return on Equity Recommendation Summary

CAPM-Based Methods	10.0%–10.9%
DCF-Based Methods	9.5%–11.%
Implied Risk Premium	10.1%–10.2%
Reasonable Range for sample	10–11%
Recommended ROE	10.8%

It is important to note that while the overall ranges incorporate the results for the three estimation methods, and also include alternative inputs and formulations for the CAPM and DCF estimation methods, the ranges listed for each methodology does not take into account any unique features of California-American Water or the industry. However, in determining a reasonable range, I looked to the characteristics of the industry such as the presence of share buybacks and unusually low GDP growth rates. The recommendation for

California-American Water places the Company within the range based on its risk characteristics relative to the sample.

Q5. Why do you emphasize that all estimation methods have result in the reasonable range?

A5. The consideration of multiple estimation methods is an essential practice when estimating the cost of equity capital. As my colleague, Professor Stewart C. Myers has eloquently advised:

> Use more than one model when you can. Because estimating the opportunity cost of capital is difficult, only a fool throws away useful information.[1]

It is especially important to heed this advice amidst the current economic conditions, since the unprecedented sustained low interest rate environment and elevated risk aversion among investors can affect the results from various standard models in different ways. In Decision 09-05-019, the Commission noted that "[t]he financial models commonly used in water utility cost of capital proceedings are the Discounted Cash Flow Analysis and Capital Asset Pricing."[2] Thus, the Commission has in the past acknowledged the practice of using more than one model.

Considering the relative merits of the multiple models and eliminating atypical outlying high and low-end results that are unduly influenced by unrepresentative data, I evaluate these results as indicating a reasonable return on equity for local water distribution utilities in the range of 10 to 11 percent. The midpoint of the suggested by the model estimates is approximately 10.5 percent, which I believe is representative of the required return on equity for an otherwise representative local water distribution utility with a capital structure matching that requested by California-American Water in this proceeding. I therefore recommend that California-American Water receive an allowed ROE between 10 and 11 percent. I note that none of my results include an allowance for flotation costs.

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

2 CPUC Decision 09-05-019, issued May 8, 2009, p. 15.

That range and its midpoint, however, do not reflect to California-American Water. In Section VI below, I discuss such California-American Water-specific risk and return considerations—including its accelerating capital expenditure requirements and uncompensated equity flotation costs—and summarize the role those factors play in informing my recommended point estimate of 10.8 percent for California-American Water's allowed ROE. It is my opinion that this fairly estimates the market required rate of return on California-American Water's equity during the test year.

Q6. Are you sponsoring any exhibits to your direct testimony?

A6. Yes. I am sponsoring the following four exhibits, which I have attached to this testimony:

- Exhibit BV-1: Resume of Dr. Bente Villadsen
- Exhibit BV-2: Technical Appendix
- Exhibit BV-3: Implied Risk Premium Model Calculations
- Exhibit BV-4: Cost of Equity Estimate Calculations

III. APPROACH TO ESTIMATING THE COST OF CAPITAL

A. PRELIMINARY COMMENTS

Q7. What are the guiding standards that define a just and reasonable allowed rate of return on rate-regulated utility investments?

A7. Perhaps the seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope* and *Bluefield* cases[3], which found that:

1. The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[4]
2. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and
3. The return should be adequate, under efficient and economical management for the utility to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[5]

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[3] Bluefield Water Works & Improvement Co. v. Public Service Com'n of West Virginia, 262 U.S. 679 (1923) ("Bluefield"), and Federal Power Com'n v. Hope Natural Gas Co., 320 U.S. 591 (1944) ("Hope").

[4] Hope, 320 U.S. at 603.

[5] Bluefield, 262 U.S. at 680.

Q8. How have you conducted your cost of equity analysis?

A8. As stated above, the standard for establishing a fair rate of return on equity requires that a regulated utility be allowed to earn a return equivalent to what an investor could expect to earn on an alternative investment of equivalent risk. Therefore, my approach to estimating the cost of equity for California-American Water focuses on measuring the expected returns required by investors to invest in companies that face business and financial risks comparable to those faced by California-American Water. Because the models I rely upon most heavily require market data, my consideration of comparable companies is restricted to those that have publicly traded stock.

To this end, I selected a sample of regulated water utilities that are comparable in business risk to California-American Water, to which I applied widely-accepted objective quantitative methodologies—specifically the CAPM and DCF approaches—to estimate the return that investors require to provide capital for those utilities. As an indicator of the targeted returns of entities which will compete with California-American Water for investor capital, I have also analyzed the ROEs authorized for water utilities in U.S. regulatory jurisdictions in the form of an implied risk premium analysis. The CAPM, DCF, and Implied Risk Premium[6] approaches are all are widely used in the utility and ratemaking setting including in recent filings before the ICC. I also reviewed certain business and financial risk factors pertaining specifically to California-American Water and compared those to the characteristics of my sample.

The cost of equity for the CAPM and DCF based models are derived from market data that reflect the capital that investors hold in the sample companies. I consider the impact of any difference between the financial risk inherent in those cost of equity estimates and the

[6] The Implied Risk Premium methodology relies on the evaluation of decades of market data by regulatory agencies and uses statistical techniques to assess how those allowed returns vary with respect to the level of risk-free interest rates. It is essentially a meta-analysis of existing regulatory review of years of market data. Importantly, my analysis employs all of the gas utility rate case data tracked by SNL Financial, without filtering or excluding items from the database. I use the phrase "Implied Risk Premium" to distinguish this approach from the broader category of "risk premium" approaches, which can refer variously to asset pricing models such as the CAPM or to approaches that simply add a flat historical average risk premium (unadjusted for the impact of interest rates) to a current bond yield.

capital structure used to determine California-American Water's return. See Section V.D for a detailed discussion of the methods I use to account for differences in financial risk.

To arrive at my final ROE recommendation, I considered (i) the ranges of my cost of equity numbers, (ii) the current state of the economy and capital markets, (iii) the financial risk differences between California-American Water and the sample, and (iv) the business risks and specific financial circumstances of California-American Water relative to that of the sample. Based upon my analyses of these factors, I determined that a reasonable ROE for California-American Water should fall towards the upper end of the range for the sample. As the average sample company with about 55.4 percent equity appropriately has a cost of equity between 10 and 11 percent, I believe that an ROE of 10.8 percent is appropriate for California-American Water. That recommendation both falls within the reasonable range of returns for the more general class of local water distribution companies with comparable financial leverage and takes into account factors that influence where California-American Water's return should fall within that range.

Q9. How does the return on equity factor into the determination of an overall cost of capital for ratemaking purposes?

A9. For ratemaking purposes, the allowed return on equity is a component in the determination of the overall return on the capital used to finance rate base. Importantly, the return on equity is multiplied by the equity balance in the regulatory capital structure to determine the equity portion of the total weighted average cost of capital (the regulatory "WACC") of the utility which, in turn, is applied to the rate base.

B. COST OF CAPITAL AND RISK

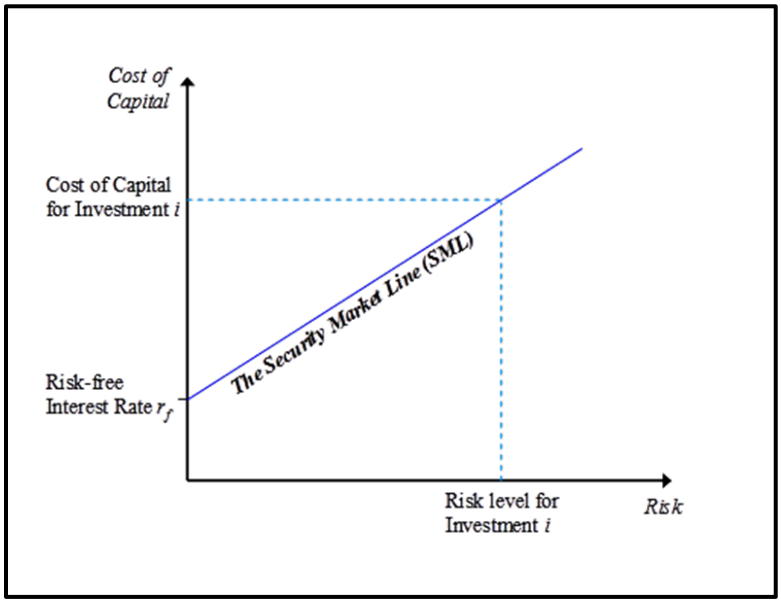
Q10. How is the "cost of capital" defined?

A10. The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of

possible outcomes. The terms "expect" and "expected," as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that can be represented by the "security market risk-return line" or "Security Market Line" for short. This line is depicted in Figure 1 below. The higher the risk, the higher the cost of capital required.

Figure 1: **The Security Market Line**



Q11. Why is the cost of capital relevant in rate regulation?

A11. The "cost of capital" is the return that investors expect to earn on investments of comparable risk.[7] The fact that investors (in aggregate) require a certain return to compensate them for a given level of risk determines (via the operation of capital markets) the cost at which companies can raise capital. Consequently, the cost of capital is set forth in the *Hope* and *Bluefield* cases as a relevant factor for determining the return that a utility company should receive—and provide to its investors—on its invested capital.

[7] See Stewart C. Myers, "The Application of Finance Theory to Public Utility Rate Cases," *The Bell Journal of Economics & Management Science*, 3:58–97 (1972).

Q12. What does this mean from an economic perspective?

A12. From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that fully compensate investors for the risks they bear. A utility's ability to attract capital and maintain its financial integrity requires that the combined equity return and equity ratio be such that not only is the expected return commensurate with that of other enterprises, but it also meets the expectations of credit market participants.

More important for customers, however, are the broader economic consequences of providing an inadequate return to the company's investors. In the short run, deviations from the expected rate of return on the rate base from the cost of capital may seemingly create a "zero-sum game"—investors gain if customers are overcharged, and customers gain if investors are shortchanged. In the longer term, inadequate returns are likely to cost customers—and society generally—far more than may be saved in the short run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. Without access to investor capital, the company may be forced to forego opportunities to maintain, upgrade, and expand its systems and facilities in ways that decrease long run costs. Indeed, the cost to consumers of an undercapitalized industry can be far greater than any short-run gains from shortfalls in the cost of capital. This is especially true in capital-intensive industries (such as the water, electric and gas utility industries), which feature systems that decay over relatively long time horizons. Such long-lived infrastructure assets cannot be repaired or replaced overnight, because of the time necessary to plan and construct the facilities, and because of the difficulty of financing very large increases to rate base within a reasonable rate structure. Thus, it is in the customers' interest not only to make sure the expected return of the investors does not exceed the cost of capital, but also that the expected return does not fall short of the cost of capital.

C. THE IMPACT OF RISK ON THE COST OF CAPITAL

Q13. How, in summary, do you factor in risk when determining the cost of capital?

A13. To ensure that the publicly traded sample companies for which I perform DCF and CAPM estimates have comparable business risk to California-American Water, I looked to traded entities whose business is primarily focused on regulated water utility operations. I structured my analysis to account for differences in financial leverage among the sample utilities, and for differences in the levels of financial risk imposed by the market value capital structures of the sample companies and the regulatory capital structure used to set California-American Water's revenue requirement. To determine where in the reasonable range of cost of equity estimates California-American Water's allowed ROE should be situated, I compared the business risk of California-American Water to that of the sample utilities.

Q14. Why is capital structure important for the determination of the cost of equity?

A14. The equity holders in a company with higher levels of debt face more financial risk to their equity investment and therefore require a higher return on equity than would equity holders in an otherwise identical company with lower levels of debt financing.[8] This is because debt holders are paid prior to equity holders, who as the owners of the firm have only the residual claim of its assets. Practically, in dissolution, everyone else eats their fill before equity holders come to the table. Even without financial distress, equity holders receive what is left—which may be either a profit or a loss—after fixed payments are made to satisfy debt folders. Consequently, increased debt financing increases equity risk (in the form of amplified variability of returns) associated with the residual claim.

