ORIGINAL

0000175997

RECEIVED
AZ CORP COMMISSION
DOCKET CONTROL

2016 DEC 28 P 3:40

Court S. Rich AZ Bar No. 021290
Rose Law Group pc
7144 E. Stetson Drive, Suite 300
Scottsdale, Arizona 85251
Email: CRich@RoseLawGroup.com
Direct: (480) 505-3937
Attorney for Energy Freedom Coalition of America

BEFORE THE ARIZONA CORPORATION COMMISSION

DOUG LITTLE
CHAIRMAN

BOB STUMP
COMMISSIONER

BOB BURNS
COMMISSIONER

TOM FORESE
COMMISSIONER

ANDY TOBIN
COMMISSIONER

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN.	**DOCKET NO. E-01345A-16-0036** **DOCKET NO. E-01345A-16-0123**
IN THE MATTER OF FUEL AND PURCHASED POWER PROCUREMENT AUDITS FOR ARIZONA PUBLIC SERVICE COMPANY.	**ENERGY FREEDOM COALITION OF AMERICA'S NOTICE OF FILING DIRECT TESTIMONY OF DAVID J. GARRETT**

Arizona Corporation Commission
DOCKETED

DEC 28 2016

DOCKETED BY

Energy Freedom Coalition of America ("EFCA") hereby provides notice of filing the Direct Testimony of David J. Garrett (Part I – Cost of Capital) in the above referenced matter.

Respectfully submitted this 28th day of December, 2016.

/s/ Court S. Rich
Court S. Rich
Rose Law Group pc
Attorney for Energy Freedom Coalition of America

Original and 13 copies filed on
the ~~19th~~ 20th day of December, 2016 with:

Docket Control
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

I hereby certify that I have this day served a copy of the foregoing document on all parties of record in this proceeding by regular or electronic mail to:

Janet Wagner
Arizona Corporation Commission
Legaldiv@azcc.gov
JXHatch-Miller@azcc.gov
chanis@azcc.gov
wvancleve@azcc.gov
eabinah@azcc.gov
tford@azcc.gov
evanepps@azcc.gov
cfitzsimmons@azcc.gov
kchristine@azcc.gov
mscott@azcc.gov

Anthony Wanger
Alan Kierman
IO DATA CENTERS, LLC
t@io.com
akierman@io.com

Meghan Grabel
OSBORN MALEDON, PA
mgrabel@omlaw.com
gyaquinto@arizonaic.org
Timothy Hogan
ACLPI
thogan@aclpi.org
ken.wilson@westernresources.org
schlegelj@aol.com
ezuckerman@swenergy.org
bbaatz@aceee.org
briana@votesolar.org
cosuala@earthjustice.org
dbender@earthjustice.org
cfitzgerrell@earthjustice.org

Daniel Pozefsky
RUCO
dpozefsky@azruco.gov

Patricia Ferre
pferreact@mac.com

Thomas Loquvam
Pinnacle West Capital Corp.
Thomas.loquvam@pinnaclewest.com

C. Webb Crockett
Patrick Black
FENNEMORE CRAIG, P.C.
wcrokett@fclaw.com
pblack@fclaw.com

Greg Eisert
Steven Puck
Sun City Homeowners Association
gregeisert@gmail.com
steven.puck@cox.net

Warren Woodward
w6345789@yahoo.com

Richard Gayer
rgayer@cox.net

Craig Marks
AURA
craig.marks@azbar.org
pat.quinn47474@gmail.com

Al Gervenack
Rob Robbins
Property Owners & Residents Assoc.
al.gervenack@porascw.org
rob.robbins@porascw.org

Cynthia Zwick
Kevin Hengehold
ACCA
czwick@azcaa.org
khengehold@azcaa.org

John William Moore, Jr.
Kroger
jmoore@mbmblaw.com
Jay Moyes

Moyes Sellers & Hendricks LTD
jasonmoyes@law-msh.com
jimoyes@law-msh.com
jim@harcuvar.com

Kurt Boehm
Jody Kyler Cohn
Boehm Kurtz & Lowry
kboehm@bkllawfirm.com
jkylercohn@bkllawfirm.com

Lawrence V. Robertson, Jr.
Noble Americas Energy Solutions LLC
tubaclawyer@aol.com

Michael Patten
Jason Gellman
Snell & Wilmer LLP
mpatten@swlaw.com
jgellman@swlaw.com
docket@swlaw.com
bcarroll@tep.com

Charles Wesselhoft
Pima County Attorney's Office
charles.wesselhoft@pcao.pima.gov

Tom Harris
AriSEIA
tom.harris@ariseia.org
Giancarlo Estrada
Kamper Estrada LLP
gestrada@lawphx.com

Greg Patterson
Munger Chadwick
greg@azcpa.org

Nicholas Enoch
Kaitlyn Redfield-Ortiz
Emily Tornabene
Lubin & Enoch PC
nick@lubinandenoch.com

Scott Wakefield
Hienton Curry, PLLC
swakefield@hclawgroup.com
mlougee@hclawgroup.com
stephen.chriss@wal-mart.com
greg.tillman@wal-mart.com
chris.hendrix@wal-mart.com

By: Hopi L. Slaughter

Albert H. Acken
Ryley Carlock & Applewhite
ssweeney@rcalaw.com
aacken@rcalaw.com
slofland@rcalaw.com

Thomas A. Jernigan
Ebony Payton
AFCEC/JA-ULFSC
thomas.jernigan.3@us.af.mil
ebony.payton.ctr@us.af.mil

John B. Coffman
john@johncoffman.net

Ann-Marie Anderson
Wright Welker & Pauole, PLC
aanderson@wwpfirm.com
aallen@wwpfirm.com

Steve Jennings
AARP Arizona
sjennings@aarp.org

Garry D. Hays
ASDA
ghays@lawgdh.com

Robert L. Pickels, Jr.
Sedona City Attorney's Office
rpickels@sedonaaz.gov

Jason Pistiner
Singer Pistiner PC
jp@singerpistiner.com
kfox@kfwlaw.com
kcrandall@eq-research.com

Thomas E. Stewart
Granite Creek Power & Gas LLC
Granite Creek Farms LLC
tom@gcfaz.com

Denis Fitzgibbons
Fitzgibbons Law Offices, PLC
denis@fitzgibbonslaw.com

Timothy J. Sabo
Snell & Wilmer, LLP
tsabo@swlaw.com
jhoward@swlaw.com
pwalker@conservamerica.org

Jeffrey J. Woner
K.R. Saline & Associates
jjw@krsaline.com

Arizona Public Service Company
Docket No. E-01345A-16-0036
E-01345A-16-0123

Responsive Testimony of

David J. Garrett

Part I – Cost of Capital

On behalf of the
Energy Freedom Coalition of America

December 28, 2016

TABLE OF CONTENTS

LIST OF EXHIBITS

I. INTRODUCTION

Q. State your name and occupation.

A. My name is David J. Garrett. I am a consultant specializing in public utility regulation. I am the managing member of Resolve Utility Consulting, PLLC. I focus my practice on the primary capital recovery mechanisms for public utility companies: cost of capital and depreciation.

Q. Summarize your educational background and professional experience.

A. I received a B.B.A., with a major in Finance, an M.B.A., and a Juris Doctor from the University of Oklahoma. I worked in private legal practice for several years before accepting a position as assistant general counsel at the Oklahoma Corporation Commission in 2011. At the Oklahoma Commission, I worked in the Office of General Counsel in regulatory proceedings. In 2012, I began working for the Public Utility Division as a regulatory analyst providing testimony in regulatory proceedings. I am a Certified Depreciation Professional through the Society of Depreciation Professionals. I am also a Certified Rate of Return Analyst through the Society of Utility and Regulatory Financial Analysts. I have testified in many regulatory proceedings on cost of capital, depreciation, and other issues. A more complete description of my qualifications and regulatory experience is included in my curriculum vitae.[1]

[1] Exhibit DJG 1-1.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the Energy Freedom Coalition of America ("EFCA").

Q. Describe the scope and organization of your testimony.

A. In this case I am testifying on the two primary capital recovery mechanisms in the rate base rate of return model – cost of capital and depreciation – in response to the Application of Arizona Public Service Company ("APS" or the "Company"). Together these issues are voluminous, so I have filed two separate responsive testimony documents. Part I of my responsive testimony (this document) includes cost of capital and related issues. Part II of my responsive testimony includes depreciation expense and related issues.

II. OVERVIEW OF COST OF CAPITAL RECOMMENDATIONS

Q. What is the purpose of your Cost of Capital Responsive Testimony?

A. The purpose of my testimony is to present evidence and provide the Commission with recommendations regarding: (1) APS's awarded return on equity ("ROE"), and (2) the appropriate capital structure that the Commission should impute for ratemaking purposes to arrive at an appropriate cost of capital for APS.

Q. Explain the Weighted Average Cost of Capital ("WACC"), and how the Company's ROE and its capital structure affect this equation.

A. The term "cost of capital" refers to the weighted average cost of all types of securities within a company's capital structure, including debt and equity. Determining the cost of debt is relatively straight-forward. Interest payments on bonds are contractual, "embedded costs" that are generally calculated by dividing total interest payments by the book value

of outstanding debt. Determining the cost of equity, on the other hand, is more complex. Unlike the known, contractual cost of debt, there is no explicit "cost" of common equity. To determine the appropriate cost of equity capital, companies must estimate the return their equity investors will demand in exchange for giving up their opportunity to invest in other securities or postponing their own consumption, in light of the level of risk associated with the investment. Thus, the overall weighted average cost of capital ("WACC"), includes the cost of debt and the estimated cost of equity. It is a "weighted average," because it is based upon the Company's relative levels of debt and equity. Companies in the competitive market often use their WACC as the discount rate to determine the value of various capital projects. The basic WACC equation used in regulatory proceedings is presented below:[2]

Equation 1:
Weighted Average Cost of Capital

$$WACC = \left(\frac{D}{D+E}\right) C_D + \left(\frac{E}{D+E}\right) C_E$$

where:

$WACC$	=	*weighted average cost of capital*
D	=	*book value of debt*
C_D	=	*embedded cost of debt capital*
E	=	*book value of equity*
C_E	=	*market-based cost of equity capital*

Thus, the term "cost of capital" is synonymous with the "weighted average cost of capital," which includes both debt and equity components. Similarly, in this context, the term "cost

[2] *See* Roger A. Morin, *New Regulatory Finance* 449-450 (Public Utilities Reports, Inc. 2006) (1994). The traditional practice uses current market returns and market values of the company's outstanding securities to compute the WACC, but in the ratemaking context, analysts usually employ a hybrid computation consisting of embedded costs of debt from the utilities books, and a market-based cost of equity. Additionally, the traditional WACC equation usually accounts for the tax shield provided by debt, but taxes are accounted for separately in the ratemaking revenue requirement.

of equity" is used interchangeably with "return on equity" or ROE. The Commission's determination of the awarded ROE and the appropriate capital structure are important to achieving the fair and reasonable rates.

In this Application, the Company has proposed a cost of equity of 10.5%, as discussed in the direct testimony of Dr. Villadsen. The Company has also proposed a cost of debt of 5.13% and a debt ratio of 44%, which equates to an overall weighted average cost of capital of 8.11%.[3] In the sections below, I discuss several of the specific flaws and errors upon which the Company's requested weighted average cost of capital is based.

Q. Summarize your analyses and conclusions regarding APS's Cost of Equity.

A. In formulating my recommendation, I performed thorough independent analyses to calculate APS's cost of equity. To do this, I selected a proxy group of companies that represents a relevant sample with asset and risk profiles similar to those of APS. Based on this proxy group, I evaluated the results of two widely-accepted financial models for calculating cost of equity: (1) the Discounted Cash Flow ("DCF") model; and (2) the Capital Asset Pricing Model ("CAPM"). I evaluated these models to ensure a balanced approach that meets the legal standards, objective market considerations, and regulatory goals for establishing an appropriate awarded return for APS. Based on my quantitative and qualitative analyses, as discussed throughout my testimony below, I recommend an awarded return on equity of 9%, which represents the midpoint within a reasonable a range of 8.75% and 9.25%.

---

[3] Company schedule D-1.

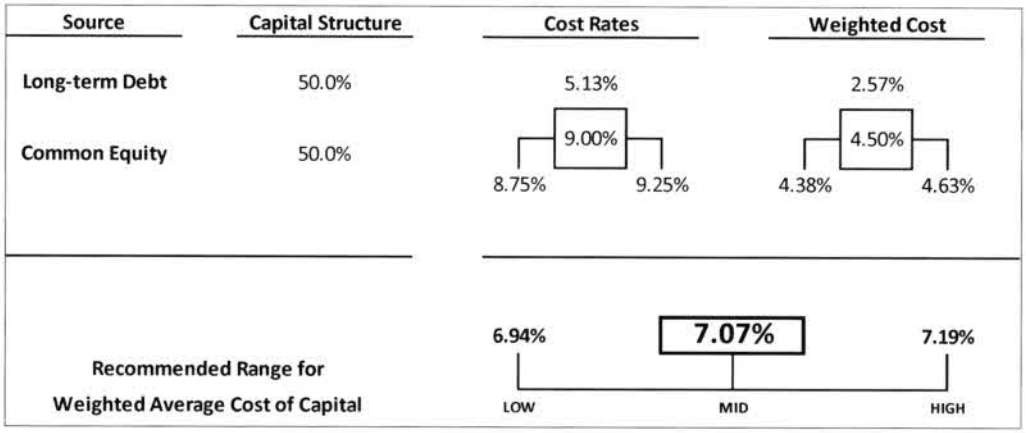
Q. Summarize your analyses and conclusions regarding APS's capital structure.

A. The Company's requested capital structure includes 44% long-term debt and 56% common equity. In this testimony, I present evidence that APS's requested capital structure is not reflective of one that would exist in a competitive environment and is therefore inappropriate for ratemaking purposes. As discussed in my testimony, I recommend the Commission impute a capital structure for APS consisting of 50% debt and 50% equity, as this represents a gradual move toward a more reasonable debt ratio and better aligns with capital structures that exist in competitive environments.

Q. What is the impact of your cost of capital recommendations?

A. My cost of capital recommendations are illustrated in the following figure:

Figure 1:
EFCA Weighted Average Cost of Capital Recommendation



As shown in this figure, an awarded return on equity of 9% with a debt ratio of 50% results in overall weighted average cost of capital of 7.07%. The Company's proposed weighted average cost of capital is much higher. The Company proposes a cost of equity of 10.5%, a cost of debt of 5.13%, and a debt ratio of 44%, which equates to an overall weighted

average cost of capital of 8.13%.[4] In dollar terms, the Company's proposal would result in more than $130 million per year of excess wealth transferred from Arizona ratepayers to the Company's shareholders, and more than $80 million per year of excess wealth transferred from Arizona ratepayers to the IRS.[5] If the Company's position is adopted, the vast majority of these excess dollars will leave the state of Arizona. In return, Arizona businesses and citizens will receive no marginal benefit in the form of better utility service. Instead, Arizona businesses will risk being less competitive with businesses in surrounding states; individual ratepayers will receive inflated costs for basic goods and services, along with higher utility bills.

Q. Provide an overview of the problems you have identified with the Company's cost of capital estimate.

A. As set forth above, the Company proposes an overall awarded rate of return of 8.13%. This is based on Dr. Villadsen's extremely high cost of equity recommendation of 10.5%, and the Company's unreasonably low debt ratio of 44%. Dr. Villadsen recommendations are based on the CAPM and DCF Models, however, several of her key assumptions and inputs to these models violate fundamental, widely-accepted tenants in finance and valuation. In the sections below, I will discuss my concerns regarding the Company's requested cost of capital in further detail. However, the key areas of concern are summarized as follows:

---

[4] *Id.*

[5] These figures are estimates based on a cost of equity of 7.5% and a debt ratio of 50%. Since both of these parameters are conservative estimates, the excess wealth transfer (i.e., when the awarded return is set above the actual market-based cost of capital) is likely greater.

1. In her DCF Model, Dr. Villadsen's long-term growth rate for APS exceeds her long-term growth rate for the entire U.S. economy. It is a fundamental concept in finance that, in the long run, a company cannot grow at a faster rate than the aggregate economy in which it operates; this is especially true for a regulated utility with a defined service territory.

2. Dr. Villadsen's estimate for the current risk-free rate is extremely high because she uses bond rates more than 25 years old in her estimate, despite acknowledging the fact that cost of capital is a forward-looking concept. Since current interest rates are much lower than they were several decades ago, Dr. Villadsen's approach is unreasonable and causes her CAPM results to be overstated.

3. Dr. Villadsen's estimate for the Equity Risk Premium ("ERP"), the single most important factor in estimating the cost of equity, is nearly twice as high as the estimate reported by thousands of other experts evaluating companies in a myriad of industries across the country. While admitting that cost of capital is a forward-looking concept, Dr. Villadsen nevertheless relies on ERP data nearly 100 years old. Moreover, she does so despite the overwhelming evidence that the current ERP is *lower* than the historical risk premium. Dr. Villadsen's overestimation of the current ERP causes her CAPM results to be unrealistic.

4. Dr. Villadsen suggests that Company-specific risk factors have an increasing effect on its cost of equity. However, this overlooks the fundamental concept that the market does not reward diversifiable, firm-specific risk; therefore, investors do not expect a return for such risk. Dr. Villadsen also erroneously suggests that the Company's relative size should have an increasing effect on its cost of equity despite the overwhelming evidence confirming that the "size premium" phenomenon was short-lived and has not been seen for over a quarter-century.

5. APS's proposed capital structure is not reflective of one that we would see in a competitive environment for this Company. Specifically, APS's proposed debt ratio is far too low, which further exacerbates the Company's high cost of capital. By choosing high-cost equity over low-cost debt, the Company has artificially inflated its capital cost at the unnecessary expense of its customers and for the sole benefit of its shareholders.

In short, the assumptions employed by Dr. Villadsen skew the results of her financial models such that they do not reflect the economic realities of the market upon which cost of equity recommendation should be based. In the testimony below, I demonstrate how correcting the various erroneous assumptions in the DCF and CAPM financial models

results in appropriate ROE recommendations which better align with today's market and APS's risk profile.

III. LEGAL STANDARDS FOR ESTABLISHING COST OF CAPITAL

Q. Discuss the legal standards governing the allowed rate of return on capital investments for regulated utilities.

A. In *Wilcox v. Consolidated Gas Co. of New York*, the U.S. Supreme Court first addressed the meaning of a fair rate of return for public utilities.[6] The Court found that "the amount of risk in the business is a most important factor" in determining the appropriate allowed rate of return.[7] Later in two landmark cases, the Court set forth the standards by which public utilities are allowed to earn a return on capital investments. In *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, the Court held:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public. . . but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[8]

In *Federal Power Commission v. Hope Natural Gas Company*, the Court expanded on the guidelines set forth in *Bluefield* and stated:

---

[6] *Wilcox v. Consolidated Gas Co. of New York*, 212 U.S. 19 (1909).

[7] *Id.* at 48.

[8] *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679, 692-93 (1923).

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses ***but also for the capital costs of the business***. These include service on the debt and dividends on the stock. By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.[9]

The cost of capital models I have employed in this case are in accord with all of the foregoing legal standards.

Q. Is it important that the "allowed" rate of return be based on the Company's actual cost of capital?

A. Yes. The Supreme Court in *Hope* makes it clear that the allowed return should be based on the cost of capital. Under the rate base rate of return model, a utility should be allowed to recover all of its reasonable expenses, its capital investments through depreciation, and a return on its capital investments sufficient to satisfy the required return of its investors. The "required return" from the investors' perspective is synonymous with the "cost of capital" from the utility's perspective. Scholars agree that the allowed rate of return should be based on the cost of capital:

---

[9] *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944) (emphasis added).

