

Appendix A  
Educational Background, Research, and Related Business Experience  
J. Randall Woolridge

J. Randall Woolridge is a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed Faculty Fellow in Business Administration in the College of Business Administration of the Pennsylvania State University in University Park, PA. In addition, Professor Woolridge is Director of the Smeal College Trading Room and President and CEO of the Nittany Lion Fund, LLC.

Professor Woolridge received a Bachelor of Arts degree in Economics from the University of North Carolina, a Master of Business Administration degree from the Pennsylvania State University, and a Doctor of Philosophy degree in Business Administration (major area-finance, minor area-statistics) from the University of Iowa. He has taught Finance courses including corporation finance, commercial and investment banking, and investments at the undergraduate, graduate, and executive MBA levels.

Professor Woolridge's research has centered on empirical issues in corporation finance and financial markets. He has published over 35 articles in the best academic and professional journals in the field, including the *Journal of Finance*, the *Journal of Financial Economics*, and the *Harvard Business Review*. His research has been cited extensively in the business press. His work has been featured in the *New York Times*, *Forbes*, *Fortune*, *The Economist*, *Barron's*, *Wall Street Journal*, *Business Week*, *Investors' Business Daily*, *USA Today*, and other publications. In addition, Dr. Woolridge has appeared as a guest to discuss the implications of his research on CNN's *Money Line*, CNBC's *Morning Call* and *Business Today*, and Bloomberg's *Morning Call*.

Professor Woolridge's stock valuation book, *The StreetSmart Guide to Valuing a Stock* (McGraw-Hill, 2003), was released in its second edition. He has also co-authored *Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation, 1999) as well as a textbook entitled *Basic Principles of Finance* (Kendall Hunt, 2011).

Professor Woolridge has also consulted with corporations, financial institutions, and government agencies. In addition, he has directed and participated in university- and company-sponsored professional development programs for executives in 25 countries in North and South America, Europe, Asia, and Africa.

Over the past twenty-five years Dr. Woolridge has prepared testimony and/or provided consultation services in regulatory rate cases in the rate of return area in following states: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Washington, D.C. He has also testified before the Federal Energy Regulatory Commission.



## **J. Randall Woolridge**

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### **Home Address**

120 Haymaker Circle  
State College, PA 16801  
814-238-9428

### **Academic Experience**

**Professor of Finance**, the Smeal College of Business Administration, the Pennsylvania State University (July 1, 1990 to the present).

**President, Nittany Lion Fund LLC**, (January 1, 2005 to the present)

**Director, the Smeal College Trading Room** (January 1, 2001 to the present)

**Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration** (July 1, 1987 to the present).

**Associate Professor of Finance**, College of Business Administration, the Pennsylvania State University (July 1, 1984 to June 30, 1990).

**Assistant Professor of Finance**, College of Business Administration, the Pennsylvania State University (September, 1979 to June 30, 1984).

### **Education**

**Doctor of Philosophy in Business Administration**, the University of Iowa (December, 1979). Major field: Finance.

**Master of Business Administration**, the Pennsylvania State University (December, 1975).

**Bachelor of Arts**, the University of North Carolina (May, 1973) Major field: Economics.

### **Books**

James A. Miles and J. Randall Woolridge, *Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation), 1999

Patrick Cusatis, Gary Gray, and J. Randall Woolridge, *The StreetSmart Guide to Valuing a Stock* (2<sup>nd</sup> Edition, McGraw-Hill), 2003.

J. Randall Woolridge and Gary Gray, *The New Corporate Finance, Capital Markets, and Valuation: An Introductory Text* (Kendall Hunt, 2003).

### **Research**

Dr. Woolridge has published over 35 articles in the best academic and professional journals in the field, including the *Journal of Finance*, the *Journal of Financial Economics*, and the *Harvard Business Review*.



**Exhibit JRW-1**

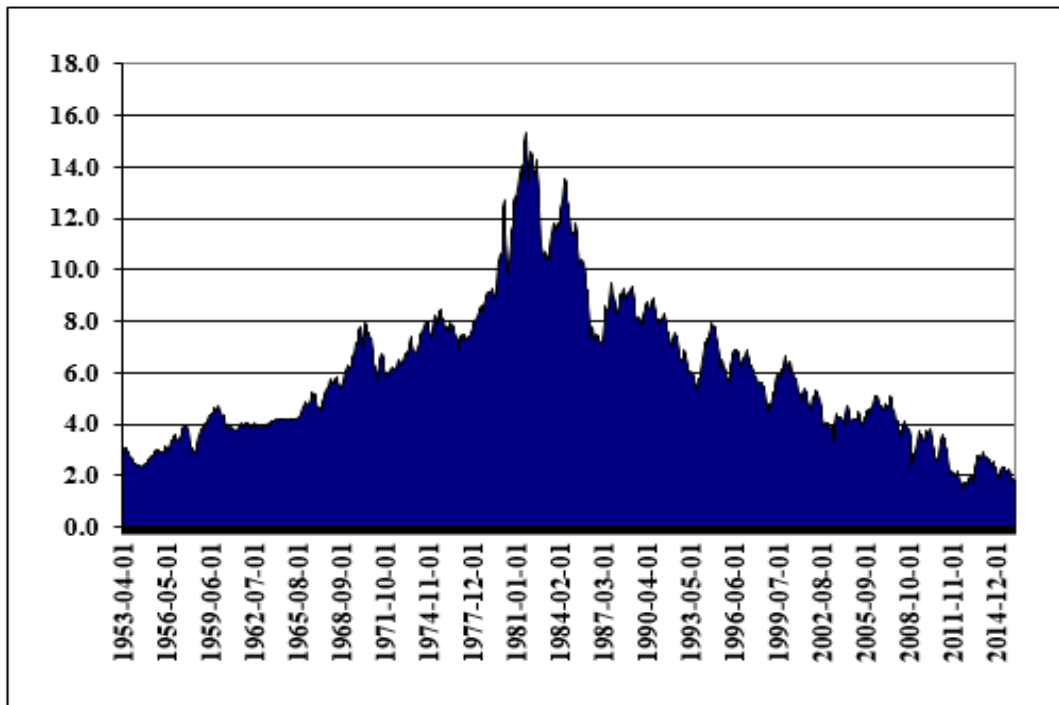
**Unitil Energy Systems, Inc.**  
**Recommended Cost of Capital**

<b>Capital Source</b>	<b>Capitalization Ratio</b>	<b>Cost Rate</b>	<b>Weighted Cost Rate</b>
<b>Short-Term Debt</b>	<b>0.11%</b>	<b>1.54%</b>	<b>0.00%</b>
<b>Long-Term Debt</b>	<b>48.80%</b>	<b>7.15%</b>	<b>3.49%</b>
<b>Preferred Equity</b>	<b>0.13%</b>	<b>6.00%</b>	<b>0.01%</b>
<b>Common Equity</b>	<b>50.97%</b>	<b>8.65%</b>	<b>4.41%</b>
<b>Total</b>	<b>100.01%</b>		<b>7.91%</b>

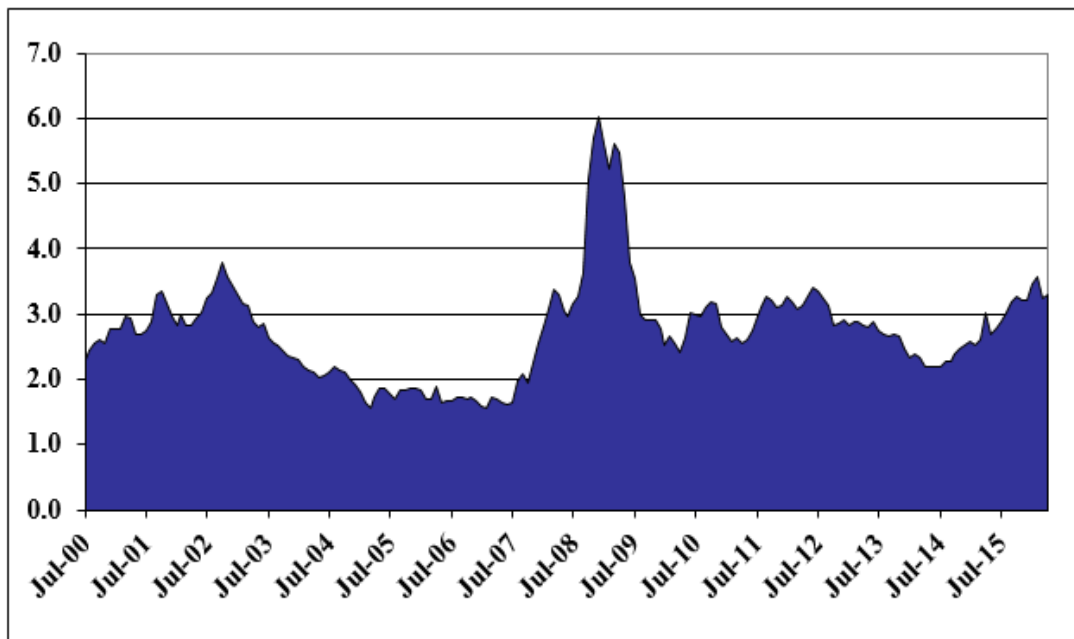


Exhibit JRW-2

Panel A  
Ten-Year Treasury Yields  
1953-Present



Panel B  
Long-Term Moody's Baa Yields Minus Ten-Year Treasury Yields  
2000-Present



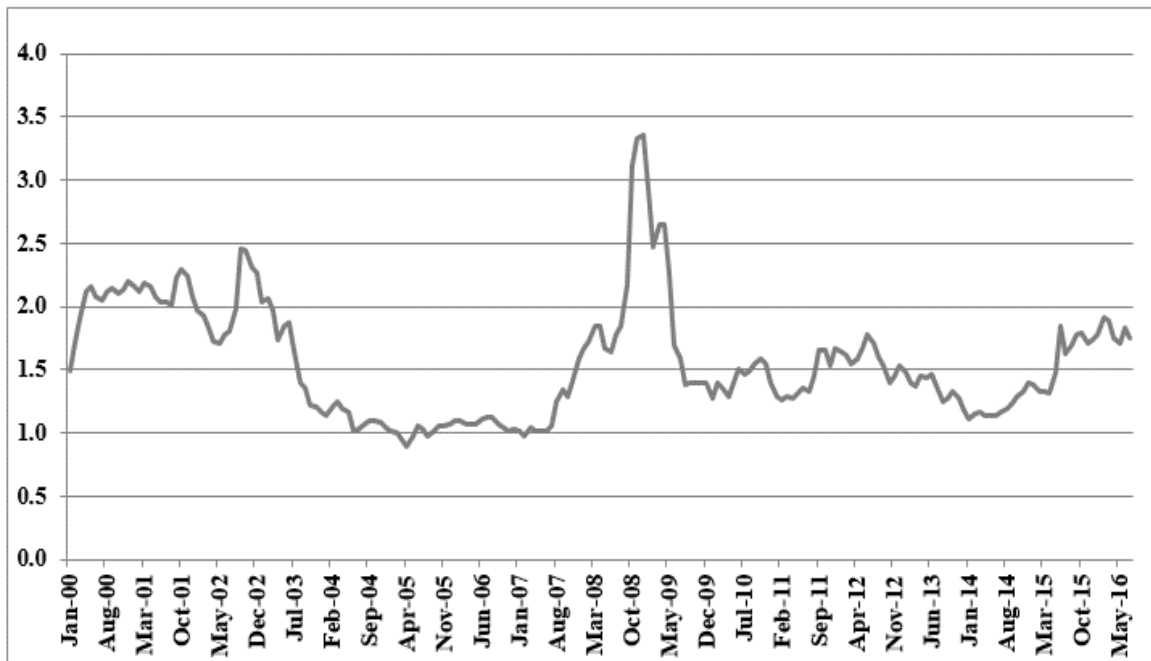
Source: Federal Reserve Bank of St. Louis, FRED Database.



**Exhibit JRW-3**  
**Panel A**  
**Long-Term, A-Rated Public Utility Yields**



**Panel B**  
**Long-Term, A-Rated Public Utility Yields minus -Twenty-Year Treasury Yields**



SOURCE: BLOOMBERG BOND RECORD, FEDERAL RESERVE BANK OF ST. LOUIS, FRED DATABASE.