There are several ways in which the impact of financial risk can be taken into account in an analysis of cost of equity. One way is to determine the overall (after-tax) weighted-average cost of capital for the sample using the equity and debt percentages as the weight assigned to the cost of equity and debt. This overall cost of capital primarily depends on the

[8] Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporate Finance," *The Journal of Finance*, 24: 13–31 (March 1969).

business risk of the sample companies, having been adjusted on an apples-to-apples basis for differences in (market value) leverage among the companies. If the overall cost of capital is constant between the estimate obtained for the sample and the entity to which it is applied in this case—the capital structure used to set the company's allowed return on rate base—then the allowed ROE that appropriately reflects the financial risk of the regulated entity can be determined. This approach assumes that the after-tax weighted-average cost of capital is constant for a range that spans the capital structures used to estimate the cost of equity and the regulatory capital structure.[9]

Another common textbook approach was developed by Professor Hamada, who estimated the cost of equity using the CAPM and made comparisons between companies with different capital structures via "unlevering" and "relevering" adjustments to the market beta. Specifically, in the Hamada approach, I use the estimated beta to calculate what beta would be associated with a 100 percent equity financed firm. This is the so-called "all-equity", "unlevered", or "assets" beta, which can then be re-levered to determine the equity beta associated with the regulatory capital structure. In Section V.D and the technical appendix to this testimony (Ex. BV-2), I provide additional explanation of the methods used to account for financial risk when estimating the cost of capital.

Q15. What capital structure do you use in your cost of capital analyses?

A15. I recommend that the Commission use California-American Water's 2018 test year capital structure. The forward looking capital structure is consistent with the notion that the cost of capital is forward-looking and with the fact that rates will go into effect in 2018. To further ensure consistency, I rely on a risk-free rate that is applicable to 2018. The test year capital structure of California-American Water includes 55.4 percent equity / 44.6 percent debt.[10] I find the use of a 2018 test year capital structure reasonable as this period coincides with the time that rates will go in to effect. My cost of equity estimate uses

[9] See also the discussion in Jonathan Berk & Peter DeMarzo, *Corporate Finance*, 3rd Edition, 2014, p. 490.

[10] See the Direct Testimony of Mr. Todd Pray..

forward-looking inputs so that all cost of capital parameters is estimated for a consistent time period.

It is a common first step to rely on a sample of comparable companies to estimate the cost of equity for companies with comparable business risks, and the use of a sample is absolutely required, where the subject utility itself issues no equity for which there is a publicly traded market.. However, this is only the first step in determining the cost of equity for a specific company, because any one company may face larger business, financial, or regulatory risks than the sample. Step two is an assessment of the risk associated with the target entity—California-American Water in this case. Therefore, if California-American Water's rate base is financed at a lower equity percentage than the sample companies, an adjustment needs to be made for the added risk in California-American Water's capital structure.

It is important to keep in mind that the portion of the total dollar return on rate base attributable to equity investment is calculated as the allowed ROE multiplied by the equity component of rate base. So as illustrated below, the cost to customers would be the same if the capital structure includes 60 percent equity with a ROE of 10 percent or if a capital structure includes 50 percent equity with an ROE of 12 percent.

Figure 2: Example Illustrating Customer Cost Associated with Equity Returns

		Scenario A	Scenario B
Equity Percentage	[a]	60.0%	50.0%
Rate Base	[b]	$1,000	$1,000
Allowed ROE	[c]	10.0%	12.0%
Cost to Customers	[d] = [a] x [b] x [c]	$60	$60

IV. IMPACT OF ECONOMIC AND CAPITAL MARKET CONDITIONS ON THE COST OF EQUITY

A. INTEREST RATES

Q16. What are the relevant developments regarding interest rates?

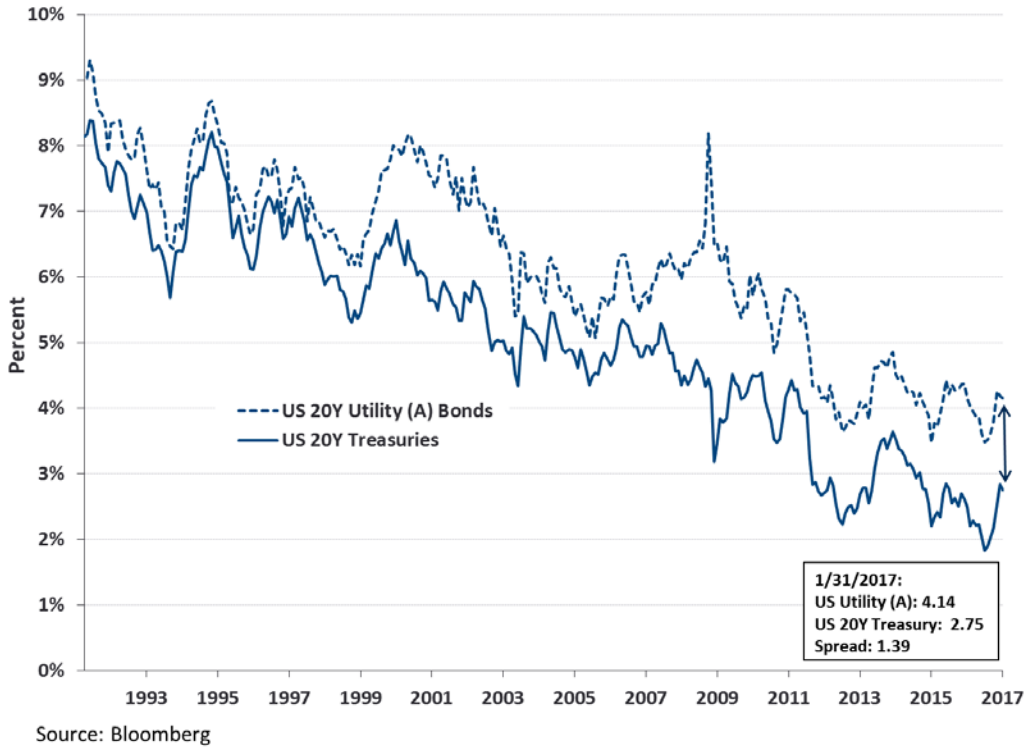
A16. Interest rates—including and perhaps especially government bond yields—have remained at very low levels in the years since the great financial crisis of 2008. However, yields have increased substantially recently and are forecasted to continue on an upward trend through and including the test year. Those interest rate increases are not just my subjective prediction, but are anticipated by the market and reflected, for example, in derivative asset prices and yield curves. Additionally, the spread between utility bond yields and government bond yields of the same maturity has been and remains elevated relative to its historical levels. This is true whether the historical average level is over the long run or a more recent period.

Figure 3 below shows the development in A rated utility and government bond yields of the same general maturity from 1991 to today.[11] It is evident that the yield spread (the difference between the yield on A rated utility bonds and government bonds of the same maturity) has increased relative to its historical average.

Figure 4 graphs the spread between A rated utility bonds and government bond yields directly, and also shows the average spread over the entire period (for which data is available) prior to the financial crisis. This graph clearly illustrates the sustained elevation in the yield spread since the onset of the great financial crisis.

[11] For clarity "A rated" reference bonds in the range of A- through A+ and "BBB rated" refer to bonds in the range of BBB- through BBB+. The majority of gas distribution utilities are in the A- range. Note that the Bloomberg utility bond indices used here first reported data in April 1991.

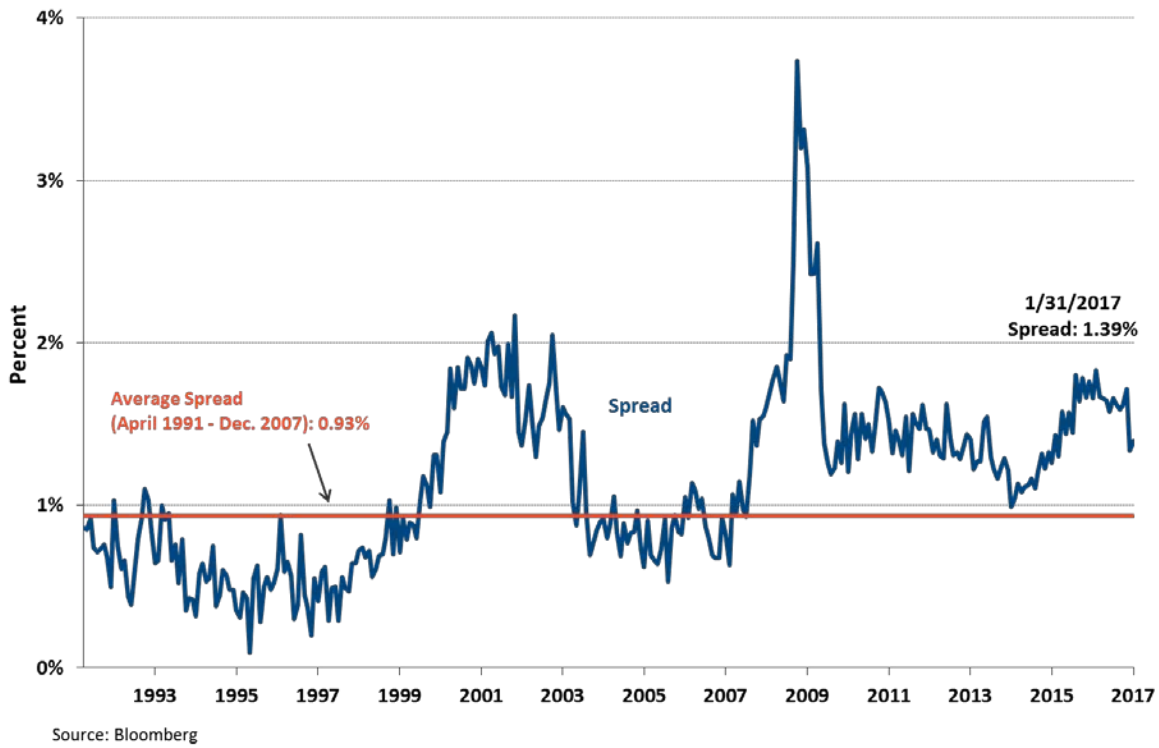
Figure 3: A Rated Utility and Government Bond Yields



Note that since early July 2016, the 20-year government bond yield has increased by more than 50 percent; from 1.82 percent in July 2016 to 2.84 percent at the end of 2016 – a level at which the 20-year government bond yield remain as of mid-March, 2017.[12]

[12] Federal Reserve, FRED (https://fred.stlouisfed.org/series/DGS20) as of March 20, 2017.

Figure 4: Spread between A Rated Utility and 20-Year Government Bond Yield



283 **Q17. How does the current spread between utility and government bond yields compare to**
284 **the historical spread?**

285 A17. As shown in Figure 3 and Figure 4 above, the spread between A rated utility bond yields
286 and government bond yields has increased. As of January 31, 2017, the spread stood at
287 1.39 percent, which is over 40 basis points higher than the long-term average level prior to
288 the 2008-09 financial crisis.

289 **Q18. How are interest rates expected to trend going forward?**

290 A18. Blue Chip Economic Indicators expects that the yield on 10-year Treasury Notes will
291 increase to 3.10 percent by 2018 and likely reach 3.6 percent by 2019 and 3.7 percent by
292 2020.[13] These expectations are consistent with the recent increase in the Federal Reserve's
293 monetary policy, where the Federal Reserve increased the Federal Funds rate in December

[13] Blue Chip Economic Indicators, January 2017; Blue Chip Economic Indicators, March 2017.

2016 and the expectation is that further increases will occur in 2017.[14] The downward pressure on Government bond yields, which has been impacted by the Federal Reserve's quantitative easing program and general stimulation of the U.S. economy.[15] These factors and have kept government bond yields low since the financial crisis and only recently have the rates started to increase both absolutely and relative to the yield on utility or corporate bonds.

Q19. How do the unusual low interest rates impact the cost of equity analysis?

A19. There are several ways in which the current interest rate environment affects the cost of equity analysis. First and most directly, the CAPM utilizes as one of its inputs a measure of the risk-free rate (*see* Figure 1). I used the yield on a U.S. government bond as a proxy for the risk-free rate. The estimated cost of equity using the CAPM increases (decreases) by 1 percent when the relied upon risk-free rate (e.g., the government bond rate) increases (decreases) by 1 percent. Therefore, to the extent that the government bond rate is driven by the monetary policy of the time rather than market factors, so is the CAPM estimate. Importantly, if the government bond rate is downward (upward) biased, then the CAPM estimate will be downward (upward) biased. When that is the case, it is necessary to take the downward bias in the government bond rate into account to avoid biasing the CAPM estimate of the cost of equity.