> Since by definition the cost of capital of a regulated firm represents precisely the expected return that investors could anticipate from other investments while bearing no more or less risk, and since investors will not provide capital unless the investment is expected to yield its opportunity cost of capital, the correspondence of the definition of the cost of capital with the court's definition of legally required earnings appears clear.[10]

The models I have employed in this case closely estimate the Company's true cost of equity. If the Commission sets the awarded return based on my lower, and more reasonable rate of return, it will comply with the Supreme Court's standards, allow the Company to maintain its financial integrity, and satisfy the claims of its investors. On the other hand, if the Commission sets the allowed rate of return much *higher* than the true cost of capital, it arguably results in an inappropriate transfer of wealth from ratepayers to shareholders.

> [I]f the allowed rate of return is greater than the cost of capital, capital investments are undertaken and investors' opportunity costs are more than achieved. Any excess earnings over and above those required to service debt capital accrue to the equity holders, and the stock price increases. In this case, the wealth transfer occurs from ratepayers to shareholders.[11]

Thus, it is important to understand that *awarded* returns and *actual* cost of capital are two separate concepts. Awarded returns are set through the regulatory process and may be influenced by a number of factors other than objective market drivers. Cost of capital, on the other hand, should be evaluated objectively and closely tie to the economic market realities. In other words, cost of capital it is driven by stock prices, dividends, growth rates, and most importantly – it is driven by risk. Cost of capital can be estimated through the use of financial models used by firms, investors, and academics around the world for

---

[10] A. Lawrence Kolbe, James A. Read, Jr. & George R. Hall, *The Cost of Capital: Estimating the Rate of Return for Public Utilities* 21 (The MIT Press 1984).

[11] Morin *supra* n. 2, at 23-24.

decades. The problem is, with respect to regulated utilities, there has been a trend in which awarded returns fail to closely track with actual market-based cost of capital. To the extent this occurs, the results are detrimental to ratepayers and the state's economy.

Q. If the Commission sets the allowed return at a level far greater than the market-based cost of capital, will this permit an excess transfer of wealth from Arizona ratepayers to Company shareholders and the federal government?

A. Yes. As discussed further in the sections below, Dr. Villadsen's recommendation of a 10.5% ROE is far higher than APS's true cost of capital based on objective market data and risk profiles of comparable firms. Nevertheless, she implies that allowing a 10.5% ROE will, in the long run, will be in the customers' best interests.[12] However, when the awarded ROE is set at a level that so far departs from the actual cost of equity – as established by objective standards – the allowed rate of return runs the risk of violating the Supreme Court's standards that the awarded return should be *based on the cost of capital.* Moreover, contrary to Ms. Villadsen's claims, this is patently unfair for ratepayers. Specifically, if the Commission were to adopt the Company's position in this case, it would be permitting an excess transfer of wealth from Arizona customers to Company shareholders of more than $130 million per year. In addition, it would be permitting an excess transfer of wealth from Arizona citizens to the Internal Revenue Service of more than $80 million per year.[13] The detrimental impact to ratepayers and the state's economy is clear. Establishing an awarded return based on flawed assumptions which overstate the

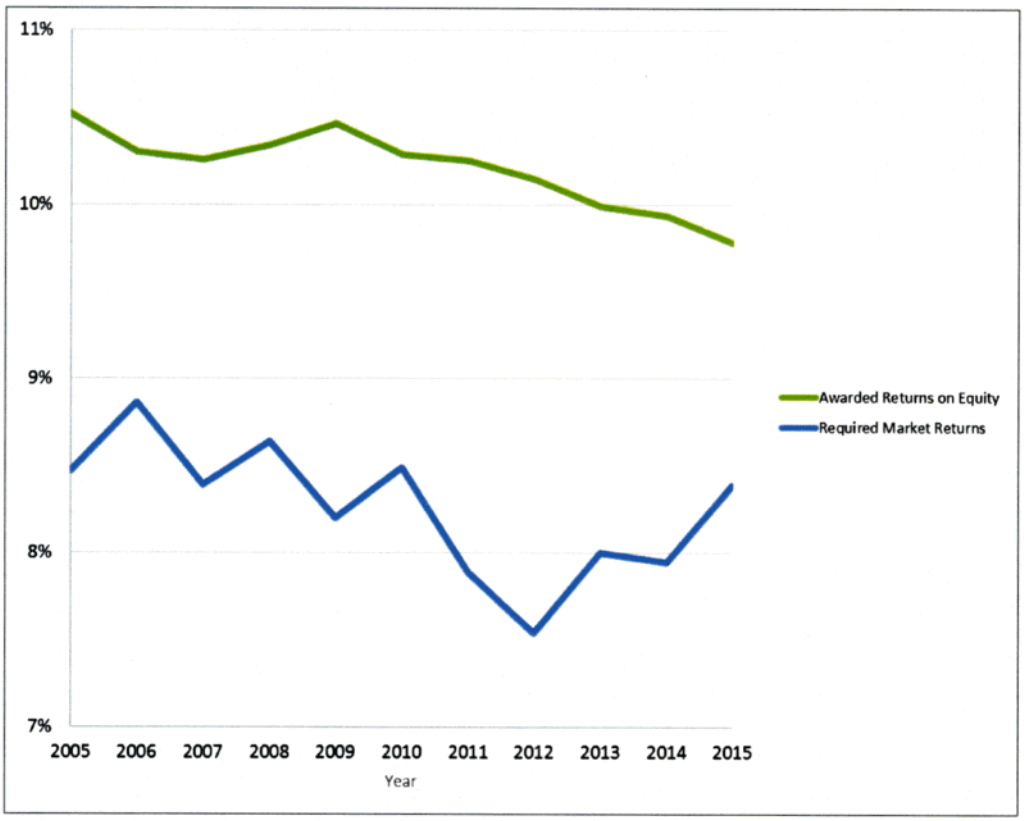
---

[12] Direct Testimony of Bente Villadsen, at 7:1-18.

[13] These figures were estimated by considering the difference between the Company's proposal regarding cost of equity and capital structure and conservative estimates of the Company's actual cost of equity and optimal debt ratio – 7.5% and 50% respectively.

cost of capital effectively prevents the awarded returns from changing along with economic conditions. As shown in the figure below, awarded returns for public utilities have been well above the average required market return for at least ten years. Due to the fact that utility stocks are consistently far less risky than the average stock in the marketplace, the cost of equity for utility companies are *less* than the required return on the market.

Figure 2:
Awarded Returns on Equity vs. Required Market Returns (2005 – 2015)



The gap between the average awarded returns and utility cost of equity (which is below the bottom line showing required market returns), has resulted in an excess of ratepayer wealth being transferred to utility shareholders and the IRS for at least 10 years. This is likely due, in part, to the fact that many years ago (in the 1990s) interest rates were

much higher, with average required market return around 12%. In that environment, the cost of equity for low-risk utility stocks might have been about 9%. Since that time, however, interest rates have dramatically declined among other economic changes, and it is clear that awarded returns have failed to keep pace with decreasing equity costs.

It is not hard to see why this trend of inflating awarded returns has occurred in the past. Because awarded returns have at times been based in part on a comparison with other awarded returns, the average awarded returns effectively fail to adapt to true market conditions. Once utility companies and regulatory commissions become accustomed to awarding rates of return higher than market conditions actually require, this trend becomes difficult to reverse. The fact is, utility stocks are *less risky* than the average stock in the market. As such, the required returns (cost of equity) on utility stocks should be less than the average required returns on the market. However, that is often not the case. What we have seen instead is a disconnect from the market-based cost of equity. For these reasons, the Commission should strive to move the awarded return to a level more closely aligned with the Company's actual, market-derived cost of capital while keeping in mind the following principles:

1. Risk is the most important factor when determining the awarded return. The awarded return should be commensurate with those on investments of corresponding risk.

The legal standards articulated in *Hope* and *Bluefield* demonstrate that the Court understands one of the most basic, fundamental concepts in financial theory: the more (less) risk an investor assumes, the more (less) return the investor requires. Since utility stocks are very low risk, the return required by equity investors should be relatively low. I have used financial models in this case to closely estimate the Company's cost of equity,

and these financial models account for risk. The public utility industry is one of the least risky industries in the entire country. This means that, in the long run, the profits realized in riskier industries should be higher than the profits realized in the utility industry. To the extent awarded returns for utilities remain comparatively higher than the returns for companies in riskier industries, this is further evidence of the disconnect resulting from the regulatory process, rather than financial or market drivers.

Current awarded returns are much higher than cost of equity returns seen in other industries. For example, while returns on equity in the electric utility industry have recently been well above 9.0%, there are more than 3,000 companies in over 30 different industries around the country with an average return on equity of only 1.3%.[14] More importantly, each of these industries is arguably riskier than the electric utility industry from an investment standpoint. In this case, APS is requesting an awarded return far greater than the actual returns of more than 3,000 "highly profitable" and riskier enterprises.[15] Recall that according to *Bluefield*, a public utility has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises. If the Commission strives to set the awarded return closer to the Company's actual, market-based cost of capital, it will satisfy this legal standard and limit the excess wealth transfer from Arizona citizens to out-of-state institutions.

---

[14] Exhibit DG 1-15.

[15] *Id.*

2. The awarded return should be sufficient to assure financial soundness under efficient management.

Because awarded returns in the regulatory environment have not closely tracked market-based trends and commensurate risk, utility companies have been able to remain more than financially sound, perhaps in spite of management efficiencies. In fact, the transfer of wealth from ratepayers to shareholders has been so far removed from actual cost-based drivers, that even under relatively inefficient management a utility could remain financially sound. Therefore, regulatory commissions should strive to set the awarded return to a regulated utility at a level based on accurate market conditions, to promote prudent and efficient management and minimize economic waste.

IV. GENERAL CONCEPTS AND METHODOLOGY

Q. Discuss your general approach in estimating the cost of equity in this case.

A. While a competitive firm must estimate its own cost of capital to assess the profitability capital projects, regulators should determine a utility's cost of capital to establish a fair rate of return. The legal standards set forth above do not include specific guidelines regarding the specific models that must be used to estimate the cost of equity. Over the years, however, regulatory commissions have consistently relied on several models. The models I have employed in this case have been widely used and accepted in regulatory proceedings for many years. These models include the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM"). The specific inputs and calculations for these models are described in more detail below.

Q. Explain why you used multiple models to estimate the cost of equity.

A. The models used to estimate the cost of equity attempt to measure the required return of equity investors by estimating a number of different inputs. It is preferable to use multiple models because the results of any one model may contain a degree of inconsistency, especially depending on the reliability of the inputs used at the time of conducting the model. By using multiple models, the analyst can compare the results of the models and look for outlying results and inconsistencies. Likewise, if multiple models produce a similar result, it may indicate a more narrow range for the cost of equity estimate.[16]

V. THE PROXY GROUP

Q. Explain the benefits of choosing a proxy group of companies in conducting cost of capital analyses.

A. The cost of equity models in this case can be used to estimate the cost of capital of any individual, publicly-traded company. There are advantages, however, to conducting cost of capital analysis on a "proxy group" of companies that are comparable to the target company. First, it is better to assess the financial soundness of a utility by comparing it a group of other financially sound utilities. Second, using a proxy group provides more reliability and confidence in the overall results because there is a larger sample size. Finally, the use of a proxy group is often a pure necessity when the target company is a subsidiary that is not publicly traded, as is the case with APS. This is because the financial

[16] *See* Morin *supra* n. 2, at 28.

models used in this case require information from publicly-traded firms, such as stock prices and dividends.

Q. Describe the proxy group you selected.

A. In this case, each utility company within my proxy group was also used in Dr. Villadsen's proxy group. Dr. Villadsen used additional companies in her proxy group that are relatively much larger and smaller than APS. There could be reasonable arguments made for the inclusion or exclusion of particular companies in a proxy group, but for all intents and purposes, the cost of equity estimates in rate cases are influenced far more by the assumptions and inputs to the various financial models we use than the composition of the proxy groups.[17]

VI. RISK AND RETURN CONCEPTS

Q. Discuss the general relationship between risk and return.

A. As discussed above, risk is among the most important factors for the Commission to consider when determining the allowed return. In order to comply with this standard, it is necessary to understand the relationship between risk and return. There is a direct relationship between risk and return: the more (or less) risk an investor assumes, the larger (or smaller) return the investor will demand. There are two primary types of risk that affect equity investors: firm-specific risk and market risk. Firm-specific risk affects individual firms, while market risk affects all companies in the market to varying degrees.

[17] *See* Exhibit DG 1-3.

Q. Discuss the differences between firm-specific risk and market risk.

A. Firm-specific risk affects individual companies, rather than the entire market. For example, a competitive firm might overestimate customer demand for a new product, resulting in reduced sales revenue. This is an example of project risk.[18] There are several other types of firm-specific risks, including: (1) financial risk – the risk that equity investors of leveraged firms face as residual claimants on earnings; (2) default risk – the risk that a firm will default on its debt securities; and (3) business risk – which encompasses all other operating and managerial factors that may result in investors realizing less than their expected return in that particular company. While firm-specific risk affects individual companies, market risk affects all companies in the market to varying degrees. Examples of market risk include interest rate risk, inflation risk, and the risk of major socio-economic events. When there are changes in these risk factors, they affect all firms in the market to some extent.[19]

Q. Is firm-specific risk diversifiable?

A. Yes. One of the fundamental concepts in finance is that firm-specific risk can be eliminated through diversification.[20] If someone irrationally invested all of their funds in one firm, they would be exposed to all of the firm-specific risk and the market risk inherent in that single firm. Rational investors, however, are risk-averse and seek to eliminate risk they

---

[18] Aswath Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* 62-63 (3rd ed., John Wiley & Sons, Inc. 2012).

[19] *See* Zvi Bodie, Alex Kane & Alan J. Marcus, *Essentials of Investments* 149 (9th ed., McGraw-Hill/Irwin 2013).

[20] *See* John R. Graham, Scott B. Smart & William L. Megginson, *Corporate Finance: Linking Theory to What Companies Do* 179-80 (3rd ed., South Western Cengage Learning 2010).

can control. Investors can eliminate firm-specific risk by simply adding more stocks to their portfolio through a process called "diversification." There are two reasons why diversification eliminates firm-specific risk. First, each stock in a diversified portfolio represents a much smaller percentage of the overall portfolio than it would in a portfolio of just one or a few stocks. Thus, any firm-specific action that changes the stock price of one stock in the diversified portfolio will have only a small impact on the entire portfolio.[21] For example, an investor who had his or her entire portfolio invested in Enron stock at the beginning of 2001 would have lost the entire investment by the end of the year, as result exposure to the firm-specific risk of Enron's imprudent management. On the other hand, a rational, diversified investor who owned every stock in the S&P 500 would have actually earned a positive return over the same period of time. The second reason why diversification eliminates firm-specific risk is that the effects of firm-specific actions on stock prices can be either positive or negative for each stock. Thus, in large portfolios, the net effect of these positive and negative firm-specific risk factors will be essentially zero and will not affect the value of the overall portfolio.[22] Firm-specific risk is also called "diversifiable risk" due to the fact that it can be easily eliminated through diversification.

Q. Is it well-known and accepted that because firm-specific risk can be easily eliminated through diversification, it is not rewarded by the market through higher returns?

A. Yes. Because investors eliminate firm-specific risk through diversification, they know they cannot expect a higher return for assuming the firm-specific risk in any one company.

---

[21] *See* Damodaran *supra* n. 18, at 64.

[22] *Id.*

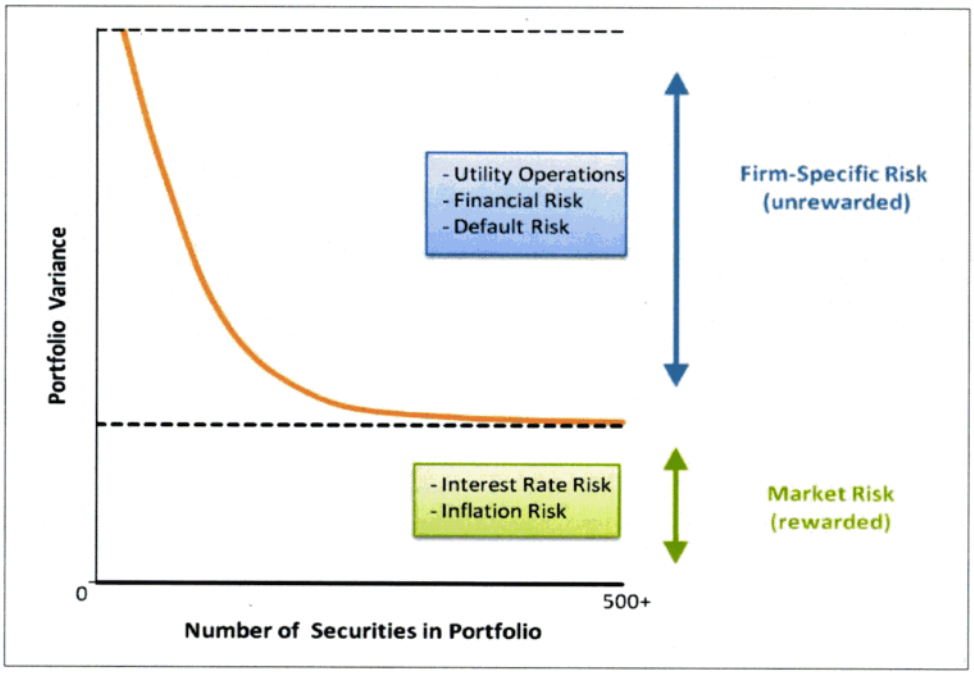
Thus, the risks associated with an individual firm's operations, as well as managerial risk and default risk are not rewarded by the market. In fact, firm-specific risk is also called "unrewarded" risk for this reason. Market risk, on the other hand, cannot be eliminated through diversification. Market risks, such as interest rate risk and inflation risk, affect all stocks in the market to different degrees. Because market risk cannot be eliminated through diversification, investors who assume higher levels of market risk also expect higher returns. Market risk is also called "systematic risk." Scholars agree:

> If investors can cheaply eliminate some risks through diversification, then we should not expect a security to earn higher returns for risks that can be eliminated through diversification. Investors can expect compensation only for bearing systematic risk (i.e., risk that cannot be diversified away).[23]

These important concepts are illustrated in the figure below.

[23] *See* Graham, Smart & Megginson *supra* n. 20, at 180 (emphasis added).

Figure 3:
Effects of Portfolio Diversification



This figure shows that as stocks are added to a portfolio, the amount of firm-specific risk is reduced until it is essentially eliminated. No matter how many stocks are added, however, there remains a certain level of fixed market risk. The level of market risk will vary from firm to firm. Market risk is the only type of risk that is rewarded by the market, and is thus the primary type of risk the Commission should consider when determining the allowed return.

Q. Describe how market risk is measured.

A. Investors who want to eliminate firm-specific risk must hold a fully diversified portfolio. To determine the amount of risk that a single stock adds to the overall market portfolio, investors measure the covariance between a single stock and the market portfolio. The

result of this calculation is called "beta."[24] Beta represents the sensitivity of a given security to the market as a whole. The market portfolio of all stocks has a beta equal to one. Stocks with betas greater than one are relatively more sensitive to market risk than the average stock. For example, if the market increases (decreases) by 1.0%, a stock with a beta of 1.5 will, on average, increase (decrease) by 1.5%. In contrast, stocks with betas of less than one are less sensitive to market risk. For example, if the market increases (decreases) by 1.0%, a stock with a beta of 0.5 will, on average, only increase (decrease) by 0.5%. Thus, stocks with low betas are relatively insulated from market conditions. The beta term is used in the Capital Asset Pricing Model to estimate the required return on equity, which is discussed in more detail later.

