

**STATE OF VERMONT
PUBLIC UTILITY COMMISSION**

Case No. 21-0898-TF

Petition of Vermont Gas Systems, Inc. for a
change in rates and for use of the System
Expansion and Reliability Fund in
connection therewith

**PREFILED DIRECT TESTIMONY OF
ZHEN ZHU
ON BEHALF OF THE
VERMONT DEPARTMENT OF PUBLIC SERVICE**

June 10, 2021

Summary: Mr. Zhu discusses in detail Vermont Gas Systems Inc's ("VGS") proposed cost of capital in this proceeding and, in particular, the proposed return on equity. Mr. Zhu maintains that VGS's cost of capital and return on equity proposals are just and reasonable.

Mr. Zhu Sponsors the Following Exhibits:

Exhibit PSD-ZZ-1	Professional Resume of Dr. Zhen Zhu
Exhibit PSD-ZZ-2	Long-Term and Short-Term Interest Rates
Exhibit PSD-ZZ-3	Capital Structure
Exhibit PSD-ZZ-4	IBES Growth Rate
Exhibit PSD-ZZ-5	Nominal GDP Growth
Exhibit PSD-ZZ-6	Constant Growth DCF Model
Exhibit PSD-ZZ-7	Market Risk Premium
Exhibit PSD-ZZ-8	CAPM
Exhibit PSD-ZZ-9	The Risk Premium Model

1 **Q1. Please state your name, position, and business address.**

2 A1. My name is Zhen Zhu. I am a Managing Consultant. My business address is
3 5555 North Grand Blvd., Oklahoma City, Oklahoma 73112.

4 **Q2. By whom are you employed?**

5 A2. I am employed by C. H. Guernsey & Company. I am also the Dr. Michael
6 Metzger Chair Professor of Economics at the University of Central Oklahoma.

7 **Q3. What is your educational background?**

8 A3. I have a B.A. in Business Administration from Renmin University in China, an
9 M.A. in Economics from Bowling Green State University, and a Ph.D. in
10 Economics from the University of Michigan.

11 **Q4. Please describe your professional background.**

12 A4. From 2000 to present, I have been an Economist, Consultant, Senior Consultant
13 and Managing Consultant with C.H. Guernsey & Company. From 1994 to
14 2000, I was an Assistant Professor of Economics at the University of Oklahoma.
15 From 2000 to present, I have been an Assistant, Associate, Professor,
16 Department Chairperson, and the Dr. Michael Metzger Chair Professor of
17 Economics at the University of Central Oklahoma. I have performed many
18 academic and applied studies of the energy market and of regulatory policy,
19 along with studies of international financial markets and commodity markets.
20 Please refer to Attachment PSD-ZZ-1 for a list of my more recent publications
21 and studies.

1 **Q5. What is your regulatory experience?**

2 A5. As a consultant, I have performed a variety of research studies, provided direct
3 testimony, support, and engagement in many projects related to gas and electric
4 utility regulatory matters. I have provided support and testimony in gas and
5 electric cost of capital cases. I have also provided testimonies on issues related
6 to Integrated Resource Planning, natural gas prices, and load forecasts before a
7 number of regulatory bodies.

8 **Q6. Before what regulatory authorities have you testified as an expert witness?**

9 A6. I have testified before the Michigan Public Service Commission, Georgia
10 Public Service Commission, Oklahoma Corporation Commission, and South
11 Carolina Public Service Commission.

12 **Q7. What is the nature of your testimony in this case and on behalf of whom
13 you are testifying?**

14 A7. Vermont Gas Systems, Inc. (“VGS” or “Company”), a subsidiary of Northern
15 New England Energy Corporation (“NNEEC”), filed an application with the
16 Vermont Public Utility Commission (“VPUC” or “Commission”) to suspend
17 the revised tariff the Company filed on February 16, 2021 and allow for the
18 rates to be implemented on a bills-rendered basis beginning on November 1,
19 2021. The rate adjustment proposed by the Company includes an increase in
20 non-gas costs of 1.95% and reflects a 4.1% increase to gas costs. VGS also
21 requests use of \$4.44 million of the System Expansion and Reliability Fund

1 (“SERF”). These proposed changes would result in an overall rate increase of
2 2.6% with bills rendered on and after November 1, 2021, if approved by the
3 Commission. In the filing, the Company’s witnesses, Andrea McNeil and
4 Mathew Mitchell, provided direct testimonies regarding the Company’s 6.5%
5 cost of capital request. The Company is requesting an 8.8% return on equity
6 (“ROE”) based on an indexing method.

7
8 I was asked by the Vermont Department of Public Service (“Department”) to
9 provide an independent evaluation of the cost of capital in this case, in
10 particular, the ROE. As the Company’s ROE was obtained through a non-
11 conventional method, I am asked to evaluate the market required return for VGS
12 employing conventional methodologies.

