BEFORE THE
STATE OF NEW YORK PUBLIC SERVICE COMMISSION

CASE 19-E-[xxxx]	)	Proceeding on Motion of the Commission as
	)	to the Rates, Charges, Rules and Regulations
	)	of Consolidated Edison Company of New
	)	York, Inc. for Electric Service.
	)	
CASE 19-G-[xxxx]	)	
	)	Proceeding on Motion of the Commission as
	)	to the Rates, Charges, Rules and Regulations
	)	of Consolidated Edison Company of New
	)	York, Inc. for Gas Service.

DIRECT TESTIMONY OF BENTE VILLADSEN

January 25, 2019

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DIRECT TESTIMONY OF BENTE VILLADSEN

I. INTRODUCTION AND PURPOSE

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

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

Q2. Please summarize your professional qualifications.

A2. I have 20 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 in Alaska, Arizona, California, Illinois, New Mexico, Oregon, and Washington, as well as before the Bonneville Power Administration, the Surface Transportation Board, the Alberta Utilities Commission, and the Ontario Energy Board. I have provided white papers on cost of capital to the British Columbia Utilities Commission, the Canadian Transportation Agency as well as to European and Australian regulators on cost of capital. I have testified or filed testimony on regulatory accounting issues before the Federal Energy Regulatory Commission ("FERC"), the Regulatory Commission of Alaska, the Michigan Public Service Commission, the Texas Public Utility Commission

as well as in international and U.S. arbitrations and regularly provide advice to utilities on regulatory matters as well as risk management. I hold a Ph.D. from Yale University and a BS/MS from University of Aarhus, Denmark. Exhibit__(BV-1) contains more information on my professional qualifications as well as a list of my prior testimonies.

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

A3. I have been asked by Consolidated Edison Company of New York, Inc. ("Con Edison" or the "Company") to estimate the cost of equity that the State of New York Public Service Commission ("NY PSC" or the "Commission") should allow the Company an opportunity to earn on the equity financed portion of its regulated (gas and electric) utility rate base. Specifically, I perform cost of equity analysis and provide return on equity ("ROE") estimates derived from market data for a proxy group of regulated electric utility companies, and provide additional estimates based on an analysis of allowed utility risk premiums. I also evaluate the business risk characteristics of Con Edison and consider the Company's requested regulatory capital structure to be applied for ratemaking purposes.

II. SUMMARY OF CONCLUSIONS

Q4. Please summarize your findings and recommendation.

A4. I recommend that Con Edison be allowed to earn a 10.00 percent rate of return on the equity portion of its regulated rate base. This recommendation is based on my implementations of standard cost of capital estimation models including two versions each of the Discounted Cash Flow ("DCF") model and Capital Asset Pricing Model ("CAPM"), as well as an implied risk premium analysis, along with an analysis of Con Edison's risks. Figure 1 and Figure 2 below summarize the model results and the corresponding reasonable ranges that are presented and discussed in Section V below. Based on my consideration of the model results in the context of Con Edison's specific business risk characteristics and financial circumstances and of current capital market conditions, I believe it is appropriate to place Con Edison's allowed return at 10.00

percent, which is in the upper half of the overall 9.25 - 10.25 percent range of reasonable cost of equity estimates suggested by my analysis.

Figure 1
Summary of Results

Model		Estimate
CAPM	[a]	8.9% - 9.3%
ECAPM (α = 1.5%)	[b]	9.4% - 10.0%
Single-Stage DCF	[c]	10.4%
Multi-Stage DCF	[d]	8.8%
Implied Risk Premium	[e]	9.8% - 10.4%

Notes:
Estimates as of 11/30/2018.
[a], [b]: Long-term risk free rate of 4.1%, Long-term market risk premium of 7.07%.
[d]: Long-run nominal GDP growth estimate of 4.1%.
[e]: Estimated using rate case data from SNL and treasury data from Bloomberg.

Figure 2
Summary of Reasonable Ranges of Estimates

Model		Estimate
CAPM/ECAPM	[a]	9.25% - 10%
DCF Models	[b]	9.25% - 10.25%
Implied Risk Premium	[c]	9.75% - 10.5%

Q5. How is the remainder of your testimony organized?

A5. Section III formally defines the cost of capital and explains the techniques for estimating it in the context of utility rate regulation. Section IV discusses conditions and trends in capital markets and their impact on the cost of capital. Section V explains my analyses and presents the results. Finally, Section VI discusses Con Edison's business risk characteristics and other company specific circumstances relevant to my recommended allowed ROE for the Company within the reasonable ranges of cost of equity estimates.

III. COST OF CAPITAL PRINCIPLES AND APPROACH

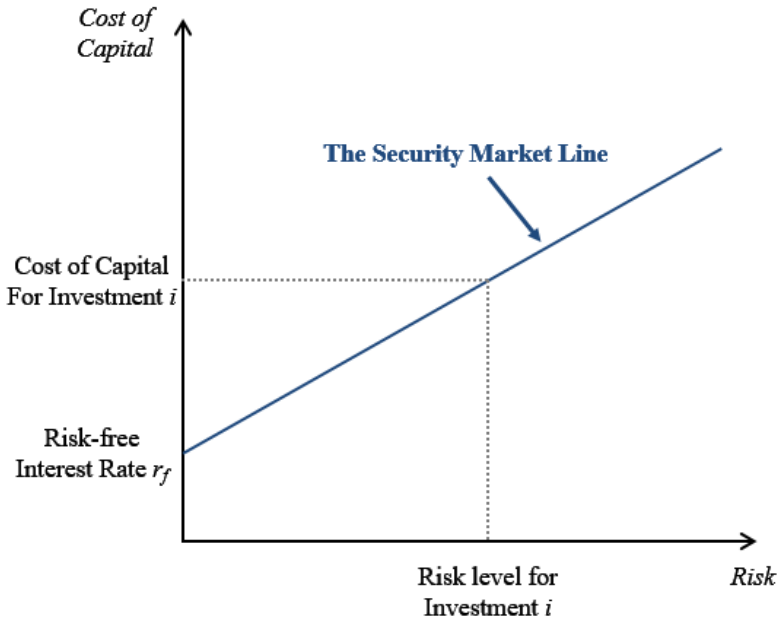
A. RISK AND THE COST OF CAPITAL

Q6. How is the "Cost of Capital" defined?

A6. The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. In other words, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. 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 3 below. The higher the risk, the higher the cost of capital required.

Figure 3
The Security Market Line



Q7. What factors contribute to systematic risk for an equity investment?

A7. When estimating the cost of equity for a given asset or business venture, two categories of risk are important. The first is business risk, which is the degree to which the cash flows generated by the business (and its assets) vary in response to moves in the broader market. In context of the CAPM, business risk can be quantified in terms of an "assets beta" or "unlevered beta." For a company with an assets beta of 1, the value of its enterprise will increase (decrease) by 1% for a 1% increase (decline) in the market index.

The second category of risk relevant for an equity investment depends on how the business enterprise is financed and is called financial risk. Section III.B below explains how financial risk affects the systematic risk of equity.

Q8. What are the guiding standards that define a just and reasonable allowed rate of return on rate-regulated utility investments?

A8. The seminal guidance on this topic was provided by the U.S. Supreme Court in the *Hope* and *Bluefield* cases,[1] which found that:

- The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks;[2]
- The return should be reasonably sufficient to assure confidence in the financial soundness of the utility; and
- 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.[3]

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[1] 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").

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

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

Q9. How does the standard for just and reasonable rate of return relate to the cost of capital?

A9. The first component of the *Hope* and *Bluefield* standard, as articulated above, is directly aligned with the financial concept of the opportunity cost of capital.[4] The cost of capital is the rate of return investors can expect to earn in capital markets on alternative investments of equivalent risk.[5]

By investing in a regulated utility asset, investors are tying up some capital in that investment, thereby foregoing alternative investment opportunities. Hence, the investors are incurring an "opportunity cost" equal to the returns available on those alternative investments. If the allowed return on the utility investment is not at least as high as the expected return offered by alternative investments of equivalent risk, investors will choose these alternatives instead, and the utility's ability to raise capital and adequately fund its operations will be adversely impacted or even prevented. This is a fundamental concept in cost of capital proceedings for regulated utilities such as Con Edison.

Q10. Please summarize how you considered risk when estimating the cost of capital.

A10. To evaluate comparable business risk, I looked to a proxy group of regulated electric utilities. Further, (as explained in Section III.B below) I analyzed and adjusted for differences in financial risk due to different levels of financial leverage among the proxy companies and between the capital structures of the proxy companies and the regulatory capital structure that will be applied to Con Edison for ratemaking purposes. To determine where in the estimated range Con Edison's ROE reasonably falls, I compared the business risk of Con Edison to that of the proxy group companies, and also considered recent capital markets developments.

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[4] A formal link between the opportunity cost of capital as defined by financial economics and the proper expected rate of return for utilities is set forth by Stewart C. Myers, "Application of Finance Theory to Public Utility Rate Cases," Bell Journal of Economics & Management Science 3:58-97 (1972).

[5] The opportunity cost of capital is also referred to as simply the "cost of capital," and can be equivalently described in terms of the "required return" needed to attract investment in a particular security or other asset (i.e., the level of expected return at which investors will find that asset at least as attractive as an alternative investment).

B. FINANCIAL RISK AND THE COST OF EQUITY

Q11. How does capital structure affect the cost of equity?

A11. Debt holders in a company have a fixed claim on the assets of the company and are paid prior to the company's owners (equity holders) who hold the inherently variable residual claim on the company's operating cash flows. Because equity holders only receive the profit that is left over after the fixed debt payments are made, higher degrees of debt in the capital structure amplify the variability in the expected rate of return earned by equity-holders. This phenomenon of debt resulting in financial leverage for equity holders means that, all else equal, a greater proportion of debt in the capital structure increases risk for equity holders, causing them to require a higher rate of return on their equity investment, even for an equivalent level of underlying business risk.

Q12. How do differences in financial leverage affect the estimation of the cost of equity?

A12. The CAPM and DCF model rely on market data to estimate the cost of equity for the proxy 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 Con Edison's rate base, which will be financed with a different portion of debt than the proxy companies. I consider the impact of any difference between the financial risk inherent in those cost of equity estimates and the capital structure used to determine Con Edison's required return on equity.

Differences in financial risk due to the different degree of financial leverage in Con Edison's regulatory capital structure compared to the capital structures of the proxy companies mean that the equity betas measured for the proxy companies must be adjusted before they can be applied to determining Con Edison's CAPM return on equity. Similarly, the cost of equity measured by applying the DCF models to the proxy companies' market data requires adjustment if it is to serve as an estimate of the appropriate allowed ROE for Con Edison at its different regulatory capital structure.

Importantly, taking differences in financial leverage into account does not change the value of the rate base. Rather, it acknowledges the fact that a higher degree of financial leverage in the regulatory capital structure imposes a higher degree of financial risk for an equity investment in Con Edison's rate base than is experienced by equity investors in the market-traded stock of the less leveraged proxy companies.

Q13. How specifically do you take financial risk into account in your analysis of the cost of equity using market data for the proxy group companies?

A13. There are several manners in which the impact of financial risk can be taken into account in an analysis of cost of equity using market-based models such as the DCF and CAPM. One way is to determine the after-tax weighted-average cost of capital for the proxy group using the equity and debt percentages as the weight assigned to the cost of equity and debt. If this figure is constant between the estimate obtained for the proxy group and the entity to which it is applied—in this case the capital structure used in the rate of return calculation—then the ROE that is required for 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.

A second approach was developed by Professor Hamada, who estimated the cost of equity using the CAPM and made comparisons between companies with different capital structure using 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 to obtain a so called all-equity or assets beta and then re-lever the beta to determine the beta associated with the regulatory capital structure. This requires an estimate of the systematic risk associated with debt (*i.e.*, the debt beta), which is usually quite small. In Exhibit___(BV-2) I set forth additional technical details related to methods to account for financial risk when estimating the cost of capital.

Q14. Can you provide a numerical illustration of how the cost of equity changes, all else equal, when the degree of financial leverage changes?

A14. Yes. I constructed a simple example below, where only the financial leverage of a company varies. I assumed the return on equity is 11.00 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 4
Illustration of Impact of Financial Risk on ROE

		Company A (50% Equity)	Company B (45% Equity)
Rate Base	[a]	$1,000	$1,000
Equity	[b]	$500	$450
Debt	[c]	$500	$550
Total Cost of Capital (8%)	[d] = [a] × 8%	$80.0	$80.0
Cost of Debt (5%)	[e] = [c] × 5%	$25.0	$27.5
Equity Return	[f] = [d] - [e]	$55.0	$52.5
Rate of Return on Equity (ROE)	**[g] = [f] / [b]**	**11.00%**	**11.67%**

Figure 4, above, illustrates how financial risk affects returns and the 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 4 is exemplary of the adjustments I performed to account for differences in financial risk when conducting estimates of the cost of equity applicable to Con Edison.

C. APPROACH TO ESTIMATING THE COST OF EQUITY

Q15. Please describe your approach for determining the cost of equity for Con Edison.