Second, if the spread between the yield on utility (or corporate) bonds and government bonds (the "yield spread") widens, it indicates that the premium that investors require for holding securities other than government bonds has increased. Thus, there is evidence that the market equity risk premium has increased. A higher than normal yield spread is one indication of the higher risk premiums currently prevailing in capital markets. Investors consider a risk-return tradeoff (like the one displayed in Figure 1 above) and select investments based upon the desired level of risk. Higher yield spreads reflect the fact that

[14] Federal Reserve Press Release, December 14, 2016. It is also consistent with the forecast from, for example, Consensus Economics, which expect the 10-year government bond yield will increase to 3 percent by early 2017. Source: Consensus Economics February 2017.

[15] For a summary of the magnitude of the Federal Reserve's purchase program, see, for example, Bloomberg, "The Fed Eases Off," September 16, 2015.

the return on corporate debt is higher relative to government bond yields than is normally the case, even for regulated utilities. Because equity is more risky than debt, this means that the spread between the cost of equity and government bond yields must also be higher; i.e., the premium required to invest in equity (the Market Risk Premium or "MRP") rather than government bonds has increased. If this fact is not recognized, then the traditional cost of capital estimation models will underestimate the cost of capital prevailing in the capital markets.

Third, in times of economic uncertainty (such as the present) investors seek to reduce their exposure to market risk. This precipitates a so-called "flight to safety," wherein demand for low-risk government bonds rises at the expense of demand for stocks. If yields on bonds are extraordinarily low, however, any investor seeking a higher expected return must choose alternative investments such as stocks, real estate, gold, or collectibles. Of course, all of these investments are riskier than government bonds, and investors demand a risk premium (perhaps an especially high one in times of economic uncertainty) for investing in them. But short of accepting meager returns, investors simply have few alternatives to returning to the stock market. Utility stocks may have experienced the "flight to safety" phenomenon to a larger degree than other stock because they traditionally have paid a substantial portion of their earnings as dividends. Therefore, investors who have sought income from their investments and found government bonds too unattractive may have accepted a higher risk and invested in utility stock with the goal of receiving periodic dividend payments.

My analysis considers the possibility that the current elevated level of the yield spread results either from government bond yields being artificially depressed due to monetary policy[16] or from elevation in the premium demanded by investors to take on risk (i.e., an elevated market risk premium). To avoid double-counting, I account for the impact on model inputs implied these two alternative explanations in two separate scenarios.

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[16] As of January 4, 2017, the Federal Reserve held approximately $1.7 trillion of mortgage-backed securities, whereas the magnitude was less than $0.5 trillion in mid-2009. *See* Federal Reserve Statistical Release H.4.1 "Factors Affecting Reserve Balances, releases dated January 5, 2017 and July 2, 2009. Available at https://www.federalreserve.gov/releases/h41/

Q20. What are the implications of elevated yield spreads to the cost of equity?

A20. The increase in the yield spread indicates that (i) the current long-term government bond yields are depressed relative to their normal levels and / or (ii) investors are demanding a premium higher than the historical premium to hold securities that are not risk free. The latter is an indication that the market equity risk premium may be elevated relative to its historical level. Regardless of the interpretation, the consequence is that if the cost of equity is estimated using the current risk-free rate and a market equity risk premium based on historical average data, the estimate will be downward biased. Hence, it is necessary to "normalize" the risk-free rate *or* take into account the current (rather than historical) market equity risk premium.[17]

Q21. Please explain the impact of an increase in investors' required risk premium?

A21. Investors dislike risk and demand a price to assume it. As a result, for any given level of risk, investors demand to earn an appropriate return to be induced to invest. On top of that, however, we must also consider changes in the degree of "risk aversion" in the market. An increase in risk aversion means not only that investors demand a greater return for greater risk, but that investors now require a higher return for any given level of risk

Q22. What evidence exists that the return premium demanded by investors for taking risk is higher than it was prior to the 2008-09 financial crisis?

A22. Substantial economic literature conducted post-financial crisis concluded that the Market Risk Premium ("MRP") had declined relative to its historical average during the pre-crisis period. However, since the start of the financial crisis, financial data services such as Bloomberg have found that the expected market risk premium is higher than before the

[17] I note that if a combination interpretation is used, it becomes important to make sure that the overall (total) "normalization" takes into account the elevated yield spread once and only once. I therefore consider two scenarios in my CAPM analysis. In Scenario I, the risk-free rate is increased by the abnormal increase in the yield-spread to take into account the elevated yield spread. This scenario is consistent with the interpretation that the current government bond yield is artificially downward suppressed. In Scenario 1, the MRP is increased by an amount that is consistent with the interpretation that the increase in the yield spread is due to an increase in the premium investors require to hold assets other than those that are risk-free. Importantly, I use the historical MRP in Scenario 1 and the adjusted MRP in Scenario 2, so that no scenario considered allows for both a normalization of the risk-free rate and an increase in the MRP.

financial crisis and at least as high as its historical average. For example, Bloomberg's expected Market Risk Premium exceeds the historical average Market Risk Premium and currently stands at about 7.1 percent over 10-year bonds, while the historical arithmetic average Market Risk Premium from 1926 to 2015 is 6.9 percent (over long-term government bonds).[18]

Q23. Is there other evidence that the Market Risk Premium has increased since the 2008-09 financial crisis?

A23. Yes. A recently updated analysis by Duarte and Rosa of the Federal Reserve of New York aggregates the results of many models of the required Market Risk Premium in the U.S. and tracks them over time. This analysis finds a very high Market Risk Premium in recent years.

The analysis estimates the Market Risk Premium that results from a range of models each year from 1960 through the present.[19] The analysis then reports the average as well as the first principal component of results.[20] The analysis finds that the models used to determine the risk premium are converging to provide more comparable estimates and that the average annual estimate of the Market Risk Premium was at an all-time high in 2013. These estimates are reasonably consistent with those obtained from Bloomberg and the consistent elevation of the Market Risk Premium over the historical average indicates that the elevated level is persistent. Figure 5 below shows Duarte and Rosa's summary results.

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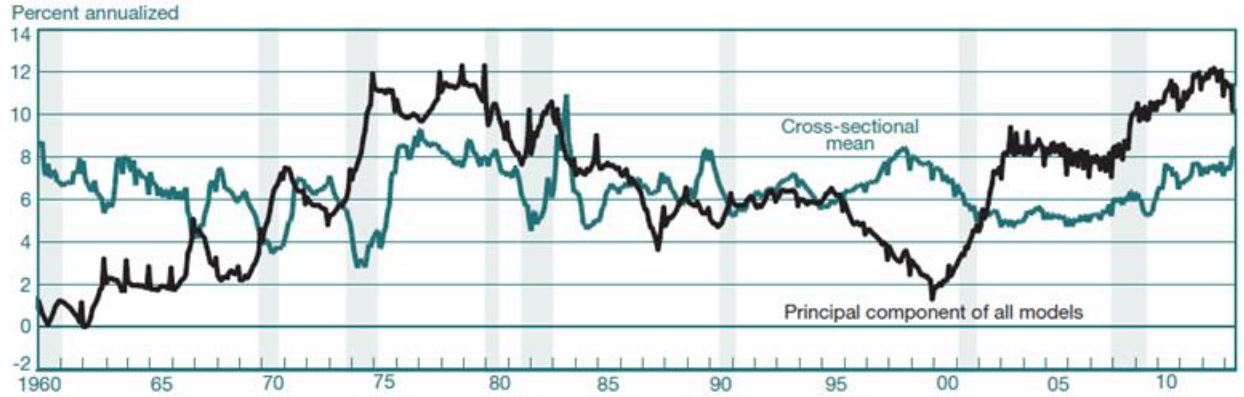
[18] Bloomberg and Duff & Phelps, "*2016 Valuation Handbook: Guide to Cost of Capital*," 2016, pp. 3–31. The text that updates this data to year-end 2017 is not available at the time of writing.

[19] Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Review of Models," *Federal Reserve Bank of New York*, December 2015 (Duarte & Rosa 2015).

[20] Duarte & Rosa emphasize the "first principal component" of the 20 models. This means that the authors used statistics to compute the weighted average combination of the models that captures the most variability among the 20 models over time.

Figure 5
Duarte and Rosa's Chart 3
Market Risk Premium Principal Component and Cross-Sectional Mean of Models



Q24. Are there other reasons why, in your view, investors are facing market uncertainty?

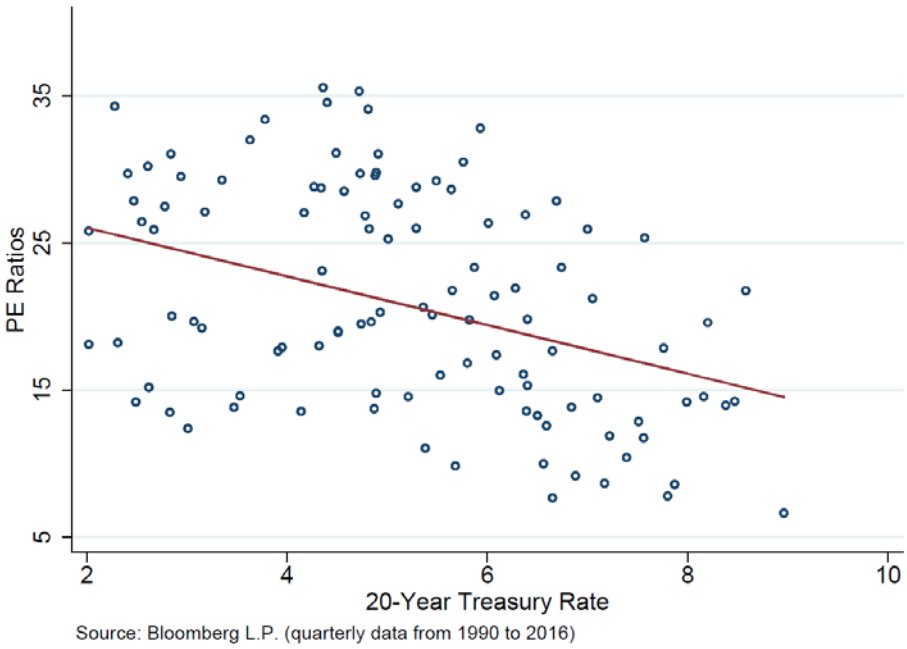
A24. Yes. It is as of now unclear what the newly elected government in the U.S. will seek to or be able to successfully implement in the form of tax policy, environmental policy, and energy policy in general. While political uncertainty is always present, the current levels are atypical. In Europe, the timing and form of the Brexit has yet to be determined, and there are renewed worries over Greece's debt.[21] Lastly, the continued turmoil in the Middle East could impact the global economy in ways that are unpredictable.

Q25. Are there other features of financial markets that are currently unusual?

A25. Yes. The current level of many companies' (including water utilities') Price-to-Earnings ("P/E") ratio is higher than what has been experienced historically. Empirically, the P/E ratio increases when interest rates decline. This effect is shown in Figure 6 below using water utilities' quarterly P/E ratios from 1990 to today.

[21] The yield on short-term Greek government debt has recently climbed to above 10 percent and the IMF warns of a climbing debt level. See, for example, Financial Times, "IMF sticks by 'Explosive' Greek Debt Analysis Amid Mounting EU Criticism," February 9, 2017.

Figure 6
Relationship Between Average Water Utility PE Ratio and 20-Year Treasury Bond Yield



Q26. How is the relationship between the P/E ratio and the 20-year government bond yield relevant to your analysis?