Q. Are public utilities characterized as defensive firms that have low betas, low market risk, and are relatively insulated from overall market conditions?

A. Yes. Recall that although market risk affects all firms in the market, it affects different firms to varying degrees. Firms with high betas are affected more than firms with low betas, which is why firms with high betas are riskier. Stocks with betas greater than one are generally known as "cyclical stocks." Firms in cyclical industries are sensitive to recurring patterns of recession and recovery known as the "business cycle."[25] Thus, cyclical firms are exposed to a greater level of market risk. Securities with betas less than one, other the other hand, are known as "defensive stocks." Companies in defensive industries, such as public utility companies, "will have low betas and performance that is

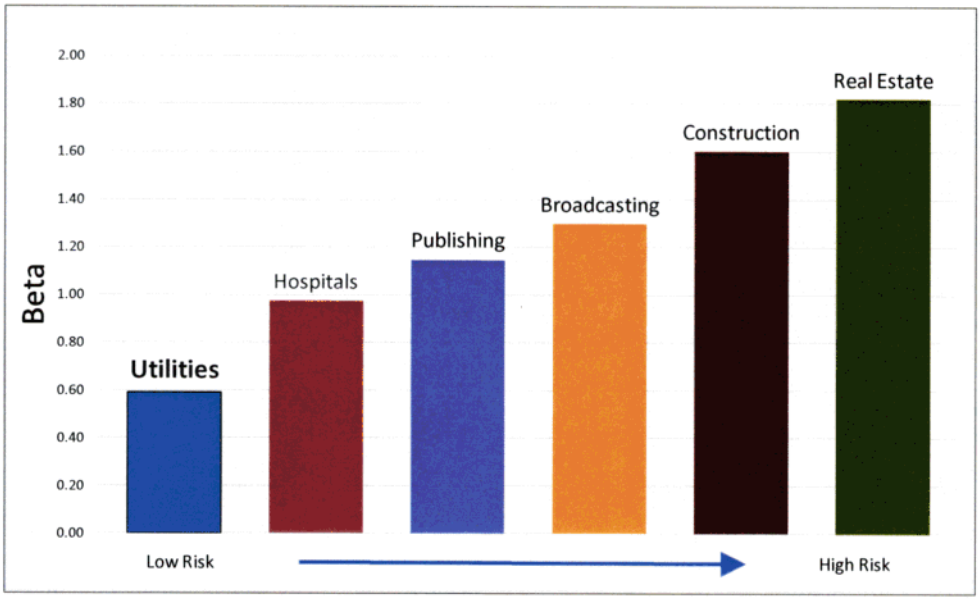
---

[24] *Id.* at 180-81.

[25] *See* Bodie, Kane & Marcus *supra* n. 19, at 382.

comparatively unaffected by overall market conditions."[26] The figure below compares the betas of several industries and illustrates that the utility industry is one of the least risky industries in the U.S. market.[27]

Figure 4:
Beta by Industry



The fact that utilities are defensive firms that are exposed to little market risk is beneficial to society. When the business cycle enters a recession, consumers can be assured that their utility companies will be able to maintain normal business operations, and utility investors can be confident that utility stock prices will not widely fluctuate. So while it is preferable that utilities are defensive firms that experience little market risk and are relatively

[26] *Id.* at 383.

[27] *See* Betas by Sector (US) at http://pages.stern.nyu.edu/~adamodar/. The exact beta calculations are not as important as illustrating the well-known fact that utilities are very low-risk companies. The fact that the utility industry is one of the lowest risk industries in the country should not change from year to year.

insulated from market conditions, this fact should also be appropriately reflected in the Commission's awarded return.

Q. Does this generally mean that investors in firms with low betas require a smaller return than the average required return on the market?

A. Yes. This is the basic concept of the risk and return doctrine: The more (less) risk an investor assumes, the larger (smaller) return the investor will demand. So, if a particular stock is less risky than the market average, then an investor in that stock will require a smaller return than the average return on the market. Since utilities are low-risk companies with low betas, the required return (i.e., cost of capital) for utilities should be lower than the required return on the overall market.

Q. Are there other reasons Commission-awarded returns on equity have exceeded the required market returns for at least the last ten years?

A. Although it is indisputable that the true required return on utility stocks is less than the required return on the overall market, commission-awarded returns on equity have often exceeded market returns over the past ten years.[28] In addition to other factors discussed above, many awarded returns arise as the result of settlements. Settled returns are generally higher than market-based cost of capital because utilities may make concessions with other issues in a rate case in exchange for obtaining a higher awarded return. When awarded returns exceed the cost of equity, it results in an inappropriate transfer of wealth from ratepayers to shareholders and the federal government. Moving the allowed return closer to the Company's cost of equity in this case will comply with the requisite legal standards,

---

[28] *See* Exhibit DG 1-14.

track more closely with market conditions, allow the Company to remain financially healthy, and reduce the burden on ratepayers.

VII. DISCOUNTED CASH FLOW ANALYSIS

Q. Describe the Discounted Cash Flow ("DCF") model.

A. The Discounted Cash Flow ("DCF") Model is based on a fundamental financial model called the "dividend discount model," which maintains that the value of a security is equal to the present value of the future cash flows it generates. Cash flows from common stock are paid to investors in the form of dividends. There are several variations of the DCF Model. In its most general form, the DCF Model is expressed as follows:[29]

Equation 2:
General Discounted Cash Flow

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_n}{(1+k)^n}$$

where: P_0 = *current stock price*
$D_1 \ldots D_n$ = *expected future dividends*
k = *discount rate / required return*

The General DCF Model would require an estimation of an infinite stream of dividends. Since this would be impractical, analysts use more feasible variations of the General DCF Model, which are discussed further below.

[29] *See* Bodie, Kane & Marcus *supra* n. 19, at 410.

Q. Describe the assumptions underlying all DCF Models.

A. Yes. The DCF Models rely on the following four assumptions:[30]

1. Investors evaluate common stocks in the classical valuation framework; that is, they trade securities rationally at prices reflecting their perceptions of value;

2. Investors discount the expected cash flows at the same rate (K) in every future period;

3. The K obtained from the DCF equation corresponds to that specific stream of future cash flows alone; and

4. Dividends, rather than earnings, constitute the source of value.

Q. Describe the Constant Growth DCF Model.

A. The General DCF can be rearranged to make it more practical for estimating the cost of equity. Regulators typically rely on some variation of the Constant Growth DCF Model, which is expressed as follows:

Equation 3:
Constant Growth Discounted Cash Flow

$$K = \frac{D_1}{P_0} + g$$

where: K = *discount rate / required return on equity*
D_1 = *expected dividend per share one year from now*
P_0 = *current stock price*
g = *expected growth rate of future dividends*

Unlike the General DCF Model, the Constant Growth DCF Model solves directly for the required return (K). In addition, by assuming that dividends grow at a constant rate, the dividend stream from the General DCF Model may be essentially substituted with a term

[30] *See* Morin *supra* n. 2, at 252.

representing the expected constant growth rate of future dividends (g). The Constant Growth DCF Model may be considered in two parts. The first part is the dividend yield (D_1/P_0), and the second part is the growth rate (g). In other words, the required return in the DCF Model is equivalent to the dividend yield plus the growth rate.

Q. Does utilization of the Constant Growth DCF Model require additional assumptions?

A. Yes. In addition to the four assumptions listed above, the Constant Growth DCF Model relies on four additional assumptions as follows:[31]

1. The discount rate (K) must exceed the growth rate (g);
2. The dividend growth rate (g) is constant in every year to infinity;
3. Investors require the same return (K) in every year; and
4. There is no external financing; that is, growth is provided only by the retention of earnings.

Since the growth rate is assumed to be constant, it is important not to use growth rates that are unreasonably high. In fact, the constant growth rate estimate for a regulated utility with a defined service territory should not exceed the growth rate for the economy in which it operates.

Q. Describe the Quarterly Approximation DCF Model.

A. The basic form of the Constant Growth DCF Model described above is sometimes referred to as the "Annual" DCF Model. This is because the model assumes an annual dividend payment to be paid at the end of every year, as well as an increase in dividends once each

[31] *See* Morin *supra* n. 2, at 254-56.

year. In reality, however, most utilities pay dividends on a quarterly basis. The Constant Growth DCF equation may be modified to reflect the assumption that investors receive successive quarterly dividends and reinvest them throughout the year at the discount rate. This variation is called the Quarterly Approximation DCF Model.[32]

Equation 4:
Quarterly Approximation Discounted Cash Flow

$$K = \left[\frac{d_0(1+g)^{1/4}}{P_0} + (1+g)^{1/4}\right]^4 - 1$$

where: K = *discount rate / required return*
d_0 = *current quarterly dividend per share*
P_0 = *stock price*
g = *expected growth rate of future dividends*

The Quarterly Approximation DCF Model assumes that dividends are paid quarterly and that each dividend is constant for four consecutive quarters. All else held constant, this model actually results in the highest cost of equity estimate for the utility in comparison to other DCF Models because it accounts for the quarterly compounding of dividends. There are several other variations of the Constant Growth (or Annual) DCF Model, including a Semi-Annual DCF Model which is used by the Federal Energy Regulatory Commission ("FERC"). These models, along with the Quarterly Approximation DCF Model, have been accepted in regulatory proceedings as useful tools for estimating the cost of equity. For this case, I have chosen to use the Quarterly Approximation DCF Model described above.

[32] *See* Morin *supra* n. 2, at 348.

Q. Describe the inputs to the DCF Model.

A. There are three primary inputs in the DCF Model: (1) stock price (P_0); (2) dividend (d_0); and (3) growth rate (g). The stock prices and dividends are known inputs based on recorded data, while the growth rate projection must be estimated. I will discuss each of these inputs in turn.

A. Stock Price

$$\left[K = \frac{D_1}{\boldsymbol{P_0}} + g\right]$$

Q. Describe how you determined the stock price input of the DCF Model.

A. For the stock price (P_0), I used a 30-day average of stock prices for each company in the proxy group.[33] Analysts sometimes rely on average stock prices for longer periods (e.g., 60, 90, or 180 days). According to the efficient market hypothesis, however, markets reflect all relevant information available at a particular time, and prices adjust instantaneously to the arrival of new information.[34] Past stock prices, in essence, reflect outdated information. The DCF Model used in utility rate cases is a derivation of the dividend discount model, which is used to determine the current value of an asset. Thus, according to the dividend discount model and the efficient market hypothesis, the value for

---

[33] *See* Exhibit DG 1-4.

[34] *See* Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, Vol. 25, No. 2 The Journal of Finance 383 (1970); *see also* Graham, Smart & Megginson *supra* n. 20, at 357. The efficient market hypothesis was formally presented by Eugene Fama in 1970, and is a cornerstone of modern financial theory and practice.

the "P_0" term in the DCF Model should technically be the current stock price, rather than an average.

Q. Explain why you used a 30-day average for the current stock price input.

A. Using a short-term average of stock prices for the current stock price input adheres to market efficiency principles which avoiding any irregularities that may arise from using a single current stock price. In the context of a utility rate proceeding there is a significant length of time from when an application is filed and responsive testimony is due. Choosing a current stock price for one particular day during that time could raise a separate issue concerning which day was chosen to be used in the analysis. In addition, a single stock price on a particular day may be unusually high or low. It is arguably ill-advised to use a single stock price in a model that is ultimately used to set rates for several years, especially if a stock is experiencing some volatility. Thus, it is preferable to use a short-term average of stock prices, which represents a good balance between adhering to well-established concepts of market efficiency while avoiding any irregularities that may arise from using a single stock price on a given day. The stock prices I used in my DCF analysis are based on 30-day averages of adjusted closing stock prices for each company in the proxy group.[35]

[35] Exhibit DG 1-4. Adjusted closing prices, rather than actual closing prices, are ideal for analyzing historical stock prices. The adjusted price provides an accurate representation of the firm's equity value beyond the mere market price because it accounts for stock splits and dividends.

B. Dividend

$$\left[K = \frac{\mathbf{D_1}}{P_0} + g\right]$$

Q. Describe how you determined the dividend input of the DCF Model.

A. The dividend term in the Quarterly Approximation DCF Model is the current quarterly dividend per share. I obtained the quarterly dividend paid in the fourth quarter of 2016 for each proxy company.[36] The Quarterly Approximation DCF Model assumes that the company increases its dividend payments each quarter. Thus, the model assumes that each quarterly dividend is greater than the previous one by $(1 + g)^{0.25}$. This expression could be describe as the dividend quarterly growth rate, where the term "g" is the growth rate and the exponential term "0.25" signifies one quarter of the year.

Q. Does the Quarterly Approximation DCF Model result in the highest cost of equity relative to other DCF Models, all else held constant?

A. Yes. The DCF Model I employed in this case results in a higher DCF cost of equity estimate than the annual or semi-annual DCF Models due to the quarterly compounding of dividends inherent in the model.

[36] Nasdaq Dividend History, http://www.nasdaq.com/quotes/dividend-history.aspx.

C. Growth Rate

$$\left[K = \frac{D_1}{P_0} + g\right]$$

Q. Explain the importance of the growth rate input in the DCF Model.

A. The most critical input in the DCF Model is the growth rate. Unlike the stock price and dividend inputs, the growth rate must be estimated. As a result, the growth rate is often the most contentious DCF input in utility rate cases. The DCF model used in this case is based on the constant growth valuation model. As stated above, one of the inherent assumptions of this model is that dividends grow at a constant rate forever. Thus, the growth rate term in the constant growth DCF model is often called the "constant," "stable," or "terminal" growth rate. For young, high-growth firms, estimating the growth rate to be used in the model can be especially difficult. For mature, low-growth firms such as utilities, however, estimating the terminal growth rate is more straightforward, as discussed further below.

Q. Is it widely accepted that the terminal growth rate cannot exceed the growth rate of the economy, especially for a regulated utility company?

A. Yes. A fundamental concept in finance is that no firm can grow forever at a rate higher than the growth rate of the economy in which it operates.[37] Thus, the terminal growth rate used in the DCF Model should not exceed the aggregate economic growth rate. This is especially true when the DCF Model is conducted on public utilities because these firms

[37] Damodaran *supra* n. 18, at 306.

have defined service territories beyond which they cannot grow. As stated by Dr. Damodaran:

> "If a firm is a purely domestic company, either because of internal constraints . . . or external constraints (such as those imposed by a government), the growth rate in the domestic economy will be the limiting value."[38]

In fact, it is reasonable to assume that a regulated utility would grow at a rate that is less than the U.S. economic growth rate. Unlike competitive firms, which might increase their growth by launching a new product line, franchising, or expanding into new and developing markets, public utilities cannot do any of these things to grow. Gross domestic product ("GDP") is one of the most widely-used measures of economic production, and is used to measure aggregate economic growth. According to the Congressional Budget Office's Budget Outlook, the long-term forecast for nominal U.S. GDP growth is 4.1%, which includes an inflation rate of 2%.[39] For mature companies in mature industries, such as utility companies, the terminal growth rate will likely fall between the expected rate of inflation and the expected rate of nominal GDP growth. Thus, APS's terminal growth rate is between 2% and 4.1%

Q. Does the Company estimate that its long-term load growth rate will only be 2.7%?

A. Yes. In its 2017 Integrated Resource Plan, the Company forecasts a long-term load growth of only 2.7%.[40] This would be a reasonable long-term growth rate to use in the DCF model

---

[38] *Id.*

[39] Congressional Budget Office Long-Term Budget Outlook, https://www.cbo.gov/publication/51580.

[40] APS Preliminary 2017 Integrated Resource Plan (October 2016 Update), p. 1.

for the Company. In fact, it falls between the two constraints discussed above (inflation and nominal GDP growth).

Q. Is it reasonable to assume that the terminal growth rate will not exceed the risk-free rate?

A. Yes. In the long term, the risk-free rate will converge on the growth rate of the economy. For this reason, financial analysts often use the risk-free rate for the terminal growth rate value in the DCF model.[41] I discuss the risk-free rate in further detail later in this testimony. My risk-free rate calculation is 2.79%.

Q. Summarize the various terminal growth rate estimates you discussed.

A. For APS, there are four different growth forecasts that could be used for the terminal growth rate in the DCF model: 1) nominal GDP; 2) inflation; 3) load growth; and 4) the risk-free rate.

Figure 5:
Terminal Growth Rates

Indicator	Period	Rate
Nominal GDP	2016 - 2046	4.10%
Inflation	2016 - 2046	2.00%
Load Growth	2017 - 2032	2.70%
Risk Free Rate	Current	2.79%
Average		**2.90%**

[41] Damodaran supra n. 18, at 307.

It would not be reasonable to use any of these rates by itself for APS's terminal growth rate. For the long-term growth rate in my DCF model I selected the highest growth rate from this list, which is the forecasted nominal GDP growth 4.1%. This growth rate estimate, however, is likely high given the fact that it not only exceeds the risk-free rate, but also exceeds the Company's own load growth forecast. It also assumes that APS will grow at the same rate as the U.S. economy. As a result, my final DCF cost of equity estimate is toward the higher end of the reasonable range.

Q. Describe the final results of your DCF Model.

A. I used the Quarterly Approximation DCF Model discussed above to estimate APS's cost of equity capital. I obtained an average of reported dividends and stock prices from the proxy group, and I used a very reasonable terminal growth rate estimate for APS. My DCF cost of equity estimate for APS is 7.7%, as expressed in the following equation:[42]

Equation 5:
DCF Results

$$7.7\% = \left[\frac{\$0.47(1+4.1\%)^{1/4}}{\$55} + (1+4.1\%)^{1/4}\right]^{4} - 1$$

As noted above, this estimate is likely at the higher end of the appropriate range due to the fact that my growth rate estimate exceeds the Company's own load growth forecast.

[42] *See also* Exhibit DG 1-7.

Q. Dr. Villadsen's DCF Model yielded much higher results. Did you find specific problems with her analysis regarding the DCF Models?

A. Yes. Dr. Villadsen's DCF Model produced cost of equity results as high as 10.9%. The results of Dr. Villadsen's DCF Model are unreasonably high primarily due to her extremely inflated growth rate estimates. Dr. Villadsen used long-term growth rates as high as 9.9% in her DCF estimate, compared to my growth rate of 2.9%, which is actually much closer to the Company's own load growth estimate of 2.7%. Dr. Villadsen's growth rate assumptions are patently unreasonable. For example, Dr. Villadsen's long-term growth rate for El Paso Electric is 8%. This means that Dr. Villadsen assumes that El Paso Electric will grow at a rate of 8% per year, every year going forward. El Paso Electric has a defined service territory of about 10,000 square miles. Its growth, like any regulated utility, is primarily set by the limited population growth and load growth in its defined service territory. Yet, Dr. Villadsen assumes that El Paso Electric is going to grow at twice the rate of the entire U.S. economy, which has access to markets across the planet. If there is one thing that Dr. Villadsen and I agree on, it is the estimation that the U.S. economy is going to grow at a nominal rate of about 4%. What we do not agree on is the notion that a small regulated utility will grow by twice that rate – a truly impossible assumption. The only way for a regulated utility's earnings or dividends to grow by 9.9% per year in the long-run would essentially be for rates to increase by 9.9% per year – again, an impossible assumption. In fact, Dr. Villadsen's growth rate assumptions are so contrary to reality that we must view them as errors rather than mere overestimations.

Q. Correct the errors in Dr. Villadsen's DCF Model by limiting the growth rate in her model to the growth rate of the U.S. economy.