A15. 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 Con Edison focuses on measuring the expected returns required by investors to invest in companies that face business and financial risks comparable to those faced by Con Edison. Because certain of the models require market data, my consideration of comparable companies is restricted to those that have publicly traded stock. To this end, I have selected a proxy group consisting of publicly traded companies. The proxy group consists of companies providing primarily regulated electricity services.[6] With this proxy group, I derive estimates of the representative cost of equity according to standard financial models including two versions of the CAPM—the traditional version and an empirically-adjusted version—and single- and multi-stage versions of the DCF.

I also perform an analysis of historical allowed ROEs for electric utilities in relation to prevailing risk-free interest rates at the time, and use the implied allowed risk-premium relationship to estimate a utility cost of equity consistent with current economic conditions. The results of this implied risk premium analysis (sometimes referred to herein as the "Risk Premium" model) are an additional consideration that informs my recommendation and serves as a check on the reasonableness of my market-based results.

Q16. How do your approach and the models you employ compare to those traditionally employed by the Staff of the New York Department of Public Service ("Staff")?

A16. As exemplified in the Commission's most recent order regarding the Company's ROE[7] and in the testimony of Staff witnesses,[8] the Commission's Generic Finance Methodology is broadly similar to, but also has important differences from, my approach.

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[6] Consistent with past precedent in Con Edison's rate cases, I use a proxy group of electric utilities to calculate the recommend ROE for both Con Edison's electric and gas regulated operations.

[7] Order Approving Electric and Gas Rate Plans (Case 16-E-0060, 16-G-0061, and 16-E-0196), January 25, 2017 ("2017 Order"), p. 28.

[8] Direct Testimony of Staff Finance Panel in Cases 16-E-0060 and 16-G-0061, p. 63.

The market-based DCF and CAPM estimation techniques I rely on align with the Commission's historical reliance on both DCF and CAPM results to inform its allowed ROE determinations. Of note, Staff has consistently implemented a "zero-beta" version of the CAPM,[9] which is conceptually and methodologically aligned with the version of the empirical CAPM (*i.e.*, ECAPM) that I implement.

While Staff and I both derive estimates from the DCF and CAPM, there are differences in how we select inputs to implement the models. For example, Staff's approach to the DCF attempts to infer a "sustainable growth" rate based on Value Line forecasts of return on book equity and retention ratio, whereas I implement both single- and multi-stage DCF models based directly on forecasts (including by Value Line) of growth in earnings available for distribution to investors. As discussed further below, I believe considering the results of both single and multi-stage models is appropriate in light of current market conditions and their impact on dividend yields.

Similarly, for the CAPM, Staff typically relies on current Treasury yields for the risk-free rate, whereas I look at forecasts of the Treasury yield in an attempt to capture investor expectations for the risk-free rate of return during the period rates set in this proceeding will be in effect. While currently prevailing yields are somewhat lower than the forecasted yield I use, the reverse is true of the market risk premium ("MRP") estimates traditionally relied on by Staff, which are significantly higher than the estimate I employ, which (as discussed below) is supported by both historical and forward-looking evidence.

Importantly, as discussed in Section III.B, my CAPM and DCF analyses employ standard finance techniques to adjust explicitly for differences in financial leverage between the proxy group companies and the Company's requested regulatory capital structure. The fact that Staff's typical approach does not take financial risk into account by using the standard adjustment techniques means that Staff's analysis misses an important step in

[9] Id., p. 87; see also Prepared Testimony of Staff Panel in Cases 18-E-0067 & 18-G-0068, p. 92.

estimating the opportunity cost of capital commensurate with an investment of equivalent risk.[10]

Finally, in contrast to Staff's practice, I do not believe it is appropriate to place fixed primary emphasis on one model in deriving a recommended allowed ROE. Whereas the Commission has traditionally placed 2/3 weight on the DCF and 1/3 on the CAPM, I consider the ranges of results produced by the models I employ: two versions of the CAPM, two versions of the DCF, and the implied Risk Premium method. The reason I believe it is important to consider the range is that I prefer to focus on the tendency of the data rather than a weighted average of results for two models – either of which may be affected by idiosyncratic market conditions (model risk) at any given point in time.

Q17. Why do you believe your approach to considering ranges of estimates derived from multiple versions of both the DCF and CAPM, and also relying on an implied Risk Premium analysis, is justified?

A17. There is no one perfect model for estimating the cost of equity, and the various models and estimation approaches I employ each have different strengths and sensitivities. For example, the CAPM relies on an explicit measurement of systematic risk (beta) for which the cost of equity capital must compensate investors, but this parameter must be measured using historical data,[11] and thus changes more slowly in response to changes in industry risk characteristics. Conversely, the DCF models incorporate current market prices and the most recent dividends, enabling them to capture shifts over time. However, this also makes the DCF sensitive to short-term market phenomena that may or may not be representative of the capital market conditions and required investor returns that will prevail during the time Con Edison's electric and gas rates are in effect. In contrast to both the CAPM and DCF models, the implied risk premium analysis focuses directly on

[10] I am not aware of any textbooks that do not discuss methods to account for financial risk.

[11] I note that Value Line applies an empirical adjustment (the Blume adjustment) that converts the beta derived from historical return data into a better indicator of forward-looking systematic risk (i.e., a better predictor of beta going forward).

the relationship of allowed returns for regulated utility companies to observable rates of return (*i.e.*, bond yields) reflective of contemporaneous capital market conditions.

Q18. Have other important utility regulatory bodies acknowledged the importance of relying on multiple models?

A18. Yes. Notably FERC, which regulates electric transmission operations, recently issued an order proposing to rely explicitly on four models in its determination of just and reasonable ROEs for transmission owners.[12] The FERC ROE Order represents a substantial change of FERC's historical practice of relying on only a single model—the DCF—to set allowed ROEs. In it, FERC explicitly recognizes that different models offer complementary views of investor requirements and market expectations and that it is necessary to evaluate and consider all such evidence.

Q19. What reasons did FERC give for revising its approach to consider multiple models rather than only the DCF?

A19. In the FERC ROE Order, FERC stated its concern that compared to when it originally adopted the DCF model as its only focus of consideration for determining utility ROEs, "the DCF methodology may no longer singularly reflect how investors make their decisions," since "investors have increasingly used a diverse set of data sources and models to inform their investment decisions."[13] The FERC ROE Order also lays out other "difficulties with sole reliance on the DCF methodology," including that the single model's results appear at times to diverge from its underlying principles and the real world experience of capital market participants, and that the results sometimes move differently from the results of other models on which those market participants may rely to inform their investment decisions.[14] Ultimately, FERC views its proposal to rely on

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[12] See Coakley v. Bangor Hydro-Electric Co., 165 FERC ¶ 61,030 (October 2018) (referred to herein as the "FERC ROE Order"). The ROE estimation methodologies in the FERC ROE Order include versions of the DCF and CAPM, as well as the implied Risk Premium method and an Expected Earnings analysis.

[13] FERC ROE Order, paragraph 40.

[14] *Id*., paragraphs 40-45.

multiple models as a way to avoid this "model risk" and summarizes its rationale as follows.

> In relying on a broader range of record evidence to estimate [New England Transmission Owners'] cost of equity, we ensure that our chosen ROE is based on substantial evidence and bring our methodology into closer alignment with how investors inform their investment decisions.[15]

FERC's assessment and reasoning in this regard is very much in line with the principles that guide my own decision to inform my analysis based on the results of multiple complementary analyses.

Q20. Are there any potential concerns about how current capital market conditions may influence the DCF model results that may caution against giving it disproportionate weight in setting Con Edison's ROE?

A20. Yes. To the extent utility stocks are currently acting as a *relatively* less risky investment vehicle for risk-averse investors seeking returns in a time of increased volatility and still-low government bond yields, this may contribute to their price-to-earnings ratios ("PE ratios") being unrepresentatively high—and their dividend yields unrepresentatively low—compared to what investors might expect in a more normal (or normalizing) interest rate environment. If this is the case, implementing the DCF model using current market data may produce results that understate what investors' required returns will be when interest rates move higher as expected in the near future (including during the time period Con Edison's rates set during these proceedings will be in effect).

FERC addressed a similar issue in the FERC ROE Order, expressing its concern about the reliability of DCF model results in the current market environment as follows.

> Under [the premise of the DCF methodology], increases in a company's actual earnings or projected growth in earnings would ordinarily be required to justify an increase in the company's stock price. Moreover, there is no evidence that investments in the utility sector have become less risky during these periods. However, it appears that during the periods at issue in these complaint proceedings, average utility stock prices have increased by more than would be justified by any increase

[15] Id., p. 15.

> in actual utility earnings or projected growth in earnings. From October 1, 2012 through December 1, 2017, the Dow Jones Utility Average increased from about 450 to 762.59, an increase of almost 70 percent. However, utility earnings did not increase by nearly the same amount, as demonstrated in Figure 3 below, which shows the substantial increase in utilities' price to earnings (PE) ratio during the same period. Moreover, average IBES three to five year growth projections appear not to have increased during that period. Thus, there has not been an increase in either current or projected utility earnings that would justify the substantial increase in utility stock prices.[16]

FERC concluded from this discussion that recent investor behavior with respect to utility stocks appears to have diverged from the DCF model's predictions, a factor that informs FERC's decision (discussed in Section III.C) to reconsider its primary reliance on the DCF in favor of giving equal weight to four different and complementary models. Similarly, this concern informs the way I consider the results of the DCF models as well as the CAPM and Risk Premium models in selecting my recommendation.

IV. CAPITAL MARKET CONDITIONS AND THE COST OF CAPITAL

Q21. Why do you discuss capital market conditions in testimony aimed at determining Con Edison's ROE?

A21. This section discusses important market conditions that affect the inputs to the cost of equity models. Because the risk-free rate is an input to the CAPM, recent and expected developments in risk-free government interest rates are important to assess the validity of any measure of the risk-free rate. Similarly, the MRP is an input to the CAPM, so factors that affect the MRP (*e.g.*, volatility and changes in investors risk perception) are vital for an accurate determination of the ROE.

As to DCF model inputs, developments in the economy in general affect growth rates and utility stock prices. Consequently, the capital market developments impact the growth rates, dividend yield, and general assessment of the estimates' reasonableness.

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[16] FERC ROE Order, paragraph 45 (citations omitted).

Finally, the Tax Cuts and Jobs Act of 2017 ("TCJA") affected utilities differently than other companies in that tax reductions generally flow to customers and, consequently, impacts the utility's credit metrics and earnings volatility. As a result, it is necessary that the allowed ROE and appropriate equity capital structure ratio for Con Edison fulfill the requirements set forth by *Hope* and *Bluefield* once the implications of the TCJA are considered.

Q22. Please summarize how your analysis of capital market conditions affects your conclusions?

A22. First, I conclude that interest rates are on an increasing trajectory, with practitioner forecasts and bond yield spread evidence suggesting further increases in long-term government bond yields. This supports my reliance on forecasts of long-term U.S. Treasury yields for the risk-free rate.

Second, because forward-looking estimates of the MRP have recently been at or slightly above the long-term historical average level and market volatility indicators have recently been higher, I conclude my reliance on the historical average U.S. MRP of 7.07% is reasonable and conservative as an input to my CAPM and ECAPM analysis.

Finally, I conclude that because (all else equal) the TCJA results in reduced cash flows and increased volatility of cash flows for Con Edison, it may be appropriate to increase the Company's allowed ROE, its equity capital structure, or both. While I do not make any explicit adjustment for TCJA's impact in my implementation of the models, I do consider it in placing my recommendation within the range of reasonable cost of equity results from the DCF, CAPM, and Risk Premium analyses.

A. INTEREST RATE DEVELOPMENTS

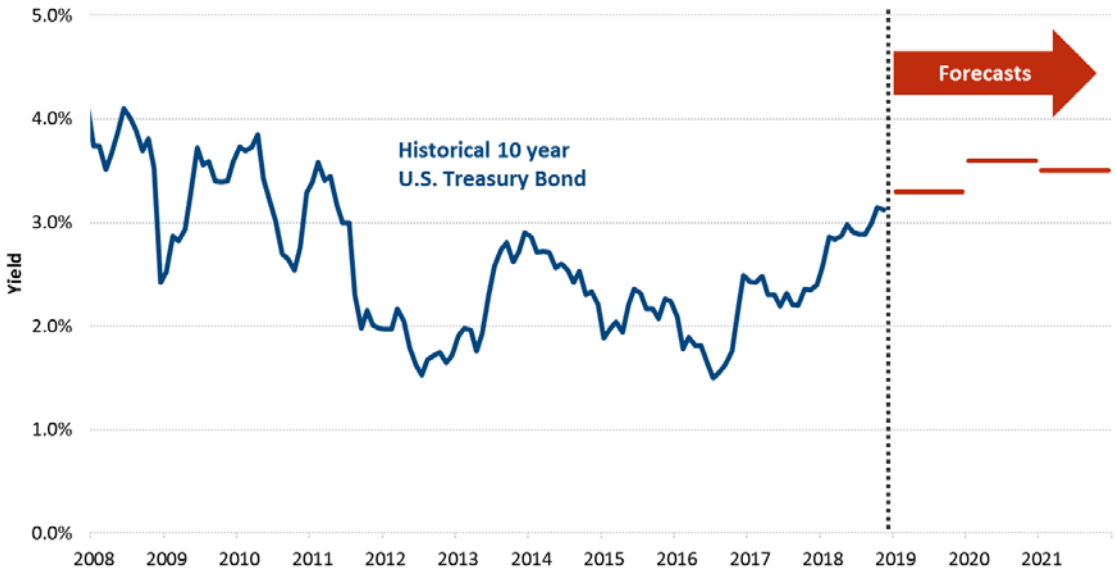
Q23. What are the relevant developments regarding interest rates?