A26. The dividend yield, which is calculated as Dividends divided by Price (D/P), is closely related to the P/E ratio as dividends are paid out of earnings. If the P/E ratio is very high (low), then the Earnings-to-Price ratio is low (high) and so is the dividend yield (D/P). The average water utility pays a about 57 percent of its earnings as dividends, so if the P/E ratio increases from, for example, 25 to 30 (a 20% increase), then the Earnings / Price ratios declines by about two-thirds of a percentage point (from 1/25 = 4.00 percent to 1/30 = 3.33 percent) and the dividend yield declines by 0.38 percentage points (57 percent × 0.67 percent). Therefore, if the 20-year government bond yield is artificially depressed and expected to increase, then the dividend yield is likely also artificially depressed and expected to increase. Consequently, the results from the standard dividend discount models estimated in the current environment of high P/E ratios and low interest rates are likely to underestimate the cost of equity that will prevail going forward as interest rates rise.

Q27. What do you conclude from this information?

A27. The increase in the spread between the yield on utility and government bonds indicates that the premium investors require to hold assets that are not risk-free has increased. Likewise, the recent trends in preferred equity yields confirm that the premium on assets other than government bonds has increased. Similarly, the forecasted Market Risk Premium is consistent with a relative high Market Risk Premium. These factors point to a relatively high degree of investor risk aversion and the premium that investors required to hold assets that are not risk-free is elevated. Similarly, the very low risk-free rate are likely to have led to higher P/E ratios due to the flight to quality discussed above and consequently lower than "normal" dividend yields. All of this must be taken into account when selecting certain inputs to the CAPM and DCF models, and when evaluating the results of these models for reasonableness.

B. IMPACT ON ROE ESTIMATION

Q28. Please summarize how the economic developments discussed above have affected the ROE and debt that investors require?

A28. Utilities rely on investors in capital markets to provide funding to support their capital expenditure program and efficient business operations, and investors consider the risk return tradeoff in choosing how to allocate their capital among different investment opportunities. It is therefore important to consider how investors view the current economic conditions; including the plausible development in the risk-free rate and the current Market Risk Premium.

These investors have been dramatically affected by the credit crisis and ongoing market volatility, so there are reasons to believe that their risk aversion remains elevated relative to pre-crisis periods.

Likewise, the effects of the Federal Reserve's monetary policy have artificially lowered the risk-free rate. As a result, yield spreads on utility debt, including top-rated instruments, have remained elevated. The evidence presented above demonstrates that the equity risk

premium is higher today than it was prior to the crisis for all risky investments. This is true even for investments of lower-than-average risk, such as the equity of regulated utilities.

Q29. Does your analysis consider the current economic conditions?

A29. Yes. In implementing the CAPM and Implied Risk Premium models, I took into account two scenarios that consider the increased yield spread as being (i) a downward bias in the risk-free rate or (ii) an elevation of the Market Risk Premium. Specifically, I relied on two sets of inputs for the CAPM: I considered the elevated spread between utility and government bond yields and either (i) move the risk-free rate towards a normalized risk-free rate to reflect the currently downward bias of the yields and combine that with the historical Market Risk Premium or (ii) rely on Blue Chip's 2018 government bond yield forecast for the risk-free rate and combine that with a Market Risk Premium that reflects strong evidence that risk premiums are elevated relative to their long-term historical average.[22] For the DCF, I considered the impact on the dividend yield from the discussion above as an indication that the estimates may be downward biased, so that the lowest estimates likely do not reflect the true cost of equity.

V. ANALYZING THE COST OF EQUITY

A. SAMPLE SELECTION

Q30. Are there unique characteristics of the water industry that are important to consider when estimating the cost of equity?

A30. Yes. The industry is one of the most capital intensive industries around as measured by the amount of capital needed to generate one dollar in revenue. This means that the industry have a high degree of fixed cost relative to its revenue and therefore any changes to its revenue will have a large impact on the bottom line. Adding to this fact is that the industry is expected to need very large infrastructure investments going forward. For example, the American Society of Civil Engineers recently gave the drinking water infrastructure in the

[22] If the yield spread were to return to the level before the financial crisis, it would, everything else equal, be appropriate to consider the forecasted risk-free rate for the period during which rates will be in effect along with the historical average MRP.

U.S. a grade of D and stated that $44.5 billion in drinking water infrastructure was needed in California over the next 20 years and about $1 trillion nation-wide.[23] The estimated are from the Environmental Protection Agency at $600 million country-wide is a lower, but still very, very high.[24] Because a high level of fixed cost and capital spending adds risk in the form of variability in income and recovery risk, the industry is facing substantial challenges going forward.

Q31. How do you identify sample companies?

A31. To select a comparable sample of water utilities, I began with the universe of publicly traded water utilities as classified by Value Line.[25] This resulted in an initial group of 11 companies. From this group, I selected companies that have five years of data available and an investment grade bond rating. In addition, I require that companies do not have unique features that render price data meaningless or difficult to interpret.[26] This leaves eight companies for examination: American States Water Co., American Water Works, Aqua America Inc., California Water Service Group, Connecticut Water Service Inc., Middlesex Water Co., SJW Corp., and York Water Co. In this case, I excluded three companies—Artesian Res. Corp., Consolidated Water, and Global Resources Inc. Neither of these companies have a credit rating. Additionally, Artesian Res. Corp. has a narrow ownership, and Global Resources Inc. does not have a growth rate estimate from either Value Line or Thomson Reuters.

Q32. What are the characteristics of the Water Utility Sample?

A32. The Water Utility Sample comprises water utilities whose primary source of revenues and majority of assets are subject to regulation. The characteristics of the final sample of 8 water utilities are displayed in Figure 7 below. These companies own regulated water utilities or subsidiaries that may operate in multiple states. The Water Utility Sample is

[23] http://www.infrastructurereportcard.org/

[24] https://www.epa.gov/waterfinancecenter/about-water-infrastructure-and-resiliency-finance-center

[25] The 11 companies are from *Value Line Investment Analyzer as of January 31, 2017*.

[26] For example, companies (including water utilities) may trade too infrequently for their stock price to meaningfully convey a market price.

broadly representative of the regulated water distribution industry from a business risk perspective.

Figure 7 reports the sample companies' annual revenues for the most recent four quarters as of January 31, 2017 and also report the market capitalization, credit rating, beta and growth rate. The 2016 annual revenue as well as the market cap was obtained from Bloomberg as were the recent Standard & Poor's credit rating and growth estimate.[27] Betas were obtained from Value Line.

Figure 7
U.S. Water Utility Sample

Company	Annual Revenues (USD million) [1]	Regulated Assets [2]	Market Cap. 2016 Q3 (USD million) [3]	Betas [4]	S&P Credit Rating (2016) [5]	Long Term Growth Est. [6]
Amer. States Water	$439	R	$1,446	0.75	A+	5.9%
Amer. Water Works	$3,283	R	$13,661	0.65	A	7.9%
Aqua America	$820	R	$5,449	0.70	A-	5.6%
California Water	$597	R	$1,531	0.75	A+	10.3%
Conn. Water Services	$98	R	$556	0.65	A	4.8%
Middlesex Water	$132	R	$571	0.75	A	5.4%
SJW Corp.	$348	R	$892	0.75	BBB+	0.0%
York Water Co. (The)	$47	R	$380	0.75	A-	6.8%
Average	$721		$3,061	0.72		5.8%

Sources and Notes:
[1]: Bloomberg as of January 31, 2017. Most recent four quarters.
[2]: See Table No. BV-WATER-2. Key:
R - Regulated (More than 80% of assets regulated).
[3]: See Table No. BV-WATER-3 Panels A through I.
[4]: See Supporting Schedule # 1 to Table No. BV-WATER-10.
[5]: S&P Credit Ratings from Research Insight as of 2016 Q4.
[6]: See Table No. BV-WATER-5.

[27] At this time, not all company 10-Ks were available for the sample. Therefore, data reflects information as of company's 3rd quarter 2016 10-Q.

Q33. How does the Water Utility Sample compare to California-American Water?

A33. The Water Utility Sample consists of 8 companies that generally have credit ratings[28] in the range of BBB+ through A+. California-American Water does not currently have a separate credit rating, but its parent, American Water Works has a credit rating of A. The annual regulated revenues for California-American Water was $175 million in 2015[29] and thus somewhat below the average or median of the sample companies' annual revenues.

Section VI below discuss some unique risks that California-American Water is facing, including the outcome of the ongoing Monteray proceeding, a very high level of capital expenditures, and a very large regulatory assets that is financed with company funds.

B. CAPITAL STRUCTURE

Q34. What regulatory capital structure do you recommend for California-American Water in this proceeding?

A34. I recommend that the Commission base rates on the Company's forecast regulatory capital structure consisting of 55.4 percent equity and 44.6 percent debt.[30] I note that the debt percentage excludes debt related to the financing of the Monterey project.

C. THE CAPM BASED COST OF EQUITY ESTIMATES

Q35. Please briefly explain the CAPM.

A35. In the CAPM the collective investment decisions of investors in capital markets will result in equilibrium prices for all risky assets such that the returns investors expect to receive on their investments are commensurate with the risk of those assets relative to the market as a whole. The CAPM posits a risk-return relationship known as the Security Market Line

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[28] Aqua America Inc., California Water, and SJW Corp. do not have an issuer credit rating from S&P. Aqua America is rated by Egan Jones until September 2013 at A-, and assumed to remain the same over the period. California Water Service is sourced from Bloomberg. SJW is rated by Egan Jones from October 2014 onwards at BBB+, and assumed to remain the same over the period.

[29] American Water Works, "2016 Investor Conference," December 15, 2016.

[30] Direct Testimony of Todd Pray.

(see Figure 1), in which the required expected return on an asset is proportional to that asset's relative risk as measured by that asset's so-called "beta."

More precisely, the CAPM states that the cost of capital for an investment, S (e.g., a particular common stock), is given by the following equation:

$$r_s = r_f + \beta_s \times MRP \qquad (1)$$

where r_S is the cost of capital for investment S;

r_f is the risk-free interest rate;

β_S is the beta risk measure for the investment S; and

MRP is the market equity risk premium.

The CAPM is a "risk-positioning model" that relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities. It says that an investment whose returns do not vary relative to market returns should receive the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 1), whereas the market receives the risk-free rate plus the Market Risk Premium. Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the Market Risk Premium: the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

1. Inputs to the CAPM

Q36. What inputs does your implementation of the CAPM require?

A36. As demonstrated by equation (1), estimating the cost of equity for a given company requires a measure of the risk-free rate of interest and the Market Risk Premium, as well as a measurement of the stock's beta. There are many methodological choices and sources of data that inform the selection of these inputs. I discuss these issues, along with the finance theory underlying the CAPM, in Exhibit BV-2. I performed multiple CAPM calculations corresponding to distinct "scenarios" reflecting different values of the inputs. This allowed me to derive a range of reasonable estimates for the cost of equity capital implied by each of my samples.

Q37. What values did you use for the risk-free rate of interest?

A37. I used the yield on a 20-year Government Bond as the risk-free asset for purposes of my analysis. Recognizing the fact that the cost of capital set in this proceeding will be in place over the next several years, I rely on a forecast of what Government bond yields will be one year out. Specifically, Blue Chip predicts that the yield on a 10-year Government Bond will be 3.1 percent by 2018.[31] I use year-end 2018 as the benchmark as rates are expected to be in effect well beyond that date with plausibly an annual adjustment for the development in interest rates.[32] I adjust this value upward by 50 basis points, which is my estimate of the representative maturity premium for the 20-year over the 10-year Government Bond.[33] This gives me a lower bound on the risk-free rate of 3.60 percent. I observe that interest rates are expected to increase further during and that Blue Chip expects the 10-year government bond yield to reach 3.7 percent by 2020,[34] so that the 20-year yield is expected to be about 4.2 percent (once the maturity premium is added. Thus, my risk-free rate is conservative relative to the forecasts for the period during which rates are expected to be in effect.

I also considered a scenario in which the appropriate risk-free rate of interest is 4.00 percent, which adds a portion of the increase in yield spread to the risk-free rate to take the downward pressure on the government bond yield into account. An alternative is to increase the Market Risk Premium to reflect the widening of the yield spread.[35] The baseline Government bond yield of 3.60 percent conservatively uses the forecasted yield for 2018 and reflects that Government bond yields are expected to increase substantially going forward.

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31 Blue Chip Economic Indicators, January 2017.

32 I conservatively use 2018 forecasted interest rates as I understand the Company is applying for a continuation of the Water Cost of Capital Mechanism (WCCM). See Decision Approving Settlement Agreement, May 2, 2011, pp. 12-13.