## Exhibit JRW-4

Unitil Energy Systems, Inc.  
Summary Financial Statistics for Proxy Groups

Panel A  
Electric Proxy Group

Company	Operating Revenue (\$mil)	Percent Elec Revenue	Percent Gas Revenue	Net Plant (\$mil)	Market Cap (\$mil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
ALLETE, Inc. (NYSE-ALE)	1,491.7	66		3,631.3	2.94	BBB+	A3	4.1	MN, WI	54.2	8.2	1.59
Alliant Energy Corporation (NYSE-LNT)	3,237.4	77	10	9,846.4	8.68	A-	A3	3.6	WI,IA,IL,MN	48.0	10.1	2.18
Ameren Corporation (NYSE-AEE)	6,002.0	86	19	19,324.0	12.09	BBB+	Baa1	3.8	IL,MO	46.5	9.2	1.75
American Electric Power Co. (NYSE-AEP)	15,983.8	82		47,436.2	32.29	BBB	Baa1	3.8	10 States	46.0	11.1	1.76
Avista Corporation (NYSE-AVA)	1,438.0	69	33	3,990.7	2.62	BBB	Baa1	3.5	WA,ID,AK	49.7	8.6	1.62
Black Hills Corporation (NYSE-BKH)	1,365.8	50	45	4,389.9	3.03	BBB	Baa1	3.4	NE,IA,CO,WY,AR,SD,MT	31.8	1.2	1.94
CMS Energy Corporation (NYSE-CMS)	6,167.0	69	26	15,187.0	11.80	BBB+	Baa2	2.8	MI	30.3	13.6	2.84
Consolidated Edison, Inc. (NYSE-ED)	12,100.0	71	14	32,600.0	22.82	A-	A3	3.7	NY,PA	47.8	8.6	1.64
Dominion Resources, Inc. (NYSE-D)	11,046.0	65	1	43,682.0	46.08	BBB+	Baa2	3.8	NC,OH,FL,SCKY	31.7	14.4	3.23
DTE Energy Company (NYSE-DTE)	9,913.0	50	13	18,295.0	16.81	BBB+	A3	3.4	MI	47.5	8.6	1.92
Duke Energy Corporation (NYSE-DUK)	22,911.0	91	2	77,329.0	55.42	A-	A3	3.0	NC,OH,FL,SCKY	47.2	6.6	1.39
Edison International (NYSE-EIX)	11,321.0	100		35,629.0	23.89	BBB+	A3	3.9	CA	44.3	7.8	2.07
El Paso Electric Company (NYSE-EE)	842.3	100		2,752.2	1.82	BBB	Baa1	2.3	TX,NM	42.3	7.4	1.80
Energy Corporation (NYSE-ETR)	10,952.3	82	1	29,069.7	13.83	BBB	Baa3	2.4	LA,AR,MS,TX	39.2	1.7	1.42
Eversource Energy (NYSE-ES)	7,447.2	89	11	20,448.5	17.60	A	Baa1	4.7	CT,NH,MA	50.3	8.4	1.67
FirstEnergy Corporation (ASE-FE)	14,934.0	71		37,461.0	13.78	BBB-	Baa3	2.2	OH,PA,NY,NJ,WV,MD	33.5	NM	1.21
IDACORP, Inc. (NYSE-IDA)	1,251.0	100		4,045.3	3.84	BBB	Baa1	3.5	ID	54.1	9.2	1.84
MGE Energy, Inc. (NYSE-MGEE)	540.9	76	24	1,266.8	1.92	AA-	A1	6.6	WI	64.4	10.6	2.72
NorthWestern Corporation (NYSE-NWE)	1,223.4	80	20	4,109.7	2.99	BBB	A3	2.5	MT,SD,NE	44.2	9.1	1.84
OGE Energy Corp. (NYSE-OGE)	2,151.4	100		7,469.9	6.01	A-	A3	4.0	OK,AR	53.3	7.2	1.81
Otter Tail Corporation (NDQ-OTTR)	798.5	52		1,428.6	1.30	BBB	A3	3.6	MN,ND,SD	51.6	9.8	2.04
PG&E Corporation (NYSE-PCG)	16,860.0	82	18	48,597.0	31.20	BBB	Baa1	2.0	CA	47.6	4.6	1.86
Pinnacle West Capital Corp. (NYSE-PNW)	3,526.1	100		12,132.1	8.40	A-	Baa1	4.8	AZ	51.1	9.4	1.83
PNM Resources, Inc. (NYSE-PNM)	1,379.7	100		4,790.2	1.26	BBB+	Baa3	2.4	NM,TX	37.3	0.4	0.75
Portland General Electric Company (NYSE-POR)	1,890.0	100		6,284.0	3.73	BBB	A3	2.6	OR	49.8	8.2	1.62
PPL Corporation (NYSE-PPL)	7,454.0	60		30,794.0	23.69	A-	Baa2	3.2	PA,KY	34.0	17.3	2.30
SCANA Corporation (NYSE-SCG)	4,102.0	61	18	13,145.0	10.16	BBB+	Baa3	3.4	SC,NC,GA	NaN	19.7	1.85
Southern Company (NYSE-SO)	17,393.0	94		63,893.0	47.96	A-	Baa1	5.2	GA,FL,NJ,IL,VA,TN,MS	37.1	10.7	2.12
WEC Energy Group (NYSE-WEC)	7,343.8	62	28	19,398.9	18.94	A-	A3	4.5	WI,IL,MN,MI	47.1	10.2	2.14
Xcel Energy Inc. (NYSE-XEL)	10,819.3	85	14	31,823.3	21.15	A-	A3	3.8	MN,WI,ND,SD,MI	42.9	10.2	1.98
Mean	7,129.5	79	17	21,675.0	15.6	BBB+	Baa1	3.6		45.0	9.0	1.89
Median	6,084.5	81	18	16,741.0	11.9	BBB+	Baa1	3.6		47.1	9.1	1.84

Data Source: AUS Utility Reports, September, 2016; Pre-Tax Interest Coverage and Primary Service Territory are from Value Line Investment Survey, 2016.

Panel B  
Hevert Proxy Group

Company	Operating Revenue (\$mil)	Percent Elec Revenue	Percent Gas Revenue	Net Plant (\$mil)	Market Cap (\$mil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
ALLETE, Inc. (NYSE-ALE)	1,491.7	66		3,631.3	2.94	BBB+	A3	4.1	MN, WI	54.2	8.2	1.59
Alliant Energy Corporation (NYSE-LNT)	3,237.4	77	10	9,846.4	8.68	A-	A3	3.6	WI,IA,IL,MN	48.0	10.1	2.18
Ameren Corporation (NYSE-AEE)	6,002.0	86	19	19,324.0	12.09	BBB+	Baa1	3.8	IL,MO	46.5	9.2	1.75
American Electric Power Co. (NYSE-AEP)	15,983.8	82		47,436.2	32.29	BBB	Baa1	3.8	10 States	46.0	11.1	1.76
Avista Corporation (NYSE-AVA)	1,438.0	69	33	3,990.7	2.62	BBB	Baa1	3.4	WA,ID,AK	49.7	8.6	1.62
CenterPoint Energy (NYSE-CNP)	6,979.0	42	36	11,898.0	9.53	A-	Baa1	2.7	TX,MN,AR,LA,OK	28.4	NM	2.81
CMS Energy Corporation (NYSE-CMS)	6,167.0	69	26	15,187.0	11.80	BBB+	Baa2	2.8	MI	30.3	13.6	2.84
Consolidated Edison, Inc. (NYSE-ED)	12,100.0	71	14	32,600.0	22.82	A-	A3	3.7	NY,PA	47.8	8.6	1.64
DTE Energy Company (NYSE-DTE)	9,913.0	50	13	18,295.0	16.81	BBB+	A3	3.4	MI	47.5	8.6	1.92
Eversource Energy (NYSE-ES)	7,447.2	89	11	20,448.5	17.60	A	Baa1	4.7	CT,NH,MA	50.3	8.4	1.67
FirstEnergy Corporation (ASE-FE)	14,934.0	71		37,461.0	13.78	BBB-	Baa3	2.2	OH,PA,NY,NJ,WV,MD	33.5	NM	1.21
IDACORP, Inc. (NYSE-IDA)	1,251.0	100		4,045.3	3.84	BBB	Baa1	3.5	ID	54.1	9.2	1.84
NorthWestern Corporation (NYSE-NWE)	1,223.4	80	20	4,109.7	2.99	BBB	A3	2.5	MT,SD,NE	44.2	9.1	1.84
OGE Energy Corp. (NYSE-OGE)	2,151.4	100		7,469.9	6.01	A-	A3	4.0	OK,AR	53.3	7.2	1.81
Otter Tail Corporation (NDQ-OTTR)	798.5	52		1,428.6	1.30	BBB	A3	3.6	MN,ND,SD	51.6	9.8	2.04
Pinnacle West Capital Corp. (NYSE-PNW)	3,526.1	100		12,132.1	8.40	A-	Baa1	4.8	AZ	51.1	9.4	1.83
PNM Resources, Inc. (NYSE-PNM)	1,379.7	100		4,790.2	1.26	BBB+	Baa3	2.4	NM,TX	37.3	0.4	0.75
Portland General Electric Company (NYSE-POR)	1,890.0	100		6,284.0	3.73	BBB	A3	2.6	OR	49.8	8.2	1.62
SCANA Corporation (NYSE-SCG)	4,102.0	61	18	13,145.0	10.16	BBB+	Baa3	3.4	SC,NC,GA	NaN	19.7	1.85
Xcel Energy Inc. (NYSE-XEL)	10,819.3	85	14	31,823.3	21.15	A-	A3	3.8	MN,WI,ND,SD,MI	42.9	10.2	1.98
Mean	5,641.7	78	19	15,267.3	10.5	BBB+	Baa1	3.4		45.6	9.4	1.83
Median	3,814.1	79	18	12,015.1	9.1	BBB+	Baa1	3.6		47.8	9.2	1.82

Data Source: AUS Utility Reports, September, 2016; Pre-Tax Interest Coverage and Primary Service Territory are from Value Line Investment Survey, 2016.



## Exhibit JRW-4

## Unitil Energy Systems, Inc.

## Value Line Risk Metrics

Panel A  
Electric Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
ALLETE, Inc. (NYSE-ALE)	0.75	A	2	90	95
Alliant Energy Corporation (NYSE-LNT)	0.75	A	2	85	100
Ameren Corporation (NYSE-AEE)	0.70	A	2	85	95
American Electric Power Co. (NYSE-AEP)	0.65	A	2	90	100
Avista Corporation (NYSE-AVA)	0.70	A	2	80	95
Black Hills Corporation (NYSE-BKH)	0.90	A	2	50	85
CMS Energy Corporation (NYSE-CMS)	0.65	B++	2	80	100
Consolidated Edison, Inc. (NYSE-ED)	0.55	A+	1	95	100
Dominion Resources, Inc. (NYSE-D)	0.70	B++	2	80	100
DTE Energy Company (NYSE-DTE)	0.70	B++	2	90	100
Duke Energy Corporation (NYSE-DUK)	0.60	A	2	80	100
Edison International (NYSE-EIX)	0.65	A	2	65	95
El Paso Electric Company (NYSE-EE)	0.70	B++	2	80	90
Entergy Corporation (NYSE-ETR)	0.65	B++	3	70	95
Eversource Energy (NYSE-ES)	0.70	A	1	85	95
FirstEnergy Corporation (ASE-FE)	0.65	B+	3	45	90
IDACORP, Inc. (NYSE-IDA)	0.75	A	2	90	95
MGE Energy, Inc. (NYSE-MGEE)	0.70	A	1	90	95
NorthWestern Corporation (NYSE-NWE)	0.70	B+	3	90	95
OGE Energy Corp. (NYSE-OGE)	0.90	A	2	85	90
Otter Tail Corporation (NDQ-OTTR)	0.85	B++	2	50	85
PG&E Corporation (NYSE-PCG)	0.65	B+	3	55	95
Pinnacle West Capital Corp. (NYSE-PNW)	0.70	A+	1	80	95
PNM Resources, Inc. (NYSE-PNM)	0.75	B	3	40	90
Portland General Electric Company (NYSE-PO)	0.70	B++	2	70	95
PPL Corporation (NYSE-PPL)	0.70	B++	2	60	100
SCANA Corporation (NYSE-SCG)	0.70	B++	2	100	100
Southern Company (NYSE-SO)	0.55	A	2	100	100
WEC Energy Group (NYSE-WEC)	0.65	A+	1	85	100
Xcel Energy Inc. (NYSE-XEL)	0.60	A+	1	100	100
Mean	0.70	A	2.0	78	96

Data Source: Value Line Investment Survey, 2016.

Panel B  
Hevert Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
ALLETE, Inc. (NYSE-ALE)	0.75	A	2	90	95
Alliant Energy Corporation (NYSE-LNT)	0.75	A	2	85	100
Ameren Corporation (NYSE-AEE)	0.70	A	2	85	95
American Electric Power Co. (NYSE-AEP)	0.65	A	2	90	100
Avista Corporation (NYSE-AVA)	0.70	A	2	80	95
CenterPoint Energy (NYSE-CNP)	0.80	B+	3	90	90
CMS Energy Corporation (NYSE-CMS)	0.65	B++	2	80	100
Consolidated Edison, Inc. (NYSE-ED)	0.55	A+	1	95	100
DTE Energy Company (NYSE-DTE)	0.70	B++	2	90	100
Eversource Energy (NYSE-ES)	0.70	A	1	85	95
FirstEnergy Corporation (ASE-FE)	0.65	B+	3	45	90
IDACORP, Inc. (NYSE-IDA)	0.75	A	2	90	95
NorthWestern Corporation (NYSE-NWE)	0.70	B+	3	95	95
OGE Energy Corp. (NYSE-OGE)	0.90	A	2	85	90
Otter Tail Corporation (NDQ-OTTR)	0.85	B++	2	50	85
Pinnacle West Capital Corp. (NYSE-PNW)	0.70	A+	1	75	95
PNM Resources, Inc. (NYSE-PNM)	0.75	B	3	40	90
Portland General Electric Company (NYSE-PO)	0.70	B++	2	70	95
SCANA Corporation (NYSE-SCG)	0.70	B++	2	100	100
Xcel Energy Inc. (NYSE-XEL)	0.60	A+	1	100	100
Mean	0.71	A	2.0	81	95

Data Source: Value Line Investment Survey, 2016.



### *Value Line Risk Metrics*

#### **Beta**

A relative measure of the historical sensitivity of a stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The "coefficient" is derived from a regression analysis of the relationship between weekly percent-age changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. Betas are adjusted for their long-term tendency to converge toward 1.00.