A23. Interest rates, including the long-term government bond yields that are typically used to represent the risk-free rate in the context of regulated utility ratemaking, have remained extremely low in the years since the global financial crisis of 2008. However, yields

have increased substantially over the past year and are forecasted to continue on their upward trajectory in coming years. For example, since hitting an all-time low in July 2016, the yield on ten-year U.S. Treasury bonds has more than doubled to over 3 percent at the time of my analysis.[17]

Furthermore, the consensus forecast from Blue Chip Economic Indicators—which surveys more than 50 institutional market analysts and participants, including major banks, academic finance departments, credit rating agencies, institutional investors, and Fortune 500 companies—is that the yield on ten-year Treasury bonds will increase to 3.6 percent by 2020. Figure 5 below plots these expected increases in the ten-year Treasury bond yield.

Figure 5
Historical and Projected Ten-Year Treasury Bond Yields



Source: Historical data from Bloomberg. Forecasts from Blue Chip Economic Indicators Oct. 2018 issue.

[17] Bloomberg as of 11/30/2018. The November 2018 average ten-year U.S. Treasury yield was 3.12%. On July 5, 2016, the ten-year U.S. treasury yield closed at 1.37%.

Q24. What forces contributed to the sustained period of very low interest rates over the decade following the financial crisis?

A24. The monetary policy actions of the Federal Reserve (the "Fed") in response to the financial crisis were a key driver of the low interest rates. The Fed's Federal Open Market Committee ("FOMC") undertakes market actions to influence interest rates—especially the so-called "federal funds rate"[18]—subject to its statutory mandate to maximize employment and keep inflation under control. In response to the financial crisis, the FOMC drastically reduced its target federal funds rate from 5.25 percent in August 2007 to 0.00 – 0.25 percent starting in December 2008.[19] The Fed's zero interest rate policy remained in effect for the next seven years, ending in December 2015 when the FOMC finally raised its federal funds target to 0.25 - 0.50 percent.[20]

Concurrent with its sustained monetary policy actions related to the short-term federal funds rate, the Fed also implemented several unprecedented policy interventions with the explicit goal of reducing interest rates on long-term borrowing instruments. This "quantitative easing" program of long-term government bonds served to keep Treasury yields at very low levels for an extended period of time. And importantly, even after the FOMC ceased buying securities, it maintained trillions of dollars' worth of Treasuries and government-backed mortgage backed securities on its balance sheet, continuing to reinvest the principal when the assets matured.[21]

Global economic conditions also contributed to the unprecedented low rates on U.S. government debt. For example, at the height of the European sovereign debt crisis in 2011-2012, flight from European bonds and yield-lowering actions by the European

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[18] The federal funds rate is the rate at which large banks lend and borrow funds in the short-term. It is therefore influential in determining market interest rates throughout the economy.

[19] See FOMC Statements issued August 7, 2007 and December 16, 2008 accessed at https://www.federalreserve.gov/monetarypolicy/fomc_historical.htm

[20] See FOMC Statement, December 16, 2015 accessed at https://www.federalreserve.gov/monetarypolicy/fomccalendars htm

[21] As of October 4, 2018, the Fed's long-term Treasury and Agency securities balance was at $4.0 trillion. See Board of Governors of the Federal Reserve System, Credit and Liquidity Programs and the Balance Sheet, accessed at https://www.federalreserve.gov/releases/h41/20181004/.

Central Bank ("ECB") spurred increased demand for U.S. Treasury bonds—thus driving up prices and bringing yields down. This pattern repeated in 2016 in the period leading up to, and especially following, the "Brexit" vote. Indeed, on July 10, 2016, shortly after Great Britain officially voted to leave the European Union, the ten-year U.S. Treasury Yield reached its all-time low of 1.37%.[22]

Q25. What forces have contributed to the current rising trend in interest rates?

A25. As shown in Figure 5, U.S. Treasury bond yields have been on an increasing trend since their low point in mid-2016. This is consistent with the Fed's recognition that the economy has strengthened, employment conditions remain strong, and inflation—while still below its 2.0 percent target—has begun to increase. The FOMC has responded by increasing the target federal funds rate eight times since ending the zero interest rate policy in December 2015, consistently over each subsequent quarterly meeting. After the most recent hike announced at the FOMC's December 19, 2018 meeting, the federal funds target rate stands at 2.25 – 2.50 percent.[23] In addition, the Fed signaled its intention to continue the consistent rate increases going forward.

Importantly, the Fed has also recently enacted "Policy Normalization" procedures, whereby it is gradually decreasing its holdings of long-term bonds by not reinvesting principal from expiring securities. These procedures took effect starting in October 2017 and have continued at an accelerating pace ever since.[24]

In summary, central bank monetary policy action is aligned with and supportive of a continued gradual steady increase in interest rates, including yields on risk-free long-term government bonds. This is consistent with the economic forecasts of continued increases in the risk-free rate continuing through the period at issue in this proceeding.

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[22] Yield from Bloomberg. See also "U.S. 10-Year Treasury Yield Closes at Record Low" (July 5, 2016) The Wall Street Journal, accessed at https://www.wsj.com/articles/government-bond-yields-in-u-s-europe-hit-historic-lows-1467731411.

[23] See FOMC Statement, September 19, 2018, accessed at https://www.federalreserve.gov/newsevents/pressreleases/monetary20181219a.htm

[24] See FOMC Communications related to Policy Normalization, April 16, 2018, accessed at https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm

B. RISK PREMIUMS AND YIELD SPREADS

Q26. What is the Market Risk Premium?

A26. In general, a risk premium is the amount of "excess" return—above the risk-free rate of return—that investors require to compensate them for taking on risk. As illustrated above in Figure 3, the riskier the investment, the larger the risk premium investors will require.

The MRP is the risk premium associated with investing in the market as a whole. Since the so-called "market portfolio" embodies the maximum possible degree of diversification for investors,[25] the MRP is a highly relevant benchmark indicating the level of risk compensation demanded by capital market participants. It is also a direct input necessary to estimating the cost of equity using the CAPM and other risk-positioning models.

Q27. Do you have any data on how estimates of the MRP have evolved over the time leading up to and since the 2008 financial crisis?

A27. Yes. Bloomberg publishes a forward-looking estimate of the MRP based on market prices and expected dividends for U.S. stocks.[26] Figure 6 displays the development of Bloomberg's forecasted MRP since 2006.

The Bloomberg MRP increased substantially with the onset of the financial crisis and has remained elevated relative to pre-crisis levels. Though the November 2018 average forward-looking MRP reported by Bloomberg is in line with the long-term historical

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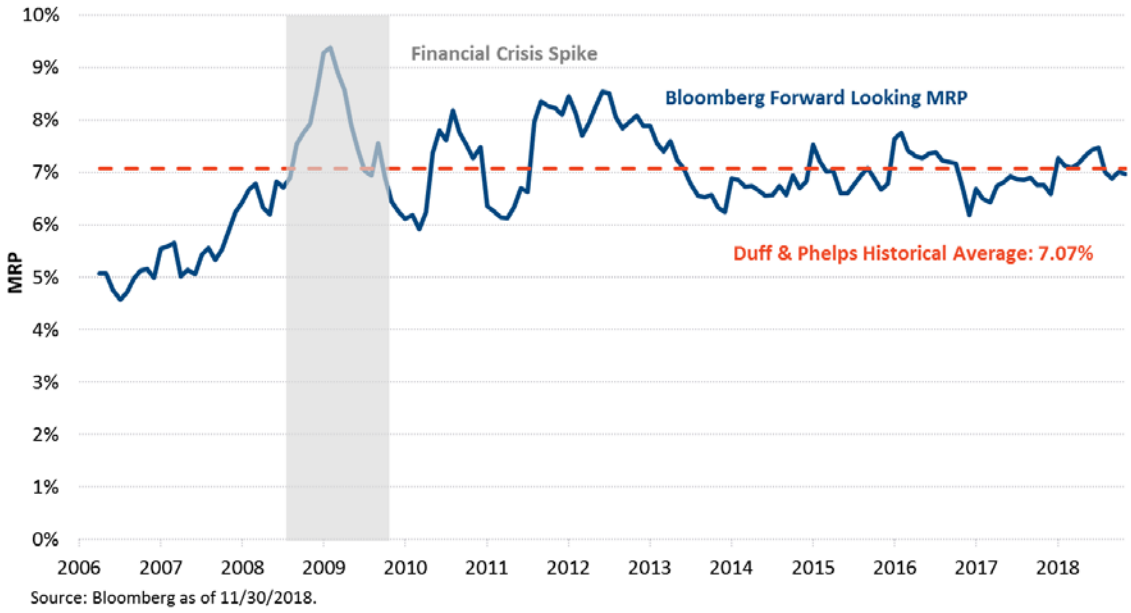
[25] In finance theory, the "market portfolio" describes a value-weighted combination of all risky investment assets (e.g., stocks, bonds, real estate) that can be purchased in markets. In practice, academics and financial analysts nearly always use a broad-based stock market index, such as the S&P 500, to represent the overall market.

[26] Bloomberg's calculation of the expected market return is based on an implementation of a multi-stage DCF model (see Section V.D.1 below) applied to all dividend paying stocks in the S&P 500 index; Bloomberg calculates the MRP by subtracting the current ten-year Treasury bond yield from the estimated expected market return, however, it is also possible to calculate the MRP measured relative to a 20-year Treasury bond yield, which is the calculation I perform for ease of comparison to historical average risk premiums calculated by comparing the Ibbotson data on stock market returns in excess income returns on long-term U.S. Treasury yields with an approximate average maturity of 20 years.

average MRP,[27] the average since the 2008 financial crisis was 7.2 percent,[28] indicating the investors have displayed increased risk aversion and demanded higher compensation for taking on risk in the time since the financial crisis.

Figure 6
Bloomberg Forward looking MRP (2006-2018)



Source: Bloomberg as of 11/30/2018.

Q28. Is there any other market evidence concerning risk premiums?

A28. Yes. One observable risk premium is the spread between yields on risk-free Treasury bonds and the yields on corporate bonds of the same maturity. Unlike U.S. government bonds, debt instruments issued by corporate entities come with some probability of default and have some associated level of systematic risk. To compensate for this risk, corporate bonds—including utility bonds—offer higher expected returns (as measured by the market yield) than do government bonds.

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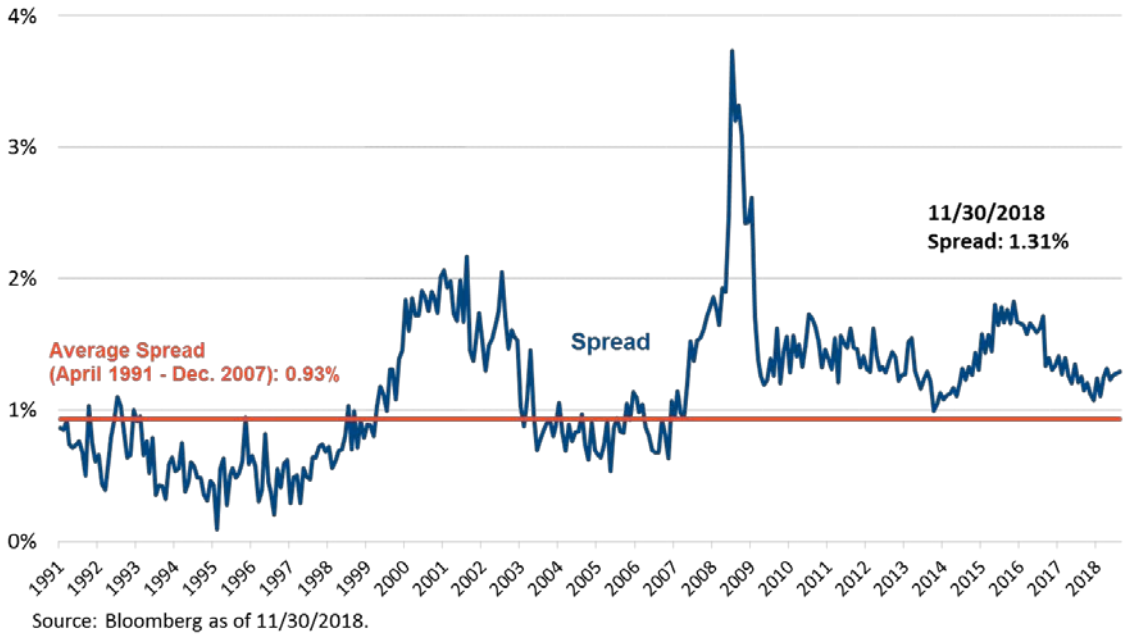
[27] As noted below, the historical average MRP calculated using the long-established Ibbotson stock and bond market data currently published by Duff & Phelps is 7.07 percent.