33 This maturity premium is estimated by comparing the average excess yield on 20-year versus 10-year Government Bonds over the period January 1990 through December 2016, using data from Bloomberg.

34 Blue Chip Economic Indicators, March 2017.

35 As of January 2017, the spread between A rated utility and government bond yields was elevated by 42 basis points relative to the historical norm, so I apply 40 basis points as an upward adjustment to the risk-free interest rate.

Q38. What values did you use for the Market Risk Premium?

A38. Like the cost of capital itself, the Market Risk Premium is a forward-looking concept. It is by definition the premium above the risk-free interest rate that investors can *expect* to earn by investing in a value-weighted portfolio of all risky investments in the market. The premium is not directly observable, and must be inferred or forecasted based on known market information. One commonly used method for estimating the Market Risk Premium is to measure the historical average premium of market returns over the income returns on government bonds over some long historical period. *Duff and Phelps* performs such a calculation of the Market Risk Premium. The average market risk premium from 1926 to the present (2015) is 6.9 percent.[36] I used this value of the Market Risk Premium in one input scenario to my CAPM analyses. However, investors may require a higher or lower risk premium, reflecting the investment alternatives and aggregate level of risk aversion at any given time. As explained in Section III, there is substantial evidence that investors' level of risk aversion remains elevated relative to the time before the global financial crisis and ensuing recession that commenced in 2008. In recognition of this evidence, together with forward-looking measurements of the expected Market Risk Premium that are higher than the long-term historical average, I also performed CAPM calculations using 7.9 percent for the Market Risk Premium.[37]

Q39. What is the basis for stating that the current Market Risk Premium is higher than its historical average?

A39. That conclusion is supported by both academic research and empirical market data. Academic articles that were written in the late 1990s or early 2000s often found that the U.S. Market Risk Premium at the time was lower than the its historical average based on various forward-looking models, such as market-wide versions of the DCF model. A recent article by Duarte and Rosa of the Federal Reserve of New York summarizes many

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[36] Duff & Phelps, "2016 Valuation Handbook: Guide to Cost of Capital," pp. 3–31.

[37] Bloomberg currently forecast the U.S. MRP at 7.1 percent over a 10-year Government bond, while the average for 2016 was 7.6 percent over the 10-year Government bond. At the same time, the increase in yield spread indicates an elevation in the MRP that is well above 1 percent, so 7.9 percent over a 20-year government bond is a reasonable second benchmark. See Ex. BV-2 for details.

of these models and also estimates the Market Risk Premium from the models each year from 1960 through the present.[38] The authors find that the models are converging to provide more consensus around the estimate and that the average annual estimate of the Market Risk Premium is consistent with the academic literature and with forward-looking estimates such as Bloomberg's. Their analysis shows that the U.S. Market Risk Premium was lower than its long-term historical average in the early 2000s, but is currently at an all-time high. Chart 3 from Duarte & Rosa 2015 was reproduced in Figure 5, which shows the average estimated Market Risk Premium (over 30-day T-bills) for 20 models.

These findings are broadly consistent with the forward-looking Market Risk Premium's calculated by Bloomberg albeit a bit higher even after downward adjustment for the maturity premium. I also note that the approximately 40 basis points elevation in the yield spread indicate a substantial elevation in the Market Risk Premium.[39] However, I conservatively relied on the historical average Market Risk Premium of about 6.9 percent and a forward-looking Market Risk Premium of 7.9 percent in my CAPM analysis.[40]

Q40. What betas did you use for the companies in your sample?

A40. I evaluated both Value Line and Bloomberg betas, which are estimated using five years of weekly data, as inputs. I found the two sources to produce betas which were very similar on average. I use Value Line betas in this analysis, but also note that the use of Bloomberg betas potentially would increase my estimation results.[41]

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38 Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Consensus of Models," *Federal Reserve Bank of New York*, December 2015 (Duarte & Rosa 2015).

39 *See* Villadsen WP 3 for details.

40 Following the evidence in standard finance textbooks, I rely on the arithmetic average for the historic MRP. *See, e.g.,* Brealey, Myers and Allen, "*Principles of Corporate Finance*," 11th Edition, 2014 pp. 162–163, and Ross, Westerfield and Jaffe, "*Corporate Finance*," 10th Edition, 2013 pp. 322–323.

41 An identical analysis using Bloomberg betas would increase the CAPM based ROE estimates by approximately 20 basis points on average.

2. The Empirical CAPM

Q41. Did you use any other CAPM-based model?

A41. Yes. Empirical research has shown that the Empirical Capital Asset Pricing Model ("ECAPM") tends to perform better as low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[42] A number of variations on the original CAPM theory have been proposed to explain this finding, but the observation itself can also be used to estimate the cost of capital directly, using beta to measure relative risk by making a direct empirical adjustment to the CAPM.

The second variation on the CAPM that I employed makes use of these empirical findings. It estimated the cost of capital with the equation,

$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \qquad (2)$$

where $\boldsymbol{\alpha}$ is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as for the CAPM (see equation (2) above).

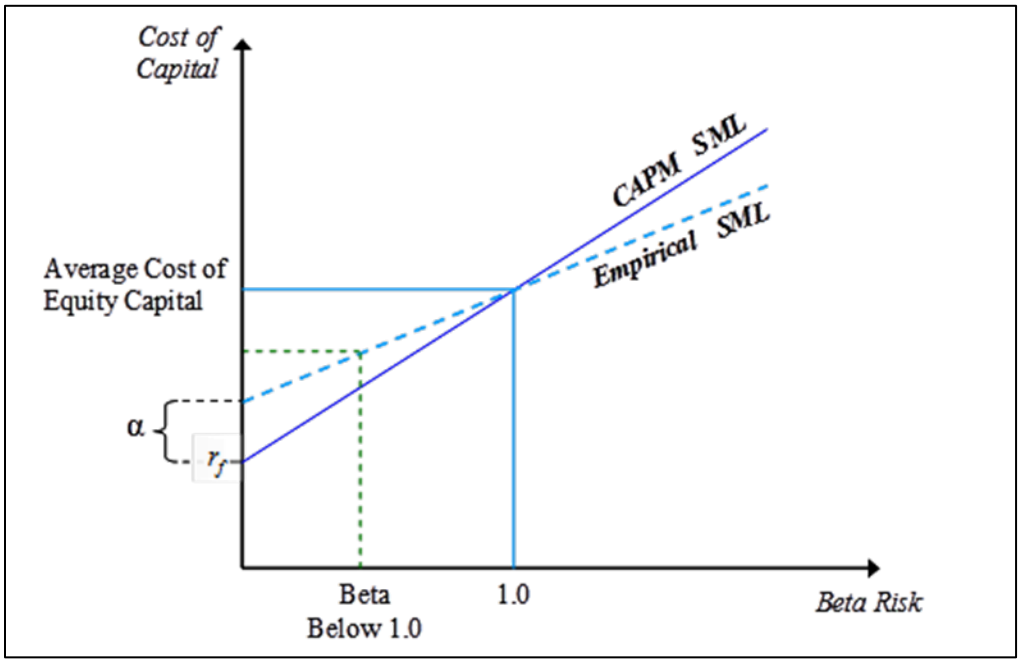
This model is referred to as the ECAPM. The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line in Figure 1, which results in a Security Market Line that more closely matches the results of empirical tests. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

Q42. Why do you use the ECAPM?

A42. The ECAPM is based on recognizing that the actual observed risk-return line is flatter and has a higher intercept than that predicted by the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact, which has been established by repeated empirical tests of the CAPM. Figure A-3 in Exhibit BV-2 provides a list of empirical studies that have tested the CAPM and also provides documentation for the magnitude of the adjustment, (α).

[42] *See* Exhibit BV-2 for references to relevant academic articles.

Figure 8: The Empirical Security Market Line



3. Inputs Used in the CAPM Based Models

Q43. Please summarize the parameters of the scenarios and variations you considered in your CAPM and ECAPM analyses.

A43. The parameters for the two scenarios are displayed in Figure 9 below. The basis for using the scenarios is the empirical observation that the yield spread is higher than normal as is the forecasted Market Risk Premium. The increased yield spread could reflect the increase in the Market Risk Premium or downward pressure on the yield of government bonds due to a flight to quality or other factors. Therefore, I used the unadjusted forecast risk-free rate with a higher estimate of the Market Risk Premium, and the unadjusted historical average Market Risk Premium with the increased estimate of the risk-free interest rate as illustrated in Figure 9. This is a conservative approach as it is plausible that both downward pressure on the risk-free rate and upward pressure on the Market Risk Premium could simultaneously occur. Scenario 1 normalizes the risk-free rate and uses a historical Market Risk Premium while Scenario 2 uses an unadjusted forecast of the risk-free rate and a forecasted Market Risk Premium. Because I did not simultaneously normalize both the

government bond rate and the Market Risk Premium, my estimates are more likely to be downward than upward biased.

Figure 9: **Parameters Used in CAPM-based Models**

	Scenario 1	Scenario 2
Risk-Free Interest Rate	4.0%	3.6%
Market Equity Risk Premium	6.9%	7.9%

D. FINANCIAL RISK AND THE COST OF EQUITY

Q44. Are differences in financial leverage important to the estimation of the cost of equity?

A44. Yes. Both the CAPM and the DCF models rely on market data to estimate the cost of equity for the sample companies, so the results reflect the value of the capital that investors hold during the estimation period (market values). The allowed ROE is applied to California-American Water's rate base, which could be financed with a different portion of debt than the sample companies. Taking differences in financial leverage into consideration does not change the value of the rate base, but it does consider the fact that the more debt a company has, the higher is the financial risk associated with an equity investment. To see this I constructed a simple example below, where only the financial leverage of a company varies. I assumed the return on equity is 11 percent at a 50 percent equity capital structure and determine the return on equity that would result in the same overall return if the percentage of equity in the capital structure were reduced to 45 percent.

Figure 10
Illustration of Impact of Financial Risk on Allowed ROE

		Company A (50% Equity)	Company B (45% Equity)
Rate Base	[a]	$1,000	$1,000
Equity	[b] = [a] x Equity Share	$500	$450
Debt	[c] = [a] - [b]	$500	$550
Total Cost of Capital (@ 8%)	[d] = [a] x 8%	$80.00	$80.00
Cost of Debt (@ 5%)	[e] = [c] x 5%	$25.00	$27.50
Allowed Return on Equity	[f] = [d] - [e]	$55.00	$52.50
Implied ROE	[g] = [f] / [b]	11.0%	11.7%

Figure 10, above, illustrates how financial risk affects returns and also the allowed ROE. The overall return remains the same for Company A and B at $80. But Company B with the lower equity share and higher financial leverage must earn a higher percentage ROE in order to maintain the same overall return. This higher percentage allowed ROE represents the increased risk to equity investors caused by the higher degree of financial leverage.

The principle illustrated in Figure 10 is exemplary of the adjustments I performed to account for differences in financial risk when conducting estimates of the cost of equity applicable to California-American Water.

Q45. Please describe the methods you use to take differences in financial risk into account.

A45. A common issue in regulatory proceedings (and business valuation in general) is how to apply data from a benchmark set of comparable securities when estimating a fair return on equity for the target/regulated company. It may be tempting to simply estimate the cost of equity capital for each of the sample companies (using one of the above approaches) and average them. After all, the companies were chosen to be comparable in their business risk characteristics, so why would an investor necessarily prefer equity in one to the other (on average)?

The problem with this argument is that it ignores the fact that underlying asset risk (i.e., the risk inherent in the lines of business in which the firm employs its assets) for each company is typically divided between debt and equity holders. The firm's debt and equity are therefore financial derivatives of the underlying asset return, each offering a differently structured claim on the cash flows generated by those assets. Even though the risk of the underlying assets may be comparable, a different capital structure splits that risk differently between debt and equity holders. The relative structures of debt and equity claims are such that higher degrees of debt financing increase the variability of returns on equity, *even when the variability of asset returns remains constant*. As a consequence, otherwise identical firms with different capital structures will impose different levels of risk on their

equity holders. Stated simply, increased leverage adds financial risk to a company's equity.[43]

To develop an intuition for the manner in which financial leverage affects the risk of equity, it is helpful to consider a concrete example. Figure 11 and Figure 12 below demonstrate the impact of leverage on the risk and return for equity by comparing equity's risk when a company uses no debt to finance its assets, and when it uses a 50-50 capital structure (i.e., it finances 50 percent of its assets with equity and 50 percent with debt). For illustrative purposes, the figures assume that the cash flows will be either $5 or $15 and that these two possibilities have the same chance of occurring.