A. Since it is impossible for a domestic regulated utility to grow at a greater rate than the U.S. economy over long run, I corrected this error in Dr. Villadsen's DCF Model. I recalculated Dr. Villadsen's DCF Model using her proxy group, her dividends, her stock prices, and her own estimate for GDP growth, 4.1%, which is the same as my estimate.[43] Therefore, all of the inputs to this corrected DCF Model are provided by Dr. Villadsen. The results of Dr. Villadsen's corrected DCF Model indicate a much more reasonable cost of equity estimate of 7.9%. This cost of equity estimate is likely high given the fact that GDP growth is viewed as a limiting factor on long-term growth rates for domestic companies, especially regulated utilities. In fact, the long-term growth rates of regulated utilities are likely less than projected GDP growth. Regardless, a 7.9% cost of equity estimate is much more reasonable than Dr. Villadsen's initial estimate of 10.9%, which was based on long-term growth rates as high as 9.9%. The results of Dr. Villadsen's revised DCF Model are presented in the following figure.[44]

---

[43] *See* Dr. Villadsen's response to data request EFCA 8.8. When asked about her opinion regarding the long-term growth rate of the U.S. economy, Dr. Villadsen responded that the best estimate of GDP growth is 4.1%. This is the same estimate I used for GDP growth, so I would agree that it is a good estimate.

[44] *See also* Exhibit DG 1-19.

Figure 6:
Dr. Villadsen's DCF Inputs using Corrected Growth Rates

Villadsen Proxy Group	Villadsen Stock Price	Villadsen Dividend	Villadsen GDP Growth Estimate	DCF Results
ALLETE	51.84	0.51	4.1%	8.2%
Alliant Energy	65.26	0.59	4.1%	7.9%
Amer. Elec. Power	60.29	0.56	4.1%	8.0%
Ameren Corp.	44.89	0.43	4.1%	8.1%
CenterPoint Energy	17.87	0.25	4.1%	10.0%
CMS Energy Corp.	38.24	0.31	4.1%	7.5%
Consol. Edison	70.35	0.65	4.1%	8.0%
Dominion Resources	70.14	0.65	4.1%	8.0%
DTE Energy	84.26	0.73	4.1%	7.8%
Edison Int'l	61.87	0.48	4.1%	7.4%
El Paso Electric	40.31	0.30	4.1%	7.2%
Entergy Corp.	69.76	0.85	4.1%	9.3%
G't Plains Energy	27.99	0.26	4.1%	8.1%
IDACORP Inc.	68.34	0.51	4.1%	7.2%
MGE Energy	48.72	0.30	4.1%	6.6%
NextEra Energy	110.89	0.77	4.1%	7.0%
OGE Energy	25.89	0.28	4.1%	8.6%
Otter Tail Corp.	27.22	0.31	4.1%	9.0%
PG&E Corp.	54.64	0.46	4.1%	7.6%
Pinnacle West Capital	66.36	0.63	4.1%	8.1%
Portland General	38.83	0.30	4.1%	7.4%
Public Serv. Enterprise	41.06	0.39	4.1%	8.1%
SCANA Corp.	63.12	0.55	4.1%	7.7%
Sempra Energy	94.21	0.70	4.1%	7.2%
Vectren Corp.	42.02	0.40	4.1%	8.1%
Westar Energy	43.50	0.36	4.1%	7.6%
Xcel Energy Inc.	38.14	0.32	4.1%	7.6%
Average				**7.9%**

As shown in this figure, if we use a more realistic growth rate in Dr. Villadsen's DCF Model, we see a more realistic cost of equity estimation. While the actual long-term growth

rates for each of the proxy companies may be slightly different, there is one thing we can be sure of: none of them will exceed U.S. nominal GDP growth. Thus, I've assumed the highest reasonable growth rate for each proxy company, which means that the model has produced the highest reasonable result.

Q. Were the results of your DCF Model consistent with the results of your CAPM?

A. Yes, although the financial models are based on different inputs, the results were consistent. The DCF Model yielded a cost of equity of 7.7%. The CAPM yielded a cost of equity of 7.1%, as discussed in the following section.

VIII. CAPITAL ASSET PRICING MODEL ANALYSIS

Q. Describe the Capital Asset Pricing Model.

A. The Capital Asset Pricing Model ("CAPM") is a market-based model founded on the principle that investors demand higher returns for incurring additional risk.[45] The CAPM estimates this required return.

Q. What assumptions are inherent in the CAPM?

A. The CAPM relies on the following assumptions:

1. Investors are rational, risk-adverse, and strive to maximize profit and terminal wealth;

2. Investors make choices on the basis of risk and return. Return is measured by the mean returns expected from a portfolio of assets; risk is measured by the variance of these portfolio returns;

---

[45] William F. Sharpe, *A Simplified Model for Portfolio Analysis* 277-93 (Management Science IX 1963); *see also* Graham, Smart & Megginson *supra* n. 20, at 208.

3. Investors have homogenous expectations of risk and return;

4. Investors have identical time horizons;

5. Information is freely and simultaneously available to investors.

6. There is a risk-free asset, and investors can borrow and lend unlimited amounts at the risk-free rate;

7. There are no taxes, transaction costs, restrictions on selling short, or other market imperfections; and,

8. Total asset quality is fixed, and all assets are marketable and divisible.[46]

While some of these assumptions may appear to be restrictive, they do not outweigh the inherent value of the model. The CAPM has been widely used by firms, analysts, and regulators for decades to estimate the cost of equity capital.

Q. Is the CAPM approach consistent with the legal standards set forth by the U.S. Supreme Court?

A. Yes. Our courts have recognized that "the amount of risk in the business is a most important factor" in determining the allowed rate of return,[47] and that "the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks."[48] The CAPM is a useful model because it directly considers the amount of risk inherent in a business. It is arguably the strongest of the models usually presented in rate cases because unlike the DCF Model, the CAPM directly measures the most important component of a fair rate of return analysis: Risk.

---

[46] *See id.*

[47] *Wilcox*, 212 U.S. at 48 (emphasis added).

[48] *Hope Natural Gas Co.*, 320 U.S. at 603 (emphasis added).

Q. Describe the CAPM equation.

A. The basic CAPM equation is expressed as follows:

Equation 6:
Capital Asset Pricing Model

$$K = R_F + \beta_i(R_M - R_F)$$

where: K = *required return*
R_F = *risk-free rate*
β = *beta coefficient of asset i*
R_M = *required return on the overall market*

There are essentially three terms within the CAPM equation that are required to calculate the required return (K): (1) the risk-free rate (R_F); (2) the beta coefficient (β); and (3) the equity risk premium ($R_M - R_F$), which is the required return on the overall market less the risk-free rate. Each term is discussed in more detail below, along with the inputs I used for each term.

A. The Risk-Free Rate

$$\left[K = \boldsymbol{R_F} + \beta_i(R_M - R_F)\right]$$

Q. Explain the risk-free rate.

A. The first term in the CAPM is the risk-free rate (R_F). The risk-free rate is simply the level of return investors can achieve without assuming any risk. The risk-free rate represents the bare minimum return that any investor would require on a risky asset. Even though no investment is technically void of risk, investors often use U.S. Treasury securities to represent the risk-free rate because they accept that those securities essentially contain no

default risk. The Treasury issues securities with different maturities, including short-term Treasury Bills, intermediate-term Treasury Notes, and long-term Treasury Bonds.

Q. Is it preferable to use the yield on long-term Treasury bonds for the risk-free rate in the CAPM?

A. Yes. In valuing an asset, investors estimate cash flows over long periods of time. Common stock is viewed as a long-term investment, and the cash flows from dividends are assumed to last indefinitely. Thus, short-term Treasury bill yields are rarely used in the CAPM to represent the risk-free rate. Short-term rates are subject to greater volatility and can thus lead to unreliable estimates. Instead, long-term Treasury bonds are usually used to represent the risk-free rate in the CAPM.[49] I considered a 30-day average of daily Treasury yield curve rates on 30-year Treasury bonds in my risk-free rate estimate, which resulted in a risk-free rate of 2.79%.[50]

B. The Beta Coefficient

$$\left[K = R_F + \boldsymbol{\beta_i}(R_M - R_F)\right]$$

Q. Describe the beta coefficient.

A. As discussed above, beta represents the sensitivity of a given security to movements in the overall market. The CAPM states that in efficient capital markets, the expected risk premium on each investment is proportional to its beta. Recall that a security with a beta greater (less) than one is more (less) risky than the market portfolio. A stock's beta equals

---

[49] *See* Morin *supra* n. 2, at 150.

[50] Exhibit DG 1-8.

the covariance of the asset's returns with the returns on a market portfolio, divided by the portfolio's variance, as expressed in the following formula:[51]

Equation 7:
Beta

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2}$$

where: β_i = *beta of asset i*
σ_{im} = *covariance of asset i returns with market portfolio returns*
σ^2_m = *variance of market portfolio*

Typically, an index such as the S&P 500 Index is used as proxy for the market portfolio. The historical betas for publicly traded firms are published by several commercial sources.[52] Beta may also be calculated through a linear regression analysis, which provides additional statistical information about the relationship between a single stock and the market portfolio. Also as discussed above, beta represents the sensitivity of a given security to the market as a whole. The market portfolio of all stocks has a beta equal to one. Stocks with betas greater than one are relatively more sensitive to market risk than the average stock. For example, if the market increases (decreases) by 1.0%, a stock with a beta of 1.5 will, on average, increase (decrease) by 1.5%. In contrast, stocks with betas of less than one are less sensitive to market risk. For example, if the market increases (decreases) by 1.0%, a stock with a beta of 0.5 will, on average, only increase (decrease) by 0.5%.

---

[51] Graham, Smart & Megginson *supra* n. 20, at 180-81.

[52] E.g., Value Line, Bloomberg, and Merrill Lynch.

Q. Describe the source for the betas you used in your CAPM analysis.

A. I used betas recently published by Value Line Investment Survey. The beta for each proxy company was less than 1.0, and the average beta for the proxy group is 0.71. Thus, we have an objective measure to prove the well-known concept that utility stocks are less risky than the average stock in the market.

C. The Equity Risk Premium

$$\left[K = R_F + \beta_i\left(\boldsymbol{R_M} - \boldsymbol{R_F}\right)\right]$$

Q. Describe the equity risk premium.

A. The final term of the CAPM is the equity risk premium ("ERP"), which is the required return on the market portfolio less the risk-free rate ($R_M - R_F$). In other words, the ERP is the level of return investors expect above the risk-free rate in exchange for investing in risky securities. Many experts would agree that "the single most important variable for making investment decisions is the equity risk premium."[53] Likewise, the ERP is arguably the single most important factor in estimating the cost of capital in this matter. There are three basic methods to estimate the ERP: (1) calculating a historical average; (2) taking a survey of experts; and (3) calculating the implied equity risk premium. I incorporated each one of these methods in determining the ERP used in my CAPM analysis. I will discuss each method in turn.

---

[53] Elroy Dimson, Paul Marsh & Mike Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns* 4 (Princeton University Press 2002).

1. HISTORICAL AVERAGE

Q. Describe the historical equity risk premium.

A. The historical ERP may be calculated by simply taking the difference between returns on stocks and returns on government bonds over a certain period of time. Ibbotson, one of the most widely cited source for the historical ERP in the U.S.,[54] reports both the geometric mean and arithmetic mean for the returns of stocks and government bonds in its annual yearbooks.[55] Many practitioners rely on the historical ERP as an estimate for the forward-looking ERP because it is easy to obtain. However, there are disadvantages to relying on the historical ERP as an indication of the current ERP.

Q. What are the limitations of relying solely on a historical average to estimate the current or forward-looking ERP?

A. Many investors use the historic ERP because it is convenient and easy to calculate. What matters in the CAPM model, however, is not the actual risk premium from the past, but rather the current and forward-looking risk premium.[56] Some investors may think that a historic ERP provides some indication of what the prospective risk premium is, but there is empirical evidence to suggest the prospective, forward-looking ERP is actually lower than the historical ERP. In a landmark publication on risk premiums around the world, *Triumph of the Optimists*, the authors suggest through extensive empirical research that the prospective ERP is lower than the historical ERP.[57] This is due in large part to what is

---

[54] *Id.* at 173.

[55] 2015 Ibbotson Stocks, Bonds, Bills, and Inflation Classic Yearbook 91 (Morningstar 2015).

[56] Graham, Smart & Megginson *supra* n. 20, at 330.

[57] Dimson, Marsh & Staunton *supra* n. 53.

known as "survivorship bias" or "success bias" – a tendency for failed companies to be excluded from historical indices.[58] From their extensive analysis, the authors make the following conclusion regarding the prospective ERP:

> The result is a forward-looking, geometric mean risk premium for the United States . . . of around 2½ to 4 percent and an arithmetic mean risk premium . . . that falls within a range from a little below 4 to a little above percent.[59]

Indeed, these results are lower than many reported historical risk premiums. Other noted experts agree:

> The historical risk premium obtained by looking at U.S. data is biased upwards because of survivor bias . . . . The true premium, it is argued, is much lower. This view is backed up by a study of large equity markets over the twentieth century (*Triumph of the Optimists*), which concluded that the historical risk premium is closer to 4%.[60]

Regardless of the variations in historic ERP estimates, many scholars and practitioners agree that simply relying on a historic ERP to estimate the risk premium going forward is not ideal. Fortunately, "a naïve reliance on long-run historical averages is not the only approach for estimating the expected risk premium."[61]

2. EXPERT SURVEYS

Q. Describe the expert survey approach to estimating the ERP.

A. As its name implies, the expert survey approach to estimating the ERP involves conducting a survey of experts including professors, analysts, chief financial officers and other

---

[58] *Id.* at 34.

[59] *Id.* at 194.

[60] Aswath Damodaran, *Equity Risk Premiums: Determinants, Estimation and Implications – The 2015 Edition* 17 (New York University 2015).

[61] Graham, Smart & Megginson *supra* n. 20, at 330.

executives around the country and asking them what they think the ERP is. Graham and Harvey have performed such a survey every year since 1996. In their 2016 survey, they found that experts around the country believe that the current risk premium is only 4.0%.[62] The IESE Business School conducts a similar expert survey. Their expert survey reported an average ERP of only 5.3%.[63] It should be noted that ERP values assumed by Dr. Villadsen are as high as 8%, which is a substantial departure from these objective survey results.

3. IMPLIED EQUITY RISK PREMIUM

Q. Describe the implied equity risk premium.

A. The third method of estimating the ERP is arguably the best. The implied ERP relies on the stable growth model proposed by Gordon, often called the "Gordon Growth Model," which is a basic stock valuation model widely used in finance for many years:[64]

Equation 8:
Gordon Growth Model

$$P_0 = \frac{D_1}{K - g}$$

where: P_0 = *current value of stock*
D_1 = *value of next year's dividend*
K = *cost of equity capital / discount rate*
g = *constant growth rate in perpetuity for dividends*

---

[62] John R. Graham and Campbell R. Harvey, *The Equity Risk Premium in 2016*, at 3 (Fuqua School of Business, Duke University 2014), copy available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2611793.

[63] Pablo Fernandez, Pablo Linares & Isabel F. Acin, *Market Risk Premium used in 171 Countries in 2016: A Survey with 6,932 Answers*, at 3 (IESE Business School 2015), copy available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2598104

[64] Myron J. Gordon and Eli Shapiro, *Capital Equipment Analysis: The Required Rate of Profit* 102-10 (Management Science Vol. 3, No. 1 Oct. 1956).

This model is similar to the Constant Growth DCF Model presented in Equation 3 above ($K=D_1/P_0+g$). In fact, the underlying concept in both models is the same: The current value of an asset is equal to the present value of its future cash flows. Instead of using this model to determine the discount rate of one company, we can use it to determine the discount rate for the entire market by substituting the inputs of the model. Specifically, instead of using the current stock price (P_0), we will use the current value of the S&P 500 (V_{500}). Instead of using the dividends of a single firm, we will consider the dividends paid by the entire market. Additionally, we should consider potential dividends. In other words, stock buybacks should be considered in addition to paid dividends, as stock buybacks represent another way for the firm to transfer free cash flow to shareholders. Focusing on dividends alone without considering stock buybacks could understate the cash flow component of the model, and ultimately understate the implied ERP. The market dividend yield plus the market buyback yield gives us the gross cash yield to use as our cash flow in the numerator of the discount model. This gross cash yield is increased each year over the next five years by the growth rate. These cash flows must be discounted to determine their present value. The discount rate in each denominator is the risk-free rate (R_F) plus the discount rate (K). The following formula shows how the implied return is calculated. Since the current value of the S&P is known, we can solve for K: The implied market return.[65]

Equation 9:
Implied Market Return

$$V_{500} = \frac{CY_1(1+g)^1}{(1+R_F+K)^1} + \frac{CY_2(1+g)^2}{(1+R_F+K)^2} + \cdots + \frac{CY_5(1+g)^5 + TV}{(1+R_F+K)^5}$$

[65] *See* Exhibit DG 1-10 for detailed calculation.

where:	V_{500}	=	*current value of index (S&P 500)*
	$CY_{1\text{-}5}$	=	*average cash yield over last five years (includes dividends and buybacks)*
	g	=	*compound growth rate in earnings over last five years*
	R_F	=	*risk-free rate*
	K	=	*implied market return (this is what we are solving for)*
	TV	=	*terminal value* $= CY_5 (1+R_F) / K$

The discount rate is called the "implied" return here because it is based on the current value of the index as well as the value of free cash flow to investors projected over the next five years. Thus, based on these inputs, the market is "implying" the expected return. After solving for the implied market return (K), we simply subtract the risk-free rate from it to arrive at the implied ERP.

Equation 10:
Implied Equity Risk Premium

$$Implied\ Expected\ Market\ Return - R_F = Implied\ ERP$$

Q. Discuss the results of your implied ERP calculation.

A. After collecting data for the index value, operating earnings, dividends, and buybacks for the S&P 500 over the past six years, I calculated the dividend yield, buyback yield, and gross cash yield for each year. I also calculated the compound annual growth rate (g) from operating earnings. I used these inputs, along with the risk-free rate and current value of the index to calculate a current expected return on the entire market of 8.09%. I subtracted the risk-free rate to arrive at the implied equity risk premium of 5.3%. Dr. Damodaran, one of the world's leading experts on the ERP, promotes the implied ERP method discussed above. He calculates monthly and annual implied ERPs with this method and publishes her results. Dr. Damodaran's highest ERP estimate for December 2016 was only 6.14%.[66]

[66] http://pages.stern.nyu.edu/~adamodar/

Q. Discuss the results of your final ERP estimate.

A. For the final ERP estimate I used in my CAPM analysis, I averaged the results of the ERP surveys along with Dr. Damodaran's published ERP and my implied ERP calculation.[67] The results are presented in the following figure:

Figure 7:
Equity Risk Premium Results

Expert Survey Risk Premium	
IESE Business School	5.3%
Graham & Harvey	4.0%
Calculated Risk Premium	
Damodaran	6.1%
Garrett	5.3%
Average	**5.2%**

While it would be reasonable to select any one of these ERP estimates, or the average of these estimates, I selected the highest ERP estimate of 6.14% to use in my CAPM in the interest of conservatism. However, this means that the final results of my CAPM are at the higher end of a reasonable range.

Q. Explain the final results of your CAPM analysis.

A. Using the inputs for the risk-free rate, beta coefficient, and equity risk premium discussed above, I calculated the CAPM cost of equity for each proxy company. Using the same

[67] *See also* Exhibit DG 1-11.