[28] Average of Bloomberg forecasted MRP (relative to 20-year Treasury Bonds) for the U.S. from January 2009 - November 2018. Bloomberg as of 11/30/2018.

Figure 7 plots the yield spread for A-rated utility bonds compared to Treasury bonds for the longest period of available data. As the figure shows, utility yield spreads spiked dramatically with the onset of the financial crisis and have remained elevated to their pre-crisis average level.

Figure 7
Spread between 20-year A-rated Utility Bond and 20-year Treasury Bond Yields



Source: Bloomberg as of 11/30/2018.

Q29. What are the implications of elevated yield spreads to the cost of equity?

A29. The yield spread is simply one form of risk premium, albeit for assets (corporate bonds) that are relatively lower risk compared to equity securities (*i.e.*, stock). Consequently, one explanation for the elevated yield spread is that investors are requiring a higher premium to take on market risk than they did on average prior to the financial crisis.[29] This would indicate an elevated MRP compared to the historical average.

An alternative explanation for the elevated yield spread is that the yield on Treasury bills remains artificially low due to the lingering after-effects of Fed's unprecedented

[29] See "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agarwal, and Christopher Mann, The Journal of Finance, February 2001, pp. 247-277.

monetary policy. Under this explanation, the yield spread would be expected to return to its historical average level as the risk-free rate returns to more normal levels.

Regardless of which interpretation is correct, the consequence is that if the cost of equity is estimated using the current risk-free rate and a historical average MRP, the estimate will be downward biased. Hence, it is necessary to "normalize" the risk-free rate in CAPM model inputs, which I have done by using a forecast for what government bond yields will be throughout the period at issue in this case.

C. MARKET VOLATILITY

Q30. How does the stock market's volatility relate to the cost of capital?

A30. Academic research has found that investors expect higher risk premiums during more volatile periods,[30] indicating that the MRP may increase when market volatility is high, even when investors' level of risk aversion remains unchanged. This is relevant to estimating the Company's cost of equity because increased volatility suggests higher risk premiums and therefore higher market-required ROE.

A measure of the market's expectations for volatility is the VIX index, which measures the 30-day implied volatility of the S&P 500 index.[31] These indices are also referenced as the "market's fear gauge."[32] While the VIX had recently been trading substantially below its long term historical average of approximately 19.40, it spiked substantially

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[30] See, e.g., K. French, W. Schwert and R. Stambaugh (1987), "Expected Stock Returns and Volatility," Journal of Financial Economics, Vol. 19, p. 3:

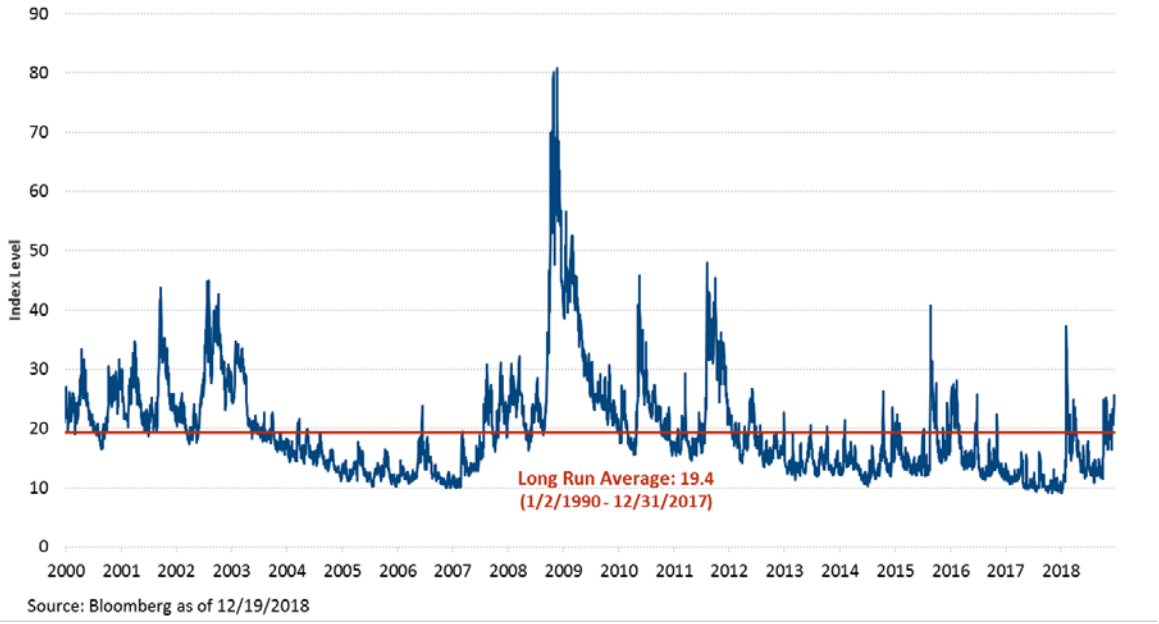
> We find evidence that the expected market risk premium (the expected return on a stock portfolio minus the Treasury bill yield) is positively related to the predictable volatility of stock returns. There is also evidence that unexpected stock returns are negatively related to the unexpected change in the volatility of stock returns. This negative relation provides indirect evidence of a positive relation between expected risk premiums and volatility.

[31] *See, e.g.*, Chicago Board Option Exchange at http://www.cboe.com/micro/VIX/vixintro.aspx

[32] CNBC, "VIX, the Market's Fear Gauge Plunges in Historic One-Week Move," July 5, 2016.

above that level in early October and again in December 2018, each time concurrent with a significant drop in the stock market.[33]

Figure 8
VIX Index



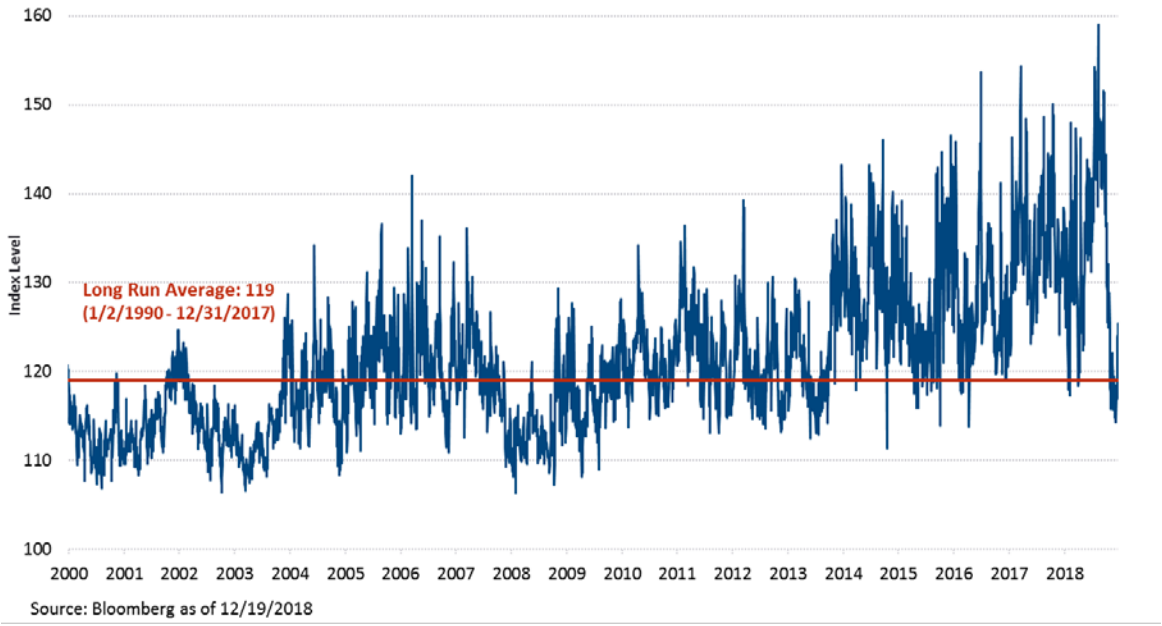
Q31. Do you look at any other indexes regarding market volatility?

A31. Yes. The SKEW index, which measures the market's willingness to pay for protection against negative "black swan" stock market events (*i.e.*, sudden substantial downturns), offers a reason to be cautious of interpreting recent low VIX levels as an indicator of improved capital market certainty over the long term. A SKEW value of 100 indicates outlier returns are unlikely, but as the SKEW increases, the probability of outlier returns become more significant. Figure 9 shows that the SKEW currently stands at almost 132, while the index has averaged 119 over the last 15 years. This indicates that investors are willing to pay for protection against downside risk and thus are exhibiting signs of elevated risk aversion concerns of downside tail risk.

[33] As an illustration of the market volatility, the S&P 500 dropped more than 350 points (12%) during the first three weeks of December.

The SKEW has briefly dropped below its long-run average in November and December 2018, but generally has been on an upward trend since at least 2015.

Figure 9
SKEW Index



Q32. Are there reasons why capital markets may exhibit high volatility going forward?

A32. Yes. A few contributing reasons to capital market volatility recently include notably the shut-down of the federal government, which has been going on since December 23, 2018 and where no resolution are in sight. This may impact economic growth and regulatory policy implementation, and will likely contribute to uncertainty among capital market participants.

Additionally, the ongoing exchange of trade tariffs between the United States and China, challenging negotiations occurring in the European Union regarding finalization of the exit of Great Britain, which could lead to a no-deal Brexit, and the new agreement seeking to replace the North American Free Trade Agreement ("NAFTA").

Throughout 2018, the U.S. and China engaged in an exchange of new trade tariffs, as exemplified by China's September 18, 2018 response to a September 17, 2018 U.S.

declaration of tariffs on $200 billion of Chinese exports.[34] As these trade tensions have unfolded and escalated, uncertainty in the markets has increased significantly because investors do not know when or if tariffs will be implemented on products affecting companies in which they hold equity. On any given day, a tariff could be announced, significantly affecting the value of a company or companies. Thus, the current market landscape embodies significant uncertainty.

To further the instability facing U.S. markets resulting from the trade dispute with China, the removal of NAFTA and the implementation of the United States-Mexico-Canada Agreement ("USMCA") has been an ongoing source of insecurity for all investors and those doing business throughout North America. Though the USMCA was formally signed in November 2018, the negotiation process was far from transparent and led to significant concerns of the fallout for investors holding equity in any business needing to trade across the applicable borders. Before the USMCA, which still requires approval from the U.S. Congress, is finally approved and implemented, certain tariffs and trade rules will change, likely leading investors to be unsure of the direction of certain businesses.

D. IMPLICATIONS OF THE TAX CUTS AND JOBS ACT OF 2017 ("TCJA")

Q33. How does implementation of the TCJA affect regulated utilities?

A33. The TCJA reduced the federal corporate marginal tax rate from 35% to 21%. Although the TCJA is likely to be a net positive for investors in unregulated companies, for the Company, the vast majority (if not all) of the benefits will flow to customers. This is because the savings in income taxes will flow through to customers in the form of lower rates. At the same time, the implementation of the TCJA (including its treatment by utility regulators in a ratemaking context) will likely increase the risks facing regulated companies because they will experience (i) a near-term decrease in cash flows and (ii) an increase in the variability of after-tax earnings (and cash flows).

[34] The U.S. announced a 10% tariff on these goods for the remainder of 2018, which will escalate to a 25% tariff afterward. The Chinese retaliation included $60 billion of U.S. goods. See "The Trade War is on: How We Got Here and What's Next, Bloomberg," 9/18/2018.

Q34. How does the lower corporate tax rate under the TCJA affect the expected volatility of cash flows for regulated companies?

A34. For regulated companies, as for unregulated corporate taxpayers, the change in the income tax allowance will result in greater volatility of net income (and cash flow) because the income tax provides a "buffer" against the impact of variations in expected costs and expected revenue on net income. Consider for example the effect on net income of a 10% increase in sales revenue. All else equal, net income would increase by about 6.5% for a 35% income tax rate, (*i.e.* 0.10 times (1 – 0.35)), but would increase by 7.9% for a 21% income tax rate. The change would be similar and symmetrical for a decrease in revenue.

Further, the amplified variability in net income due to the lower corporate tax rate is likely to amplify systematic risk, because variations in revenue are generally related to variations in the broader economy that affect the value of all risky assets, not just tax-paying corporations. Since systematic risk is the type of risk that affects the cost of capital, it is reasonable to expect that the TCJA will, all else equal, contribute to higher required returns for corporate equity holders, including those in regulated utilities.

Importantly, while this increase in variability of income applies to all corporate tax-paying entities, unlike unregulated corporations, regulated utilities do not benefit from after-tax higher profits under the new lower tax rate, because the revenue requirement is adjusted to pass the tax savings on to customers.[35]

Q35. How will the TCJA affect a regulated company's credit metrics?