Figure 11: All Equity Capital Structure

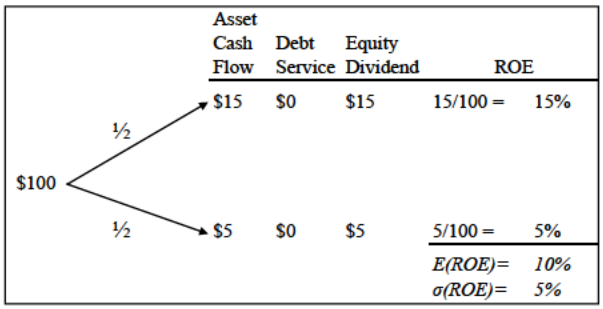
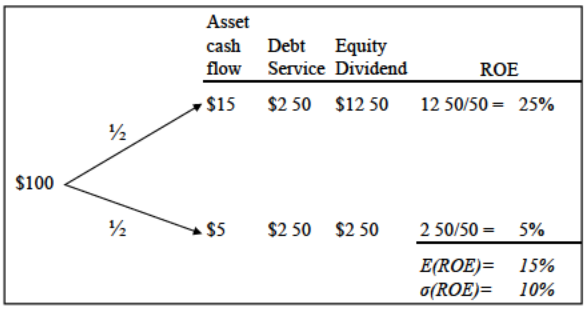


Figure 12: 50/50 Capital Structure



In the figures, $E(ROE)$ indicates the mean return and $\sigma(ROE)$ represents the deviation of returns from that mean. This simple example illustrates that the introduction of debt increases both the mean (expected) return to equity holders and the variance of that return, even though the firm's expected cash flows—which are a property of the line of business in which its assets are invested—are unaffected by the firm's financing choices. The "magic" of financial leverage is not magic at all—leveraged equity investors can only earn a higher return because they take on greater risk.

[43] I refer to this effect in terms of *financial risk* because the additional risk to equity holders stems from how the company chooses to finance its assets. In this context financial risk is distinct from and independent of the *business risk* associated with the manner in which the firm deploys its cash flow generating assets. The impact of leverage on risk is conceptually no different than that faced by a homeowner who takes out a mortgage. The equity of a homeowner who finances his home with 90% debt is much riskier than the equity of one who only finances with 50% debt.

Q46. Can you summarize the methods used to account for differences in financial risk?

A46. Yes. Because several different approaches are discussed in finance textbooks, I use three common approaches to span the plausible range of outcomes. First, if the companies in a sample are comparable in terms of the systematic risks of the underlying assets, then the overall cost of capital of each company should be about the same across companies (except for sampling error), so long as they do not use extreme leverage or no leverage. Thus, within a range of capital structures, the weighted average cost of capital will be the same for the sample used to estimate the cost of capital and for California-American Water. Second, alternative approaches based on the work of Professor Hamada account for the impact of financial risk by examining the impact of leverage on beta, which inherently means working within the CAPM framework. Hamada adjustment procedures—so-named for Professor Robert S. Hamada who contributed to their development[44]—are ubiquitous among finance practitioners when using the CAPM to estimate discount rates. In my CAPM analysis I employ two varieties of Hamada adjustments to beta: one that directly incorporates taxes and one that does not.

The theoretical and methodological details of these financial risk adjustment procedures are explained in the Technical Appendix (Ex. BV-2) to my testimony, and the mechanics of their implementation are shown in my workpapers and in Ex. BV-4.

Q47. Can you summarize the results from applying the CAPM-based methodologies?

A47. Yes. The results, adjusted to California-American Water's capital structure, are presented in Figure 13 below.[45]

[44] Hamada, R.S., "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stock", *The Journal of Finance* 27(2), 1971, pp. 435–452.

[45] Tables and supporting schedules detailing my cost of capital calculations for Gas Utility sample are contained in Exhibit BV-4

Figure 13: **Water Utility Sample CAPM-Based Results**

	Full Sample
Range of Estimates	9.5%–10.9%
Reasonable Range for Sample	10%–10.9%

The CAPM estimated cost of equity for a water utility with 55.4 percent equity has a somewhat wide dispersion, but a reasonable range is approximately 10 to 10.9 percent once the very high operating leverage of the industry and the exceptional need for capital investments have been taken into account.

E. THE DCF BASED ESTIMATES

1. Single- and Multi-Stage DCF Models

Q48. Can you describe the DCF approach to estimating the cost of equity?

A48. The DCF model attempts to estimate the cost of capital for a given company directly, rather than based on its risk relative to the market as the CAPM does. The DCF method simply assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow—literally a stream of expected "cash flows" discounted at a risk-appropriate discount rate. When the cash flows are dividends, that discount rate is the cost of equity capital:

$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \qquad (6)$$

Where P_0 is the current market price of the stock;

D_t is the dividend cash flow expected at the end of period t;

T is the last period in which a dividend cash flow is to be received; and

r is the cost of equity capital.

Importantly, this formula implies that if the current market price and the pattern of expected dividends are known, it is possible to "solve for" the discount rate, ***r*** that makes the equation true. In this sense, a DCF analysis can be used to estimate the cost of equity

capital implied by the market price of a stock and market expectations for its future dividends.

Many DCF applications assume that the growth rate will remain constant forever, so the formula can be rearranged to estimate the cost of capital. Specifically, the implied DCF cost of equity can then be calculated using the well-known "DCF formula" for the cost of capital:

$$r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g \qquad (7)$$

where D_0 is the current dividend, which investors expect to increase at rate g by the end of the next period, and over all subsequent periods into perpetuity.

Equation (7) says that if equation (6) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the single-stage DCF model; it is also known as the Gordon Growth model.[46]

Q49. Are there different versions of the DCF model?

A49. Yes. There are many alternative versions, notably (i) multi-stage models, (ii) models that use cash flow rather than dividends, or versions that combine aspects of (i) and (ii).[47] One such alternative expands the Gordon Growth model to three stages. In the multistage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period.[48]

A common implementation of the multi-stage DCF is to assume that companies grow their dividend for five years at the forecasted company-specific rate of earnings growth, the growth then transitioning to over the next five years toward a forecast of the growth rate of the overall economy (i.e., the long-term GDP growth rate forecasted to be in effect 10 years

[46] The Gordon Growth model is among the models the CPUC has reviewed in the past.

[47] The Surface Transportation Board uses a cash flow based model with three stages. See, for example, Surface Transportation Board Decision, "STB Ex Parte No. 664 (Sub-No. 1)," Decided January 23, 2009. Confirmed in STB Docket EP No. 664 (Sub-No. 2), October 31, 2016.

[48] *See* Ex. BV-2 for further discussion of the various versions of the DCF model, as well as the details of the specific versions I implement in this proceeding.

or more into the future). While variations of this model have historically been used many of its features are problematic in the current environment. In particular: (i) The current dividend yield may be lower than expected going forward for the reasons discussed in Figure 6 above and (ii) the current GDP forecast is much lower than its historical average. Thus, the combination of these two elements is likely to lead to unusually low DCF estimates of the cost of equity. As a result, I believe the result merits less weight than the Gordon growth model discussed above.

Q50. What are the relative strengths and weaknesses of the DCF versus CAPM based methodologies for estimating the cost of equity capital?

A50. Current market conditions affect all cost of capital estimation models to some degree, but the DCF model has at least one advantage over the CAPM-based models as it includes contemporaneous stock prices and forward-looking growth, whereas the CAPM relies on historical data to estimate systematic risk and (in some cases) the market risk premium.

2. DCF Inputs

Q51. What growth rate information did you use?

A51. I looked to a sample of investment analysts' forecasted earnings growth rates for companies in my samples. I used investment analyst forecasts of company-specific growth rates sourced from *Value Line* and Thomson Reuters *IBES*. (For Middlesex Water Co., SJW Corp., and York Water Co., IBES does not provide a consensus growth rate estimate.[49]) For the multi-stage version, I also use Blue Chip growth forecasts.

Additionally, I relied on the dividend yields of the companies, which I estimate using the most recently available dividend information and the average of the last 15 days of stock prices. As the single largest advantage of the DCF model is that is uses current market information, I find it is important to use a relatively short time period to determine the

[49] Certain sources that report IBES estimates—including Yahoo! Finance—do currently show growth rate projections for these companies. However, my analysis of detailed information on the individual estimates underlying the IBES consensus provided by Thomson Reuters (via their Eikon subscription data service) reveals that these growth rates are based on "stale" estimates that were originally made some years ago and have not been updated since.

dividend yield—yet to avoid the bias caused by using any one day. I believe a 15-day average accomplishes that goal. Because the stock prices of utilities currently are higher than they historically have been and because some companies engage in share buybacks, the dividend yield underestimates the yield on cash distributions to investors. I have not adjusted for this in my calculations and therefore believe my estimates to be conservative.

Q52. Please address the input data in the DCF model.

A52. The Gordon Growth / single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon, but estimates are typically only available for three to five years.

One issue with the data is that it includes solely dividend payments as cash distributions to shareholders, while some companies also use share repurchases to distribute cash to shareholders. To the extent that companies in my samples use share repurchases, the DCF model using dividend yields will under estimate the cost of equity for these companies.

A second issue is that the flight to quality has resulted in higher than usual stock prices for water utilities and hence lower than usual dividend yields. As a result, the dividend yield may be downward biased. The multi-stage DCF model additionally requires a measure of the long-term expected GDP growth. While I commonly report the results from using the Blue Chip forecasted GDP growth, the current GDP growth forecast is substantially below what historically has been the case. I therefore also calculate the multi-stage DCF using the historical GDP growth to assess the potential downward bias in the multi-stage DCF using Blue Chip forecasted growth.[50]

[50] I obtained data on the historical GDP growth from the Federal Reserve's FRED system: https://fred.stlouisfed.org/series/GDP/downloaddata

3. Share Buybacks and the DCF Model

Q53. Are there other important considerations regarding the implementation of the DCF models for water utilities?

A53. Yes. Several water utilities have engaged in share buybacks, which means that they have distributed cash to shareholders through means other than dividends. Therefore, a model that relies on dividends only under estimates how much cash shareholders have received. In particular, the dividend yield is lower than the cash yield and as a result the estimated return on equity is too low.

Q54. Please explain how you determine the implications of share buybacks.

A54. Looking at the sample companies annual reports and news announcements, I find that three companies have recently engaged in share buybacks: American Water Works, Aqua America, and York Water. Of these, American Water Works and York Water have ongoing non-dilutive share buyback programs authorizing the repurchase of specified numbers of outstanding shares. For both of these companies, I determine the magnitude of the share buyback and the horizon over which the buybacks are announced to occur. I then calculate the total cash flows expected per share including buybacks, and use that figure rather than the dividend-only yield to determine the DCF-based ROE. In doing so, I take care that share buybacks are modeled only for the first few years, based on the announced parameters and recent activity of on-going programs. Conservatively, I do not assume any cash distributions via repurchases except where the companies have explicitly announced on-going programs in their annual reports, even though investors may expect them even without an explicit announcement, especially for companies that have engaged in such buybacks in the recent past. Having determined the cash yield and the period during which it is relevant, I can calculate the DCF-based results using the modified model and find the differences provided in Figure 14 below.[51]

[51] Note that the DCF ROE calculations for this analysis are illustrative and not intended to serve as estimates for the proxy group companies. My actual estimates for the proxy group companies, which more precisely model quarterly expected dividends and appropriately account for differences in financial leverage, but do not take account of share buybacks, are provided in Exhibit BV-4.