CAPM equation presented above, the results of my CAPM analysis are expressed as follows:[68]

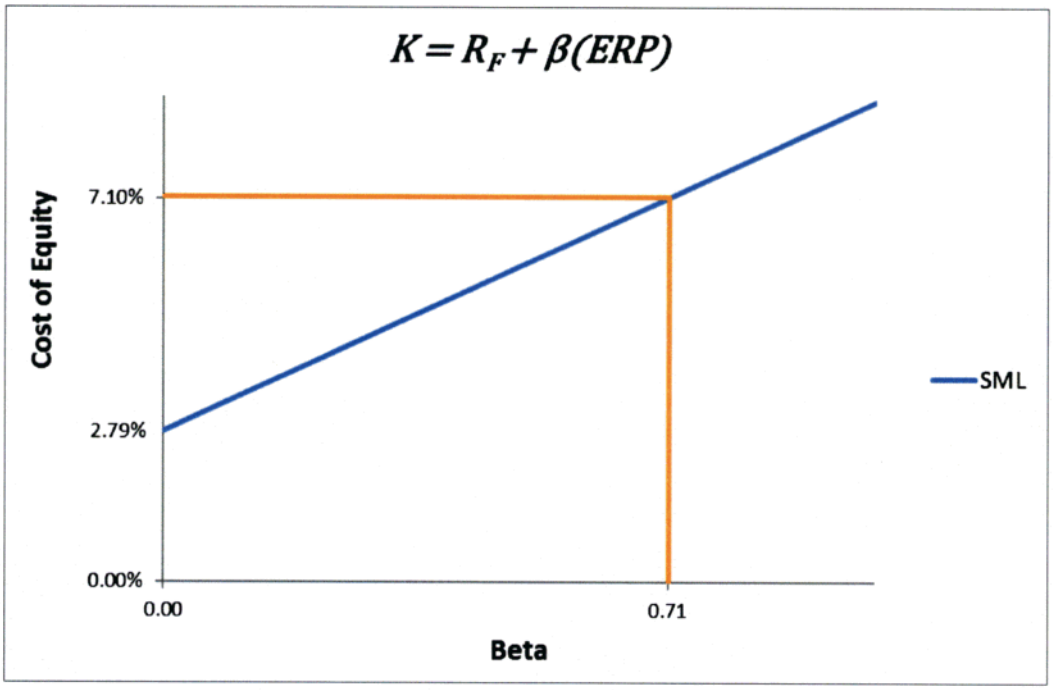
Equation 11:
CAPM Results

$$\mathbf{7.1\%} = 2.79\% + 0.71(6.1\%)$$

The CAPM suggests that APS's cost of equity capital is about 7.1%. The CAPM may be displayed graphically through what is known as the Security Market Line ("SML"). The following figure shows the expected return (cost of equity) on the y-axis, and the average beta for the proxy group on the x-axis. The SML intercepts the y-axis at the level of the risk-free rate. The slope of the SML is the equity risk premium.

[68] Exhibit DG 1-12.

Figure 8:
CAPM Graph



The SML provides the required rate of return that will compensate investors for the beta risk of that investment. Thus, at an average beta of 0.71 for the proxy group, the estimated cost of equity for APS is 7.1%.

Q. Dr. Villadsen's CAPM analysis yields considerably higher results. Did you find specific problems with Dr. Villadsen's CAPM assumptions and inputs?

A. Yes. Dr. Villadsen's cost of equity estimates through her CAPM analysis are as high as 10.5%. This is primarily due to overestimation of the risk-free rate and the equity risk premium.

Q. Why do you think that Dr. Villadsen's assumed risk-free rate is overstated?

A. Recall that the risk-free rate is the level of return investors can achieve without assuming any risk. Analysts often use U.S. Treasury bond rates for the risk-free rate in the CAPM.

Recent treasury bond rates have been around 2.79%, which is the risk-free rate I used in my CAPM analysis. Dr. Villadsen, however, used a much higher risk-free rate of 4.73%. As part of her estimation for the risk-free rate, Dr. Villadsen appears to have added an arbitrary 53-basis-point "maturity premium," which considers government bond rates as far back as 1990, when interest rates were much higher than they are today.[69] Relying on bond rates nearly 30 years old in order to justify a "maturity premium" appears to be at odds with Dr. Villadsen's admission that cost of capital is a "forward-looking" concept.[70]

Q. Did Dr. Villadsen also rely on an inappropriate measure for the equity risk premium ("ERP")?

A. Yes. As noted above, Dr. Villadsen's estimate for the equity risk premium ("ERP") is as high as 8%.[71] Because the ERP is one of the most important factors for estimating the cost of equity, Dr. Villadsen's unreasonable assumption skews her results. In my CAPM, I conducted an analysis of the ERP using two reasonable, widely-accepted methods, including: (1) consulting expert surveys; and (2) calculating the implied ERP based on aggregate market data. Dr. Villadsen, on the other hand, apparently relied on a historical average of equity risk premiums dating back to 1926. Relying on data nearly 100 years old is an inappropriate way to estimate the current and forward-looking ERP, especially without considering the more reasonable approaches that I utilized. Moreover, as discussed above in my CAPM analysis, there is ample evidence to suggest that the forward-looking

---

[69] Direct Testimony of Bente Villadsen at p. 31, footnote 32.

[70] *Id.* at p. 31:17-18.

[71] *Id.* at p. 32:14.

ERP is actually lower than the historical ERP. This is due in large part to what is known as "survivorship bias" or "success bias" – a tendency for failed companies to be excluded from historical indices.[72] Moreover, the current ERP reported by Dr. Villadsen's source, Duff & Phelps, is only 5.5%, not 7%.[73] It is especially concerning that Dr. Villadsen would rely on data nearly 100 years old for a forward-looking model, while ignoring the current ERP reported by the very same source that she cited. Furthermore, Dr. Villadsen used an ERP as high as 8% in her other CAPM scenarios. As with her inflated risk-free rate estimate, this 8% ERP estimate is based on an arbitrary "maturity premium."[74] Arbitrary factors such as "maturity premiums," "size premiums," and other various premiums routinely implanted by utility witnesses are not found in objective financial textbooks and seem to serve no purpose other than a transparent attempt to artificially inflate the cost of equity estimate for the sole benefit of shareholders.

Q. What is the impact of Dr. Villadsen's flawed ERP estimate?

A. Dr. Villadsen's overestimated ERP is considerably higher than the range of ERPs utilized by firms and analysts across the country. Because the ERP is not firm-specific, there are fairly standardized ERP levels that are widely recognized by several prominent national expert surveys. For example, as discussed above, Graham and Harvey's 2016 expert survey reports an average ERP of 4.0%. The IESE Business School expert survey reports

---

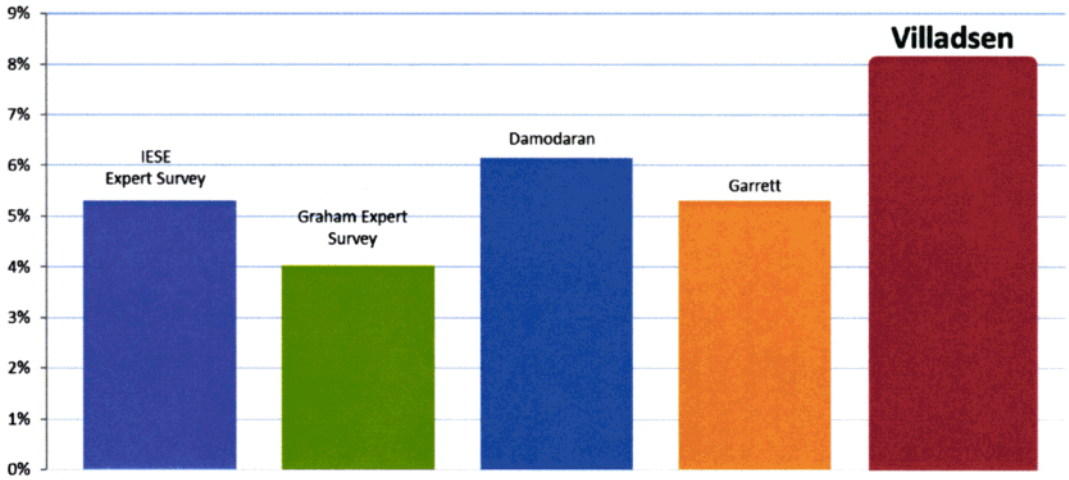
[72] Dimson, Marsh & Staunton *supra* n. 53, at 34.

[73] Duff & Phelps Client Alert, at p. 4, March 16, 2016.

[74] Direct Testimony of Bente Villadsen, p. 32 footnote 36.

an average ERP of 5.3%. The following chart illustrates that Dr. Villadsen's ERP estimate is far out of line with industry norms:[75]

Figure 9:
Equity Risk Premium Comparison



When compared with these well-established ERP benchmarks, it is clear that Dr. Villadsen's ERP estimate is not within the range of reasonableness. As a result, her CAPM cost of equity estimates are overstated.

Q. Did you also review Dr. Villadsen's Risk Premium Model?

A. Yes. Before I discuss Dr. Villadsen's risk premium model, I will reiterate that the CAPM itself is a "risk premium" model. In short, it takes the bare minimum return any investor would require for buying a stock (the risk-free rate), then adds a premium to compensate the investor for the extra risk he or she assumes by buying a stock rather than a riskless U.S. Treasury security. The CAPM has been utilized by companies around the world for

[75] The ERP estimated by Dr. Damodaran is the highest of his several ERP estimates under various assumptions.

decades for the same purpose we are using it in this case – to estimate cost of equity. When reasonable inputs are used in the CAPM, this model tends to produce cost of equity results for utility companies that are much lower than the excessive awarded returns demanded by shareholders. Thus, utility witnesses often downplay the Nobel-Prize-winning CAPM and instead promote their own various risk premium models.

In stark contrast to the CAPM, the risk premium models relied upon by utility witnesses are not market-based, and therefore have no value in helping us estimate the market-based cost of equity. Unlike the CAPM, which is found in almost every comprehensive financial textbook, the risk premium models used by utility witnesses are typically only found in texts written by other utility witnesses. Specifically, these risk premium models attempt to create an inappropriate link between market-based factors, such as interest rates, with awarded returns on equity. Inevitably, this type of model is used to justify a cost of equity that is much higher than one that would be dictated by market forces. In this case, Dr. Villadsen's risk premium model is no different. Dr. Villadsen's version of the risk premium model looked at the "spread between the allowed ROE at a given time and the then prevailing interest rate. . . ."[76] This necessarily suggests that the awarded ROE should be somehow based on the current interest rate. In some aspects this is correct, though not for the reasons implied in Dr. Villadsen's model. Indeed, the legal standards governing this issue direct that the awarded return on equity should be based on the cost of equity. In turn, the cost of equity, as estimated through the CAPM, is driven by interest rates. Thus, the idea that the awarded ROE should be based on interest rates is

[76] Direct Testimony of Bente Villadsen, p. 45:24-25.

already built into the CAPM, but only if regulators base the awarded ROE on the true cost of equity, which is about 7.4% in this case. Unfortunately, it is clear that for many years, awarded returns for utilities have escalated far above market-based cost of equity computations. Giving undue consideration to Dr. Villadsen's "risk premium" model would only serve to perpetuate this trend, which has resulted in a significant wealth shift from ratepayers to shareholders for many years.

Q. Describe the proper way to consider risk premiums when estimating the cost of equity.

A. Dr. Villadsen's risk premium model is not only inappropriate as presented, but it is also unnecessary. The CAPM already has a built-in risk premium factor known as the equity risk premium ("ERP"). Not only is the ERP a crucial factor in the CAPM, but many would agree that the ERP is "the single most important variable for making investment decisions. . . ."[77] Specifically, the ERP is the expected return on the market less the risk-free rate. In other words, the ERP is a function of market-driven forces. Unlike the risk premium presented in Dr. Villadsen's testimony, the ERP cannot be influenced by the decisions of a utility commission. For that matter, it cannot be materially influenced by the decisions of any single company. Thus, the ERP has no material connection with the returns awarded to public utility companies in rate cases. This point is furthered by the expert surveys. Recall that the expert surveys ask thousands of experts across the country about the current ERP. When these experts are asked about the sources they relied on in giving their ERP

[77] Dimson, Marsh & Staunton *supra* n. 53, at 4.

estimate, it is not surprising that they make no mention of commission-awarded returns.[78] Moreover, many awarded returns arise out of settlements, which means that in complete contrast to the ERP, they are not reflective of market-driven forces. For all of these reasons, it is completely inappropriate to consider commission-awarded returns in any risk premium analysis. Thus, the Commission should disregard Dr. Villadsen's risk premium analysis.

IX. OTHER COST OF EQUITY ISSUES

Q. Are there any other issues raised in Dr. Villadsen's testimony to which you would like to respond?

A. Yes, in her direct testimony Dr. Villadsen discusses various firm-specific risk factors and suggests that they should have an increasing effect on the cost of equity. Dr. Villadsen also suggests that the size of APS should justify an even higher cost of equity. Finally, I would like to address the issue of fair value rate of return. I will discuss each issue in turn.

A. Firm-Specific Risks

Q. Do you agree that the Company's firm-specific risk factors cited by Dr. Villadsen materially influence its cost of equity?

A. No. Recall that there are two primary types of risk: market risk, which affects all firms to varying degrees, and firm-specific risk, which affects individual firms. Dr. Villadsen suggests that certain firm-specific factors should have an increasing effect on the cost of

[78] In the IESE Business School's 2014 survey, some of the respondents indicated which books, papers, and other sources they used as a reference to justify the equity risk premium that they used. The most cited references were Dr. Damodaran, Ibbotson, Duff & Phelps, Graham-Harvey, Bloomberg, Grabowski, Siegel, and other sources. Of course, there was no mention of commission-awarded returns.

equity, including nuclear generation, distributed generation, and decoupling.[79] As discussed above however, it is a well-known concept in finance that firm-specific risks are unrewarded by the market. In fact, Dr. Villadsen actually acknowledges this truth in her testimony, and ultimately concludes that the firm-specific risk factor of decoupling should not affect the cost of equity.[80] In fact, the same is true with regard to all of APS's other firm-specific risk factors. In other words, this fundamental concept in finance applies to all firm-specific risk factors, not just some of them. This is because investors can easily eliminate firm-specific risks through portfolio diversification. Therefore, the Company's few and relatively small firm-specific business risks, while perhaps relevant to other issues in the rate case, have no meaningful effect on the cost of equity estimate. Rather, it is market risk that is rewarded by the market, and this concept is thoroughly addressed in my CAPM analysis discussed above.

B. Size Premium

Q. Does the Company's relatively small size materially affect the cost of equity estimate?

A. No. Dr. Villadsen suggests that APS's cost of equity should be further inflated due to its relatively small size. Utility cost of capital witness often refer to this as a "size premium." The size premium refers to the idea that the additional risk associated with smaller firms is not fully accounted for in their betas. The "size effect" phenomenon arose from a 1981 study conducted by Banz, which found that "in the 1936 – 1975 period, the common stock of small firms had, on average, higher risk-adjusted returns than the common stock of large

[79] *See* Direct Testimony of Bente Villadsen pp. 48-49.

[80] *Id.* at p. 56:16-19.

firms."[81] According to Ibbotson, Banz's size effect study was "[o]ne of the most remarkable discoveries of modern finance."[82] Perhaps there was some merit to this idea at the time, but the size effect phenomenon was short lived. Banz's 1981 publication generated much interest in the size effect, and spurred the launch of significant new small cap investment funds. However, this "honeymoon period lasted for approximately two years. . . ." [83] After 1983, U.S. small-cap stocks actually underperformed relative to large cap stocks. In other words, the size effect essentially reversed. In *Triumph of the Optimists*, the authors conducted an extensive empirical study of the size effect phenomenon around the world. They found that after the size effect phenomenon was discovered in 1981, it disappeared within a few years:

> It is clear . . . that there was a global reversal of the size effect in virtually every country, with the size premium not just disappearing but going into reverse. Researchers around the world universally fell victim to Murphy's Law, with the very effect they were documenting – and inventing explanations for – promptly reversing itself shortly after their studies were published.[84]

In other words, the authors assert that the very discovery of the size effect phenomenon likely caused its own demise. The authors ultimately concluded that it is "inappropriate to use the term 'size effect' to imply that we should automatically expect there to be a small-cap premium," yet, this is exactly what utility witnesses often do in attempting to

---

[81] Rolf W. Banz, *The Relationship Between Return and Market Value of Common Stocks* 3-18 (Journal of Financial Economics 9 (1981)).

[82] 2015 Ibbotson Stocks, Bonds, Bills, and Inflation Classic Yearbook 99 (Morningstar 2015).

[83] Dimson, Marsh & Staunton *supra* n. 53, at 131

[84] *Id.* at 133.

artificially inflate the cost of equity with a size premium. Other prominent sources have agreed that the size premium is a dead phenomenon. According to Ibbotson:

> The unpredictability of small-cap returns has given rise to another argument against the existence of a size premium: that markets have changed so that the size premium no longer exists. As evidence, one might observe the last 20 years of market data to see that the performance of large-cap stocks was basically equal to that of small cap stocks. In fact, large-cap stocks have outperformed small-cap stocks in five of the last 10 years.[85]

In addition to the studies discussed above, other scholars have concluded similar results. According to Kalesnik and Beck:

> Today, more than 30 years after the initial publication of Banz's paper, the empirical evidence is extremely weak even before adjusting for possible biases. . . . The U.S. long-term size premium is driven by the extreme outliers, which occurred three-quarters of a century ago. . . . Finally, adjusting for biases . . . makes the size premium vanish. If the size premium were discovered today, rather than in the 1980s, it would be challenging to even publish a paper documenting that small stocks outperform large ones.[86]

For all of these reasons, the Commission should reject the arbitrary size premium proposed by the Company.

X. COST OF EQUITY SUMMARY

Q. Summarize the results of the DCF and CAPM cost of equity models presented above.

A. The following table shows the cost of equity results from each of the models I employed in this case.

---

[85] Ibbotson *supra* n. 82, at 112 (emphasis added).

[86] Vitali Kalesnik and Noah Beck, *Busting the Myth About Size* (Research Affiliates 2014), available at https://www.researchaffiliates.com/Our%20Ideas/Insights/Fundamentals/Pages/284_Busting_the_Myth_About_Size.aspx (emphasis added).

Figure 10:
Cost of Equity Summary

Model	Cost of Equity
Discounted Cash Flow Model	7.7%
Capital Asset Pricing Model	7.1%
Average	**7.4%**

The average cost of equity of the DCF Model and the CAPM is 7.4%. Furthermore, it is noteworthy that these two models produced comparable results, especially considering the fact that the inputs for the two modes are completely different. Again, the DCF Model considers stock price, dividends, and a long-term growth rate. The CAPM considers the risk-free rate, beta, and the equity risk premium. These inputs are relatively unrelated to each other, and yet the models produced similar results.[87] This fact further highlights the validity of these two models, which have been relied upon by executives, analysts, academics, and regulators for decades to value companies and estimate cost of equity.

Q. What do you recommend for the awarded return on equity?

A. The Commission should strive to award a return on equity that reflects the market-based cost of equity. However, the awarded return must also consider broader ratemaking principles and be reasonable under the circumstances. The results of the financial models presented in this case indicate a cost of equity estimate of 7.4%. The Company's current

[87] These results also highlight the fact that the growth rate used in my DCF Model, nominal U.S. GDP growth, is a relatively high growth rate estimate for a utility company. Using a growth rate closer to the risk-free rate or APS's projected load growth would have made the results of the DCF Model even closer to the CAPM.

authorized return on equity is 10% pursuant to a 2012 settlement agreement. In the interest of achieving a gradual movement toward the appropriate market-based cost of equity of about 7.5%, I recommend the Commission in this case adopt an awarded return on equity of 9%, which is the midpoint in a range of reasonableness of 8.75% to 9.25%.