A35. Credit metrics are negatively affected by regulatory ratemaking treatment of the TCJA, because such treatment causes a near-term reduction in the regulated utilities' cash flow and related cash flow metrics that are closely observed by debt ratings agencies. As discussed further in Section V.B below, the expected refunds of excess deferred taxes and lower tax deferrals associated with new investment due to the lower tax rate and loss

[35] This discussion assumes that the revenue requirement has been adjusted to account for the lower corporate income tax rate.

of bonus depreciation under the TCJA will reduce cash flow. Yet the tax reform has no impact on the amount of assets needed for reliability and to serve customers, a portion of which will be debt-financed. Decreases in key cash flow metrics, such as the cash flow to debt ratios that inform the credit rating agencies credit opinions, have negatively affected the credit profile of many regulated utilities, and will continue to do so.[36] Indeed, as discussed below, Con Edison is among the group of regulated utility companies that have had their credit ratings downgraded by one or more rating agencies due to the effects of the TCJA.

Q36. What are the implications of the reduced cash flows and increased volatility of cash flows in the context of these proceedings?

A36. These effects suggest that it could be appropriate to increase either the allowed ROE or the amount of equity in the capital structure (or possibly both) to help compensate for the increased financial risk imposed on regulated utilities by the TCJA.

While the uncertainty surrounding the passage of the TCJA has been removed, it is unlikely that impacts on the cost of capital will immediately appear in the estimation models. The TCJA has not yet been in place for one complete fiscal year, and the regulatory treatments in various jurisdictions have been in effect for an even shorter period. A longer period of market data may be needed before the cost of capital estimation models can be expected to reflect impacts of the TCJA on investors' required returns.

Notwithstanding that decreases in cash flow metrics and increased volatility of earnings both increase financial risk in ways that may not be reflected in the cost of capital model

[36] See Moody's Investor Service, Global Credit Research, "Moody's changes outlooks on 25 US regulated utilities primarily impacted by tax reform," January 19, 2018; Sector Comment, "Tax reform is credit negative for sector, but impact varies by company," January 24, 2018; Regulated Utilities - U.S., "2019 outlook shifts to negative due to weaker cash flows, continued high leverage," June 18, 2018; and Regulated Utilities - U.S., "2019 outlook negative amid growing debt and stagnant cash flow," November 8, 2018. See also S&P Global Ratings, Rating Direct, "U.S. Tax Reform: For Utilities' Credit Quality, Challenges Abound," January 24, 2018 and Fitch Ratings, Special Report, "Tax Reform Impact on the U.S. Utilities, Power & Gas Sector: Tax Reform Creates Near-Term Credit Pressure for Regulated Utilities and Holding Companies," January 24, 2018.

results, I do not make an explicit upward adjustment to my estimate of the cost of equity or my recommended allowed ROE to account for the impact of the TCJA. However, in Section V.B below, I address the question of how increasing the proportion of equity in Con Edison's regulatory capital structure could help to mitigate some of the TCJA's negative effects on credit quality.

V. ESTIMATING THE COST OF EQUITY

A. PROXY GROUP SELECTION

Q37. How do you identify proxy companies of comparable business risk to Con Edison?

A37. Con Edison is primarily engaged in the regulated distribution of electricity and natural gas. The business risk associated with these endeavors depends on many factors, including the specific characteristics of the service territory and regulatory environment in which the provider of these services operates. Consequently, it is not possible to identify publicly traded proxy companies that replicate every aspect of Con Edison's risk profile. However, selecting companies with business operations concentrated in similar lines of business and/or business environments is an appropriate starting point for selecting a proxy group of comparable risk to Con Edison.

To this end I have selected a proxy group composed of companies focused on the provision of electricity to end users, which also includes some companies that—like Con Edison—engage in the regulated distribution of both electricity and natural gas ("Electric Proxy Group").

Q38. Please summarize how you selected the members of the Electric Proxy Group.

A38. To identify companies suitable for inclusion in the Electric Proxy Group, I started with the universe of publicly traded companies in the electricity utility industry as identified by *Value Line Investment Analyzer* (*"Value Line").* Next, I reviewed business

descriptions and financial reports of these companies and eliminated those which had less than 50 percent of their assets dedicated to regulated electric utility activities.[37]

With this group of companies, I applied further screening criteria to eliminate companies which have had recent significant events that could affect the market data necessary to perform cost of capital estimation. Specifically, I identify companies that have cut their dividends or engaged in substantial merger and acquisition ("M&A") activities over the relevant estimation window.[38] I eliminate companies with such dividend cuts because the announcement of a cut may produce disturbances in the stock prices and growth rate expectations in addition to potentially being a signal of financial distress. I generally eliminate companies with significant M&A activities because such events typically affect a company's stock price in ways that are not representative of how investors perceive its business and financial risk characteristics. For example, a utility's stock price will commonly jump upon the announcement of an acquisition to match the acquirer's bid.

Further, I require companies have an investment grade credit rating[39] and more than $300 million in annual revenues for liquidity purposes. A final, and fundamental, requirement is that the proxy companies have the necessary data available for estimation.

Q39. What are the characteristics of the Electric Proxy Group?

A39. The Electric Proxy Group is comprised of electric utilities whose primary source of revenues and majority of assets are subject to regulation. The final proxy group consists of the 26 electric utilities listed in Figure 10 below. These companies own regulated electric utility subsidiaries and are classified by EEI as either "regulated"—having at

37 I rely on Edison Electric Institute (EEI), Stock Performance – 2017 Q4 Financial Update. This report gives industry financial information as well as a percentage of regulated assets for each of the companies.

38 As described in Sections V.C, the CAPM requires five years of historical data, while the DCF relies on current market data.

39 In some cases, a proxy company does not have a credit rating from any of the major rating agencies. However, if they were to be rated, they would receive an investment grade rating. In these instances, I assign the company the average credit rating of the rest of the Electric Proxy Group.

least 80% of their assets dedicated to regulated utility operations) or "mostly regulated"—having at least 50% regulated assets.[40] (These EEI categories are designated with an "R" or "M" in the table below). Therefore, the Electric Utility Proxy Group is broadly representative of the regulated electric industry from a business risk perspective.

Figure 10 reports the proxy companies' annual revenues for the most recent four quarters as of Q3, 2018 and also reports the market capitalization, credit rating, beta and growth rate. The annual revenue as well as the market cap was obtained from Bloomberg. The credit rating is reported by S&P Research Insight. The growth rate estimate is a weighted average between estimates from Thomson Reuters and *Value Line*. Betas were obtained from *Value Line*.

[40] Edison Electric Institute (EEI), Stock Performance – 2017 Q4 Financial Update.

Figure 10
Electric Proxy Group

Company	Annual Revenues (USD million)	Regulated Assets	Market Cap. 2018 Q3 (USD million)	Beta	S&P Credit Rating (2018)	Long Term Growth Est.
	[1]	[2]	[3]	[4]	[5]	[6]
ALLETE	$1,388	M	$3,878	0.65	BBB+	5.7%
Alliant Energy	$3,517	R	$10,181	0.60	A-	6.2%
Amer. Elec. Power	$16,205	R	$35,280	0.55	A-	5.8%
Ameren Corp.	$6,274	R	$15,714	0.55	BBB+	6.8%
CMS Energy Corp.	$6,822	R	$14,027	0.55	BBB+	6.9%
DTE Energy	$13,733	M	$20,096	0.55	BBB+	5.6%
Entergy Corp.	$11,121	R	$14,961	0.60	BBB+	1.7%
MGE Energy	$560	M	$2,260	0.60	AA-	8.3%
OGE Energy	$2,260	R	$7,331	0.85	BBB+	1.1%
Otter Tail Corp.	$902	R	$1,907	0.75	BBB	6.1%
AVANGRID Inc.	$6,346	M	$15,110	0.30	BBB+	9.7%
Consol. Edison	$12,349	R	$24,364	0.40	A-	3.2%
Duke Energy	$24,205	R	$57,441	0.50	A-	4.9%
Eversource Energy	$8,309	R	$19,745	0.60	A+	5.7%
NextEra Energy	$16,360	M	$81,411	0.55	A-	8.3%
PPL Corp.	$7,772	R	$21,335	0.70	A-	3.4%
Public Serv. Enterprise	$9,324	M	$26,428	0.60	BBB+	6.7%
Southern Co.	$23,787	R	$43,762	0.50	A-	2.2%
Unitil Corp.	$434	R	$763	0.55	BBB+	4.0%
Edison Int'l	$12,868	R	$22,051	0.55	BBB+	4.2%
El Paso Electric	$909	R	$2,418	0.65	BBB	4.4%
IDACORP Inc.	$1,364	R	$5,003	0.55	BBB	2.4%
Pinnacle West Capital	$3,695	R	$8,907	0.55	A-	4.5%
PNM Resources	$1,425	R	$3,135	0.65	BBB+	5.7%
Portland General	$1,984	R	$4,113	0.60	BBB+	4.9%
Xcel Energy Inc.	$11,453	R	$24,475	0.50	A-	6.1%
Average	$7,899		$18,696	0.58		5.2%

Sources and Notes:
[1]: Bloomberg as of 9/30/2018.
[2]: Company 10-Ks. See Table No. BV-2.
[3]: See Table No. BV-3 Panels A through Z.
[4]: See Supporting Schedule # 1 to Table No. BV-10.
[5]: S&P Credit Ratings from Research Insight as of 2018 Q3.
[6]: See Table No. BV-5.

Q40. How does the Electric Proxy Group compare to Con Edison in terms of financial metrics?

A40. Con Edison's electric distribution operations generated an annual revenue figure of $7.1 billion in 2017, which is smaller than the average member of the Electric Proxy Group by approximately $0.8 billion. The approximate equity rate base of Con Edison's electric distribution operations is $8.4 billion, less than half the market capitalization of the average member of the Electric Proxy Group.[41] Con Edison's issuer credit rating of A- is above the median credit rating of BBB+ for the Electric Proxy Group.[42]

B. CAPITAL STRUCTURE

Q41. What regulatory capital structure for Con Edison did you employ in your analysis?

A41. As recommended by Con Edison company witness Saegusa, I use a capital structure consisting of 50.00 percent equity, 48.89 percent debt, and 1.11 percent customer deposits. I understand this request reflects a greater equity ratio than the capital structure in Con Edison's most recent approved rate order,[43] and I believe an increase in equity financing of rate base is appropriate at this time for reasons discussed below. I also note that Con Edison's requested 50% equity ratio is in line with regulatory capital structures determined in recent U.S. utility rate cases,[44] but is also substantially lower than the market value equity ratios for the Electric Proxy Group that affect the cost of equity estimates measured for those companies using market data.[45]

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41 This estimate falls between the median ($8 billion) and average ($10.4 billion) book value of equity of the Electric Proxy Group.

42 Con Edison data as reported by S&P Global Market Intelligence, accessed 10/11/2018.

43 2017 Order, p. 28. See also Joint Proposal in Case 16-E-0060, 16-G-0061, and 16-E-0196, Appendix 1, page 6 of 11.

44 The average allowed equity ratio from 2013 to 2018 for Electric cases was 49%. Calculated using data from SNL Financial as of 12/7/2018.

45 Exhibit___(BV-3), Table No. BV-4

Q42. Are there any reasons why it might be appropriate to consider including a higher equity ratio in Con Edison's regulatory capital structure used for ratemaking purposes compared to what has been applied in past rate cases?

A42. Yes. The impact of the TCJA, coupled with Con Edison's significant ongoing capital expenditures, has placed downward pressure on the Company's cash flows and associated credit metrics. As a result, Moody's recently downgraded Con Edison's long term debt issuer rating (from A2 to A3), along with that of its corporate parent CEI (from A3 to Baa1), stating that regulatory treatment of the new tax law would lead to "a series of revenue and cash flow reductions" for Con Edison "that will offset some of the expected general rate increases that the utility would otherwise have."[46] Moody's explained that offsetting rate increases and cash flow reductions will lead Con Edison's "cash flow to remain steady, at the same time that the utility's capital spending – and debt – is expected to increase for infrastructure resiliency, energy efficiency, and other New York policy priorities," resulting in "cash flow to debt ratios around 16-17% through 2020, … down from over 20% in recent years."[47]

Q43. How does regulatory treatment of the TCJA lead to lower cash flows and deteriorating credit metrics for regulated utilities such as Con Edison?

A43. The TCJA can reduce cash flows for regulated companies in several ways. First, when the benefits of decreased tax costs are passed through to utility customers, this manifests in a lower "gross up" for taxes (*i.e.*, the income tax allowance) in the revenue requirement. Reduced revenues in turn lead to decreased pre-tax cash flows and associated credit metrics.[48]

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[46] "Rating Action: Moody's downgrades ConEd to Baa1, CECONY to A3 and O&R to Baa1; outlooks stable," Moody's Investor Service, October 30, 2018.

[47] *Ibid*.

[48] EBIT (earnings before interest and taxes) and EBITDA (earnings before interest, taxes, depreciation and amortization) are common measures of pre-tax cash flow that are considered by credit rating agencies as part of credit metrics such as EBIT and EBITDA interest coverage ratios or the debt-to-EBITDA ratio. As discussed below, cash flow mesures such as Funds from Operations (FFO) and associated credit metrics (such as FFO-to-debt and FFO interst coverage) for regulated utilities are also negatively affected by the TCJA.