Figure 14: Company Buyback Analysis

Company	Ticker	Single Stage DCF ROE: Dividend stream (no buybacks) [1]	Single Stage DCF ROE: Dividend stream (with buybacks) [2]	Single Stage DCF ROE: Difference [3]	Multi-Stage DCF ROE: Dividend stream (no buybacks) [4]	Multi-Stage DCF ROE: Dividend stream (with buybacks) [5]	Multi-Stage DCF ROE: Difference [6]
Amer. States Water	AWR	NA	NA	NA	NA	NA	NA
Amer. Water Works	AWK	10.1%	10.8%	0.69%	7.0%	7.3%	0.31%
Aqua America	WTR	NA	NA	NA	NA	NA	NA
California Water	CWT	NA	NA	NA	NA	NA	NA
Conn. Water Services	CTWS	NA	NA	NA	NA	NA	NA
Middlesex Water	MSEX	NA	NA	NA	NA	NA	NA
SJW Corp.	SJW	NA	NA	NA	NA	NA	NA
York Water Co. (The)	YORW	8.7%	9.2%	0.54%	6.4%	6.7%	0.29%
Average		9.4%	10.0%	**0.61%**	6.7%	7.0%	**0.30%**

Notes:
[1]-[2]: Buybacks Analysis Supporting Schedule #1, Panels A and B.
[3]: [2]-[1]
[4]-[5]: Buybacks Analysis Supporting Schedule #2, Panels A and B.
[6]: [5]-[4]
NA signifies that the company does not have any indication of future buybacks.
AWR and WTR both had buyback programs that were completed by end of year 2016.

Q55. What conclusions do you draw from this analysis?

A55. Based on the analysis above, it is clear that the reliance on dividends as the only source of cash that accrue to shareholders creates a downward bias in the cost of equity estimates obtained from the dividend discount model. Specifically, the average downward bias for affected companies is 61 basis points in the single-stage DCF and 30 basis points in the multi-stage DCF. While I do not attempt to correct for this bias via any specific numerical adjustments, I do consider it when evaluating the range of reasonable cost of equity estimates based on the model results.

Q56. What are the DCF based cost of equity estimates for the sample?

A56. The results are presented in Figure 15 below.[52]

[52] Tables and supporting schedules detailing my cost of capital calculations are included in Ex. BV-4.

Figure 15: Range of DCF Results for Water Utility Sample[53]

	Sample
Range of Results	8.3%–11.1%
Reasonable Range	9.5%–11.0%

I believe that the simple DCF is a much more reasonable estimate at the current time than is the multi-stage DCF. The multi-stage DCF is impacted by both low dividend yields that fail to consider the share buybacks and the unusually low GDP growth rate forecast, as well as the downward pressure on the dividend yield from low interest rates as discussed in Section IV. Therefore, I believe the multi-stage DCF results deserve limited weigh at this time. As a result, I find that a reasonable range for the DCF results for the sample is about 9.5 to about 11.0 percent. The lower bound takes into the downward bias from buyback activity as well as the unusually low GDP growth while the upper bound simply eliminates results above 11%. In my judgment, it is appropriate to "narrow the range" of DCF estimates in this manner so as to recognize the potential biases from the two versions of the DCF. The single-stage DCF assumes that individual company growth rates will persist forever, which may not be appropriate if 3-5 year growth exceeds the perpetual growth rate potential of the larger economy. Conversely, as noted above, the multi-stage version of the DCF is currently estimated using a lower-than typical estimate of long-term GDP growth (4.20 percent, compared to estimates in the range of 4.5 percent provided in recent years, and average annual historical GDP growth of 6.5 percent in the time-series maintained by the Federal Reserve Bank of St. Louis); this low forecast likely introduces a downward bias in the multi-stage DCF results by a non-trivial amount.

Q57. How do you interpret the results of your DCF analyses?

A57. The DCF model estimates a wide range from 8.3 percent to 11.1 percent, but I note that the combined impact of the elevated P/E ratios and the low GDP growth render the multi-stage

[53] I note that while the lower bound of my DCF based cost of equity range of estimates is determined using the Blue Chip forecasted GDP growth in the multi-stage model, using a long-term historical level of GDP growth (e.g., the approximately 4.75 percent annual average GDP growth rate that has occurred over the most recent 30 years) would result in a cost of equity estimate of8.7 percent for the sample ignoring buybacks.

DCF downward biased. In addition, the presence of non-dividend cash distributions (in this case share buybacks) biases the estimation results downward, and as demonstrated above, such unaccounted for cash distributions have a material effect on the dividends-only DCF results for some of the companies in the water utility sample. In summary, the DCF results are likely downwardly biased due to a combination of elevated P/E ratios, the presence of substantial share buybacks, and—for the multi-stage model—unusually low GDP growth forecasts. Consequently, I find that the DCF analysis supports a cost of equity for a generic water utility in the range of 9.5 to 10.8 percent and that a reasonable point estimate for California-American Water is at the upper bound at 10.8 percent.

F. THE IMPLIED RISK PREMIUM MODEL ESTIMATES

Q58. Did you estimate the cost of equity that results from an analysis of risk premiums implied by ROE's that were derived in past utility rate cases?

A58. Yes. In this type of analysis, which I am calling the "implied risk premium model" to avoid potential confusion with more a broader set of approaches that are often categorized under the label of "risk premium" approaches, the cost of equity capital for utilities is estimated based on the historical relationship between ROE's derived in in past utility rate cases and the risk-free rate of interest at the time the ROE's were derived. These estimates add a "risk premium" implied by this relationship to the relevant (prevailing or forecast) risk-free interest rate:

$$Cost\ of\ Equity = r_f + Risk\ Premium$$

Q59. What are the merits of this approach?

A59. First, it estimates the cost of equity from regulated entities as opposed to publicly-traded holding companies, so that the relied upon figure is directly applicable to a rate base. Second, the allowed returns are clearly observable to market participants, who will use this one data input to make investment decisions, so that the information is at the very least a good check on whether the return is comparable to that of other investments. Third, I analyze the spread between the allowed ROE at a given time and the then-prevailing interest rate to ensure that I properly consider the interest rate regime at the time the ROE

was awarded. This implementation ensures that I can compare allowed ROE granted at different times and under different interest rate regimes.

Q60. How did you use rate case data to estimate the risk premiums for your analysis?

A60. I used rate case data from 2004 through 2016. The data from 2004-2014 is derived from AUS Consultants, the data for 2015 was collected from the sample companies 10-Ks and data for 2016 was obtained from SNL.[54] Using this data I compared (statistically) the average allowed rate of return on equity granted by U.S. state regulatory agencies in water utility rate cases to the average 20-year Treasury bond yield that prevailed in each quarter.[55]

I calculated the allowed utility "risk premium" in each quarter as the difference between allowed returns and the Treasury bond yield, since this represents the compensation for risk allowed by regulators. Then I used the statistical technique of ordinary least squares ("OLS") regression to estimate the parameters of the linear equation:

$$Risk\ Premium\ =\ A_0\ +\ A_1\ \times\ (Treausury\ Bond\ Yield) \qquad (8)$$

I derived my estimates of A_0 and A_1 using standard statistical methods (OLS regression) and find that the regression has a high degree of explanatory power in a statistical sense ($R^2 = 0.977$) and the parameter estimates, $A_0 = 9.13$ percent and $A_1 = -0.737$, are statistically significant. The negative slope coefficient reflects the empirical fact that regulators grant smaller risk premiums when risk-free interest rates (as measured by Treasury bond yields) are higher. This is consistent with past observations that the premium investors require to hold equity over government bonds increases as government bond yields decline. In the regression described above the risk premium declined by less than the increase in Treasury bond yields. Therefore, the allowed ROE on average declined by less than 100 basis points when the government bond yield declined by 100

[54] The data sources varied as I do not have access to one consistent source.

[55] I rely on the 20-year government bond to be consistent with the analysis using the CAPM and to avoid confusion about the risk-free rate. While it is important to use a long-term risk-free rate to match the long-lived nature of the assets, the exact maturity is a matter of choice.

basis points. Based on this analysis, I find that the risk premium model results applied using current treasury yields are consistent with an ROE of 10.1 to 10.2 percent for the average water utility.[56]

I also determine the ROE that is consistent with average allowed ROE granted for water utilities over the 12 years of available data, which is approximately 10.1 percent.

Q61. What conclusions did you draw from your risk premium analysis?

A61. While risk premium models based on historical allowed returns are not underpinned by fundamental finance principles in the manner of the CAPM or DCF models, I believe this analysis, can provide useful benchmarks for evaluating whether the estimated ROE is consistent with recent practice. My implied risk premium model cost of equity estimates demonstrate that the results of my DCF and CAPM analyses are broadly in line with the actions of utility regulators. Because the risk premium analysis as implemented takes into account the interest rate prevailing during the quarter the decision was issued, it provides a useful benchmark for the cost of equity in any interest environment.

VI. CALIFORNIA-AMERICAN WATER'S SPECIFIC CHARACTERISTICS AND THE COST OF EQUITY

A. RISK COMPARISON OF CALIFORNIA-AMERICAN WATER TO SAMPLE COMPANIES

Q62. Does California-American Water have risks characteristics that differ from those of the sample companies?

A62. Yes. California American Water faces three categories unique business risks. First, California-American Water has recently had (and expects to have going forward) very high capital expenditures, which, as discussed below, increases the variability in income and, in an environment of declining usage, the amount of capital that has to be recovered per gallon of water delivered. Second, the Company has in the past not been able to earn its allowed return on equity. Third, California-American Water faces some unique challenges

[56] The 10.1 percent is consistent with the forecasted risk-free rate, while the 10.2 percent is consistent with the normalized risk-free rate.

regarding the recovery of certain costs, which makes it even more challenging to earn the allowed ROE. Capital Expenditures

Q63. Have you analyzed California-American Water's capital expenditures?

A63. Yes. The Company has provided me with information regarding its recent historical and forecast future investments in utility plant assets. To compare the Company's historical expenditures to contemporaneous investment levels for the publicly-traded sample companies, I normalized the annual capital expenditures of each company by its gross property plant and equipment balances. This provides a measure of how substantial each company's investment is relative to its existing plant in service, and allows for a meaningful comparison of capital expenditures among the companies. As shown in Figure 16, California-American Water's capital expenditures have consistently been substantially higher (relative to gross plant) than those of the average sample company over the period 2011-2015. Indeed, in each of those years except 2012, California-American Water added to its gross plant balance by a larger percentage than *any* of the sample companies.

Figure 16
Historical Capital Expenditures as a Percentage of Gross Plant
For California-American Water and the Water Sample

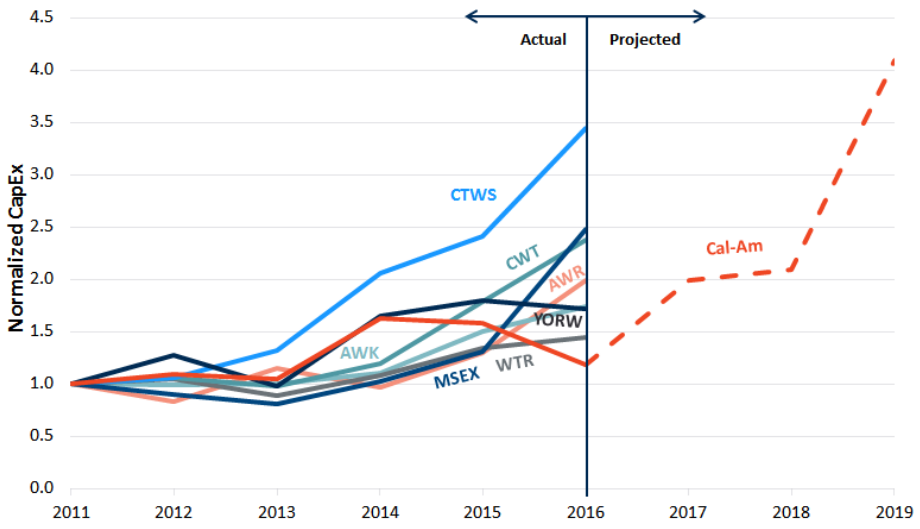
		CapEx / Gross PP&E					
		2011	2012	2013	2014	2015	2016
		[1]	[2]	[3]	[4]	[5]	[6]
Amer. States Water	[a]	6.1%	5.0%	6.6%	4.8%	5.5%	7.7%
Amer. Water Works	[b]	6.4%	6.0%	5.9%	5.5%	6.3%	6.6%
Aqua America	[c]	7.2%	6.9%	5.8%	5.8%	6.0%	5.9%
California Water	[d]	6.1%	6.1%	5.6%	5.7%	7.1%	8.5%
Conn. Water Services	[e]	4.8%	4.1%	5.1%	6.5%	6.4%	8.2%
Middlesex Water	[f]	4.5%	4.0%	3.5%	3.8%	4.2%	7.1%
SJW Corp.	[g]	5.3%	8.0%	6.0%	6.3%	6.1%	7.6%
York Water Co. (The)	[h]	3.4%	4.2%	3.3%	4.6%	4.3%	3.9%
Sample Average	[i]	5.5%	5.5%	5.2%	5.4%	5.7%	6.9%
California American	[j]	7.2%	7.4%	6.9%	10.5%	9.6%	

Sources and Notes:
[a] - [h]: Capital IQ.
[i]: Average([a] - [h])
[j]: California American provided data and CPUC Annual Reports.
[j][6]: CPUC Annual Report for 2016 not yet available.