#### **Financial Strength**

A relative measure of of the companies reviewed by Value Line. The relative ratings range from A++ (strongest) down to C (weakest).

#### **Safety Rank**

A measurement of potential risk associated with individual common stocks. The Safety Rank is computed by averaging two other Value Line indexes the Price Stability Index and the Financial strength Rating. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit their purchases to equities ranked 1 (Highest) and 2 (Above Average) for Safety.

#### **Earnings Predictability**

A measure of the reliability of an earnings forecast. Earnings Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily than earlier ones. The most reliable forecasts tend to be those with the highest rating (100); the least reliable, the lowest (5). The earnings stability is derived from the standard deviation of percentage changes in quarterly earnings over an eight-year period. Special adjustments are made for comparisons around zero and from plus to minus.

#### **Stock Price Stability**

A measure of the stability of a stock's price It includes sensitivity to the market (see Beta as well as the stock's inherent volatility. Value Line Stability ratings range from 1 (highest) to 5 (lowest).

Source: *Value Line Investment Analyzer*.



## Exhibit JRW-5

Unitil Energy Systems, Inc.  
Capital Structure Ratios and Debt Cost Rates

**Panel A -Unitil's Proposed Capitalization Ratios and Senior Capital Cost Rate**

Capital Source	Capitalization Ratio	Cost Rate
Short-Term Debt	0.11%	1.54%
Long-Term Debt	48.80%	7.15%
Preferred Equity	0.13%	6.00%
Common Equity	50.97%	
Total	100.01%	

**Panel B - Staff's Proposed Capitalization Ratios and Cost Rates**

Capital Source	Capitalization Ratio	Cost Rate
Short-Term Debt	0.11%	1.54%
Long-Term Debt	48.80%	7.15%
Preferred Equity	0.13%	6.00%
Common Equity	50.97%	
Total	100.01%	



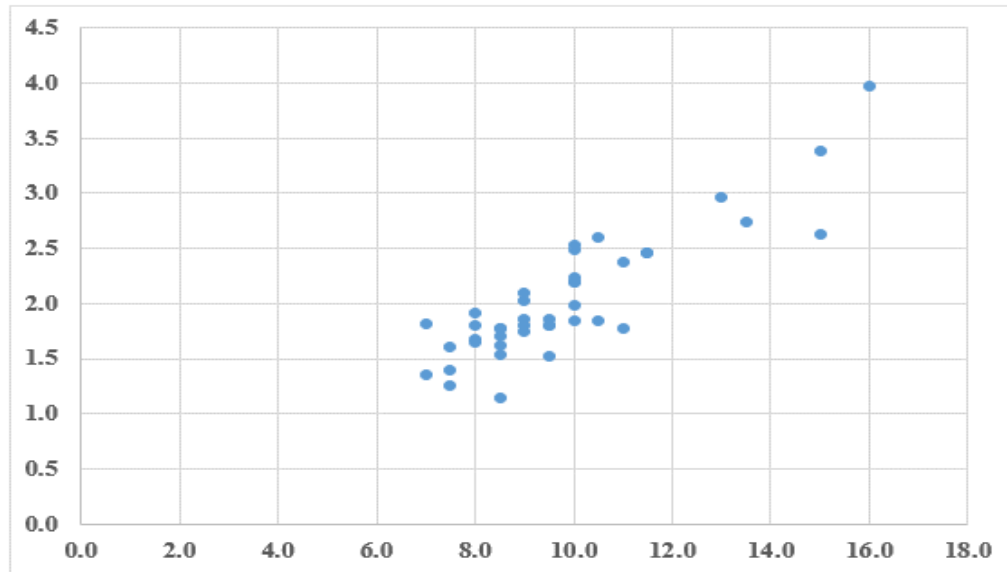
The Relationship Between Expected ROE and Market-to-Book Ratios

Exhibit JRW-6

Electric Utilities

Panel A

Market-to-Book



Expected Return on Equity

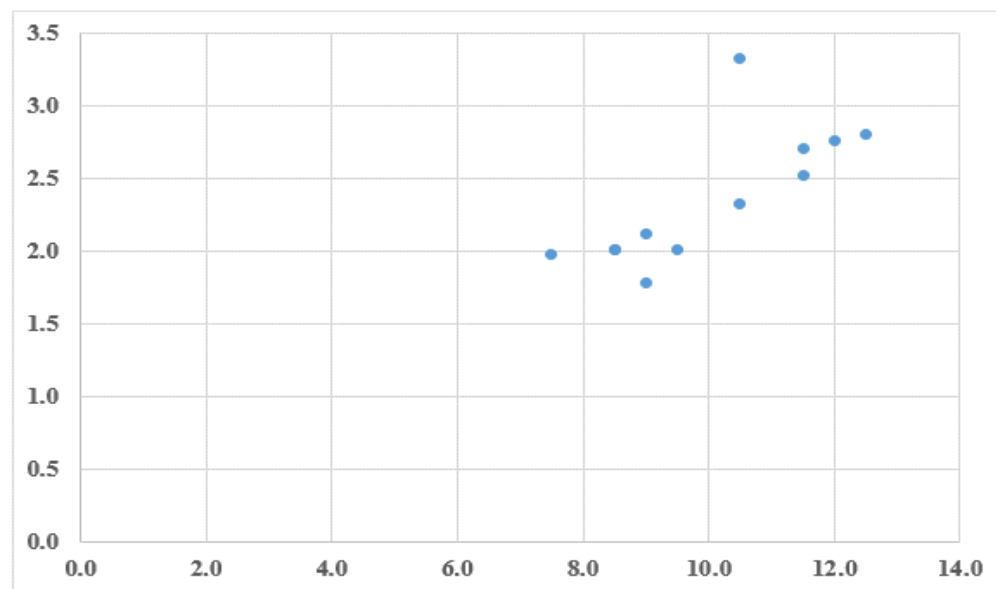
R-Square = .77, N=42

Source: Value Line Investment Survey, 2016.

Panel B

Gas Companies

Market-to-Book



Expected Return on Equity

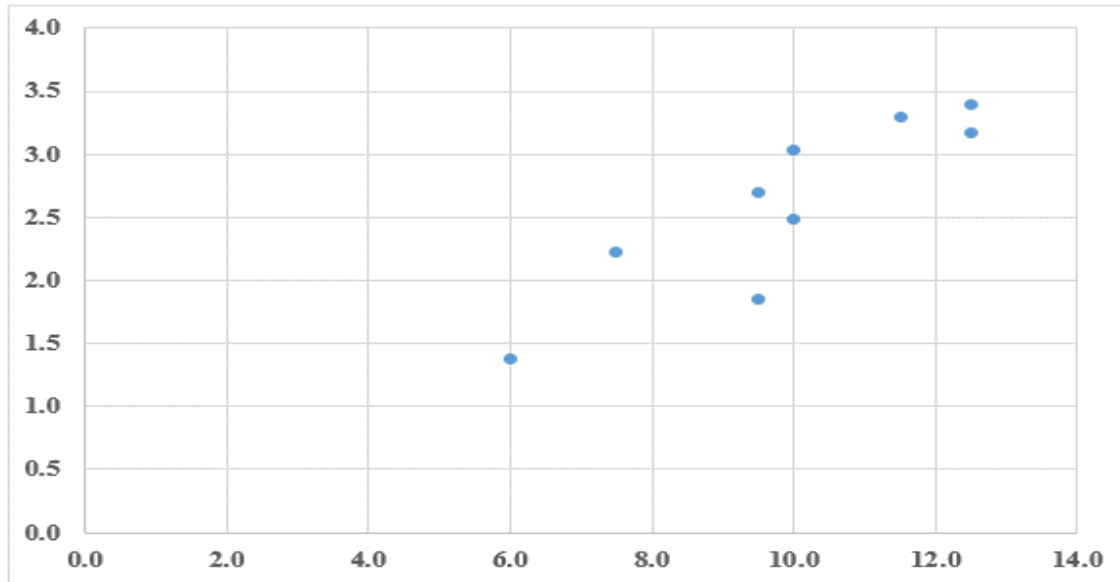
R-Square = .56, N=12

Source: Value Line Investment Survey, 2016.



**Exhibit JRW-6**  
**Water Companies**  
**Panel C**

**Market-to-Book**



**Expected Return on Equity**

**R-Square = .75, N=9**

Source: *Value Line Investment Survey*, 2016.



Exhibit JRW-7  
Long-Term 'A' Rated Public Utility Bonds

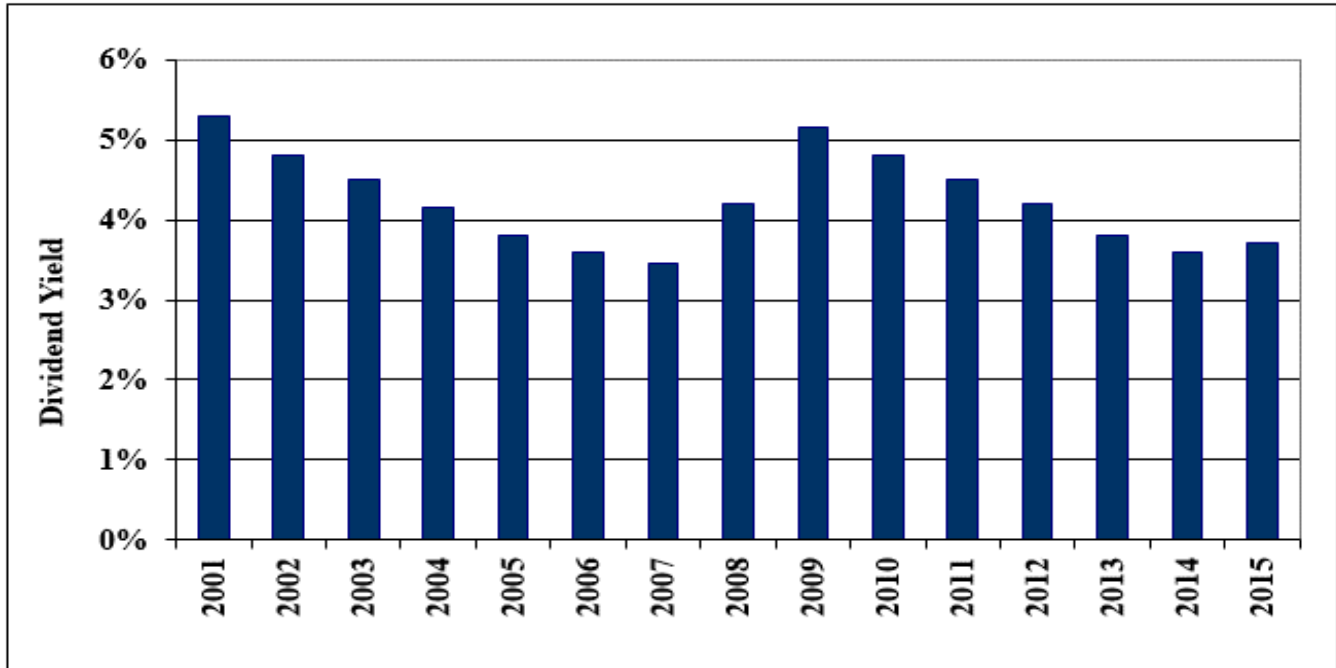


Data Source: Mergent Bond Record



Exhibit JRW-7

Electric Utility Average Dividend Yield



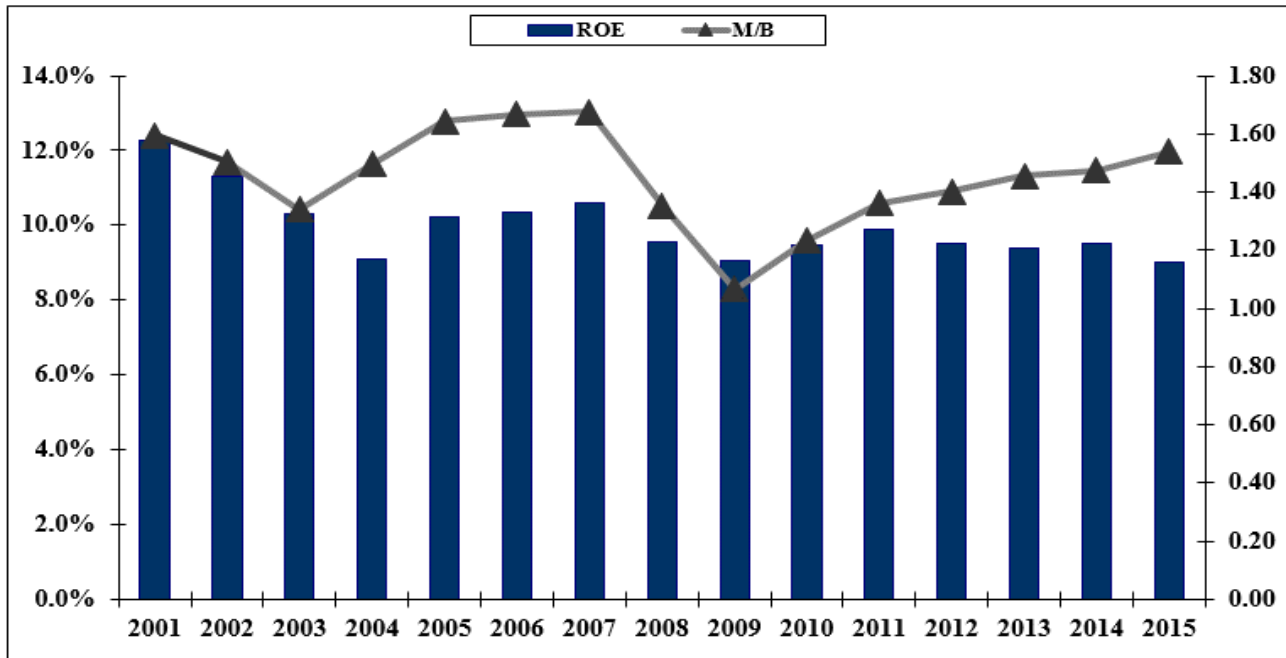
Data Source: *Value Line Investment Survey*.