Second, on an after-tax basis, the benefit of accelerated tax depreciation is reduced in proportion to tax rate, leading to a reduction in after-tax cash flows. Third, the TCJA eliminated bonus depreciation for utility assets, drastically reducing the amount of tax deductions that can be taken immediately for new capital investment.

Fourth, regulated utilities will be required to amortize back to customers the balances of Excess Deferred Income Taxes ("EDIT") that arise from the reduced corporate tax rate. EDIT relates to Accumulated Deferred Income Tax ("ADIT"), which represents the accumulated effect of timing difference in depreciation for income tax and regulatory purposes. Because tax depreciation deductions are accelerated relative to regulatory depreciation expense included in rates, utilities collect and accumulate positive deferred taxes in the early years of a regulated asset; these balances are drawn down in later years when the tax deductions are reduced below the levels of book depreciation (or entirely exhausted). The assumption is that the ADIT balance will return to zero for any asset at the end of its regulatory life. However, with a reduction in the corporate tax rate, some of the taxes deferred in the early years (at the higher tax rate) will never become due to the IRS in later years (at the new lower rate). This excess ADIT represents a temporary windfall to the utility until it is amortized back to customers via adjustments to the revenue requirement. As the EDIT is amortized, the portion of rate base that must be financed by investors increases, since EDIT (like ADIT) is a source of zero cost financing for the utility. However, despite this partially offsetting increase in required return on rate base, the net effect of returning EDIT to customers is to decrease the utility's cash flows, both before and after taxes, until the EDIT has been exhausted. In addition, because amortizing EDIT increases the proportion of rate base that must be financed with external capital, this may place additional downward pressure on cash flow-to-debt metrics (to the extent the additional capital required is in the form of debt).

Q44. Please illustrate how implementation of the TCJA reduces utility cash flows and credit metrics.

A44. Figure 11 below illustrates the impact of TCJA on incremental after-tax cash flows generated by a new investment in utility rate base. It compares the pre-TCJA status quo

(*i.e.*, a 35% corporate tax rate and 40% year-1 bonus depreciation that was scheduled to be permitted for new utility investment in 2019 under the prior tax code) with the new situation, namely 21% tax rate and only the standard year-1 Modified Accelerated Capital Recovery System ("MACRS") tax depreciation deduction.[49] As shown, the funds from operations ("FFO")[50] measure of cash flow is dramatically lower under the new tax regime compared to what utilities would have forecasted for new rate base investments prior to the TCJA taking effect. In turn, the incremental impact of new capital expenditures on utilities' cash flow to debt ratios is diminished by the new law,[51] contributing to the kind of deterioration in the aggregate levels of these metrics that Moody's discussed in justifying its downgrade of Con Edison's credit rating.

[49] For illustrative purposes, the figure posits a hypothetical $1 million investment in new utility assets with a 30-year economic life for depreciation purposes and qualifying for accelerated tax depreciation according to the 20-year MACRS schedule. The investment in rate base is assumed to be financed with 50.00% debt / 50.00% equity and receive a 10.00% allowed ROE.

[50] For purposes of this example, FFO is defined as the result of adding back depreciation expense and deferred taxes (which are non-cash expenses) to net income. All credit rating agencies consider an after-tax cash flow measure of this type for purposes of calculating cash flow to debt ratios.

[51] Under standard depreciated original cost ratemaking and absent the effects of accelerated tax depreciation, the incremental impact of a given rate base asset to the FFO-to-debt metric is lowest when the asset is new and improves as the asset depreciates; accelerated tax depreciation, and especially bonus depreciation, mitigates or even reverses this trend by providing more cash flow in early years.

Figure 11
TCJA Impact on Year-1 Incremental Cash Flow and Credit Metrics
Illustrated for $1,000 of New Utility Plant Investment
Financed with 50% Equity / 50% Debt

		No TCJA - 35% tax rate with bonus depreciation	TCJA - 21% tax rate without bonus depreciation	Difference
		[1]	[2]	[3] = [2] - [1]
Net Income	[a] = 500 * 10%	$50.0	$50.0	-
Depreciation	[b] = 1,000 / 30	$33.3	$33.3	-
Deferred income Taxes				
Tax Depreciation	[c]	$422.5	$37.5	($385.0)
Book Depreciation	[d] = [b]	$33.3	$33.3	-
Temporary Difference	[e] = [c] - [d]	$389.2	$4.2	($385.0)
Deferred Income Taxes	[f] = [e] * tax rate	$136.2	$0.9	($135.3)
Funds From Operations	[g] = [a] + [b] + [f]	$219.5	$84.2	($135.3)
FFO-to-Debt (%)	[h] = [g] / 500	43.9%	16.8%	-27.1%

Notes:
[1] [c] = 1,000 * 42.25%; Represents year-1 deduction from 20-year MACRS schedule with 40% bonus depreciation.
[2] [c] = 1,000 * 3.75%; Represents year-1 deduction from 20-year MACRS schedule.

I note that while Figure 11 focuses on the impact of TCJA for new investment, the combined effect of differences in on-going tax deferrals and EDIT amortization is to reduce cash flow and cash flow-to-debt metrics associated with many pre-existing rate base assets also. Indeed, Moody's has evaluated all components of the TCJA as a drag on credit quality across the regulated utility industry, estimating that the average reduction in the ratio of cash flow to debt for utilities due to implementing the new tax law is 150-250 bps.[52]

[52] Moody's Investor Service, "Moody's Changes Outlook on 25 US Regulated Utilities Primarily Impacted by Tax Reform," January 19, 2018. The average reflects bonus depreciation and the impact on cash flow and financing of both new and pre-existing assets. See also Moody's Investor Service, Regulated Utilities - U.S., "2019 outlook shifts to negative due to weaker cash flows, continued high leverage," June 18, 2018 and "2019 outlook negative amid growing debt and stagnant cash flow," November 8, 2018.

Q45. Has the Commission recognized that its proposed ratemaking treatment of the TCJA will decrease cash flows and credit quality for Con Edison and other regulated utilities?

A45. Yes. In its August 9, 2018 Order Determining Rate Treatment of Tax Changes, the Commission acknowledged the findings of Staff and the submissions of the utilities with respect to the negative cash flow implications of TCJA described above,[53] and stated that "the prospective cash flow reductions that utilities will experience because of the Tax Act warrant a careful consideration of the methodology for passing back the Tax Act savings to customers."[54] Further, the Commission described credit quality concerns as an important factor for consideration in recent and future rate proceedings.[55]

Q46. Can using a greater percentage of equity in the regulatory capital structure mitigate some of the detrimental impacts of the new tax law on utility credit quality?

A46. Yes, as discussed by Company witness Saegusa, by financing a greater portion of rate base assets with equity, regulated utilities can both improve cash flow (due to earning an after-tax return) and reduce their debt obligations, both of which serve to improve credit metrics and overall credit quality as evaluated by rating agencies. Figure 12 below illustrates this point using a simple example of a utility with aggregate accelerated tax depreciation deductions approximately 1.5 times the composite depreciation expense included in rates.[56] This example demonstrates that, holding all other factors constant, increasing the percentage of equity vs. debt financing included in the regulatory capital structure can lead to meaningful improvements in after-tax cash flow-to-debt metrics.

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53 Case 17-M-0815, Order Determining Rate Treatment of Tax Changes, issued August 9, 2018 ("2018 Tax Order"), pp. 61-62.

54 *Id.*, p. 61.

55 *Id.*, p. 62.

56 Specifically, the example assumes ratemaking depreciation at 3.33% and accelerated tax depreciation deductions at 5.00% of aggregate rate base value.

Figure 12
Effect of Capital Structure on Cash Flow to Debt Credit Metrics
Illustrated per $1,000 of Rate Base

		48% Equity / 52% Debt	50% Equity / 50% Debt	52% Equity / 48% Debt
		[1]	[2]	[3]
Equity Portion of Rate Base	[a]	$480.0	$500.0	$520.0
Debt Portion of Rate Base	[b] = 1,000 - [a]	$520.0	$500.0	$480.0
Net Income	[c] = [a] * 10%	$48.0	$50.0	$52.0
Depreciation	[d] = 1,000 / 30	$33.3	$33.3	$33.3
Deferred income Taxes				
Tax Depreciation	[e] = 1,000 * 5.00%	$50.0	$50.0	$50.0
Book Depreciation	[f] = [d]	$33.3	$33.3	$33.3
Temporary Difference	[g] = [e] - [f]	$16.7	$16.7	$16.7
Deferred Income Taxes	[h] = [g] * 21%	$3.5	$3.5	$3.5
Funds From Operations	[i] = [c] + [d] + [h]	$84.8	$86.8	$88.8
FFO-to-Debt (%)	[j] = [i] / [b]	16.3%	17.4%	18.5%

Q47. Have utilities and regulators recognized that increasing the equity ratio in the regulatory capital structure is a viable and effective mechanism for mitigating the negative credit impacts associated with regulatory implementation of the TCJA?

A47. Yes. The Georgia Public Utilities Commission increased Atlanta Gas Light Co's common equity ratio from 51.00 to 55.00 percent and also increased the equity thickness for Georgia Power.[57] Similarly, the Kentucky Public Service Commission allowed Atmos Kentucky to increase its equity percentage from 52.30 to 58.20 percent,[58] and the Alabama Public Service Commission has approved a plan to allow Alabama Power Company to gradually increase its regulatory equity ratio from 47.00 to 55.00 percent by 2025 or sooner.[59] In addition the New Jersey Board of Public Utilities has authorized PSE&G to increase its regulatory equity ratio to 54.00 percent.[60]

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57 GA PUC, Docket D-40828 and Southern Company, "Investor Presentation," Nov. 7, 2018.

58 KY PSC, Docket C-2018-00281.

59 *See* Moody's Investor Service, Regulated Utilities - U.S., "2019 outlook shifts to negative due to weaker cash flows, continued high leverage," June 18, 2018.

60 *See* BPU Docket Nos. ER18010029 and GR18010030, NJ BPU Decision, pp. 7, 14. PSE&E has been steadily increasing its regulatory equity ratio since 2013, a year in which its year end regulatory equity

At the same time, utilities have been issuing a larger volume of equity than at any time since the financial crisis according to Thompson Reuter's data.[61] According to Moody's, approximately $24 billion in new equity issuances by regulated U.S. utilities were announced in 2018 (though November).[62]

Both utility managers and utility regulators recognize that "deleveraging" through use of more equity financing—especially as accompanied by recognition of this greater reliance on equity financing for ratemaking purposes—is an effective and appropriate option for supporting utility credit ratings in the face of the cash flow reductions and increased investor financing requirements imposed by regulatory implementation of the TCJA.

C. THE CAPM BASED COST OF EQUITY ESTIMATES

Q48. Please briefly explain the CAPM.

A48. 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 (*see* Figure 3 in Section III), in which the required expected return on an asset is proportional to that asset's relative risk as measured by that asset's beta.

More precisely, the CAPM states that the cost of capital for an investment, S (*e.g.*, a particular common stock), is determined by the risk-free rate plus the stock's systematic risk multiplied by the market risk premium. Mathematically, the relationship is given by the following equation:

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

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ratio was 51%. See BPU Docket Nos. ER18010029 and GR18010030, Direct Testimony of Scott Jennings, 12+0 Update, August 8, 2018, p. 55.

[61] Reuters Business News, "US tax reform reenergizes equity markets for utility companies," June 12, 2018.

[62] Moody's Investor Service, Regulated Utilities - U.S., "2019 outlook negative amid growing debt and stagnant cash flow," November 8, 2018.

- 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," which operates on the principle (corroborated by empirical data) 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 3), whereas investments of the same risk the overall market (*i.e.*, those that by definition have average systematic market risk) are priced so as to expect to return the risk-free rate plus the MRP. 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 MRP.

1. Inputs to the CAPM

Q49. What inputs does your implementation of the CAPM require?

A49. 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 MRP, 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 below. (Additional technical detail, along with a discussion of the finance theory underlying the CAPM is provided in Exhibit___(BV-2).)

Q50. What value did you use for the risk-free rate of interest?

A50. I used the yield on a 20-year U.S. Treasury bond as the risk-free asset for purposes of my analysis. Recognizing the fact that the cost of capital set in this proceeding may be in place over the next several years, I rely on a forecast of what Treasury bond yields will be in 2020. Specifically, *Blue Chip Economic Indicators* projects that the yield on a ten-

year Government Bond will be 3.6 percent by 2020.[63] I adjust this value upward by 50 bps, which is my estimate of the representative historical maturity premium for the 20-year over the ten-year Government Bond. This gives me 4.1 percent as an estimate of the risk-free rate.

Q51. What value did you use for the MRP?

A51. Like the cost of capital itself, the MRP 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. Rather, it must be inferred or forecasted based on known market information. One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds over some long historical period. The average market risk premium from 1926 to the present (2017) is 7.07 percent.[64] I use this value of the MRP in my CAPM analyses.