XI. COST OF DEBT

Q. Describe APS's position regarding long-term debt financing.

A. APS had $3.7 billion of long-term debt capital during the test year at a cost of 5.13%. The Company's cost of debt appears to have been calculated correctly. I do not recommend any adjustments to the Company's proposed cost of debt.

XII. CAPITAL STRUCTURE

Q. Describe in general the concept of a company's "capital structure."

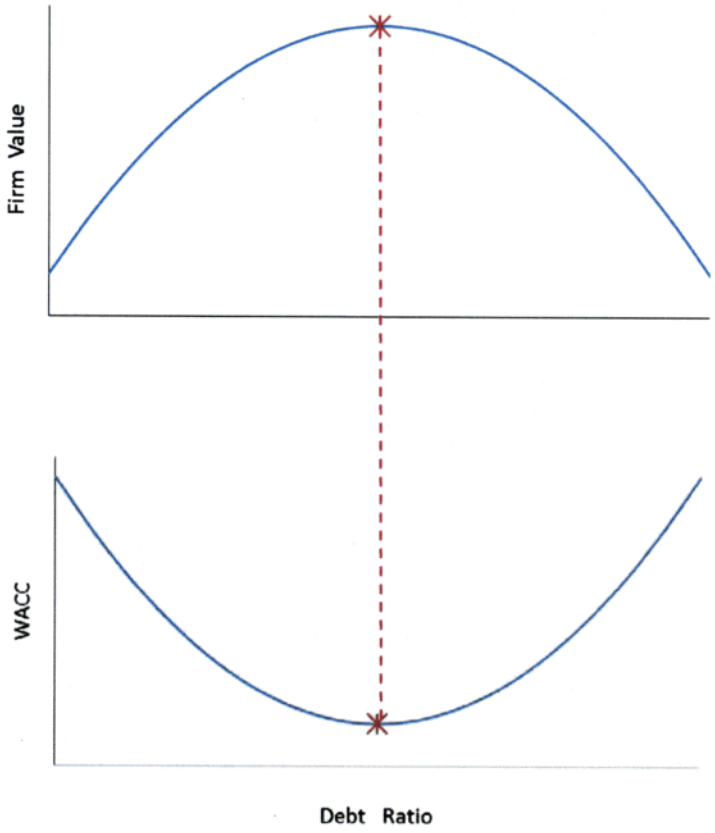
A. "Capital structure" refers to the way a firm finances its overall operations through external financing. The primary sources of long-term, external financing are debt capital and equity capital. Debt capital usually comes in the form of contractual bond issues that require the firm make payments, while equity capital represents an ownership interest in the form of stock. Because a firm cannot pay dividends on common stock until it satisfies its debt obligations to bondholders, stockholders are referred to as "residual claimants." The fact that stockholders have a lower priority to claims on company assets increases their risk and required return relative to bondholders. Thus, equity capital has a higher cost than debt capital. Firms can reduce their weighted average cost of capital ("WACC") by

recapitalizing and increasing their debt financing. In addition, because interest expense is deductible, increasing debt also adds value to the firm by reducing the firm's tax obligation.

Q. Is it true that by increasing debt, competitive firms can add value and reduce their WACC?

A. Yes. A competitive firm can add value by increasing debt. After a certain point, however, the marginal cost of additional debt outweighs its marginal benefit. This is because the more debt the firm uses, the higher interest expense it must pay, and the likelihood of loss increases. This increases the risk of recovery for both bondholders and shareholders, causing both groups of investors to demand a greater return on their investment. Thus, if debt financing is too high, the firm's WACC will increase instead of decrease. The following figure illustrates these concepts.

Figure 11: Optimal Debt Ratio



As shown in this figure, a competitive firm's value is maximized when the WACC is minimized. In both of these graphs, the debt ratio [D/(D+E)] is shown on the x-axis. By increasing its debt ratio, a competitive firm can minimize its WACC and maximize its value. At a certain point, however, the benefits of increasing debt do not outweigh the costs of the additional risks to both bondholders and shareholders, as each type of investor will demand higher returns for the additional risk they have assumed.[88]

[88] *See* Graham, Smart & Megginson *supra* n. 20, at 440-41.

Q. Does the rate base rate of return model effectively incentivize utilities to operate at the optimal capital structure?

A. No. While it is true that competitive firms maximize their value by minimizing their WACC, this is not the case for regulated utilities. Under the rate base rate of return model, a higher WACC results in higher rates, all else held constant. The basic revenue requirement equation is as follows:

Equation 12:
Revenue Requirement for Regulated Utilities

$$RR = O + d + T + \boldsymbol{r}(A - D)$$

where:	RR	=	*revenue requirement*
	O	=	*operating expenses*
	d	=	*depreciation expense*
	T	=	*corporate tax*
	$\boldsymbol{r}$	=	***weighted average cost of capital (WACC)***
	A	=	*plant investments*
	D	=	*accumulated depreciation*

As shown in this equation, utilities can increase their revenue requirement by increasing their WACC, not by minimizing it. Thus, because there is no incentive for a regulated utility to minimize its WACC, a Commission standing in the place of competition must ensure that the regulated utility is operating at the lowest reasonable WACC.

Q. Do you believe that, generally speaking, utilities can afford to have higher debt levels than other industries?

A. Yes. Because regulated utilities have large amounts of fixed assets, stable earnings, and low risk relative to other industries, they can afford to have higher debt ratios (or "leverage"). As aptly stated by Dr. Damodaran:

> Since financial leverage multiplies the underlying business risk, it stands to reason that firms that have high business risk should be reluctant to take on financial leverage. It also stands to reason that firms that operate in stable businesses should be much more willing to take on financial leverage. Utilities, for instance, have historically had high debt ratios but have not had high betas, mostly because their underlying businesses have been stable and fairly predictable.[89]

Note in the passage above that the author explicitly contrasts utilities with firms that have high underlying business risk. Because utilities have low levels risk and operate a stable business, they should generally operate with relatively high levels of debt to achieve their optimal capital structure. There are objective methods available to estimate the optimal capital structure, as discussed further below.

Q. Is it appropriate to solely consider the capital structures of the proxy group in assessing a prudent capital structure?

A. No. Utility witness often argue that regulators should consider only the capital structures of other regulated utilities in assessing the proper capital structure. This type of analysis is oversimplified and insufficient for three important reasons:

1. Utilities do not have a financial incentive to operate at the optimal capital structure.

Under the rate base rate of return model, utilities do not have a natural financial incentive to minimize their cost of capital; in fact, they have a financial incentive to do the opposite. Competitive firms, in contrast, can maximize their value by minimizing their cost of capital. Competitive firms minimize their cost of capital by including a sufficient amount of debt in their capital structures. Simply comparing the debt ratios of other regulated utilities will not indicate an appropriate capital structure for the Company. Rather, it is

---

[89] Damodaran *supra* n. 18, at 196 (emphasis added).

likely to justify debt ratios that are far too low. It is the Commission's role to act as a surrogate for competition and thereby ensure that the capital structure of a regulated monopoly is similar to what would be appropriate in a competitive environment, not a regulated environment. This cannot be accomplished by simply looking at the capital structures of other regulated utilities or the target utility's test-year capital structure.

2. The optimal capital structure is unique to each firm.

As discussed further below, the optimal capital structure for a firm is dependent on several unique financial metrics for that firm. The other companies in the proxy group have different financial metrics than the target utility, and thus have different optimal capital structures. An objective analysis should be performed using the financial metrics of the target utility in order to estimate its unique optimal capital structure.

3. The capital structures of the proxy group may not have been approved by their regulatory commissions.

The actual capital structure of any utility falls within the realm of managerial discretion. Regulatory commissions, however, have a duty to impute a proper capital structure if the company's actual capital structure is inappropriate. Thus, the actual capital structures of other utilities may have been deemed inappropriate by their own commission. For all of the foregoing reasons, simply comparing the capital structures of other regulated utilities has no place in a proper capital structure analysis.

Q. Describe an objective approach to estimating a firm's optimal capital structure.

A. My analysis of the optimal capital structure includes objective methods to measure the effects of increasing debt on both the cost of debt and cost of equity. I will discuss the effects of increasing the debt ratio on each type of security separately.

Cost of Debt

As discussed above, increasing the debt ratio will increase the cost of debt. To objectively measure how much the cost of debt increases, I considered the spreads above the risk-free rate for various levels of bond ratings and interest coverage ratios. The following table shows increasing interest rates for debt based on different bond rating levels.

Figure 12:
Bond Rating Spreads

Ratings Table			
Coverage Ratio	Bond Rating	Spread	Interest Rate
> 8.5	Aaa/AAA	0.75%	3.52%
6.5 - 8.49	Aa2/AA	1.00%	3.77%
5.5 - 6.49	A1/A+	1.10%	3.87%
4.25 - 5.49	A2/A	1.25%	4.02%
3.0 - 4.24	A3/A-	1.75%	4.52%
2.5 - 2.99	Baa2/BBB	2.25%	5.02%
2.25 - 2.49	Ba1/BB+	3.25%	6.02%
2.0 - 2.249	Ba2/BB	4.25%	7.02%
1.75 - 1.99	B1/B+	5.50%	8.27%
1.5 - 1.74	B2/B	6.50%	9.27%
1.25 - 1.49	B3/B-	7.50%	10.27%
0.8 - 1.249	Caa/CCC	9.00%	11.77%

As shown in this table, the spreads over the risk-free rate gradually increase as bond ratings fall.[90] The spread is added to the risk-free rate to obtain the interest rates shown in the far right column. This concept is somewhat comparable to the interest rate a mortgage lender

[90] The link between interest coverage ratios and ratings was developed by looking at all rated companies in the U.S. The default spreads are obtained from traded bonds. The spreads are added to the risk-free rate to obtain the interest rates in the table. http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.htm.

would charge a borrower. The mortgage lender's advertised rate is usually the lowest rate, or the "prime" rate, which is available to borrowers with stellar credit scores. As credit scores decrease, however, the offered interest rate will increase. The bond ratings in this figure are based on various levels of interest coverage ratios shown in the far left column. The interest coverage ratio, as its name implies, is a metric used by financial analysts to gauge a firm's ability to pay its interest expense from its available earnings before interest and taxes ("EBIT"). (Likewise, the mortgage lender would consider the borrower's personal income-debt ratio). The formula for the interest coverage ratio is as follows:

Equation 13:
Interest Coverage Ratio

$$\frac{Earnings\ before\ Interest\ and\ Taxes}{Interest\ Expense}$$

As the debt ratio rises, the interest coverage ratio falls, the bond ratings increase, and the cost of debt increases. Now that we have an objective way of measuring how increasing the debt ratio affects the cost of debt, we need to measure how increasing the debt ratio affects the cost of equity.

Cost of Equity

As with the cost of debt, increasing the debt ratio also increases the cost of equity. To objectively measure how much the cost of equity increases, I first calculated the Company's unlevered beta. The unlevered beta is determined by the assets owned by the firm, and removes the effects of financial leverage. As leverage increases, equity investors bear increasing amounts of risk, leading to higher betas. Before the effects of financial

leverage can be accounted for, however, the effects of leverage must first be removed, which is accomplished through the unlevered beta equation:[91]

Equation 14:
Unlevered Beta

$$\beta_U = \frac{\beta_L}{\left[1 + (1 - T_c)\left(\frac{D}{E}\right)\right]}$$

where: β_U = *unlevered beta (or "asset" beta)*
β_L = *average levered beta of proxy group*
T_C = *corporate tax rate*
D = *book value of debt*
E = *book value of equity*

Using this equation, the beta for the firm can be unlevered, and then "re-levered" based on various debt ratios (by rearranging this equation to solve for β_L). So, by using the Bond Rating Spreads table and the unlevered beta equation, the costs of both debt and equity can be increased in correspondence with increasing the debt ratio, until the ideal capital structure is found: where the weighted average cost of capital is minimized.

Q. Describe APS's optimal capital structure.

A. I analyzed the Company's optimal capital structure based on the approach discussed above. The following table presents different levels of APS's weighted average cost of capital ("WACC") based on increasing debt ratios.

[91] Damodaran *supra* n. 18, at 197. This formula was originally developed by Hamada in 1972.

Figure 13:
APS's WACC at Various Debt Ratios

Optimal Capital Structure Calculation							
Debt Ratio	Levered Beta	True Cost of Equity	Awarded ROE	Coverage Ratio	After-tax Debt Cost	Optimal WACC	WACC at 9% ROE
0%	0.482	5.10%	9.00%	∞	2.43%	5.10%	9.00%
40%	0.702	6.15%	9.00%	5.2	2.77%	4.80%	6.51%
45%	0.752	6.39%	9.00%	4.6	2.77%	4.76%	6.20%
49%	0.800	6.61%	9.00%	4.3	2.77%	4.73%	5.95%
50%	0.812	6.68%	9.00%	4.2	3.11%	4.89%	6.06%
55%	0.886	7.03%	9.00%	3.8	3.11%	4.87%	5.76%
60%	0.978	7.47%	9.00%	3.5	3.11%	4.85%	5.47%
65%	1.096	8.03%	9.00%	3.2	3.11%	4.83%	5.17%
70%	1.253	8.78%	9.00%	3.0	3.11%	4.81%	4.88%
72%	1.332	9.16%	9.00%	2.9	3.45%	5.05%	5.01%

Utilities routinely offer the following misleading narrative: "If we issue more debt, our risk will increase which will raise our cost of debt and also raise our cost of equity." While this statement is technically true, it is very misleading for one important reason: It fails to acknowledge that the only cost that matters here is the weighted average cost of capital, not the cost of individual components of capital. In the figure above, the column on the far left shows increasing levels of debt ratios. At a debt ratio of 0%, the utility's beta is completely unlevered, its cost of equity is only 5.1%, its cost of debt is only 2.43%, and its optimal WACC is only 5.1% (the column second from the far right). As the debt ratio is increased to 40%, notice that both the cost of equity and the cost of debt increase (6.15% and 2.77% respectively). However, notice that the weighted average cost (the Optimal WACC column) actually decreases from 5.1% to 4.8%. This occurs as result of the basic weighted average cost of capital formula:

Weighted Average Cost of Capital = (Debt Ratio x Cost of Debt) + (Equity Ratio x Cost of Equity)

As the debt ratio increases, both the cost of debt and the cost of equity rise, however, the equity ratio also falls. This means the firm is replacing the higher-cost equity with the lower-cost debt as it increases the debt ratio. As shown in the figure above, at a debt ratio as high as 65%, the utility's WACC is actually much lower than it was at a debt ratio of 0%, even though the costs of debt and equity have both increased. In the figure above I have also estimated APS's optimal WACC at my recommended ROE of 9%, which is considerably higher than the Company's true cost of equity. At a 9% ROE, APS's WACC (far right column) is minimized at a debt ratio of 70%. While a debt ratio of 70% may initially appear to be high, it is not surprising given the level of debt ratios in many other U.S. industries.

Q. Is your opinion based in part on the fact that hundreds of competitive firms around the country utilize high debt ratios in order to maximize profits?

A. Yes. In fact, there are currently more than 1,000 firms across the country with debt ratios of 60% or greater, with an average debt ratio of 68%, as shown in the following figure:[92]

[92] *See* Exhibit DG 1-17.

Figure 14:
Industries with Debt Ratios of 60% or Greater

Industry	Number of Fimrs	Debt Ratio
Advertising	44	73%
Air Transport	20	57%
Auto & Truck	19	74%
Bank (Money Center)	9	67%
Beverage (Soft)	43	64%
Broadcasting	29	68%
Brokerage & Investment Banking	42	77%
Cable TV	19	69%
Coal & Related Energy	38	69%
Hospitals/Healthcare Facilities	58	66%
Hotel/Gaming	73	61%
Office Equipment & Services	24	67%
Packaging & Container	25	63%
Paper/Forest Products	20	74%
R.E.I.T.	221	64%
Restaurant/Dining	83	61%
Retail (Automotive)	26	70%
Retail (Building Supply)	5	67%
Retail (Distributors)	83	60%
Telecom (Wireless)	19	61%
Telecom. Services	65	65%
Tobacco	20	85%
Trucking	26	74%
Total / Average	**1011**	**68%**

Many of the industries shown here, like public utilities, are generally well-established industries with large amounts of capital assets. These shareholders of these industries demand higher debt ratios in order to maximize their profits. There are several notable industries that are relatively comparable to public utilities in some ways. For example, the Cable TV industry has an average debt ratio of about 69%. Likewise, the telecommunication services industry has a debt ratio of 65%. Yet utility witnesses often lead regulators to believe that they cannot operate at debt ratios above 50%. This is simply untrue.

Q. Describe the debt ratios of the proxy group.

A. Although, as discussed above, it is not necessarily appropriate to consider the capital structures of other regulated utilities when assessing the proper capital structure of the target utility, I have conducted an analysis of the proxy company's debt ratios. The average debt ratio of the proxy companies is 51%, which is considerably higher than APS's debt ratio of 44%.

Q. Summarize your conclusions with regard to capital structure.

A. All of the evidence presented here with regard to capital structure clearly indicates that APS's debt ratio is far below one that could be considered reasonable. When a utility's debt ratio is far below a reasonable level, a Commission standing in the place of competition should impute a debt ratio that would exist in a competitive environment, and at least partially limit the inappropriate transfer of excess wealth from Arizona ratepayers to Company shareholders and the IRS. Even though the evidence indicates that APS's optimal debt ratio could be as high as 70%, I recommend that the Commission impute a debt ratio of 50%.

XIII. CONCLUSION AND RECOMMENDATION

Q. Summarize the key points of your testimony.

A. The key points of my testimony are summarized as follows:

1. The legal standards governing this issue are clear that the awarded rate of return should be based on the Company's cost of capital.

2. When the awarded rate of return exceeds the actual cost of capital, it results in an inappropriate transfer of excess wealth from customers to shareholders.

3. The models I used in this case indicate the Company's cost of equity is about 7.4%. However, under prudent ratemaking principles, the Commission should award APS's shareholders with a return on equity of 9%, which is within a reasonable range of 8.75% - 9.25%. Although we must move awarded returns toward true cost of equity, we should do so gradually rather than abruptly to avoid volatility within the industry.

4. When assessing the proper capital structure, it is not appropriate to merely consider the capital structures of other regulated utilities or the Company's test-year capital structure; APS's optimal capital structure consists of about 60% debt and 40% equity.

Q. What is your recommendation to the Commission?

A. EFCA respectfully requests the Commission consider the following findings with regard to the issues presented in this testimony:

Cost of Equity

1. The Commission adopts an awarded return on equity of 9.0%, and although this awarded return on equity is significantly higher than APS's actual cost of equity, it is nonetheless based on the Company's cost of equity, and is fair under the circumstances as it represents a gradual move towards true cost of equity.

Cost of Debt

2. APS's proposed cost of debt should be adopted;

Capital Structure

3. As a surrogate for competition, the Commission has the authority to impute a proper capital structure for any regulated utility when the utility's capital structure is not reflective of one that would exist in a competitive environment;

4. Regulated utilities do not have a financial incentive to operate at a capital structure that would exist in a competitive environment, and thus the capital structures of other regulated utilities do not necessarily indicate appropriate benchmarks for the capital structures that would exist in a competitive environment;

5. Just as competitive firms seek to minimize their weighted average cost of capital, the utility has the obligation to seek the lowest reasonable weighted average cost of capital;

6. APS's current debt ratio of 44% is significantly less than a debt ratio that would exist for the Company in a competitive environment, and this low debt ratio overstates APS's weighted average cost of capital;

7. The Commission adopts a capital structure consisting of 50% debt and 50% equity;

Awarded Rate of Return

8. Based on the foregoing findings regarding cost of equity, cost of debt, and capital structure, the Commission adopts an awarded rate of return of 7.07%;

Q. Does this conclude your testimony?

A. Yes, including any exhibits, appendices, and other items attached hereto. I reserve the right to supplement this testimony as needed with any additional information that has been requested from the Company but not yet provided.