Data Source: *Value Line Investment Survey*.



Exhibit JRW-7

Electric Utility Average Return on Equity and Market-to-Book Ratios



Data Source: *Value Line Investment Survey*.

Data Source: *Value Line Investment Survey*.

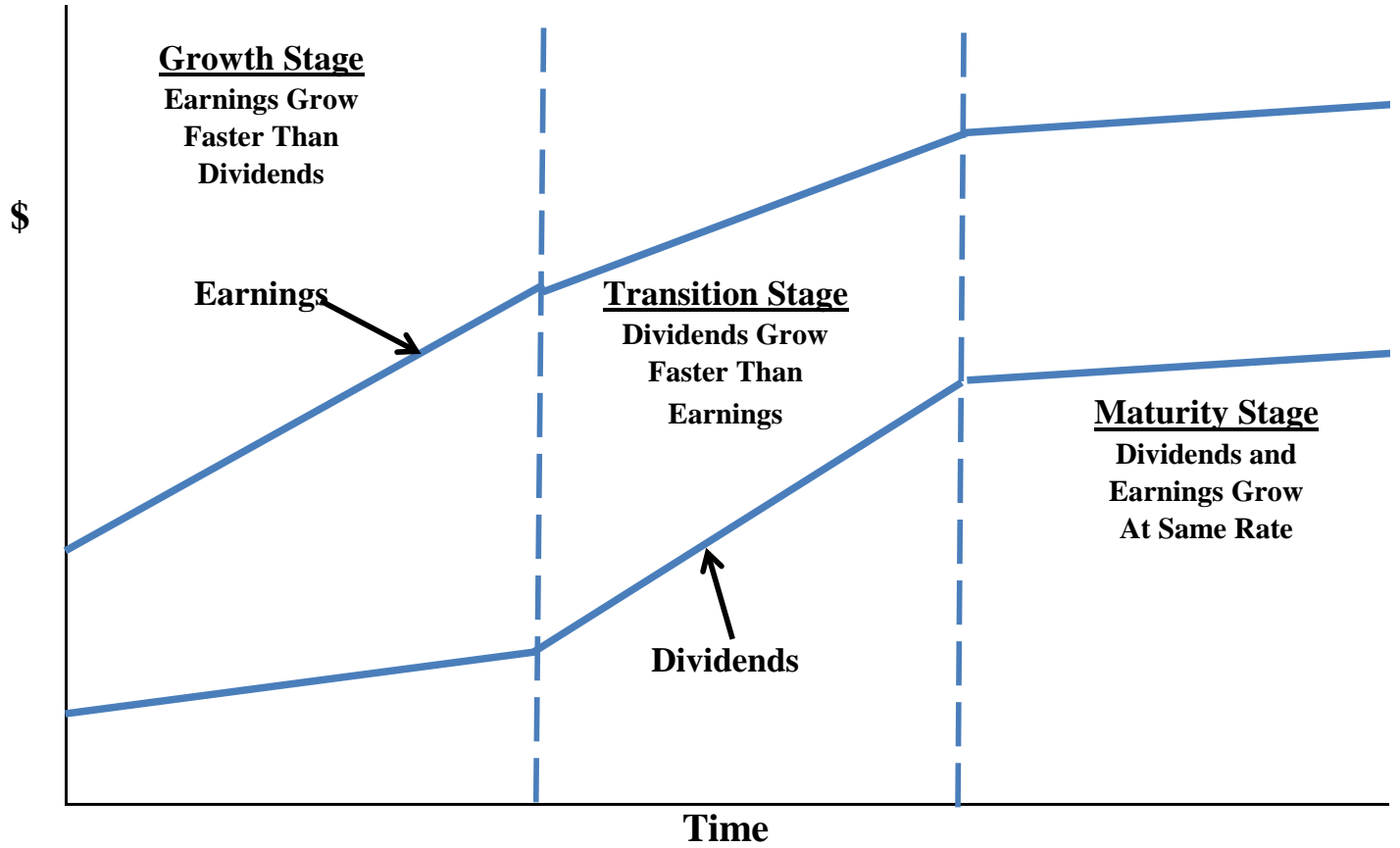


Exhibit JRW-8

Industry Average Betas					
Industry Name	Beta	Industry Name	Beta	Industry Name	Beta
Petroleum (Producing)	1.62	Office Equip/Supplies	1.17	Foreign Electronics	1.01
Maritime	1.54	Furn/Home Furnishings	1.16	Retail (Softlines)	1.00
Homebuilding	1.48	Precision Instrument	1.16	Cable TV	0.99
Oilfield Svcs/Equip.	1.47	Entertainment	1.16	Information Services	0.99
Metals & Mining (Div.)	1.44	Advertising	1.16	Drug	0.99
Steel	1.43	Biotechnology	1.15	Healthcare Information	0.98
Natural Gas (Div.)	1.41	Trucking	1.15	Investment Co.(Foreign)	0.98
Metal Fabricating	1.36	Diversified Co.	1.14	Med Supp Non-Invasive	0.98
Auto Parts	1.35	Financial Svcs. (Div.)	1.14	Telecom. Utility	0.97
Heavy Truck & Equip	1.35	Computer Software	1.14	Precious Metals	0.97
Building Materials	1.34	Internet	1.14	R.E.I.T.	0.96
Engineering & Const	1.30	Newspaper	1.13	Med Supp Invasive	0.96
Hotel/Gaming	1.30	Apparel	1.13	Funeral Services	0.94
Railroad	1.30	Retail (Hardlines)	1.12	Environmental	0.94
Petroleum (Integrated)	1.29	Computers/Peripherals	1.12	Retail Store	0.93
Chemical (Diversified)	1.27	Educational Services	1.11	Restaurant	0.90
Insurance (Life)	1.26	Paper/Forest Products	1.10	Pharmacy Services	0.89
Electrical Equipment	1.26	Wireless Networking	1.10	Thrift	0.89
Public/Private Equity	1.26	Air Transport	1.09	Reinsurance	0.88
Power	1.25	Bank	1.09	Beverage	0.88
Chemical (Specialty)	1.25	Bank (Midwest)	1.08	Food Processing	0.86
Semiconductor	1.24	Recreation	1.07	Insurance (Prop/Cas.)	0.85
Oil/Gas Distribution	1.24	Medical Services	1.06	Investment Co.	0.85
Chemical (Basic)	1.22	Industrial Services	1.06	Household Products	0.84
E-Commerce	1.22	Retail Building Supply	1.06	Retail/Wholesale Food	0.80
Electronics	1.21	Pipeline MLPs	1.05	Tobacco	0.75
Human Resources	1.20	Packaging & Container	1.04	Electric Util. (Central)	0.75
Automotive	1.19	Toiletries/Cosmetics	1.04	Electric Utility (West)	0.74
Machinery	1.19	Shoe	1.02	Natural Gas Utility	0.74
Entertainment Tech	1.18	Retail Automotive	1.02	Water Utility	0.71
Semiconductor Equip	1.18	Telecom. Services	1.01	Electric Utility (East)	0.68
Telecom. Equipment	1.17	IT Services	1.01		
Publishing	1.171	Aerospace/Defense	1.01		



Exhibit JRW-9  
DCF Model



Source: William F. Sharpe, Gordon J. Alexander, and Jeffrey V. Bailey, Investments (Prentice-Hall, 1995), pp. 590-91.



Exhibit JRW-9

DCF Model  
Consensus Earnings Estimates  
Alliant Energy Corp. (LNT)

[www.reuters.com](http://www.reuters.com)

10/21/2016

Line	Date	# of Estimates	Mean	High	Low
1	Quarter Ending Dec-16	2	0.18	0.20	0.16
2	Quarter Ending Mar-17	1	0.45	0.45	0.45
3	Year Ending Dec-16	9	2.10	2.28	1.88
4	Year Ending Dec-17	9	2.22	2.32	1.97
5	LT Growth Rate (%)	2	6.60	7.20	6.00



**Exhibit JRW-10**

**Unitil Energy Systems, Inc.  
Discounted Cash Flow Analysis**

**Panel A  
Electric Proxy Group**

<b>Dividend Yield*</b>	<b>3.35%</b>
<b>Adjustment Factor</b>	<b><u>1.025</u></b>
<b>Adjusted Dividend Yield</b>	<b>3.43%</b>
<b>Growth Rate**</b>	<b><u>5.00%</u></b>
<b>Equity Cost Rate</b>	<b>8.45%</b>

\* Page 2 of Exhibit JRW-10

\*\* Based on data provided on pages 3, 4, 5, and  
6 of Exhibit JRW-10

**Panel B  
Hevert Proxy Group**

<b>Dividend Yield*</b>	<b>3.40%</b>
<b>Adjustment Factor</b>	<b><u>1.02625</u></b>
<b>Adjusted Dividend Yield</b>	<b>3.49%</b>
<b>Growth Rate**</b>	<b><u>5.25%</u></b>
<b>Equity Cost Rate</b>	<b>8.75%</b>

\* Page 2 of Exhibit JRW-10

\*\* Based on data provided on pages 3, 4, 5, and  
6 of Exhibit JRW-10



## Exhibit JRW-10

Unitil Energy Systems, Inc.  
Monthly Dividend YieldsPanel A  
Electric Proxy Group

Company	Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
ALLETE, Inc. (NYSE-ALE)	\$ 2.08	3.5%	3.4%	3.6%
Alliant Energy Corporation (NYSE-LNT)	\$ 1.18	3.1%	3.0%	3.2%
Ameren Corporation (NYSE-AEE)	\$ 1.76	3.6%	3.5%	3.6%
American Electric Power Co. (NYSE-AEP)	\$ 2.24	3.5%	3.4%	3.5%
Avista Corporation (NYSE-AVA)	\$ 1.37	3.3%	3.3%	3.4%
Black Hills Corporation (NYSE-BKH)	\$ 1.68	2.8%	2.8%	2.8%
Consolidated Edison, Inc. (NYSE-ED)	\$ 2.68	3.6%	3.5%	3.6%
CMS Energy Corporation (NYSE-CMS)	\$ 1.24	3.0%	2.9%	3.0%
Dominion Resources, Inc. (NYSE-D)	\$ 2.80	3.8%	3.7%	3.8%
DTE Energy Company (NYSE-DTE)	\$ 3.08	3.3%	3.3%	3.4%
Duke Energy Corporation (NYSE-DUK)	\$ 3.42	4.3%	4.2%	4.3%
Edison International (NYSE-EIX)	\$ 1.92	2.7%	2.6%	2.7%
El Paso Electric Company (NYSE-EE)	\$ 1.24	2.7%	2.7%	2.8%
Entergy Corporation (NYSE-ETR)	\$ 3.40	4.4%	4.3%	4.5%
Eversource Energy (NYSE-ES)	\$ 1.78	3.3%	3.2%	3.2%
FirstEnergy Corporation (ASE-FE)	\$ 1.44	4.4%	4.3%	4.3%
IDACORP, Inc. (NYSE-IDA)	\$ 2.20	2.9%	2.8%	2.9%
MGE Energy, Inc. (NYSE-MGEE)	\$ 1.23	2.2%	2.2%	2.3%
NorthWestern Corporation (NYSE-NWE)	\$ 2.00	3.5%	3.4%	3.4%
OGE Energy Corp. (NYSE-OGE)	\$ 1.21	3.9%	3.9%	4.1%
Otter Tail Corporation (NDQ-OTTR)	\$ 1.25	3.6%	3.7%	4.0%
PG&E Corporation (NYSE-PCG)	\$ 1.96	3.2%	3.1%	3.3%
Pinnacle West Capital Corp. (NYSE-PNW)	\$ 2.62	3.5%	3.4%	3.5%
PNM Resources, Inc. (NYSE-PNM)	\$ 0.88	2.7%	2.7%	2.7%
Portland General Electric Company (NYSE-POR)	\$ 1.28	3.0%	3.0%	3.1%
PPL Corporation (NYSE-PPL)	\$ 1.52	4.5%	4.3%	4.2%
SCANA Corporation (NYSE-SCG)	\$ 2.30	3.2%	3.2%	3.3%
Southern Company (NYSE-SO)	\$ 2.24	4.4%	4.3%	4.4%
WEC Energy Group (NYSE-WEC)	\$ 1.98	3.3%	3.2%	3.3%
Xcel Energy Inc. (NYSE-XEL)	\$ 1.36	3.3%	3.2%	3.3%
Mean		3.4%	3.4%	3.5%
Median		3.3%	3.3%	3.4%

Data Sources: <http://quote.yahoo.com>, October 21, 2016.Panel B  
Hevert Proxy Group