I also note that Bloomberg's forward-looking market-implied MRP is currently estimated at approximately 7.0 percent (when expressed relative to 20-year bond yields) and was above the 7.07 percent long-term historical average value in most months of 2018. The fact that recent forward-looking estimates of the MRP exceeded the historical average level is consistent with the broader body of evidence that risk premiums have remained elevated relative to their pre-financial crisis levels. (See Section IV above.)

Therefore, and considering the recent increase in measures of market volatility, I believe the 7.07 percent long-term historical average MRP value I rely on is a reasonable and conservatively low estimate of what the market risk premium will be during the period at issue in this proceeding.

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63 Blue Chip Economic Indicators, October 2018, p. 14.

64 Duff & Phelps, Ibbotson SBBI 2018 Valuation Yearbook 10-21.

Q52. What betas did you use for the companies in the Electric Proxy Group?

A52. I used *Value Line* betas, which are estimated using the most recent five years of weekly historical returns data.[65] The *Value Line* levered equity betas measured for the Electric Proxy Group are reported in Figure 10 and above. Importantly, as explained in Section III.B above, these betas—which are measured (by *Value Line*) using the market stock return data of the proxy companies—reflect the level of financial risk inherent in the proxy companies' market value leverage ratios over the estimation period. Because Con Edison's regulatory capital structure includes a substantially higher proportion of debt financing compared to the proxy companies,[66] the financial risk associated with an equity investment in Con Edison's rate base is correspondingly greater than the financial risk borne by investors in the proxy companies' publicly traded stock.[67]

Consequently, when standard textbook techniques are applied to unlever the *Value Line* betas reported in Figure 10 and relever the resulting asset betas at Con Edison's regulatory capital structure, the resulting proxy group averages are 0.68 – 0.70 for the Electric Proxy Group.[68]

2. The Empirical CAPM

Q53. What other equity risk premium model do you use?

A53. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than

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65 See Value Line Glossary, accessible at http://www.valueline.com/Glossary/Glossary.aspx

66 Con Edison's proposed regulatory capital structure debt ratio of 48.89% (with 1.11% customer deposits) is above the maximum of five-year average debt ratios measured for the Electric Proxy Group. The average debt percentage of the Electric Proxy Group is 40%.

67 A further detailed discussion is contained in Exhibit___(BV-2), Section III.

68 See Exhibit___(BV-3), Table Nos. BV-13 – BV-15. The Technical Appendix (Exhibit___(BV-2)) to this testimony provides a detailed description of the standard textbook formulas used to implement the "Hamada" technique for unlevering measured equity betas based on the proxy companies' capital structures to calculate "asset betas" that measure the proxy companies' business risk independent of the financial risk impact of differing capital structures. The proxy group average asset betas are then relevered at the target capital structure (i.e., Con Edison's regulatory capital structure), with the precise relevered beta depending on the specific version of the unlevering/relevering formula employed.

predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted.[69] 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 employ makes use of these empirical findings. It estimates the cost of capital with the equation,

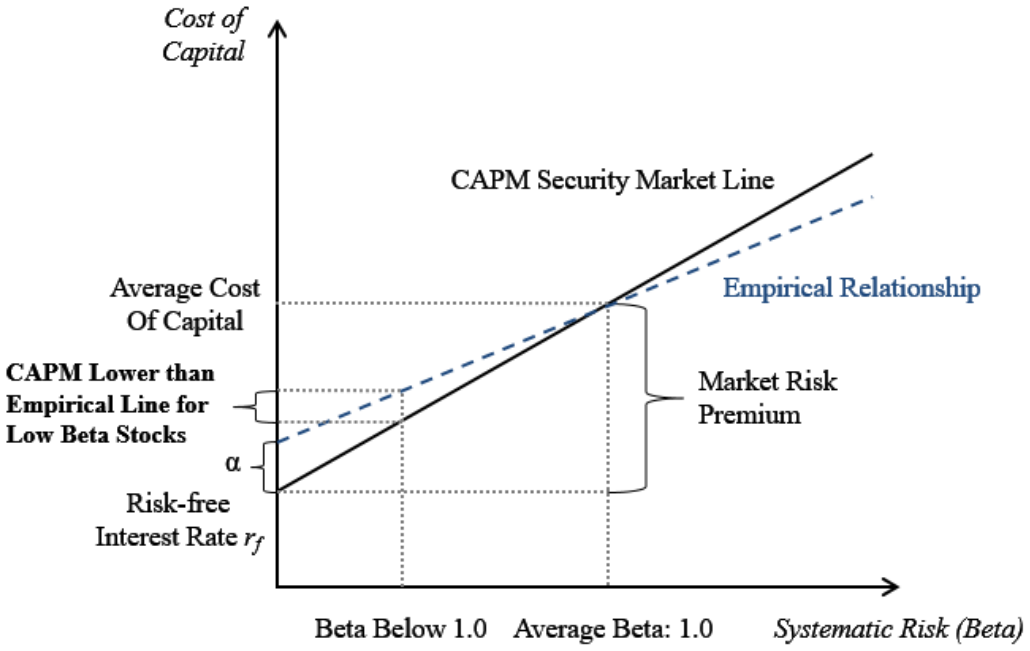
$$\boldsymbol{r_S = r_f + \alpha + \beta_S \times (MRP - \alpha)} \qquad (2)$$

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).

I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the Security Market Line in Figure 3, which results in a Security Market Line that more closely matches the results of empirical tests. This adjustment is portrayed in Figure 13 below. In other words, the ECAPM produces more accurate predictions of eventual realized risk premiums than does the CAPM.

[69] *See* Figure A-2 in Exhibit___(BV-2) for references to relevant academic articles.

Figure 13
The Empirical Security Market Line



Q54. Why do you use the ECAPM?

A54. Academic research finds that the CAPM has not generally performed well as an empirical model. One of its short-comings is directly addressed by the ECAPM, which recognizes the consistent empirical observation that the CAPM underestimates the cost of capital for low beta stocks. In other words, 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. Exhibit___(BV-2), Section II.C discusses the empirical findings that have tested the CAPM and also provides documentation for the magnitude of the adjustment, α.

Q55. How does your implementation of the ECAPM compare to the "Zero Beta" CAPM that has recently been employed by Staff?

A55. The two models are conceptually linked. In recent base rate proceedings involving Con Edison (as well as CEI's other regulated subsidiary Orange and Rockland Utilities, Inc.), Staff testified that "a considerable body of research has shown that the Traditional CAPM may underestimate required returns when betas are below 1.0."[70] This is the same reason I employ the ECAPM. In addition, while the specific formula employed by Staff differs from Equation 2 above, the mathematical impact of the two adjustments is similar, with Staff's formula adjusting the slope of the risk-return relationship somewhat more (and thus increasing the estimated cost of equity for low beta companies somewhat more) than my ECAPM formula.[71]

3. Results from the CAPM Based Models

Q56. Please summarize the parameters of the scenarios and variations you considered in your CAPM and ECAPM analyses.

A56. The parameters are displayed in Figure 14 below. As discussed above, the risk-free interest rate represents Blue Chip Economic Indicators projection for the ten-year Treasury Yield to prevail in 2020, adjusted to a 20-year horizon. The MRP is the long-term historical arithmetic average of annual realized premiums of U.S. stock market returns over long-term (approximately 20-year maturity) Treasury bond income returns from 1926 to 2017 as reported by Duff and Phelps.

Figure 14
Parameters in Risk Positioning Analyses

Risk-Free Interest Rate	4.10%
Market Risk Premium	7.07%

[70] Direct Testimony of Staff Finance Panel in Cases 16-E-0060 and 16-G-0061, pp. 87-88; Direct Testimony of Staff Finance Panel in Cases 18-E-0067 and 18-G-0068, pp. 92-93.

[71] Staff uses the formula $\boldsymbol{r_S = r_f + 0.25 \times MRP + \beta_S \times (0.75 \times MRP)}$. If this formula were applied with an MRP of approximately 7.0%, it would be equivalent to applying an alpha of $\alpha = 1.75\%$ in my ECAPM formula, rather than the $\alpha = 1.5\%$ I actually use.

Q57. Please summarize the results of the CAPM-based models.

A57. The results of CAPM and ECAPM estimation for the Electric Proxy Group are presented in Figure 15 below. The ranges of results for each model (CAPM and ECAPM) reflect the application of different specific versions of the textbook formulas used to account for the impact of different financial leverage on financial risk.

Figure 15
CAPM Summary: Electric Proxy Group

	CAPM	ECAPM (α = 1.5%)
Overall Cost of Capital	9.3%	10.0%
Hamada Adjustment Method (with taxes)	8.9%	9.4%
Hamada Adjustment Method (without taxes)	9.1%	9.5%

Note: Long-Term Risk Free Rate of 4.10%, Long-Term Market Risk Premium of 7.07%.

Q58. How do you interpret the results of your CAPM and ECAPM Analyses?

A58. In my opinion, the estimates reported above support a reasonable cost of equity range of 9.25 - 10.00 percent based on the Electric Proxy Group.[72] As discussed above, the established academic evidence indicates that the traditional CAPM tends to understate the cost of equity for lower-than-average risk companies such as those in the Electric Proxy Group, I therefore give somewhat greater weight to the ECAPM results to inform my recommendation and consider the lowest estimate from the CAPM to be too low.

D. DCF BASED ESTIMATES

1. Single and Multi-Stage DCF Models

Q59. Can you describe the DCF model's approach to estimating the cost of equity?

A59. 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 assumes that the market price of a stock is equal to the present value of the dividends that

[72] I consider the lowest of the CAPM estimates unreasonable and round the results to the nearest 0.25 percent to assess the reasonable range.

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:

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

Where,

$\boldsymbol{P_0}$ is the current market price of the stock;

$\boldsymbol{D_t}$ is the dividend cash flow expected at the end of period $\boldsymbol{t}$;

$\boldsymbol{T}$ is the last period in which a dividend cash flow is to be received; and

$\boldsymbol{r}$ 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 lasts into perpetuity, so the formula can be rearranged algebraically to directly 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:

$$\boldsymbol{r = \frac{D_1}{P_0} + g = \frac{D_0}{P_0} \times (1 + g) + g} \quad (4)$$

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

Equation (4) says that if equation (3) 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, in honor of its originator Professor Myron J Gordon of the University of Toronto.

Q60. Are there other versions of the DCF model?

A60. 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).[73] 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. [74]

In my implementation of the multi-stage DCF, I assume that companies grow their dividend for five years at the forecasted company-specific rate of earnings growth, with that growth then tapering over the next five years toward the growth rate of the overall economy (*i.e.*, the long-term GDP growth rate forecasted to be in effect ten years or more into the future).

2. DCF Inputs and Results

Q61. What growth rate information do you use?

A61. The first step in my DCF analysis (either constant growth or multi-stage formulations) is to examine a sample of investment analysts' forecasted earnings growth rates for companies in my proxy group. For the single-stage DCF and for the first stage of the multi-stage DCF, I use investment analyst forecasts of company-specific growth rates sourced from *Value Line* and Thomson Reuters IBES.

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73 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.

74 See Exhibit___(BV-2), Section I 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.

For the long-term growth rate for the final, constant-growth stage of the multistage DCF estimates, I use the long-term U.S. GDP growth forecast of 4.1 from Blue Chip Economic Indicators.[75] Thus, the long-run (or terminal) growth rate in the multi-stage model is nominal GDP growth.

Q62. What are the pros and cons of the input data?

A62. Both the Gordon Growth and 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 - five years. In the multi-stage version, I taper these growth rates toward a stable growth rate corresponding to a forecast of long-term GDP growth for all companies.

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.

Q63. Please summarize the DCF based cost of equity estimates for the Electric Proxy Group.

A63. The results of the DCF based estimation for the Electric Proxy Group are displayed below in Figure 16.

Figure 16
DCF Model Results: Electric Proxy Group

Single-Stage	10.4%
Multi-Stage	8.8%

Q64. How do you interpret the results of your DCF analyses?

A64. As discussed above, the DCF models are currently estimated based on dividend yields that may be expected to increase as interest rates continue to rise in the coming months

[75] See Blue Chip Economic Indicators, October 2018, p. 14.

and years. As a consequence, the multi-stage DCF model's assumption that *current* prices reflect investor's expectations that dividend growth will converge with the rate of GDP growth in the long term may underestimate how that pattern of expected dividends will be valued in the market throughout the period for which the rates decided in this proceeding will be in effect (*i.e.*, 2019 onward).[76] Thus, while I acknowledge that the single-stage DCF model makes the strong assumption that current three-to-five year Earnings Per Share growth expectations will persist into perpetuity, I conclude that a reasonable estimate of the cost of equity falls somewhere between what is estimated by the two versions of the model. In considering the results from the Electric Proxy Group, I believe the DCF model supports a reasonable range of 9.25 to 10.25 percent for Con Edison's cost of equity.

E. RISK PREMIUM MODEL ESTIMATES

Q65. Did you estimate the cost of equity that results from an analysis of risk premiums implied by allowed ROEs in past utility rate cases?