1900 NW Expy., Ste. 410
Oklahoma City, OK 73118

DAVID J. GARRETT

405.249.1050
dgarrett@resolveuc.com

EDUCATION

University of Oklahoma — Norman, OK
Master of Business Administration — 2014
Areas of Concentration: Finance, Energy

University of Oklahoma College of Law — Norman, OK
Juris Doctor — 2007
Member, American Indian Law Review

University of Oklahoma — Norman, OK
Bachelor of Business Administration — 2003
Major: Finance

PROFESSIONAL DESIGNATIONS

Society of Depreciation Professionals
Certified Depreciation Professional (CDP)

Society of Utility and Regulatory Financial Analysts
Certified Rate of Return Analyst (CRRA)

The Mediation Institute
Certified Civil / Commercial & Employment Mediator

WORK EXPERIENCE

Resolve Utility Consulting PLLC — Oklahoma City, OK
Managing Member — 08/2016 – Present
Provide expert analysis and testimony specializing in depreciation and cost of capital issues for clients in utility regulatory proceedings.

Oklahoma Corporation Commission — Oklahoma City, OK
Public Utility Regulatory Analyst — 02/2012 – Present
Assistant General Counsel — 02/2011 – 01/2012
Represented commission staff in utility regulatory proceedings and provided legal opinions to commissioners. Provided expert analysis and testimony in depreciation, cost of capital, incentive compensation, payroll and other issues.

Perebus Counsel, PLLC — Oklahoma City, OK
Managing Member — 09/2009 – 01/2011
Represented clients in the areas of family law, estate planning, debt negotiations, business organization, and utility regulation.

Moricoli & Schovanec, P.C. — Oklahoma City, OK
Associate Attorney — 08/2007 – 08/2009
Represented clients in the areas of contracts, oil and gas, business structures and estate administration.

TEACHING EXPERIENCE

University of Oklahoma — Norman, OK
Adjunct Instructor – "Conflict Resolution" — 2014 – Present
Adjunct Instructor – "Ethics in Leadership"

Rose State College — Midwest City, OK
Adjunct Instructor – "Legal Research" — 2013 – 2015
Adjunct Instructor – "Oil & Gas Law"

PUBLICATIONS

American Indian Law Review — Norman, OK
"Vine of the Dead: Reviving Equal Protection Rites for Religious Drug Use" — 2006
(31 Am. Indian L. Rev. 143)

VOLUNTEER EXPERIENCE

Calm Waters — Oklahoma City, OK
Board Member — 2015 – Present
Participate in management of operations, attend meetings, review performance, compensation, and financial records. Assist in fundraising events.

Group Facilitator & Fundraiser — 2014 – Present
Facilitate group meetings designed to help children and families cope with divorce and tragic events. Assist in fundraising events.

St. Jude Children's Research Hospital — Oklahoma City, OK
Oklahoma Fundraising Committee — 2008 – 2010
Raised money for charity by organizing local fundraising events.

PROFESSIONAL ASSOCIATIONS

Oklahoma Bar Association — 2007 – Present

Society of Depreciation Professionals — 2014 – Present
Board Member – Vice President — 2016 – 2017
Participate in management of operations, attend meetings, review performance, organize presentation agenda.

Society of Utility Regulatory Financial Analysts — 2014 – Present

CONTINUING PROFESSIONAL EDUCATION

Society of Depreciation Professionals — Austin, TX
"Life and Net Salvage Analysis" — 2015
Extensive instruction on utility depreciation, including actuarial and simulation life analysis modes, gross salvage, cost of removal, life cycle analysis, and technology forecasting.

Society of Depreciation Professionals — New Orleans, LA
"Introduction to Depreciation" and "Extended Training" — 2014
Extensive instruction on utility depreciation, including average lives and net salvage.

Society of Utility and Regulatory Financial Analysts — Indianapolis, IN
46th Financial Forum. "The Regulatory Compact: Is it Still Relevant?" — 2014
Forum discussions on current issues.

Energy Management Institute — Houston, TX
"Fundamentals of Power Trading" — 2013
Instruction and practical examples on the power market complex, as well as comprehensive training on power trading.

New Mexico State University, Center for Public Utilities — Santa Fe, NM
Current Issues 2012, "The Santa Fe Conference" — 2012
Forum discussions on various current issues in utility regulation.

Energy Management Institute — Houston, TX
"Introduction to Energy Trading and Hedging" — 2012
Instruction in energy trading and hedging, including examination of various trading instruments and techniques.

Michigan State University, Institute of Public Utilities — Clearwater, FL
"39th Eastern NARUC Utility Rate School" — 2011
One-week, hands-on training emphasizing the fundamentals of the utility ratemaking process.

New Mexico State University, Center for Public Utilities — Albuquerque, NM
"The Basics: Practical Regulatory Training for the Changing Electric Industries" — 2010
One-week, hands-on training designed to provide a solid foundation in core areas of utility ratemaking.

The Mediation Institute — Oklahoma City, OK
"Civil / Commercial & Employment Mediation Training" — 2009
Extensive instruction and mock mediations designed to build foundations in conducting mediations in civil matters.

EXPERIENCE IN REGULATORY PROCEEDINGS

1. **CenterPoint Energy Resources, 2016** (Texas) – Filing testimony on cost of capital; filing testimony on depreciation rates.

2. **Oklahoma Gas and Electric Company, 2016** (Arkansas, Docket No. 16-052-U) – (Arkansas rate case) Filing testimony on cost of capital; filing testimony on depreciation rates.

3. **Peoples Gas System, 2016** (Florida, Docket No. 160-159-GU) – Filed report on depreciation rates.

4. **Arizona Public Service Company, 2016** (Arizona, Docket No. E-01345A-16-0036) – Filing testimony on depreciation rates.

5. **Sierra Pacific Power Company, 2016** (Nevada, Docket No. 16-06008) – Testified on depreciation rates.

6. **Oklahoma Gas and Electric Company, 2016** (Oklahoma, Docket No. PUD 15-273) – Testified on cost of capital and depreciation rates.

7. **Public Service Company of Oklahoma, 2015** (Oklahoma, Docket No. PUD 15-208) – Testified on cost of capital and depreciation rates.

8. **Oklahoma Natural Gas Company, 2015** (Oklahoma, Docket No. PUD 15-213) – Testified on cost of capital and depreciation rates.

9. **Oak Hills Water System, Inc.** (Oklahoma, Docket No. PUD 15-123) – Testified on cost of capital and depreciation rates.

10. **CenterPoint Energy Oklahoma Gas, 2014** (Oklahoma, Docket No. PUD 14-227) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

11. **Public Service Company of Oklahoma, 2014** (Oklahoma, Docket No. PUD 14-233) – Testified on PSO's application for a certificate of authority to issue new debt securities.

12. **Empire District Electric Company, 2014** (Oklahoma, Docket No. PUD 14-226) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

13. **Fort Cobb Fuel Authority, 2014** (Oklahoma, Docket No. PUD 14-219) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

14. **Fort Cobb Fuel Authority, 2014** (Oklahoma, Docket No. PUD 14-140) – Testified in FCFA's application for a rate increase on outside services, legislative advocacy, miscellaneous taxes, payroll expense and taxes, employee insurance expense, and insurance expense.

15. **Public Service Company of Oklahoma, 2013** (Oklahoma, Docket No. PUD 13-217) – Lead auditor of PSO's application for a rate increase. Provided additional research support for cost of capital issue. Assisted in coordination of PUD staff analysts and issues.

16. **Public Service Company of Oklahoma, 2013** (Oklahoma, Docket No. PUD 13-201) – Testified in PSO's application for authorization of a standby and supplemental service tariff.

17. **Fort Cobb Fuel Authority, 2013** (Oklahoma, Docket No. PUD 13-134) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

18. **Empire District Electric Company, 2013** (Oklahoma, Docket No. PUD 13-131) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

19. **CenterPoint Energy Oklahoma Gas, 2013** (Oklahoma, Docket No. PUD 13-127) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

20. **Oklahoma Gas & Electric Company, 2012** (Oklahoma, Docket No. PUD 12-185) – Testified in OG&E's application for extension of a gas transportation contract.

21. **Empire District Electric Company, 2012** (Oklahoma, Docket No. PUD 12-170) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

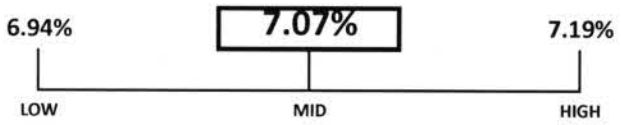
22. **Oklahoma Gas & Electric Company, 2012** (Oklahoma, Docket No. PUD 12-169) – Testified on prudence of fuel-related costs and process in annual fuel audit and prudence review.

Weighted Average Awarded Return Recommendation

Exhibit DG 1-2

Source	Capital Structure	Cost Rates	Weighted Cost
Long-term Debt	50.0%	5.13%	2.57%
Common Equity	50.0%	9.00% (8.75% – 9.25%)	4.50% (4.38% – 4.63%)

Recommended Range for Awarded Rate of Return



Proxy Group Summary

Exhibit DG 1-3

Company	Ticker	[1] Market Cap. ($ millions)	[2] Market Category	[3] S&P Bond Rating	[4] Value Line Safety Rank	[5] Financial Strength	[6] Value Line Region
Alliant Energy	LNT	7,128	Mid Cap	A-	2	A	Central
Ameren Corp.	AEE	10,638	Large Cap	BBB+	2	A	Central
CenterPoint Energy	CNP	7,766	Mid Cap	A-	3	B+	Central
CMS Energy Corp.	CMS	10,003	Large Cap	BBB+	2	B++	Central
Consol. Edison	ED	17,485	Large Cap	A-	1	A+	East
DTE Energy	DTE	14,360	Large Cap	BBB+	2	B++	Central
Edison Int'l	EIX	19,666	Large Cap	BBB+	2	A	West
Entergy Corp.	ETR	12,271	Large Cap	BBB	3	B++	Central
G't Plains Energy	GXP	4,234	Mid Cap	BBB+	3	B+	Central
IDACORP Inc.	IDA	3,465	Mid Cap	BBB	2	B++	West
OGE Energy	OGE	5,358	Mid Cap	A-	2	A	Central
Portland General	POR	3,239	Mid Cap	BBB	2	B++	West
Public Serv. Enterprise	PEG	19,536	Large Cap	BBB+	1	A++	East
SCANA Corp.	SCG	8,746	Mid Cap	BBB+	2	B++	East
Sempra Energy	SRE	23,962	Large Cap	BBB+	2	A	West
Vectren Corp.	VVC	3,542	Mid Cap	A-	2	A	Central
Westar Energy	WR	6,032	Mid Cap	BBB+	2	B++	Central
Xcel Energy Inc.	XEL	18,186	Large Cap	A-	1	A	West

[1], [4], [5], [6] Value Line Investment Survey as of 2-9-2016

[2] Large Cap > $10 billion; Mid Cap > $2 billion; Small Cap > $200 million

[3] S&P bond ratings

Stock and Index Prices

Exhibit DG 1-4

Ticker	^GSPC	LNT	AEE	CNP	CMS	ED	DTE	EIX	ETR	GXP	IDA	OGE	POR	PEG	SCG	SRE	VVC	WR	XEL
30-day Average	2160	36.58	49.20	23.06	40.63	71.63	93.44	70.31	69.91	27.19	76.18	31.00	42.18	41.11	70.88	101.20	48.70	56.94	39.82
Standard Deviation	37.0	0.85	0.88	0.67	0.78	1.74	1.47	1.42	1.72	0.53	1.18	0.66	0.73	0.72	1.13	3.28	0.91	0.23	0.93
12/02/16	2192	35.99	49.66	24.10	39.94	69.69	95.13	69.40	69.28	26.31	76.64	32.34	41.33	41.25	70.92	99.90	49.68	56.41	38.74
12/01/16	2191	35.51	48.91	23.80	39.69	69.47	93.61	68.56	68.88	26.20	75.80	31.84	41.06	41.04	70.10	99.35	48.87	56.75	38.54
11/30/16	2199	35.92	49.12	23.86	40.22	69.77	93.09	68.77	68.73	26.39	76.15	31.65	41.60	41.31	70.53	99.80	49.08	56.96	39.01
11/29/16	2205	37.25	50.93	24.09	41.84	72.65	95.80	71.15	71.40	27.15	79.03	32.26	43.15	42.84	72.45	101.27	51.15	57.11	40.49
11/28/16	2202	37.09	51.08	24.17	41.52	72.65	95.80	71.27	70.58	27.23	78.72	32.07	43.35	42.80	72.49	101.25	50.54	57.18	40.32
11/25/16	2213	36.35	49.99	23.95	40.60	70.66	94.03	69.76	69.53	26.79	77.99	31.73	42.52	41.45	71.01	99.46	49.55	57.08	39.52
11/23/16	2205	35.75	49.07	23.61	39.72	69.55	92.66	68.99	68.12	26.43	76.66	31.20	41.86	40.74	69.87	98.68	48.56	56.98	38.77
11/22/16	2203	36.13	49.43	23.62	40.53	70.32	93.83	69.73	68.41	26.66	77.42	31.28	42.24	41.25	71.00	100.19	49.26	57.00	39.29
11/21/16	2198	35.83	48.84	23.52	40.18	70.10	92.28	69.28	68.42	26.97	76.08	31.33	42.24	41.00	70.38	99.71	48.25	57.12	39.34
11/18/16	2182	35.64	48.48	23.34	39.72	69.53	91.22	68.45	67.83	26.68	75.41	30.85	41.74	40.34	69.65	99.82	47.74	57.01	38.87
11/17/16	2187	35.81	48.51	23.22	39.77	70.04	91.68	68.69	68.18	26.93	75.09	30.63	41.57	40.72	69.88	99.53	47.90	56.71	39.00
11/16/16	2177	35.78	48.47	23.22	39.92	69.84	91.96	68.84	68.12	26.88	74.95	30.98	41.42	40.68	69.62	98.31	48.00	56.73	39.01
11/15/16	2180	36.02	49.27	23.27	39.99	70.57	93.39	69.44	68.63	27.09	75.43	31.20	41.74	41.33	70.61	97.05	48.36	56.90	39.25
11/14/16	2164	35.51	48.62	22.96	39.49	69.55	91.38	68.34	68.03	26.91	75.09	30.44	41.24	39.97	69.42	94.74	48.22	56.81	38.51
11/11/16	2164	35.36	47.77	22.66	39.75	69.82	90.97	68.85	67.41	26.98	76.49	30.44	41.90	39.57	69.14	95.69	47.43	56.67	38.84
11/10/16	2167	35.49	47.80	22.86	39.49	70.02	91.28	68.76	67.87	27.12	75.29	30.40	42.10	40.04	68.93	97.24	47.22	56.35	38.68
11/09/16	2163	36.81	49.05	22.95	40.34	71.57	92.37	70.17	68.85	27.50	76.06	31.23	42.80	40.63	69.97	99.67	48.67	56.74	39.58
11/08/16	2140	38.50	51.21	23.43	41.98	74.61	96.15	72.26	71.73	28.31	77.85	31.59	43.77	42.05	73.26	104.38	49.87	57.06	41.52
11/07/16	2132	37.93	50.81	23.35	41.71	73.83	95.29	71.57	70.64	27.76	77.34	31.26	43.09	41.88	72.24	104.07	49.40	57.17	41.15
11/04/16	2085	36.83	49.36	22.67	40.78	73.05	93.09	70.31	69.96	27.31	75.37	30.40	42.38	40.90	71.01	102.10	47.69	56.60	40.36
11/03/16	2089	37.09	49.07	22.29	41.16	73.17	93.27	71.05	70.52	27.40	75.55	29.86	42.51	40.97	71.01	100.98	47.98	57.05	40.62
11/02/16	2098	36.98	48.65	21.86	40.87	73.12	93.18	70.70	70.55	27.30	75.45	29.73	42.37	40.80	71.10	99.36	47.84	57.03	40.46
11/01/16	2112	37.42	49.17	22.25	41.22	73.35	94.29	72.50	71.05	27.58	76.02	30.25	42.56	41.35	71.72	104.85	48.66	57.05	40.86
10/31/16	2126	38.05	49.95	22.54	41.84	74.83	96.01	73.48	72.78	28.15	77.82	31.04	43.64	42.08	73.36	107.10	49.88	57.32	41.55
10/28/16	2126	37.23	48.87	22.28	40.99	73.29	93.94	71.88	71.48	27.72	76.12	30.69	42.94	41.03	71.55	105.10	48.65	57.04	40.68
10/27/16	2133	37.02	48.74	22.32	41.05	72.77	93.69	71.41	71.01	27.72	75.28	30.64	41.86	41.21	71.13	104.57	48.64	57.07	40.44
10/26/16	2139	37.19	49.10	22.40	41.34	73.18	93.90	71.76	71.40	27.78	75.43	30.71	41.65	41.22	71.48	105.35	48.77	57.06	40.60
10/25/16	2143	37.10	49.03	22.41	41.30	72.95	93.99	71.62	71.60	27.56	75.20	30.69	41.75	41.17	71.28	106.41	48.89	57.08	40.48
10/24/16	2151	37.03	48.65	22.30	41.07	72.47	93.14	71.26	73.17	27.50	74.98	30.62	41.69	40.86	70.81	105.21	48.34	57.16	40.20
10/21/16	2141	36.78	48.47	22.46	40.85	72.47	92.75	70.90	73.27	27.28	74.72	30.55	41.32	40.95	70.41	104.85	48.01	56.92	39.95

All prices are adjusted closing prices reported by Yahoo! Finance, http://finance.yahoo.com

DCF Final Results

Company	Ticker	[1] Dividend	[2] Stock Price	[3] Dividend Yield
Alliant Energy	LNT	0.29	36.58	0.80%
Ameren Corp.	AEE	0.44	49.20	0.89%
CenterPoint Energy	CNP	0.26	23.06	1.11%
CMS Energy Corp.	CMS	0.31	40.63	0.76%
Consol. Edison	ED	0.67	71.63	0.94%
DTE Energy	DTE	0.77	93.44	0.82%
Edison Int'l	EIX	0.48	70.31	0.68%
Entergy Corp.	ETR	0.87	69.91	1.24%
G't Plains Energy	GXP	0.28	27.19	1.01%
IDACORP Inc.	IDA	0.55	76.18	0.72%
OGE Energy	OGE	0.30	31.00	0.98%
Portland General	POR	0.32	42.18	0.76%
Public Serv. Enterprise	PEG	0.41	41.11	1.00%
SCANA Corp.	SCG	0.58	70.88	0.81%
Sempra Energy	SRE	0.76	101.20	0.75%
Vectren Corp.	VVC	0.42	48.70	0.86%
Westar Energy	WR	0.38	56.94	0.67%
Xcel Energy Inc.	XEL	0.34	39.82	0.85%
Average		**$0.47**	**$55.00**	**0.87%**

[1] Fourth quarter 2016 reported dividends per share. Nasdaq.com

[2] Average stock price from stock price exhibit.