Company	Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
ALLETE, Inc. (NYSE-ALE)	\$ 2.08	3.5%	3.4%	3.6%
Alliant Energy Corporation (NYSE-LNT)	\$ 1.18	3.1%	3.0%	3.2%
Ameren Corporation (NYSE-AEE)	\$ 1.76	3.6%	3.5%	3.6%
American Electric Power Co. (NYSE-AEP)	\$ 2.24	3.5%	3.4%	3.5%
Avista Corporation (NYSE-AVA)	\$ 1.37	3.3%	3.3%	3.4%
CenterPoint Energy (NYSE-CNP)	\$ 1.03	4.5%	4.5%	4.7%
CMS Energy Corporation (NYSE-CMS)	\$ 1.24	3.0%	2.9%	3.0%
Consolidated Edison, Inc. (NYSE-ED)	\$ 2.68	3.6%	3.5%	3.6%
DTE Energy Company (NYSE-DTE)	\$ 3.08	3.3%	3.3%	3.4%
Eversource Energy (NYSE-ES)	\$ 1.78	3.3%	3.2%	3.2%
FirstEnergy Corporation (ASE-FE)	\$ 1.44	4.4%	4.3%	4.3%
IDACORP, Inc. (NYSE-IDA)	\$ 2.20	2.9%	2.8%	2.9%
NorthWestern Corporation (NYSE-NWE)	\$ 2.00	3.5%	3.4%	3.4%
OGE Energy Corp. (NYSE-OGE)	\$ 1.21	3.9%	3.9%	4.1%
Otter Tail Corporation (NDQ-OTTR)	\$ 1.25	3.6%	3.7%	4.0%
Pinnacle West Capital Corp. (NYSE-PNW)	\$ 2.62	3.5%	3.4%	3.5%
PNM Resources, Inc. (NYSE-PNM)	\$ 0.88	2.7%	2.7%	2.7%
Portland General Electric Company (NYSE-POR)	\$ 1.28	3.0%	3.0%	3.1%
SCANA Corporation (NYSE-SCG)	\$ 2.30	3.2%	3.2%	3.3%
Xcel Energy Inc. (NYSE-XEL)	\$ 1.36	3.3%	3.2%	3.3%
Mean		3.4%	3.4%	3.5%
Median		3.4%	3.3%	3.4%

Data Sources: <http://quote.yahoo.com>, October 21, 2016.



## Exhibit JRW-10

Unitil Energy Systems, Inc.  
DCF Equity Cost Growth Rate Measures  
Value Line Historic Growth Rates

## Panel A

## Electric Proxy Group

Company	Value Line Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
ALLETE, Inc. (NYSE-ALE)	4.5	9.5	5.5	5.0	2.5	6.0
Alliant Energy Corporation (NYSE-LNT)	6.0	7.0	4.0	7.0	6.5	4.0
Ameren Corporation (NYSE-AEE)	-2.5	-4.5	-0.5	-4.0	-3.0	-3.0
American Electric Power Co. (NYSE-AEP)	2.5	3.0	5.0	3.5	4.0	5.0
Avista Corporation (NYSE-AVA)	7.5	9.5	4.0	4.0	9.0	4.0
Black Hills Corporation (NYSE-BKH)	4.0	2.5	3.0	15.0	2.0	1.5
CMS Energy Corporation (NYSE-CMS)	13.0		2.5	8.5	16.5	4.0
Consolidated Edison, Inc. (NYSE-ED)	3.5	1.0	4.0	3.0	1.5	3.5
Dominion Resources, Inc. (NYSE-D)	5.5	6.5	2.5	1.5	7.0	1.5
DTE Energy Company (NYSE-DTE)	4.5	3.0	4.0	6.5	5.0	4.0
Duke Energy Corporation (NYSE-DUK)				3.0	2.5	3.0
Edison International (NYSE-EIX)	6.5	9.5	6.0	3.5	4.0	1.5
El Paso Electric Company (NYSE-EE)	12.0		8.0	4.0		7.5
Entergy Corporation (NYSE-ETR)	3.0	6.0	3.5	-3.0	1.5	3.5
Eversource Energy (NYSE-ES)	9.5	9.5	6.0	6.0	11.0	9.0
FirstEnergy Corporation (ASE-FE)	-2.0	-1.0	1.0	-12.0	-7.5	1.5
IDACORP, Inc. (NYSE-IDA)	9.5	2.5	5.0	8.0	8.0	6.0
MGE Energy, Inc. (NYSE-MGEE)	6.5	2.0	6.0	7.0	2.5	5.5
NorthWestern Corporation (NYSE-NWE)		13.0	4.0	7.0	4.5	7.0
OGE Energy Corp. (NYSE-OGE)	7.5	3.5	8.5	6.5	6.0	8.5
Otter Tail Corporation (NDQ-OTTR)	-0.5	1.0	0.5	15.5	0.5	-3.5
PG&E Corporation (NYSE-PCG)	0.5		7.0	-5.5	1.5	3.5
Pinnacle West Capital Corp. (NYSE-PNW)	4.5	2.5	2.0	8.5	2.0	3.5
PNM Resources, Inc. (NYSE-PNM)	1.0	1.0	1.5	23.5	7.0	3.0
Portland General Electric Company (NYSE-POR)	7.0		2.5	6.5	2.5	3.0
PPL Corporation (NYSE-PPL)	2.5	5.5	5.5	4.0	1.5	4.0
SCANA Corporation (NYSE-SCG)	3.5	3.5	5.0	4.5	2.5	5.0
Southern Company (NYSE-SO)	3.0	4.0	5.0	3.5	3.5	4.0
WEC Energy Group (NYSE-WEC)	8.5	14.0	7.5	8.0	18.5	7.5
Xcel Energy Inc. (NYSE-XEL)	5.0	4.0	4.5	6.0	4.5	4.5
Mean	4.9	4.7	4.2	5.2	4.4	3.9
Median	4.5	3.5	4.0	5.5	3.5	4.0
Average of Median Figures =				4.2		

Data Source: Value Line Investment Survey.

## Panel B

## Hevert Proxy Group

Company	Value Line Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
ALLETE, Inc. (NYSE-ALE)	4.5	9.5	5.5	5.0	2.5	6.0
Alliant Energy Corporation (NYSE-LNT)	6.0	7.0	4.0	7.0	6.5	4.0
Ameren Corporation (NYSE-AEE)	-2.5	-4.5	-0.5	-4.0	-3.0	-3.0
American Electric Power Co. (NYSE-AEP)	2.5	3.0	5.0	3.5	4.0	5.0
Avista Corporation (NYSE-AVA)	7.5	9.5	4.0	4.0	9.0	4.0
CenterPoint Energy (NYSE-CNP)	3.5	8.5	8.0	2.0	4.0	7.5
CMS Energy Corporation (NYSE-CMS)	13.0		2.5	8.5	16.5	4.0
Consolidated Edison, Inc. (NYSE-ED)	3.5	1.0	4.0	3.0	1.5	3.5
DTE Energy Company (NYSE-DTE)	4.5	3.0	4.0	6.5	5.0	4.0
Eversource Energy (NYSE-ES)	9.5	9.5	6.0	6.0	11.0	9.0
FirstEnergy Corporation (ASE-FE)	-2.0	-1.0	1.0	-12.0	-7.5	1.5
IDACORP, Inc. (NYSE-IDA)	9.5	2.5	5.0	8.0	8.0	6.0
NorthWestern Corporation (NYSE-NWE)		13.0	4.0	7.0	4.5	7.0
OGE Energy Corp. (NYSE-OGE)	7.5	3.5	8.5	6.5	6.0	8.5
Otter Tail Corporation (NDQ-OTTR)	-0.5	1.0	0.5	15.5	0.5	-3.5
Pinnacle West Capital Corp. (NYSE-PNW)	4.5	2.5	2.0	8.5	2.0	3.5
PNM Resources, Inc. (NYSE-PNM)	1.0	1.0	1.5	23.5	7.0	3.0
Portland General Electric Company (NYSE-POR)	7.0		2.5	6.5	2.5	3.0
SCANA Corporation (NYSE-SCG)	3.5	3.5	5.0	4.5	2.5	5.0
Xcel Energy Inc. (NYSE-XEL)	5.0	4.0	4.5	6.0	4.5	4.5
Mean	4.6	4.3	3.9	5.8	4.4	4.1
Median	4.5	3.3	4.0	6.3	4.3	4.0
Average of Median Figures =				4.4		

Data Source: Value Line Investment Survey.



## Exhibit JRW-10

Unitil Energy Systems, Inc.  
DCF Equity Cost Growth Rate Measures  
Value Line Projected Growth Rates

Panel A  
Electric Proxy Group

Company	Value Line			Value Line		
	Projected Growth			Sustainable Growth		
	Est'd. '13-'15 to '19-'21			Return on Equity	Retention Rate	Internal Growth
	Earnings	Dividends	Book Value			
ALLETE, Inc. (NYSE-ALE)	4.0	3.5	4.0	8.5%	37.0%	3.1%
Alliant Energy Corporation (NYSE-LNT)	6.0	4.5	4.0	12.5%	39.0%	4.9%
Ameren Corporation (NYSE-AEE)	6.0	4.0	3.5	9.5%	37.0%	3.5%
American Electric Power Co. (NYSE-AEP)	4.0	5.0	4.0	9.5%	33.0%	3.1%
Avista Corporation (NYSE-AVA)	5.0	4.0	3.5	8.5%	35.0%	3.0%
Black Hills Corporation (NYSE-BKH)	7.5	6.0	4.5	10.5%	47.0%	4.9%
CMS Energy Corporation (NYSE-CMS)	6.0	6.5	6.0	13.5%	38.0%	5.1%
Consolidated Edison, Inc. (NYSE-ED)	2.5	3.0	3.5	8.5%	35.0%	3.0%
Dominion Resources, Inc. (NYSE-D)	9.0	8.0	6.0	18.5%	30.0%	5.6%
DTE Energy Company (NYSE-DTE)	6.0	5.5	4.5	10.0%	40.0%	4.0%
Duke Energy Corporation (NYSE-DUK)	4.0	3.5	1.5	8.0%	25.0%	2.0%
Edison International (NYSE-EIX)	3.5	9.5	5.5	11.5%	45.0%	5.2%
El Paso Electric Company (NYSE-EE)	4.0	7.0	4.0	9.0%	41.0%	3.7%
Energys Corporation (NYSE-ETR)	2.0	3.0	3.0	10.0%	35.0%	3.5%
Eversource Energy (NYSE-ES)	6.0	6.0	4.0	9.5%	42.0%	4.0%
FirstEnergy Corporation (NYSE-FE)	7.0	1.0	1.5	9.0%	47.0%	4.2%
IDACORP, Inc. (NYSE-IDA)	3.0	7.5	4.0	9.0%	40.0%	3.6%
MGE Energy, Inc. (NYSE-MGEE)	7.0	4.0	5.0	13.0%	56.0%	7.3%
NorthWestern Corporation (NYSE-NWE)	6.5	5.5	4.5	10.0%	42.0%	4.2%
OGE Energy Corp. (NYSE-OGE)	3.0	9.5	3.5	12.0%	26.0%	3.1%
Otter Tail Corporation (NYSE-OTTR)	6.0	1.5	5.5	10.0%	36.0%	3.6%
PG&E Corporation (NYSE-PCG)	12.0	7.0	4.5	11.0%	41.0%	4.5%
Pinnacle West Capital Corp. (NYSE-PNW)	4.0	5.0	3.5	10.0%	36.0%	3.6%
PNM Resources, Inc. (NYSE-PNM)	9.0	10.0	3.5	9.5%	45.0%	4.3%
Portland General Electric Company (NYSE-POR)	5.5	6.0	3.5	9.0%	41.0%	3.7%
PPL Corporation (NYSE-PPL)	NMF	3.0	NMF	13.0%	31.0%	4.0%
SCANA Corporation (NYSE-SCG)	4.5	5.0	5.0	10.0%	41.0%	4.1%
Southern Company (NYSE-SO)	4.0	3.5	6.5	10.5%	26.0%	2.7%
WEC Energy Group (NYSE-WEC)	6.0	7.0	7.0	11.0%	33.0%	3.6%
Xcel Energy Inc. (NYSE-XEL)	5.5	6.0	4.0	11.0%	38.0%	4.2%
Mean	5.5	5.4	4.2	10.5%	37.9%	4.0%
Median	5.5	5.3	4.0	10.0%	38.0%	3.8%
Average of Median Figures =		4.9			Median =	3.8%

\* Est'd. '13-'15 to '19-'21 is the estimated growth rate from the base period 2013 to 2015 until the future period 2019 to 2021.

Data Source: Value Line Investment Survey.