A65. Yes. In this type of analysis, sometimes called the "risk premium model," the cost of equity capital for utilities is estimated based on the historical relationship between allowed ROEs in utility rate cases and the risk-free rate of interest at the time the ROEs were granted. These estimates add a "risk premium" implied by this relationship to the relevant (prevailing or forecast) risk-free interest rate:

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

Q66. What are the merits of this approach?

A66. First, it estimates the cost of equity from regulated entities as opposed to holding companies, so that the relied upon figure is directly applicable to a rate base. Second, the allowed returns are readily observable to market participants, who will use this one

[76] Blue Chip's forecasted GDP growth was 4.10% at the time of estimation, while the realized nominal GDP growth for Q2 and Q3, 2018 was 7.60 percent and 4.90 percent, respectively.
Source: https://www.bea.gov/news/glance

data input to making 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.

Q67. How did you use rate case data to estimate the risk premiums for your analysis?

A67. The rate case data from 1990-2018 is derived from Regulatory Research Associates.[77] Using this data I compared (statistically) the average allowed rate of return on equity granted by U.S. state regulatory agencies in electric utility and electric distribution rate cases to the average 20-year Treasury bond yield that prevailed in each quarter.[78] 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. I report my results for the respective classifications of rate cases below in Figure 17.[79]

77 SNL Financial as of December 2018.

78 I rely on the 20-year government bond to be consistent with the analysis using the CAPM 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.

79 My workpapers for the implied risk premium analysis are contained in Exhibit___(BV-4).

Figure 17
Implied Risk Premium Model Estimates

		R Squared	Estimate of A_0	Estimate of A_1	Implied Cost of Equity
Electric Utility	[a]	0.829	8.48%	-0.542	10.4%
Electric Distribution	[b]	0.877	8.87%	-0.762	9.8%

Sources and notes: [a], [b]: Estimated using SNL Past Rate Case data as of 12/7/2018 and Bloomberg Treasury yield data as of 11/30/2018.

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 bps when the government bond yield declined by 100 bps. Based on this analysis, I find that the current market conditions are consistent with an ROE of 10.4 percent for the average electric utility and 9.8 percent for the average electric distribution utility.

Q68. What conclusions did you draw from you risk premium analysis?

A68. The results in Figure 17 indicate a range of approximately 9.75 - 10.5 percent as a reasonable allowed ROE for Con Edison based on the risk premium model, which overlaps with the upper half of the estimates from the reasonable range from the DCF and CAPM models. While the risk premium model based on historical allowed returns are not underpinned by fundamental finance principles in the manner of the CAPM or DCF models, I believe that this analysis, when properly designed and executed and placed in the proper context, is a valid and useful approach to estimating utility ROE. 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. Because it relies on the returns for

regulated utilities, I believe this method provides a good way to directly assess whether the ROE is commensurate with that available to alternative investments of similar risk.

VI. CON EDISON SPECIFIC CIRCUMSTANCES AND ROE RECOMMENDATION

A. BUSINESS RISK CHARACTERISTICS

Q69. Are there any differences in the regulatory environment in which the comparable companies and Con Edison operates?

A69. Yes. There are several. First, the state of New York has undertaken a package of energy and utility policy reforms known as New York's Reforming the Energy Vision (REV) programs. The stated goal of these programs is

> promoting more efficient use of energy, deeper penetration of renewable energy resources such as wind and solar, wider deployment of "distributed" energy resources, such as micro grids, roof-top solar and other on-site power supplies, and storage …[80]

From an electric utility perspective, energy efficiency and distributed energy resources reduces the amount of power the utility distributes and most of the comparable companies operate in states without such comprehensive plans.[81] In addition, the New York REV programs reflect a new regulatory environment, so that its ultimate impact on the utilities is unknown and therefore results in higher business risk.

Second, the Company's most recent electric and gas rate orders each included an earnings sharing mechanism, where earnings are shared between customers and the Company above the allowed ROE plus 50 bps. There is no similar sharing mechanism when earnings are below the allowed ROE minus 50 bps.[82] An asymmetric sharing mechanism inherently makes it more difficult for the Companies to earn their allowed ROE on average as illustrated in the example below.

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[80] *See*, http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument

[81] New York does have a decoupling mechanism in place. Source: SNL, "Adjustment Clauses: A State-by State Overview," September 28. 2018.

[82] 2017 Order, pp. 26-29.

Figure 18
Example of Asymmetric Risk Associated with Sharing Mechanism

		8% Earned ROE	9% Earned ROE	10% Earned ROE
Rate Base	[a]	$1,000	$1,000	$1,000
Equity (%)	[b]	48%	48%	48%
Allowed Return on Equity	[c] = [a] × [b] × (9%)	$43.20	$43.20	$43.20
Earned Return	[d] = [a] × [b] × Earned ROE	$38.40	$43.20	$48.00
Earned Return - reimbursed to Customers	[e]	$0.00	$0.00	$1.20
Net Earned Return	[f] =[d] - [e]	$38.40	$43.20	$46.80
Deviation from Allowed Return	**[g] = [f] - [c]**	**-$4.80**	**$0.00**	**$3.60**

Notes:
[e]: For earned return on equity from 9.5% - 10%, Con Edison must reimburse customers 50% of value.
Thus, $1.20 = (10% - 9.5%) × [a] × [b] × .5 must be reimbursed to customers if Con Edison were to realize a 10% return on equity.

As is shown in the figure, the negative deviation from under-earning by 1% is *greater* than the positive deviation associated with over-earning by 1%. As a result, on an expected value basis, Con Edison is more likely to under-earn than they are to over-earn and consequently they will be challenged in earning the allowed ROE.[83]

Third, Con Edison's electric operations have the opportunity to earn incentive for Non-Wires Alternatives based on the net benefits of such programs. Based on periodic filings with the Commission, the Company can earn up to 30% (with customers earning 70%) of the net benefits associated with pursuing non-wires alternative projects.[84] As these incentives are granted for replacing wires with alternatives, there is no distinct impact on the cost of capital or the estimation hereof.

Fourth, I understand Con Edison is implementing an aggressive cost mitigation program - the Business Cost Optimization ("BCO") Program - and has reflected projected savings from the BCO Program in its revenue requirements in these cases. I also understand Con

[83] Statistically speaking, the expected value is the average across all possible outcomes weighted by their likelihood. In this simple example, this points to the average of $-4.80 and $3.60 being less than zero, despite the percentage deviation from the allowed return being +/- 1%. A circumstance without asymmetric risk would retain an expected value of zero for the identical percentage deviation in expected return. This example assumes that Con Edison is equally likely to over earn by 1% as Con Edison is to under earn by 1%.

[84] 2017 Order pp. 29-32 and "Order Approving Shareholder Incentives," Case 15-E-0229, pp. 9-13; Joint Proposal in Case 16-E-0060, pp. 29-31.

Edison has not proposed a reconciliation mechanism if the savings actually realized are less than the projected amounts. As a result, Con Edison bears additional business risk associated with not achieving the BCO Program related costs savings that it provides to customers. This business risk increases the difficulty the Company will face earning its allowed ROE going forward.

Q70. How do these regulatory mechanisms compare to those of the comparable companies?

A70. As noted above, REV-like programs are not common. Looking next to adjustment clauses, a study published by Regulatory Research Associates has found that New York State is neither at the top nor at the bottom regarding the use of adjustment mechanisms for new investments.[85] However, New York is among the few states that operate with a multi-year rate plan for both electric and gas utilities.[86] I also note that Con Edison has a decoupling mechanism, as do more than half of the proxy companies, although the specifics of each plan differ.[87] Because a decoupling mechanism is common, any impact on the ROE or the ability to earn the allowed ROE would be included in the proxy group data, so there is no impact on what Con Edison should be allowed. In addition, research has shown that statistically the presence of a decoupling mechanism has no impact on the cost of capital for electric or gas utilities.[88]

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85 Regulatory Research Associates, "Adjustment Clauses: A state-by-state overview," September 28, 2018.

86 Mark A. Lowry, "Multi-year Rate Plans," NRRI, May 9, 2017.

87 Regulatory Research Associates, "Adjustment Clauses: A state-by-state overview," September 28, 2018.

88 *See*, for example, Joe Wharton and Michael J. Vilbert, "Decoupling and the Cost of Capital," The Electricity Journal vol. 28, 2015, pp. 19-28.

B. EQUITY FLOTATION COSTS

Q71. Are there any other Con Edison-specific considerations relevant to the determination of its allowed ROE?

A71. Yes. It is my understanding that the Company (through its parent company CEI) has incurred flotation costs associated with equity issuances that have not been recovered in rates. These costs take the form of underwriting fees and discounts to the offer price. For example, if flotation costs represent approximately 2.5% of the proceeds raised by the issuances, only $97.50 out of every $100 raised in equity issuances would actually be available to finance Con Edison's assets and operations. To the extent these costs were / are not recovered as expenses at the time of the issuances, they should appropriately be recovered via an adjustment to the return on equity going forward.

Q72. How can Con Edison's ROE be adjusted to allow recover of equity issuance costs?

A72. A standard approach to adjusting the allowed ROE to provide recovery of all past equity issuance costs can be implemented via a straightforward adjustment to the single-stage DCF model. In place of the standard single-stage DCF formula (equation 7), the following formula is used.

$$r = \frac{D_1}{P_0(1-f)} + g$$

where f is the percentage of proceeds lost to underwriting fees or other flotation costs. This formula recognizes that if shares trade at (for example) $100, but 2.5% of the proceeds of the initial issuance of those shares was consumed by flotation costs, only $\$100 \times (1 - 0.025) = \$97.5$ represents value invested in cash-flow generating assets. Therefore, it is relative to this "adjusted" price, not the nominal market price, that investors' required return should be measured.

Comparing the flotation cost-adjusted formula to the standard DCF formula for values of the dividend yield, growth rate, and financial leverage that are representative of the Electric Proxy Group (see Figure 19 below), I find that ten bps is an appropriate ROE adjustment to allow recovery of costs amounting to 2.5% of equity issuance proceeds.

Figure 19
Representative Flotation Cost Adjustment Calculation

		Without Adjustment [1]	With Adjustment [2]
Flotation Cost Share of Issuance Proceeds	[a]	n/a	2.5%
Sample Average Dividend Yield	[b]	3.4%	3.5%
Growth Rate Estimate	[c]	5.4%	5.4%
Single Stage DCF Cost of Equity	[d]	8.8%	8.9%
Sample Average Equity Market Value Ratio (%)	[e]	60.9%	60.9%
Sample Average Debt Market Value Ratio (%)	[f]	39.1%	39.1%
Sample Average Cost of Debt Estimate	[g]	4.8%	4.8%
Tax Rate	[h]	26.1%	26.1%
Single Stage DCF Overall Cost of Capital	[i]	6.8%	6.8%
ConEd Regulatory Equity Ratio (%)	[j]	50%	50%
ConEd Regulatory Debt Ratio (%)	[k]	50%	50%
ConEd Cost of Debt Estimate	[l]	4.5%	4.5%
Implied Cost of Equity	**[m]**	**10.2%**	**10.3%**

Sources and Notes:
[a]: Villadsen Direct Testimony.
[b], [c]: Table No. BV-6 - Panel A.
[d] = [b] + [c]
[e]: Table No. BV-4
[f] = 1 - [e]. For simplification, I include preferred equity in debt.
[g]: Table No. BV-7.
[h]: Composite State and Federal Tax Rate.
[i] = ([d] x [e]) + ([g] x [f] x (1 - [h]))
[j], [k]: ConEd Regulatory Capital Structure.
[l]: Representative Cost of Debt for A rated Utilities.
[m] = ([i] - [k] x [l] x (1 - [h])) / [j]

C. COST OF CAPITAL RECOMMENDATION

Q73. What do you recommend for Con Edison's cost of equity in this proceeding?

A73. I recommend that Con Edison be allowed to earn a 10.00 percent rate of return on the equity portion of its regulated rate base. This estimate is situated in the upper half of the reasonable range of 9.25 - 10.25 percent I obtained from the DCF and CAPM estimation. It is also consistent with the range of 9.75 to 10.25 percent that I obtained from the implied risk premium model. The fact that 10.00 percent is within what is observed for

all three models, DCF-based, CAPM-based, and Risk Premium, suggests that it is a central tendency of the data.

In my opinion, placing Con Edison's allowed rate of return in the upper half of the reasonable range of DCF cost of equity estimates, at the high end of the CAPM/ECAPM range, and in a range consistent with the implied Risk Premium model results is reasonable. As noted above, (i) Con Edison faces somewhat elevated uncertainty and business risk related to substantial changes in regulatory policy, and (ii) the TCJA has resulted in greater volatility of equity cash flows and negative credit quality impacts for the Company, which will only be partially offset by a higher equity ratio (*i.e.*, 50 percent).[89] Finally, although the illustrative ten bps flotation costs adjustment derived in Section VI.B above is not explicitly included in my model results or reasonable ranges, I believe my recommendation is sufficient to allow Con Edison to earn compensation for past (and potential future) equity flotation costs as a component of its ROE.

Q74. Does this conclude your direct testimony?

A74. Yes, it does.

[89] The impact of the TCJA on the Company is discussed in greater detail in the Direct Testimony of Yukari Saegusa.