[3] = [1] / [2]

Terminal Growth Rate

Indicator	Period	Rate	
Nominal GDP	2016 - 2046	4.10%	[1]
Inflation	2016 - 2046	2.00%	[2]
Load Growth	2017 - 2032	2.70%	[3]
Risk Free Rate	Current	2.79%	[4]
Average		**2.90%**	

[1], [2] Congressional Budget Office Long-Term Budget Outlook

[3] Company Integrated Resource Plan 2017

[4] From risk-free rate exhibit

Final DCF Result

Dividend (d_0)	Stock Price (P_0)	Growth Rate (g)	**DCF Result**
$0.47	$55.00	4.10%	**7.7%**

Risk-Free Rate

Date	Rate
10/20/16	2.50
10/21/16	2.48
10/24/16	2.52
10/25/16	2.50
10/26/16	2.53
10/27/16	2.60
10/28/16	2.62
10/31/16	2.58
11/01/16	2.58
11/02/16	2.56
11/03/16	2.60
11/04/16	2.56
11/07/16	2.60
11/08/16	2.63
11/09/16	2.88
11/10/16	2.94
11/14/16	2.99
11/15/16	2.97
11/16/16	2.92
11/17/16	3.01
11/18/16	3.01
11/21/16	3.00
11/22/16	3.00
11/23/16	3.02
11/25/16	3.01
11/28/16	2.99
11/29/16	2.95
11/30/16	3.02
12/01/16	3.10
12/02/16	3.08
Average	**2.79%**

*Daily Treasury Yield Curve Rates on 30-year T-bonds, http://www.treasury.gov/resources-center/data-chart-center/interest-rates/.

Beta Results

Company	Ticker	Beta
Alliant Energy	LNT	0.75
Ameren Corp.	AEE	0.70
CenterPoint Energy	CNP	0.80
CMS Energy Corp.	CMS	0.65
Consol. Edison	ED	0.55
DTE Energy	DTE	0.70
Edison Int'l	EIX	0.65
Entergy Corp.	ETR	0.65
G't Plains Energy	GXP	0.75
IDACORP Inc.	IDA	0.75
OGE Energy	OGE	0.90
Portland General	POR	0.70
Public Serv. Enterprise	PEG	0.70
SCANA Corp.	SCG	0.70
Sempra Energy	SRE	0.80
Vectren Corp.	VVC	0.75
Westar Energy	WR	0.70
Xcel Energy Inc.	XEL	0.60
Average		0.71

*Betas from Value Line Investment Survey

Implied Equity Risk Premium

Exhibit DG 1-10

Year	[1] Index Value	[2] Operating Earnings	[3] Dividends	[4] Buybacks	[5] Earnings Yield	[6] Dividend Yield	[7] Buyback Yield	[8] Gross Cash Yield
2010	11,430	759	206	299	6.64%	1.80%	2.61%	4.42%
2011	11,385	877	240	405	7.70%	2.11%	3.56%	5.67%
2012	12,742	870	281	399	6.83%	2.20%	3.13%	5.33%
2013	16,495	956	312	476	5.80%	1.89%	2.88%	4.77%
2014	18,245	1,004	350	553	5.50%	1.92%	3.03%	4.95%
2015	17,900	885	382	572	4.95%	2.14%	3.20%	5.33%

Cash Yield	5.08%	[9]
Growth Rate	3.14%	[10]
Risk-free Rate	2.79%	[11]
Current Index Value	2,160	[12]

Year	[13] 1	[14] 2	[15] 3	[16] 4	[17] 5
Expected Dividends	113	117	120	124	128
Expected Terminal Value					2483
Present Value	105	100	95	91	1769

Intrinsic Index Value	2160	[18]
Required Return on Market	8.09%	[19]
Implied Equity Risk Premium	**5.30%**	[20]

[1-4] S&P Quarterly Press Releases, data found at www.spdji.com/indices/equity/sp-500 (additional info tab) (all dollar figures are in $ billions)
[1] Market value of S&P 500
[5] = [2] / [1]
[6] = [3] / [1]
[7] = [4] / [1]
[8] = [6] + [7]
[9] = Average of [8]
[10] = Compund annual growth rate of [2] = (end value / beginning value)^ $^{1/4}$-1
[11] Risk-free rate calculated in DG 1-8
[12] 30-day average of closing index prices from DG 1-4
[13-16] Expected dividends = [9]*[12]*(1+[10])^n ; Present value = expected dividend / (1+[11]+[19])^n
[17] Expected terminal value = expected dividend * (1+[11]) / [19] ; Present value = (expected dividend + expected terminal value) / (1+[11]+[19])^n
[18] = Sum([13-17]) present values.
[19] = [20] + [11]
[20] Internal rate of return calculation setting [18] equal to [12] and solving for the discount rate

Equity Risk Premium Results

Expert Survey Risk Premium		
IESE Business School	5.3%	[1]
Graham & Harvey	4.0%	[2]
Calculated Risk Premium		
Damodaran	6.1%	[3]
Garrett	5.3%	[4]
Average	**5.2%**	[5]

[1] IESE Business School Survey

[2] Graham and Harvey Survey

[3] Highest ERP est., http://pages.stern.nyu.edu/~adamodar/

[4] From implied ERP exhibit

[5] = Average ([1], [2], [3], [4])

CAPM Final Results

Company	Ticker	[1] Risk-Free Rate	[2] Value Line Beta	[3] Risk Premium	[4] CAPM Results
Alliant Energy	LNT	2.79%	0.750	6.10%	7.4%
Ameren Corp.	AEE	2.79%	0.700	6.10%	7.1%
CenterPoint Energy	CNP	2.79%	0.800	6.10%	7.7%
CMS Energy Corp.	CMS	2.79%	0.650	6.10%	6.8%
Consol. Edison	ED	2.79%	0.550	6.10%	6.1%
DTE Energy	DTE	2.79%	0.700	6.10%	7.1%
Edison Int'l	EIX	2.79%	0.650	6.10%	6.8%
Entergy Corp.	ETR	2.79%	0.650	6.10%	6.8%
G't Plains Energy	GXP	2.79%	0.750	6.10%	7.4%
IDACORP Inc.	IDA	2.79%	0.750	6.10%	7.4%
OGE Energy	OGE	2.79%	0.900	6.10%	8.3%
Portland General	POR	2.79%	0.700	6.10%	7.1%
Public Serv. Enterprise	PEG	2.79%	0.700	6.10%	7.1%
SCANA Corp.	SCG	2.79%	0.700	6.10%	7.1%
Sempra Energy	SRE	2.79%	0.800	6.10%	7.7%
Vectren Corp.	VVC	2.79%	0.750	6.10%	7.4%
Westar Energy	WR	2.79%	0.700	6.10%	7.1%
Xcel Energy Inc.	XEL	2.79%	0.600	6.10%	6.5%
Average			0.711		**7.1%**

[1] From risk-free rate exhibit
[2] Value Line Investment Survey
[3] From ERP exhibit
[6] = [1] + [2] * [3]

Cost of Equity Summary

Model	Cost of Equity
Discounted Cash Flow Model	7.7%
Capital Asset Pricing Model	7.1%
Average	**7.4%**

Awarded Returns vs. Required Market Returns (2005 - 2015)

Quarter	[1] Cases Filed	[2] Average Awarded ROE
2005.1	4	10.55%
2005.2	12	10.13%
2005.3	8	10.84%
2005.4	10	10.57%
2006.1	11	10.38%
2006.2	18	10.39%
2006.3	7	10.06%
2006.4	12	10.38%
2007.1	11	10.30%
2007.2	16	10.27%
2007.3	8	10.02%
2007.4	11	10.44%
2008.1	7	10.15%
2008.2	8	10.41%
2008.3	21	10.42%
2008.4	6	10.38%
2009.1	13	10.31%
2009.2	22	10.55%
2009.3	17	10.46%
2009.4	14	10.54%
2010.1	16	10.45%
2010.2	19	10.12%
2010.3	12	10.27%
2010.4	8	10.30%
2011.1	8	10.35%
2011.2	15	10.24%
2011.3	17	10.13%
2011.4	10	10.29%
2012.1	17	10.84%
2012.2	16	9.92%
2012.3	8	9.78%
2012.4	12	10.05%
2013.1	19	10.23%
2013.2	16	9.77%
2013.3	4	10.06%
2013.4	7	9.90%
2014.1	9	10.23%
2014.2	25	9.83%
2014.3	8	9.89%
2014.4	16	9.78%
2015.1	10	10.37%
2015.2	21	9.73%
2015.3	6	9.40%
2015.4	11	9.62%

Year	[3] Annual Market Return	
2005	4.83%	
2006	15.61%	
2007	5.48%	
2008	-36.55%	
2009	25.94%	
2010	14.82%	
2011	2.10%	
2012	15.89%	
2013	32.15%	
2014	13.48%	
Average		
Arithmetic	9.38%	[4]
Geometric	7.60%	[5]
Average Return on All Stocks	**8.5%**	[6]
Average Utility Awarded ROE	**10.2%**	[7]

Year	[8] Required Market Return
2005	8.47%
2006	8.86%
2007	8.39%
2008	8.64%
2009	8.20%
2010	8.49%
2011	7.89%
2012	7.54%
2013	8.00%
2014	7.95%
2015	8.39%
Average	**8.26%**

[1] Edison Electric Institute Financial Update. Number of cases filed in each quarter.

[2] Edison Electric Institute Financial Update. Average awarded utility ROE each quarter.

[3] Historical stock returns. NYU Stern School of Business. http://pages.stern.nyu.edu/~adamodar/.

[4] = Average of [3]

[5] = Geometric mean of [3]

[6] = Average ([4],[5])

[7] = Average of [2]

[8] Annual required market returns. NYU Stern School of Business. http://pages.stern.nyu.edu/~adamodar/ (adding risk-free rate to implied ERP)

Competitive Earnings

Industry	No. of Firms	Average Beta	Return on Equity
Farming/Agriculture	37	1.2	10%
Electronics (General)	167	1.0	10%
Healthcare Products	254	1.0	10%
Business & Consumer Services	159	1.2	10%
Hospitals/Healthcare Facilities	58	0.8	10%
Bank (Money Center)	9	1.1	10%
Banks (Regional)	644	0.5	9%
Software (Internet)	308	1.3	9%
Insurance (Life)	25	1.3	9%
Power	73	0.8	9%
Oilfield Svcs/Equip.	143	1.7	8%
Environmental & Waste Services	97	1.1	8%
Brokerage & Investment Banking	42	1.3	8%
Oil/Gas Distribution	79	1.2	8%
R.E.I.T.	221	0.8	7%
Reinsurance	3	1.0	7%
Paper/Forest Products	20	1.5	6%
Semiconductor Equip	46	1.4	6%
Oil/Gas (Integrated)	7	1.5	6%
Diversified	26	1.0	6%
Insurance (General)	20	1.0	5%
Publshing & Newspapers	39	1.4	4%
Engineering/Construction	51	1.3	2%
Real Estate (General/Diversified)	12	1.2	2%
Education	40	1.1	1%
Rubber& Tires	4	1.7	0%
Real Estate (Development)	21	1.4	-1%
Telecom (Wireless)	19	1.5	-3%
Green & Renewable Energy	28	1.6	-4%
Precious Metals	113	1.3	-4%
Chemical (Basic)	42	1.2	-6%
Steel	36	1.4	-14%
Tobacco	20	1.9	-17%
Metals & Mining	114	1.6	-23%
Oil/Gas (Production and Exploration)	351	1.6	-28%
Coal & Related Energy	38	1.5	-31%
Total / Aveage	**3,366**	**1.3**	**1.3%**

http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/pbvdata.html

Optimal Capital Structure

Inputs		
EBIT	872,127	[1]
Interest Expense	180,123	[2]
Book Debt	3,337,391	[3]
Book Equity	4,814,794	[4]
Debt / Capital	40.94%	[5]
Debt / Equity	69%	[6]
Debt Cost	5.13%	[7]
Tax Rate	31%	[8]
Unlevered Beta	0.48	[9]
Risk-free Rate	2.79%	[10]
Equity Risk Premium	5.19%	[11]
Coverage Ratio	4.84	[12]
Bond Rating	A2	[13]

Ratings Table

[14] Coverage Ratio	[15] Bond Rating	[16] Spread	[17] Interest Rate
> 8.5	Aaa/AAA	0.75%	3.54%
6.5 - 8.49	Aa2/AA	1.00%	3.79%
5.5 - 6.49	A1/A+	1.10%	3.89%
4.25 - 5.49	A2/A	1.25%	4.04%
3.0 - 4.24	A3/A-	1.75%	4.54%
2.5 - 2.99	Baa2/BBB	2.25%	5.04%
2.25 - 2.49	Ba1/BB+	3.25%	6.04%
2.0 - 2.249	Ba2/BB	4.25%	7.04%
1.75 - 1.99	B1/B+	5.50%	8.29%
1.5 - 1.74	B2/B	6.50%	9.29%
1.25 - 1.49	B3/B-	7.50%	10.29%
0.8 - 1.249	Caa/CCC	9.00%	11.79%

Optimal Capital Structure Calculation

[18] Debt Ratio	[19] D/E Ratio	[20] Levered Beta	[21] True Cost of Equity	[22] Awarded ROE	[23] Debt Level	[24] Interest Expense	[25] Coverage Ratio	[26] Pre-tax Debt Cost	[27] After-tax Debt Cost	[28] Optimal WACC	[29] WACC at 9% ROE
0%	0%	0.482	5.29%	9.00%	0	0	∞	3.54%	2.43%	5.29%	9.00%
40%	67%	0.702	6.44%	9.00%	3,260,874	167,283	5.2	4.04%	2.77%	4.97%	6.51%
45%	82%	0.752	6.70%	9.00%	3,668,483	188,193	4.6	4.04%	2.77%	4.93%	6.20%
49%	96%	0.800	6.94%	9.00%	3,994,571	204,921	4.3	4.04%	2.77%	4.90%	5.95%
50%	100%	0.812	7.01%	9.00%	4,076,093	209,104	4.2	4.54%	3.11%	5.06%	6.06%
55%	122%	0.886	7.39%	9.00%	4,483,702	230,014	3.8	4.54%	3.11%	5.04%	5.76%
60%	150%	0.978	7.87%	9.00%	4,891,311	250,924	3.5	4.54%	3.11%	5.01%	5.47%
65%	186%	1.096	8.48%	9.00%	5,298,920	271,835	3.2	4.54%	3.11%	4.99%	5.17%
70%	233%	1.253	9.30%	9.00%	5,706,530	292,745	3.0	4.54%	3.11%	4.97%	4.88%
72%	257%	1.332	9.70%	9.00%	5,869,573	301,109	2.9	5.04%	3.45%	5.20%	5.01%

[1], [2] Company 10-K (000's)
[3], [4] Company 10-K (000's)
[5] = [3] / ([3] + [4])
[6] = [3] / [4]
[7] Company schedules
[8] Estimated effective tax rate
[9] Average beta / (1+(1 - [8])*[6])
[10] From risk-free rate exhibit
[11] From ERP exhibit

[12] = [1] / [2]
[13] Company bond rating
[14] Ranges of coverage ratios
[15] Moody's / S&P bond ratings
[16] NYU spread over risk-free rate
[17] = [16] + [10] = est. debt cost
[18] = debt / total capital
[19] = [18] / (1 - [18])
[20] = [9] * (1 + (1 - [8]) * [6]

[21] = [10] + [20] * [11]
[22] Recommended awarded ROE
[23] = [18] * ([3] + [4]); (000's)
[24] = [22] * [7]; (000's)
[25] = [1] / [23]
[26] Debt cost given coverage ratio per Ratings Table
[27] = [25] * (1 - [8])
[28] = ([18] * [26]) + ((1 - [18]) * [21])
[29] = ([18] * [26]) + ((1 - [18]) * [22])

Competitive Industry Debt Ratios

Exhibit DG 1-17

Industry	Number of Fimrs	Debt Ratio
Advertising	44	73%
Air Transport	20	57%
Auto & Truck	19	74%
Bank (Money Center)	9	67%
Beverage (Soft)	43	64%
Broadcasting	29	68%
Brokerage & Investment Banking	42	77%
Cable TV	19	69%
Coal & Related Energy	38	69%
Hospitals/Healthcare Facilities	58	66%
Hotel/Gaming	73	61%
Office Equipment & Services	24	67%
Packaging & Container	25	63%
Paper/Forest Products	20	74%
R.E.I.T.	221	64%
Restaurant/Dining	83	61%
Retail (Automotive)	26	70%
Retail (Building Supply)	5	67%
Retail (Distributors)	83	60%
Telecom (Wireless)	19	61%
Telecom. Services	65	65%
Tobacco	20	85%
Trucking	26	74%
Total / Average	**1011**	**68%**

http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/dbtfund.htm

Proxy Company Debt Ratios

Company	Ticker	Debt Ratio
Alliant Energy	LNT	49%
Ameren Corp.	AEE	49%
CenterPoint Energy	CNP	70%
CMS Energy Corp.	CMS	68%
Consol. Edison	ED	48%
DTE Energy	DTE	50%
Edison Int'l	EIX	45%
Entergy Corp.	ETR	58%
G't Plains Energy	GXP	50%
IDACORP Inc.	IDA	46%
OGE Energy	OGE	44%
Portland General	POR	48%
Public Serv. Enterprise	PEG	40%
SCANA Corp.	SCG	52%
Sempra Energy	SRE	53%
Vectren Corp.	VVC	51%
Westar Energy	WR	48%
Xcel Energy Inc.	XEL	54%
Average		51%

Debt ratios from Value Line Investment Survey

Dr. Villadsen's Corrected DCF Model

Exhibit DG 1-19

	[1]	[2]	[3]	[4]
Villadsen Proxy Group	Villadsen Stock Price	Villadsen Dividend	Villadsen GDP Growth Estimate	DCF Results
ALLETE	51.84	0.51	4.1%	8.2%
Alliant Energy	65.26	0.59	4.1%	7.9%
Amer. Elec. Power	60.29	0.56	4.1%	8.0%
Ameren Corp.	44.89	0.43	4.1%	8.1%
CenterPoint Energy	17.87	0.25	4.1%	10.0%
CMS Energy Corp.	38.24	0.31	4.1%	7.5%
Consol. Edison	70.35	0.65	4.1%	8.0%
Dominion Resources	70.14	0.65	4.1%	8.0%
DTE Energy	84.26	0.73	4.1%	7.8%
Edison Int'l	61.87	0.48	4.1%	7.4%
El Paso Electric	40.31	0.30	4.1%	7.2%
Entergy Corp.	69.76	0.85	4.1%	9.3%
G't Plains Energy	27.99	0.26	4.1%	8.1%
IDACORP Inc.	68.34	0.51	4.1%	7.2%
MGE Energy	48.72	0.30	4.1%	6.6%
NextEra Energy	110.89	0.77	4.1%	7.0%
OGE Energy	25.89	0.28	4.1%	8.6%
Otter Tail Corp.	27.22	0.31	4.1%	9.0%
PG&E Corp.	54.64	0.46	4.1%	7.6%
Pinnacle West Capital	66.36	0.63	4.1%	8.1%
Portland General	38.83	0.30	4.1%	7.4%
Public Serv. Enterprise	41.06	0.39	4.1%	8.1%
SCANA Corp.	63.12	0.55	4.1%	7.7%
Sempra Energy	94.21	0.70	4.1%	7.2%
Vectren Corp.	42.02	0.40	4.1%	8.1%
Westar Energy	43.50	0.36	4.1%	7.6%
Xcel Energy Inc.	38.14	0.32	4.1%	7.6%
Average				**7.9%**

[1] Villadsen's stock prices

[2] Villadsen's dividends

[3] Villadsen's GDP growth estimate

[4] DCF calculation = ([3]*(1+[5]) ^ 0.25 / [1] + (1 + [5]) ^ 0.25) ^ 4 -1