Panel B  
Hevert Proxy Group

Company	Value Line			Value Line		
	Projected Growth			Sustainable Growth		
	Est'd. '13-'15 to '19-'21			Return on Equity	Retention Rate	Internal Growth
	Earnings	Dividends	Book Value			
ALLETE, Inc. (NYSE-ALE)	4.0	3.5	4.0	8.5%	37.0%	3.1%
Alliant Energy Corporation (NYSE-LNT)	6.0	4.5	4.0	12.5%	39.0%	4.9%
Ameren Corporation (NYSE-AEE)	6.0	4.0	3.5	9.5%	37.0%	3.5%
American Electric Power Co. (NYSE-AEP)	4.0	5.0	4.0	9.5%	33.0%	3.1%
Avista Corporation (NYSE-AVA)	5.0	4.0	3.5	8.5%	35.0%	3.0%
CenterPoint Energy (NYSE-CNP)	2.0	4.5	-1.0	15.5%	15.0%	2.3%
CMS Energy Corporation (NYSE-CMS)	6.0	6.5	6.0	13.5%	38.0%	5.1%
Consolidated Edison, Inc. (NYSE-ED)	2.5	3.0	3.5	8.5%	35.0%	3.0%
DTE Energy Company (NYSE-DTE)	6.0	5.5	4.5	10.0%	40.0%	4.0%
Eversource Energy (NYSE-ES)	6.0	6.0	4.0	9.5%	42.0%	4.0%
FirstEnergy Corporation (NYSE-FE)	7.0	1.0	1.5	9.0%	47.0%	4.2%
IDACORP, Inc. (NYSE-IDA)	3.0	7.5	4.0	9.0%	40.0%	3.6%
NorthWestern Corporation (NYSE-NWE)	6.5	5.5	4.5	10.0%	42.0%	4.2%
OGE Energy Corp. (NYSE-OGE)	3.0	9.5	3.5	12.0%	26.0%	3.1%
Otter Tail Corporation (NYSE-OTTR)	6.0	1.5	5.5	10.0%	36.0%	3.6%
Pinnacle West Capital Corp. (NYSE-PNW)	4.0	5.0	3.5	10.0%	36.0%	3.6%
PNM Resources, Inc. (NYSE-PNM)	9.0	10.0	3.5	9.5%	45.0%	4.3%
Portland General Electric Company (NYSE-POR)	5.5	6.0	3.5	9.0%	41.0%	3.7%
SCANA Corporation (NYSE-SCG)	4.5	5.0	5.0	10.0%	40.0%	4.0%
Xcel Energy Inc. (NYSE-XEL)	5.5	6.0	4.0	11.0%	38.0%	4.2%
Mean	5.1	5.2	3.7	10.3%	37.1%	3.7%
Median	5.5	5.0	4.0	9.8%	38.0%	3.6%
Average of Median Figures =		4.8			Median =	3.6%

\* Est'd. '13-'15 to '19-'21 is the estimated growth rate from the base period 2013 to 2015 until the future period 2019 to 2021.

Data Source: Value Line Investment Survey.



## Exhibit JRW-10

Unitil Energy Systems, Inc.  
DCF Equity Cost Growth Rate Measures  
Analysts Projected EPS Growth Rate Estimates

Panel A  
Electric Proxy Group

Company	Yahoo	Reuters	Zacks	Mean
ALLETE, Inc. (NYSE-ALE)	5.0%	5.0%	5.5%	5.2%
Alliant Energy Corporation (NYSE-LNT)	6.6%	6.6%	6.1%	6.4%
Ameren Corporation (NYSE-AEE)	5.2%	5.6%	6.1%	5.6%
American Electric Power Co. (NYSE-AEP)	2.3%	2.3%	5.2%	3.3%
Avista Corporation (NYSE-AVA)	5.0%	NA	5.3%	5.2%
Black Hills Corporation (NYSE-BKH)	6.7%	6.7%	5.8%	6.4%
CMS Energy Corporation (NYSE-CMS)	7.3%	7.3%	6.6%	7.0%
Consolidated Edison, Inc. (NYSE-ED)	2.1%	2.1%	2.8%	2.4%
Dominion Resources, Inc. (NYSE-D)	5.8%	5.8%	6.2%	5.9%
DTE Energy Company (NYSE-DTE)	5.5%	5.5%	5.8%	5.6%
Duke Energy Corporation (NYSE-DUK)	4.4%	3.7%	4.7%	4.2%
Edison International (NYSE-EIX)	2.3%	2.3%	5.3%	3.3%
El Paso Electric Company (NYSE-EE)	7.0%	NA	4.4%	5.7%
Entergy Corporation (NYSE-ETR)	-2.6%	-2.6%	-4.4%	-3.2%
Eversource Energy (NYSE-ES)	6.3%	6.3%	6.1%	6.2%
FirstEnergy Corporation (ASE-FE)	-2.6%	-2.0%	-2.0%	-2.2%
IDACORP, Inc. (NYSE-IDA)	4.0%	3.8%	4.4%	4.1%
MGE Energy, Inc. (NYSE-MGEE)	4.0%	NA	NA	4.0%
NorthWestern Corporation (NYSE-NWE)	5.0%	4.5%	5.0%	4.8%
OGE Energy Corp. (NYSE-OGE)	4.3%	4.3%	5.2%	4.6%
Otter Tail Corporation (NDQ-OTTR)	6.0%	NA	NA	6.0%
PG&E Corporation (NYSE-PCG)	5.7%	5.6%	4.3%	5.2%
Pinnacle West Capital Corp. (NYSE-PNW)	4.0%	4.0%	4.3%	4.1%
PNM Resources, Inc. (NYSE-PNM)	5.9%	5.9%	6.7%	6.2%
Portland General Electric Company (NYSE-POR)	5.9%	5.9%	6.0%	5.9%
PPL Corporation (NYSE-PPL)	2.5%	1.7%	3.5%	2.6%
SCANA Corporation (NYSE-SCG)	6.0%	6.0%	5.5%	5.8%
Southern Company (NYSE-SO)	3.2%	3.7%	3.9%	3.6%
WEC Energy Group (NYSE-WEC)	6.7%	6.8%	6.2%	6.6%
Xcel Energy Inc. (NYSE-XEL)	5.3%	5.3%	5.4%	5.4%
Mean	4.5%	4.3%	4.6%	4.5%
Median	5.1%	5.1%	5.3%	5.2%

Data Sources: www.reuters.com, www.zacks.com, http://quote.yahoo.com, October 21, 2016.

Panel B  
Hevert Proxy Group

Company	Yahoo	Reuters	Zacks	Mean
ALLETE, Inc. (NYSE-ALE)	5.0%	5.0%	5.5%	5.2%
Alliant Energy Corporation (NYSE-LNT)	6.6%	6.6%	6.1%	6.4%
Ameren Corporation (NYSE-AEE)	5.2%	5.6%	6.1%	5.6%
American Electric Power Co. (NYSE-AEP)	2.3%	2.3%	5.2%	3.3%
Avista Corporation (NYSE-AVA)	5.0%	NA	5.3%	5.2%
CenterPoint Energy (NYSE-CNP)	5.3%	5.2%	5.5%	5.3%
CMS Energy Corporation (NYSE-CMS)	7.3%	7.3%	6.6%	7.0%
Consolidated Edison, Inc. (NYSE-ED)	2.1%	2.1%	2.8%	2.4%
DTE Energy Company (NYSE-DTE)	5.5%	5.5%	5.8%	5.6%
Eversource Energy (NYSE-ES)	6.3%	6.3%	6.1%	6.2%
FirstEnergy Corporation (ASE-FE)	-2.6%	-2.0%	-2.0%	-2.2%
IDACORP, Inc. (NYSE-IDA)	4.0%	3.8%	4.4%	4.1%
NorthWestern Corporation (NYSE-NWE)	5.0%	4.5%	5.0%	4.8%
OGE Energy Corp. (NYSE-OGE)	4.3%	4.3%	5.2%	4.6%
Otter Tail Corporation (NDQ-OTTR)	6.0%	NA	NA	6.0%
Pinnacle West Capital Corp. (NYSE-PNW)	4.0%	4.0%	4.3%	4.1%
PNM Resources, Inc. (NYSE-PNM)	5.9%	5.9%	6.7%	6.2%
Portland General Electric Company (NYSE-POR)	5.9%	5.9%	6.0%	5.9%
SCANA Corporation (NYSE-SCG)	6.0%	6.0%	5.5%	5.8%
Xcel Energy Inc. (NYSE-XEL)	5.3%	5.3%	5.4%	5.4%
Mean	4.7%	4.6%	5.0%	4.8%
Median	5.2%	5.2%	5.5%	5.3%

Data Sources: www.reuters.com, www.zacks.com, http://quote.yahoo.com, October 21, 2016.



Exhibit JRW-10

Unitil Energy Systems, Inc.  
DCF Growth Rate Indicators

Electric and Hevert Proxy Groups

Growth Rate Indicator	Electric Proxy Group	Hevert Proxy Group
Historic <i>Value Line</i> Growth in EPS, DPS, and BVPS	4.2%	4.4%
Projected <i>Value Line</i> Growth in EPS, DPS, and BVPS	4.9%	4.8%
Sustainable Growth ROE * Retention Rate	3.8%	3.6%
Projected EPS Growth from Yahoo, Zacks, and Reuters - Mean/Median	4.5%/5.2%	4.8%/5.3%



**Exhibit JRW-11**

**Unitil Energy Systems, Inc.  
Capital Asset Pricing Model**

**Panel A  
Electric Proxy Group**

<b>Risk-Free Interest Rate</b>	<b>4.00%</b>
<b>Beta*</b>	<b>0.70</b>
<b><u>Ex Ante Equity Risk Premium**</u></b>	<b><u>5.50%</u></b>
<b>CAPM Cost of Equity</b>	<b>7.9%</b>

\* See page 3 of Exhibit JRW-11

\*\* See pages 5 and 6 of Exhibit JRW-11

**Panel B  
Hevert Proxy Group**

<b>Risk-Free Interest Rate</b>	<b>4.00%</b>
<b>Beta*</b>	<b>0.70</b>
<b><u>Ex Ante Equity Risk Premium**</u></b>	<b><u>5.50%</u></b>
<b>CAPM Cost of Equity</b>	<b>7.9%</b>

\* See page 3 of Exhibit JRW-11

\*\* See pages 5 and 6 of Exhibit JRW-11



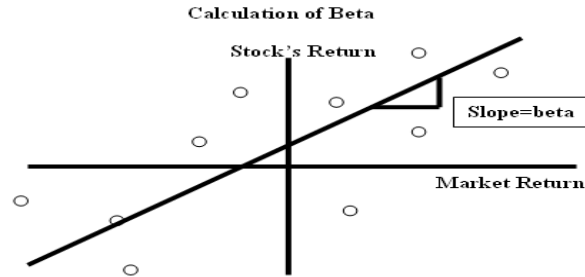
**Exhibit JRW-11**

**Thirty-Year U.S. Treasury Yields  
2011-2016**



Source: Federal Reserve Bank of St. Louis, FRED Database.





**Panel A**  
**Electric Proxy Group**

Company Name	Beta
ALLETE, Inc. (NYSE-ALE)	0.75
Alliant Energy Corporation (NYSE-LNT)	0.75
Ameren Corporation (NYSE-AEE)	0.70
American Electric Power Co. (NYSE-AEP)	0.65
Avista Corporation (NYSE-AVA)	0.70
Black Hills Corporation (NYSE-BKH)	0.90
CMS Energy Corporation (NYSE-CMS)	0.65
Consolidated Edison, Inc. (NYSE-ED)	0.55
Dominion Resources, Inc. (NYSE-D)	0.70
DTE Energy Company (NYSE-DTE)	0.70
Duke Energy Corporation (NYSE-DUK)	0.60
Edison International (NYSE-EIX)	0.65
El Paso Electric Company (NYSE-EE)	0.70
Entergy Corporation (NYSE-ETR)	0.65
Eversource Energy (NYSE-ES)	0.70
FirstEnergy Corporation (ASE-FE)	0.65
IDACORP, Inc. (NYSE-IDA)	0.75
MGE Energy, Inc. (NYSE-MGEE)	0.70
NorthWestern Corporation (NYSE-NWE)	0.70
OGE Energy Corp. (NYSE-OGE)	0.90
Otter Tail Corporation (NDQ-OTTR)	0.85
PG&E Corporation (NYSE-PCG)	0.65
Pinnacle West Capital Corp. (NYSE-PNW)	0.70
PNM Resources, Inc. (NYSE-PNM)	0.75
Portland General Electric Company (NYSE-POR)	0.70
PPL Corporation (NYSE-PPL)	0.70
SCANA Corporation (NYSE-SCG)	0.70
Southern Company (NYSE-SO)	0.55
WEC Energy Group (NYSE-WEC)	0.65
Xcel Energy Inc. (NYSE-XEL)	0.60
Mean	0.70
Median	0.70

Data Source: *Value Line Investment Survey*, 2016.

**Panel B**  
**Hevert Proxy Group**

Company Name	Beta
ALLETE, Inc. (NYSE-ALE)	0.75
Alliant Energy Corporation (NYSE-LNT)	0.75
Ameren Corporation (NYSE-AEE)	0.70
American Electric Power Co. (NYSE-AEP)	0.65
Avista Corporation (NYSE-AVA)	0.70
CenterPoint Energy (NYSE-CNP)	0.80
CMS Energy Corporation (NYSE-CMS)	0.65
Consolidated Edison, Inc. (NYSE-ED)	0.55
DTE Energy Company (NYSE-DTE)	0.70
Eversource Energy (NYSE-ES)	0.70
FirstEnergy Corporation (ASE-FE)	0.65
IDACORP, Inc. (NYSE-IDA)	0.75
NorthWestern Corporation (NYSE-NWE)	0.70
OGE Energy Corp. (NYSE-OGE)	0.90
Otter Tail Corporation (NDQ-OTTR)	0.85
Pinnacle West Capital Corp. (NYSE-PNW)	0.70
PNM Resources, Inc. (NYSE-PNM)	0.75
Portland General Electric Company (NYSE-POR)	0.70
SCANA Corporation (NYSE-SCG)	0.70
Xcel Energy Inc. (NYSE-XEL)	0.60
Mean	0.71
Median	0.70

Data Source: *Value Line Investment Survey*, 2016.