Q64. What has been the recent trend in California-American Water's level of investment?

A64. California-American Water's capital expenditures have generally increased along with those of the water industry in general. Figure 17 plots the trajectory of capital structures for California-American Water and the sample companies, with each company's spending indexed to its 2011 levels. The figure demonstrates that while the Company's spending was lower in 2015 and 2016 than in 2014, its investment plan calls for substantial growth, including very large expenditures in 2019—at levels 2.5 to 4 times greater than was typical during 2011-2015. Given that this expected increase in spending comes on top of capital expenditure levels that are already substantially higher (relative to gross plant) than those of the sample companies, this suggests increased business risk for California-American Water relative to the sample.

Figure 17
Historical and Projected Capital Expenditure Growth for California-American Water and the Water Sample



Source: Capital IQ and California American.

Q65. How does a high and increasing level of capital expenditure increase business risk?

A65. Increased capital expenditure increases fixed costs (e.g., depreciation) and the higher fixed costs are relative to total costs, the higher is the company's operating leverage. As illustrated in Figure 18, operating leverage increases the company's exposure to income fluctuations. In the example below, I consider two utilities: Utility A and Utility B. Each

utility as a benchmark expects revenues of $1,000 and total costs (fixed and variable) of $900. However, while fixed costs are only 40% of Utility A's revenue, they make up 60% of Utility B's revenue. At the same time, variable costs are 50% of revenues for Utility A but only 30% of revenues for Utility B. In the top panel of Figure 18, the expected outcome is shown and illustrates that both entities expect to earn a net income of $100.

However, if revenues decline by 10% as shown in the bottom panel of the figure, Utility B will experience a greater shock to its income (equity return) than Utility A. This is because variable costs can be expected to decline in proportion to revenue, but fixed costs are just that—fixed. Therefore a higher degree of operating leverage (i.e., a higher proportion of fixed costs in the cost structure) increases risk to equity holders all else equal. This is important in the context of determining California-American Water's allowed ROE because the Company's high and increasing level of capital expenditure amplifies operating leverage, making the Company's income (and therefore its equity return) more volatile.

Figure 18
Illustration of Risk Imposed by Operating Leverage

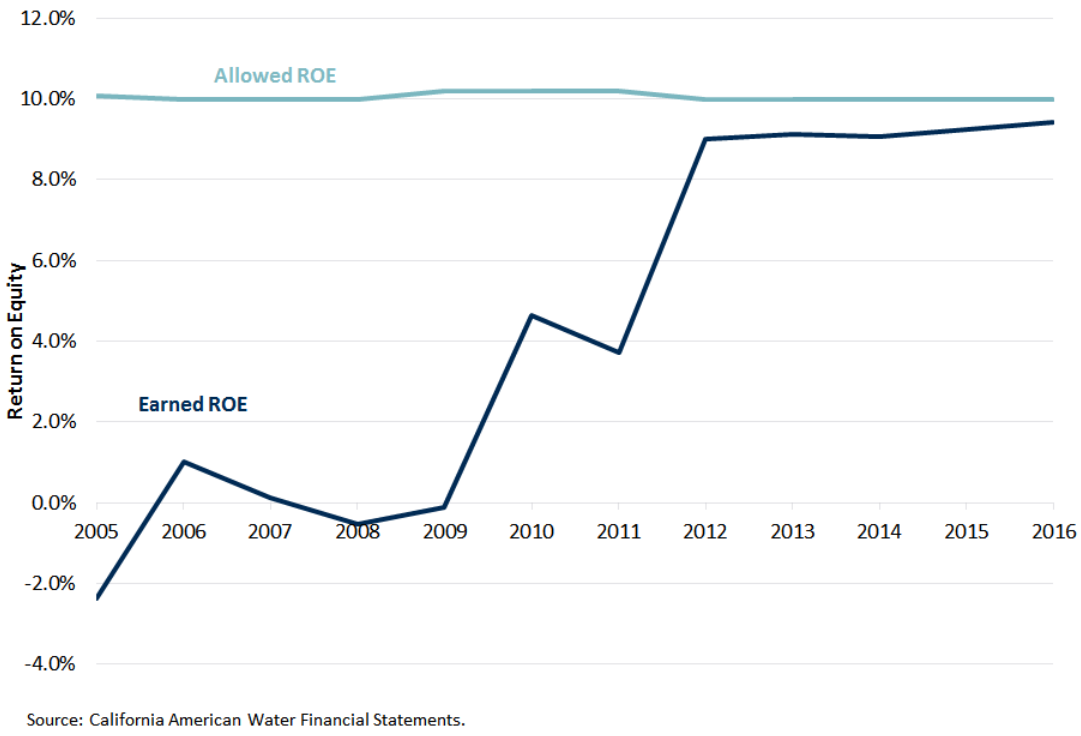
		Utility A	Utility B
Revenue	[a]	$1,000	$1,000
Variable Costs	[b]	($500)	($300)
Fixed Costs	[c]	($400)	($600)
Net Income	[d] = sum([a]:[c])	$100	$100
As Revenue and Variable Costs Decline by 10%...			
Revenue	[e] = [a] x (90%)	$900	$900
Variable Costs	[f] = [b] x (90%)	($450)	($270)
Fixed Costs	[g] = [c]	($400)	($600)
Net Income	[h] = sum([e]:[g])	$50	$30
Decline in Income	[i] = [h] - [d]	($50)	($70)
Percentage Decline in Income	[j] = [i] / [d]	-50%	-70%

1. Earning the Allowed ROE

Q66. What evidence do you have the California-American Water has been unable to earn its allowed ROE in the past?

A66. Figure 19 below shows the Company's allowed and Earned Return on Equity since 2011. It is clear from the figure that California-American Water has earned below its allowed ROE every year since 2005 although the magnitude by which it has under earned has declined. Looking to just the last four years, the Company has on average earned 78 basis points less than allowed.

Figure 19: Allowed and Earned ROE



Source: California American Water Financial Statements.

Q67. Why does the consistent under earning matter?

A67. Recall that the cost of capital is "the expected rate of return in capital markets on alternative investments of equivalent risk" and that it refers to the probability-weighted average over all possible outcomes. Therefore, if the distribution of actual earnings around the allowed ROE is not symmetric—meaning the approximately is an equal amount above and below the allowed ROE—investors will no longer earn the allowed ROE on average.

Put differently, the Company faces asymmetric risk. In such circumstances, setting the allowed rate of return equal to the cost of capital does not necessarily provide the fair rate of return for a regulated company, even when the cost of capital is estimated perfectly and the market is fully aware of the risks facing the regulated company. To ensure that the expected ROE equals the cost of capital, the allowed ROE needs to be increased or the causes for under earning need to be removed.

2. Unique Financial Circumstances – Asymmetric Risk

Q68. Is California-American Water subject to any other unique financial circumstances or risk factors?

A68. Yes. The presence of a number of long-term assets, which earn a return below California-American Water's weighted cost of capital exposes the Company to asymmetric risks as discussed above. As these risks are discussed in the Direct Testimony of Jeffrey T. Linam, I shall only provide some examples and their impact.

Q69. What are some of the larger assets that earn below the weighted cost of capital?

A69. One example is the presence of a large regulatory asset, which earn only a commercial paper rate, which is well below the weighted cost of capital that the Company has and even well below long-term interest rates. California-American cannot finance long-term assets with commercial paper and therefore incurs a financing loss each and every year on the financing of this asset. Other examples are discussed in the Direct Testimony of Mr. Jeffrey L Linam. The presence of such deferral accounts postpones California-American Water's recovery of capital and hence weakens its financial position.

In addition, California American Water has committed to provide credit as part of a water purchase agreement entered into regarding the water supply for the Monterey district.[57] These commitments have been made to support the overall project in a manner to lower financing costs to customers in California American Water's Monterey district and ensure timely delivery of the completed project to meet regulatory mandates in a timely manner.

[57] See the Direct Testimony of Mr. Jeffrey L. Linam for details.

Q70. Are there unique factors that put risk on the Company's financial health?

A70. Yes. Most notably a recent proceeding regarding potential penalties associated with customer provided allotment rate design data in Monterey discuss potential penalties in the range of $3.1 million to $320 million,[58] which not only is an incredible wide range but also exceptionally large considering California-American Water's average common equity for 2015 was only $321 million.[59] Further, I note that the Company has committed to provide a letter of credit, a credit line, and subordinated debt as part of the order authorizing the regional desalination plant in Monterey.[60] Such financial commitments put pressure on the Company's cash flow and hence credit metrics. Lastly, I note that the Company has ongoing commitments to the San Clemente Dam as well as other environmental requirements that needs to be supported with capital.[61]

B. RECOMMENDED ALLOWED ROE FOR CALIFORNIA-AMERICAN WATER

Q71. Please summarize your ROE evidence.

A71. Based on my application of standard cost of capital models to a representative sample (and sub-sample) of publicly-traded water utility companies—with appropriate adjustments for differences in financial leverage I derived the range of cost of equity estimates displayed in Figure 20 below.

[58] Assigned Commissioner Ruling in Phase 3B of the Monterey Rate Design Proceeding (A.15-07-019).

[59] 2015 Annual Report of California-American Water, p. 6.

[60] http://docs.cpuc.ca.gov/published/Final_decision/127531-10.htm

[61] See the Direct Testimony of Jeffrey T. Linam for details.

Figure 20: Range of ROE Estimates for Water Utilities

	Reasonable Range
CAPM	10.0%–10.9%
DCF	9.5%–11.0%
Risk Premium	10.1%–10.2%
Overall	10–11%

Based on my assessment of the merits of the various models and their results as affected by prevailing economic and capital market conditions, I find that an ROE in the range of 10 to 11 percent is reasonable for the water distribution utilities when applied to a 2018 test-year capital structure with approximately 55 percent equity. I further note that the primary methods relied upon, such as the CAPM and DCF, are similar to those used in California-American Water's previous ratemaking proceedings.

Q72. What do you recommend for California-American Water's allowed return on equity?

A72. I recommend an allowed ROE of 10.8 percent for California-American Water. That figure is near the high end of my recommended range of 10 to 11 percent for the cost of equity of a typical sample water utility with California-American Water's business risk and financial leverage. My determination that the Company should earn an ROE near the high end—rather than at the midpoint of that range is based on my conclusion that California-American Water (i) has higher capital investment requirements than the sample, (ii) has been unable to earn its allowed ROE, and (iii) faces some unique asymmetric risks such as being unable to earn its weighted cost of capital on regulatory assets, increasing delay in recovery of cost, and an uncertain decision regarding the outcome of the Monterey rate design proceeding.

Q73. Does your recommendation include any consideration for recovery of flotation costs associated with California-American Water's equity issuances?

A73. No, it does not. While it is appropriate that California-American be allowed to recover underwriting fees and any other costs associated with its equity issuances as part of its cost of service, neither my cost of equity estimates for the water utility sample nor my

recommended allowed ROE for California-American Water includes any adjustment for such flotation costs. In my experience, it is not uncommon for regulators to provide an upward adjustment to the allowed ROE in 15 to 50 basis points range to provide for the recovery of flotation costs.

Q74. Does this conclude your direct testimony?

A74. Yes.