**Exhibit JRW-11**  
**Risk Premium Approaches**

	<b>Historical Ex Post Returns</b>	<b>Surveys</b>	<b>Expected Return Models and Market Data</b>
<b>Means of Assessing The Market Risk Premium</b>	Historical Average Stock Minus Bond Returns	Surveys of CFOs, Financial Forecasters, Companies, Analysts on Expected Returns and Market Risk Premiums	Use Market Prices and Market Fundamentals (such as Growth Rates) to Compute Expected Returns and Market Risk Premiums
<b>Problems/Debated Issues</b>	Time Variation in Required Returns, Measurement and Time Period Issues, and Biases such as Market and Company Survivorship Bias	Questions Regarding Survey Histories, Responses, and Representativeness  Surveys may be Subject to Biases, such as Extrapolation	Assumptions Regarding Expectations, Especially Growth

Source: Adapted from Antti Ilmanen, Expected Returns on Stocks and Bonds,” *Journal of Portfolio Management* , (Winter 2003).



Exhibit JRW-8

Capital Asset Pricing Model  
Equity Risk Premium

Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low	Range High	Midpoint of Range	Mean	Median
Historical Risk Premium	Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.40%	
	Damodaran	2015	1928-2014	Historical Stock Returns - Bond Returns	Arithmetic				6.25%	
					Geometric				4.60%	
	Dimson, Marsh, Staunton	2015	1900-2014	Historical Stock Returns - Bond Returns	Arithmetic				4.40%	
					Geometric				4.50%	
	Bate	2008	1900-2007	Historical Stock Returns - Bond Returns	Arithmetic				7.00%	
					Geometric				5.50%	
	Shiller	2006	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				6.10%	
					Geometric				4.60%	
	Siegel	2005	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
					Geometric				4.77%	
	Dimson, Marsh, and Staunton	2006	1900-2005	Historical Stock Returns - Bond Returns	Arithmetic					
	Goyal & Welch	2006	1872-2004	Historical Stock Returns - Bond Returns						
	Median									5.14%
Ex Ante Models (Puzzle Research)										
	Claus Thomas	2001	1985-1998	Abnormal Earnings Model					3.00%	
	Arnott and Bernstein	2002	1810-2001	Fundamentals - Div Yld + Growth					2.40%	
	Constantinides	2002	1872-2000	Historical Returns & Fundamentals - P/D & P/E					6.90%	
	Cornell	1999	1926-1997	Historical Returns & Fundamental GDP/Earnings		3.50%	5.50%	4.50%	4.50%	
	Easton, Taylor, et al	2002	1981-1998	Residual Income Model					5.30%	
	Fama French	2002	1951-2000	Fundamental DCF with EPS and DPS Growth		2.55%	4.32%		3.44%	
	Harris & Marston	2001	1982-1998	Fundamental DCF with Analysts' EPS Growth					7.14%	
	Best & Byrne	2001								
	McKinsey	2002	1962-2002	Fundamental (P/E, D/P, & Earnings Growth)		3.50%	4.00%		3.75%	
	Siegel	2005	1802-2001	Historical Earnings Yield	Geometric				2.50%	
	Grabowski	2006	1926-2005	Historical and Projected		3.50%	6.00%	4.75%	4.75%	
	Maheu & McCurdy	2006	1885-2003	Historical Excess Returns, Structural Breaks,		4.02%	5.10%	4.56%	4.56%	
	Bostock	2004	1960-2002	Bond Yields, Credit Risk, and Income Volatility		3.90%	1.30%	2.60%	2.60%	
	Bakshi & Chen	2005	1982-1998	Fundamentals - Interest Rates					7.31%	
	Donaldson, Kamstra, & Kramer	2006	1952-2004	Fundamental, Dividend yld., Returns., & Volatility		3.00%	4.00%	3.50%	3.50%	
	Campbell	2008	1982-2007	Historical & Projections (D/P & Earnings Growth)		4.10%	5.40%		4.75%	
	Best & Byrne	2001	Projection	Fundamentals - Div Yld + Growth					2.00%	
	Fernandez	2007	Projection	Required Equity Risk Premium					4.00%	
	DeLong & Magin	2008	Projection	Earnings Yield - TIPS					3.22%	
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Duff & Phelps	2016	Projection	Normalized with 4.0% Long-Term Treasury Yield					5.50%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	Damodaran	2016	Projection	Fundamentals - Implied from FCF to Equity Model					5.42%	
	Social Security									
	Office of Chief Actuary		1900-1995							
	John Campbell	2001	1860-2000	Historical & Projections (D/P & Earnings Growth)	Arithmetic	3.00%	4.00%	3.50%	3.50%	
			Projected for 75 Years		Geometric	1.50%	2.50%	2.00%	2.00%	
	Peter Diamond	2001	Projected for 75 Years	Fundamentals (D/P, GDP Growth)		3.00%	4.80%	3.90%	3.90%	
	John Shoven	2001	Projected for 75 Years	Fundamentals (D/P, P/E, GDP Growth)		3.00%	3.50%	3.25%	3.25%	
	Median									4.00%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2016	10-Year Projection	About 20 Financial Forecasters					1.90%	
	Duke - CFO Magazine Survey	2016	10-Year Projection	Approximately 500 CFOs					4.25%	
	Welch - Academics	2008	30-Year Projection	Random Academics		5.00%	5.74%	5.37%	5.37%	
	Fernandez - Academics, Analysts, and Compan	2016	Long-Term	Survey of Academics, Analysts, and Companies					5.30%	
	Median									5.30%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			4.20%		
	Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projection)	Geometric				4.00%	
	Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				3.00%	
	Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic			4.63%	4.12%	
					Geometric			3.60%		
	Woolridge		2015	Current Supply Model (D/P & Earnings Growth)					4.50%	
	Median									4.12%
Mean										4.64%
Median										4.63%



Exhibit JRW-8

Capital Asset Pricing Model  
Equity Risk Premium

Summary of 2010-15 Equity Risk Premium Studies

Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low High	Midpoint of Range	Mean	Average
Historical Risk Premium	Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic			6.00%	
	Damodaran	2015	1928-2014	Historical Stock Returns - Bond Returns	Geometric			4.40%	
					Arithmetic			6.25%	
	Dimson, Marsh, Staunton	2015	1900-2014	Historical Stock Returns - Bond Returns	Geometric			4.60%	
					Arithmetic			4.40%	
	Median				Geometric				5.13%
Ex Ante Models (Puzzle Research)	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components				5.50%	
	Duff & Phelps	2016	Projection	Normalized with 4.0% Long-Term Treasury Yield				5.50%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate				5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors				6.00%	
	Damodaran	2016	Projection	Fundamentals - Implied from FCF to Equity Model				5.42%	
	Median								5.50%
Surveys	Duarte & Rosa - NY Fed	2015	Projection	Projections from 29 Models				5.70%	
	Survey of Financial Forecasters	2016	10-Year Projection	About 20 Financial Forecasters				1.90%	
	Duke - CFO Magazine Survey	2016	10-Year Projection	Approximately 500 CFOs				4.25%	
	Fernandez - Academics, Analysts, and Companies	2016	Long-Term	Survey of Academics, Analysts, and Companies				5.30%	
	Median								4.78%
Building Block	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic		6.22%	5.21%	
					Geometric		4.20%		
	Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projection)	Geometric			4.00%	
	Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric			3.00%	
	Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic		4.63%	4.12%	
					Geometric		3.60%		
	Woolridge	2015	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric			4.50%	
	Median								4.12%
Mean									4.88%
Median									4.95%



**Docket No. DE 16-384**  
**Exhibit JRW-12**  
**Summary of the Company's Proposed Cost of Capital**  
**Page 1 of 1**

**Exhibit JRW-12**

**Unitil Energy Systems, Inc.**

**Company's Proposed Cost of Capital**

<b>Capital Source</b>	<b>Capitalization Ratio</b>	<b>Cost Rate</b>	<b>Weighted Cost Rate</b>
<b>Short-Term Debt</b>	<b>0.11%</b>	<b>1.54%</b>	<b>0.00%</b>
<b>Long-Term Debt</b>	<b>48.80%</b>	<b>7.15%</b>	<b>3.49%</b>
<b>Preferred Equity</b>	<b>0.13%</b>	<b>6.00%</b>	<b>0.01%</b>
<b>Common Equity</b>	<b>50.97%</b>	<b>10.30%</b>	<b>5.25%</b>



Unitil Energy Systems, Inc.

Panel A

Summary of Mr. Hevert's Constant Growth DCF Results

	Mean Low	Mean	Mean High
30-Day Average	8.47%	9.13%	9.78%
90-Day Average	8.60%	9.27%	9.91%
180-Day Average	8.70%	9.37%	10.01%

Summary of Mr. Hevert's Multi-Stage Growth DCF Results

	Mean Low	Mean	Mean High
30-Day Average	9.39%	8.86%	10.32%
90-Day Average	9.72%	10.20%	10.66%
180-Day Average	9.99%	10.46%	10.93%

Panel B

Summary of Mr. Hevert's CAPM Results

	Bloomberg Derived Market Risk Premium 10.83%	Value Line Derived Market Risk Premium 9.87%
<i>Average Bloomberg Beta - 0.585</i>		
Current 30-Year Treasury - 2.68%	9.02%	8.46%
Near-Term Projected 30-Year Treasury (3.35%)	9.69%	9.13%
<i>Average Value Line Beta - 0.764</i>		
Current 30-Year Treasury - 2.68%	10.95%	10.22%
Near-Term Projected 30-Year Treasury (3.35%)	11.62%	10.89%

Panel C

Summary of Mr. Hevert's Bond Yield RP Results

	Low	Mid	High
Long-Term Treasury Yield	2.68%	3.35%	4.65%
Risk Premium	7.36%	6.73%	5.82%
Bond Yield Risk Premium	10.04%	10.08%	10.47%

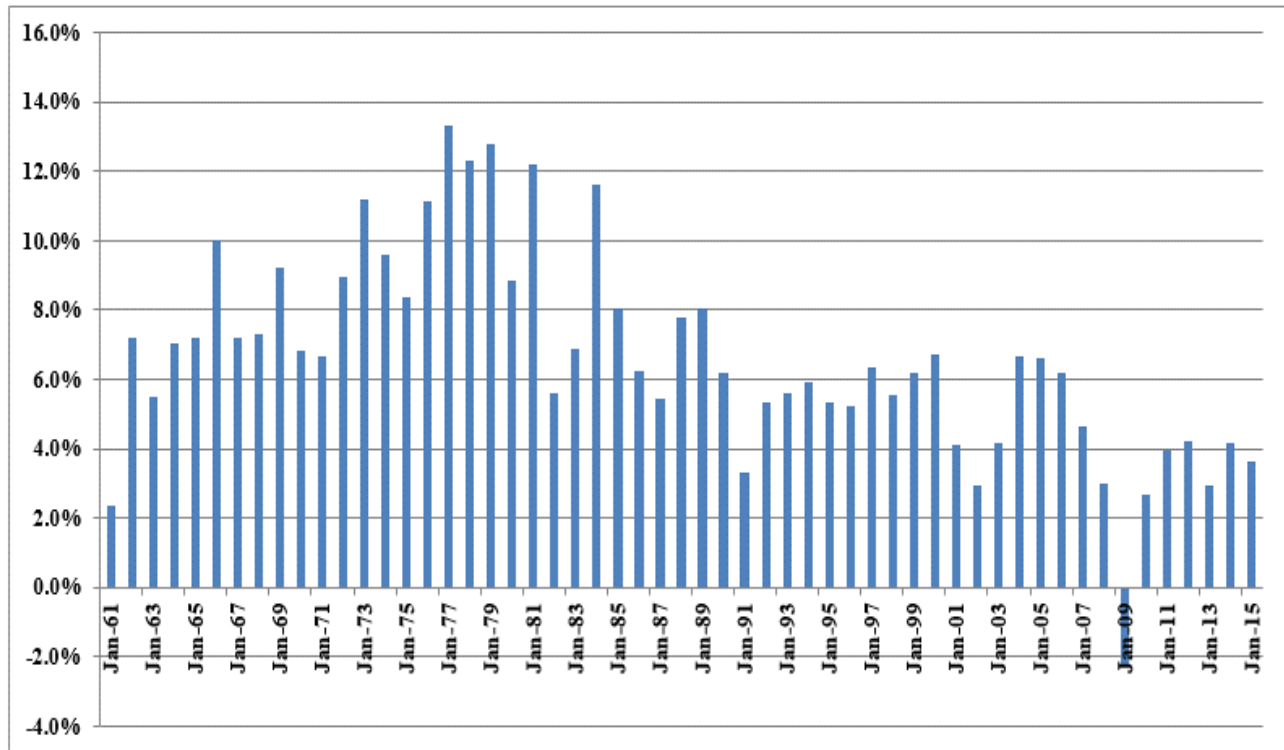


**Growth Rates**  
**GDP, S&P 500 Price, EPS, and DPS**

	<b>GDP</b>	<b>S&amp;P 500</b>	<b>Earnings</b>	<b>Dividends</b>	
1960	535.1	58.11	3.10	1.98	
1961	547.6	71.55	3.37	2.04	
1962	586.9	63.10	3.67	2.15	
1963	619.3	75.02	4.13	2.35	
1964	662.9	84.75	4.76	2.58	
1965	710.7	92.43	5.30	2.83	
1966	781.9	80.33	5.41	2.88	
1967	838.2	96.47	5.46	2.98	
1968	899.3	103.86	5.72	3.04	
1969	982.3	92.06	6.10	3.24	
1970	1049.1	92.15	5.51	3.19	
1971	1119.3	102.09	5.57	3.16	
1972	1219.5	118.05	6.17	3.19	
1973	1356.0	97.55	7.96	3.61	
1974	1486.2	68.56	9.35	3.72	
1975	1610.6	90.19	7.71	3.73	
1976	1790.3	107.46	9.75	4.22	
1977	2028.4	95.10	10.87	4.86	
1978	2278.2	96.11	11.64	5.18	
1979	2570.0	107.94	14.55	5.97	
1980	2796.8	135.76	14.99	6.44	
1981	3138.4	122.55	15.18	6.83	
1982	3313.9	140.64	13.82	6.93	
1983	3541.1	164.93	13.29	7.12	
1984	3952.8	167.24	16.84	7.83	
1985	4270.4	211.28	15.68	8.20	
1986	4536.1	242.17	14.43	8.19	
1987	4781.9	247.08	16.04	9.17	
1988	5155.1	277.72	24.12	10.22	
1989	5570.0	353.40	24.32	11.73	
1990	5914.6	330.22	22.65	12.35	
1991	6110.1	417.09	19.30	12.97	
1992	6434.7	435.71	20.87	12.64	
1993	6794.9	466.45	26.90	12.69	
1994	7197.8	459.27	31.75	13.36	
1995	7583.4	615.93	37.70	14.17	
1996	7978.3	740.74	40.63	14.89	
1997	8483.2	970.43	44.09	15.52	
1998	8954.8	1229.23	44.27	16.20	
1999	9510.5	1469.25	51.68	16.71	
2000	10148.2	1320.28	56.13	16.27	
2001	10564.6	1148.09	38.85	15.74	
2002	10876.9	879.82	46.04	16.08	
2003	11332.4	1111.91	54.69	17.88	
2004	12088.6	1211.92	67.68	19.41	
2005	12888.9	1248.29	76.45	22.38	
2006	13684.7	1418.30	87.72	25.05	
2007	14322.9	1468.36	82.54	27.73	
2008	14752.4	903.25	65.39	28.05	
2009	14414.6	1115.10	59.65	22.31	
2010	14798.5	1257.64	83.66	23.12	
2011	15379.2	1257.60	97.05	26.02	<b>Average</b>
2012	16027.2	1426.19	102.47	30.44	
2013	16498.1	1848.36	107.45	36.28	
2014	17183.5	2058.90	113.01	39.44	
2015	17803.4	2043.94	106.32	43.16	
<b>Growth Rates</b>	<b>6.58</b>	<b>6.69</b>	<b>6.64</b>	<b>5.76</b>	<b>6.42</b>



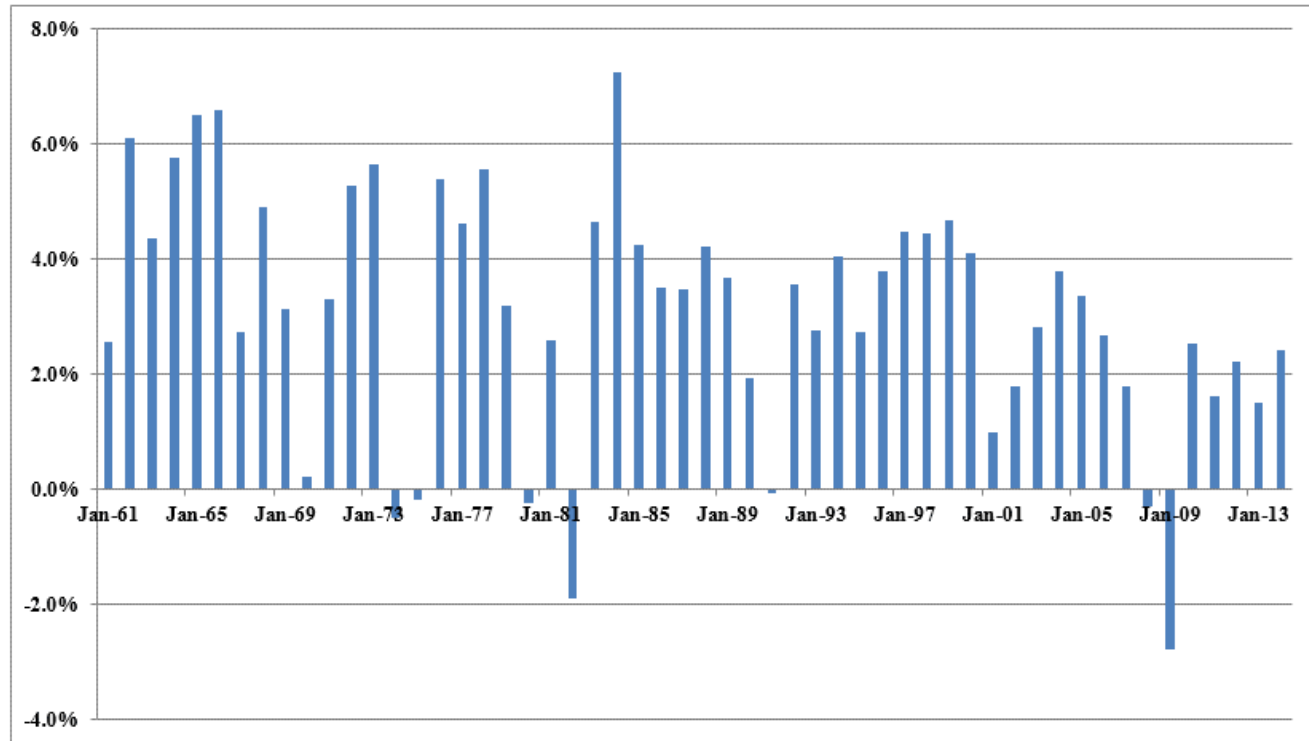
Nominal GDP Growth Rates  
Annual Growth Rates - 1961-2015



Data Sources: GDPA - <http://research.stlouisfed.org/fred2/series/GDPA/downloaddata>



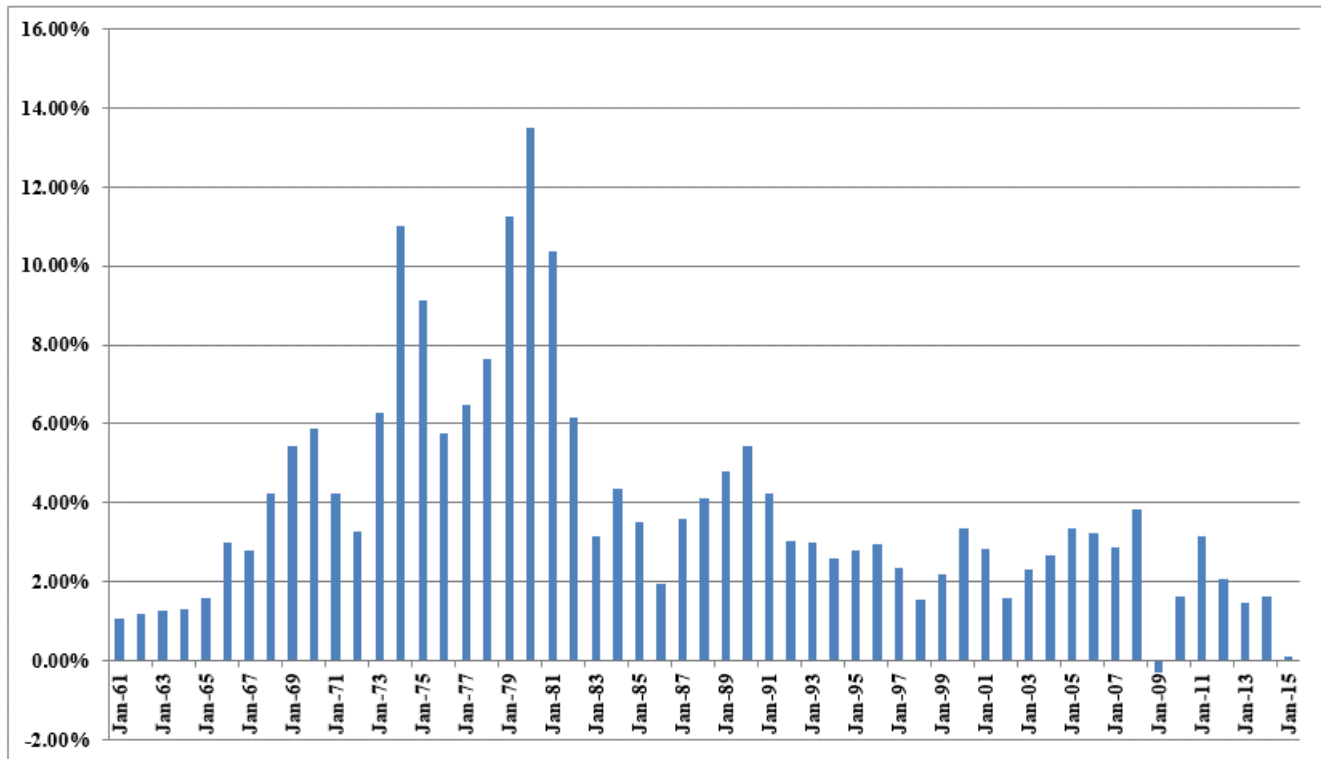
Annual Real GDP Growth Rates  
1961-2015



Data Sources: GDPC1 -<http://research.stlouisfed.org/fred2/series/GDPC1/downloaddata>



Annual Inflation Rates  
1961-2015



Data Sources: CPIAUCSL -<http://research.stlouisfed.org/fred2/series/CPIAUCSL/downloaddata>



**Panel A**  
**Historic GDP Growth Rates**

<b>10-Year Average</b>	<b>3.28%</b>
<b>20-Year Average</b>	<b>4.36%</b>
<b>30-Year Average</b>	<b>4.87%</b>
<b>40-Year Average</b>	<b>6.19%</b>
<b>50-Year Average</b>	<b>6.65%</b>

Calculated using GDP data on Page 1 of Exhibit JRW-14

**Panel B**  
**Projected GDP Growth Rates**

	<b>Time Frame</b>	<b>Projected Nominal GDP Growth Rate</b>
<b>Congressional Budget Office</b>	<b>2016-2026</b>	<b>4.1%</b>
<b>Survey of Financial Forecasters</b>	<b>Ten Year</b>	<b>4.5%</b>
<b>Social Security Administration</b>	<b>2016-2090</b>	<b>4.4%</b>
<b>Energy Information Administration</b>	<b>2015-2040</b>	<b>4.3%</b>

**Sources:**

[www.cbo.gov/publication/51129](http://www.cbo.gov/publication/51129)

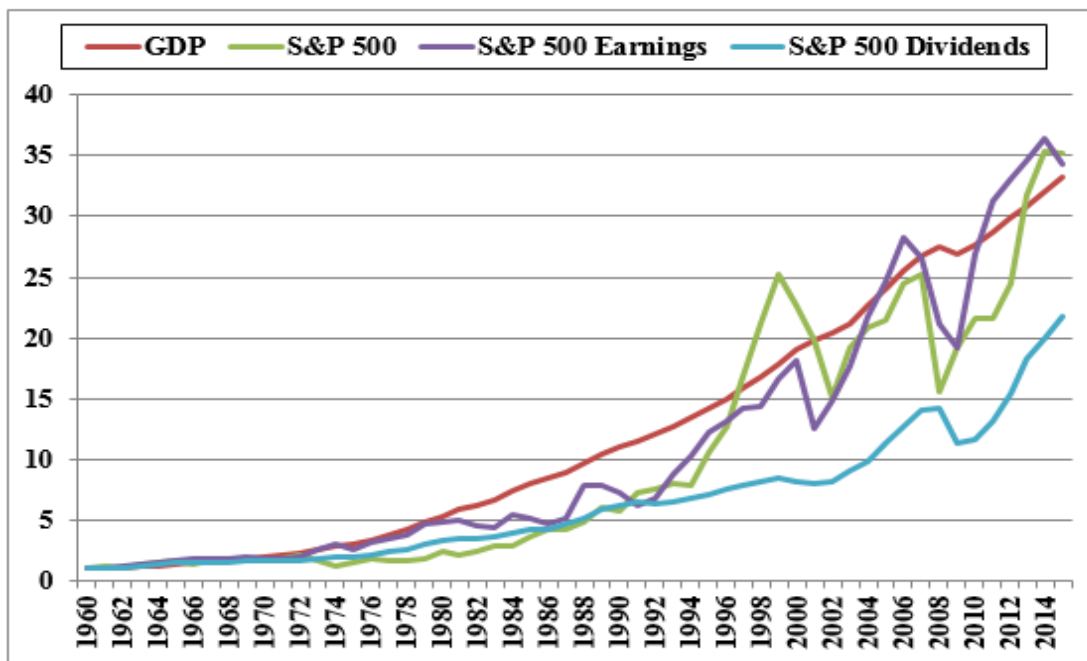
[http://www.eia.gov/forecasts/aeo/tables\\_ref.cfm](http://www.eia.gov/forecasts/aeo/tables_ref.cfm) Table 20

<http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters>

[http://www.ssa.gov/oact/tr/2016/X1\\_trLOT.html](http://www.ssa.gov/oact/tr/2016/X1_trLOT.html)



Long-Term Growth of GDP, S&P 500, S&P 500 EPS, and S&P 500 DPS



	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS
Growth Rates	6.58%	6.69%	6.64%	5.76%