13 **Q8. Please describe the organization of your testimony.**

14 A8. First, I describe the standard in setting the cost of capital and the general
15 principles in calculating the cost of the capital. I also examine the current state
16 of the economy and capital markets because economic and capital market
17 conditions set a global environment for firms to operate, thus influencing the
18 value of cost of capital. I then describe the capital structure and cost of debt of
19 the Company. I provide evidence to support my recommendations regarding
20 capital structure. Next, I detail the calculation of the cost of equity by using
21 several generally accepted methodologies. Specifically, I calculate the

1 Company's cost of equity by applying a Constant Growth Discounted Cash
2 Flow ("DCF") model and Capital Asset Pricing Model ("CAPM") to a group
3 of proxy companies. I also provide a form of risk premium ("RP") analysis
4 using the past authorized ROE and interest rate. After carrying out these
5 calculations, I provide my summary evaluations regarding the Company's cost
6 of capital and comment on the 8.8% ROE as requested by the Company.

7 **Q9. Please summarize how you developed your return on equity**
8 **recommendation for VGS.**

9 A9. I reviewed the Company's financial conditions including the cost of debt and
10 capital structure. I calculated the cost of equity for a group of comparable
11 companies based on several different models. The models I used include a
12 Constant Growth DCF model. I used a two-step methodology that considers a
13 long-term Earnings Per Share ("EPS") growth rate as represented by Gross
14 Domestic Product ("GDP") growth rate. In addition, I calculated the required
15 cost of capital based on the CAPM. In applying the CAPM model, I used a
16 measure of market risk premium obtained by applying a two-step forward-
17 looking DCF model to companies in the S&P 500 market index to generate
18 expected market return, and then subtracting interest rate from the expected
19 market return. Then I obtained the ROE by adding a long-term interest rate to
20 the adjusted risk premium which is the product of company's beta and market

1 risk premium. Finally, I used a form of bond yield plus RP model to produce
2 another measurement of ROE to support my cost of capital recommendation.

3 **Q10. Please summarize your testimony and recommendations.**

4 A10. The Company proposal of 8.8% ROE was based on an automatic adjustment
5 method indexed to an interest rate. My calculations, based on sound economic
6 principles, indicate that the Company's required cost of equity, or the
7 opportunity cost of equity, is 8.49% based on the median value of ROE from
8 the three models. The average ROE from the three models is 8.60% and the
9 midpoint of the ROE is 8.74%. My calculation suggests that the Company's
10 proposed ROE of 8.8% is very close to the numbers generated from economic
11 models applied to the current market conditions, thus in my opinion, an ROE
12 of 8.8% is reasonable and I recommend the Commission accept the 8.8% ROE
13 as proposed by VGS.

14

Table 1: Summary of ROE

Model	DCF	CAPM	Risk Premium	Average
Lower End	7.44%	7.66%		7.55%
Upper End	10.08%	9.81%		9.94%
Median	8.90%	8.09%		8.49%
Average	8.66%	8.42%	8.74%	8.60%
Midpoint	8.76%	8.73%		8.74%

15

16

1 The Company's long-term debt cost ranges from 3.32% to 7.72% with a
2 weighted average cost of debt of 4.83%. The short-term cost of debt is 0.83%,
3 according to the Company filing. I accept these costs of debt. The Company
4 also requested a capital structure of 50% equity, 42% long-term debt, and 8%
5 short-term debt. Based on my analysis of capital structure of comparable
6 companies, I recommend accepting the Company's proposed capital structure.
7 Therefore, given the capital structure, cost of debts, and cost of equity, my
8 recommended overall cost of capital is 6.50%, the same as the Company has
9 proposed. Table 2 below shows the summary of recommended overall cost of
10 capital.

11

Table 2: Cost of Capital

	Ratio	Cost	Weighted Cost
Equity	50%	8.80%	4.40%
Long-term debt	42%	4.83%	2.03%
Short-term debt	8%	0.83%	0.07%
WACC			6.50%

12

13 **Q11. Are you sponsoring any exhibits?**

14 A11. Yes, I am sponsoring the following exhibits:

15 Attachment PSD-ZZ-1: Dr. Zhen Zhu's resume

16 Attachment PSD-ZZ-2: Long-term and short-term interest rates

17 Attachment PSD-ZZ-3: Capital structure

1 Attachment PSD-ZZ-4: IBES earnings growth estimate

2 Attachment PSD-ZZ-5: Nominal GDP growth

3 Attachment PSD-ZZ-6: Market risk premium

4 Attachment PSD-ZZ-7: Constant growth DCF model

5 Attachment PSD-ZZ-8: CAPM model

6 Attachment PSD-ZZ-9: Risk premium model

7 **Q12. Did you or someone under your direct supervision prepare these exhibits?**

8 A12. Yes.

9 II. REGULATORY STANDARD AND METHODOLOGY OF THE ANALYSIS

10 **Q13. What is the purpose of establishing a rate of return when setting a utility's**
11 **rates?**

12 A13. The purpose of a rate of return, also commonly called “cost of capital” or
13 “opportunity cost of capital,” is to compensate investors who have committed
14 capital to finance the plant and equipment necessary for utility service to
15 customers. Investors commit these funds in anticipation of earning a return on
16 their investment that is consistent with that of other investment alternatives with
17 comparable risks. This regulatory standard is well-recognized and was
18 addressed by the U.S. Supreme Court in the cases of *Bluefield Water Works &*
19 *Improvement Co.* (1923) and *Hope Natural Gas Co.* (1944). It provides the
20 utility an opportunity to earn a rate of return sufficient to: (1) fairly compensate

1 capital currently invested in the utility; (2) enable the utility to attract new
2 capital on reasonable terms; and (3) maintain the utility's financial integrity.

3 **Q14. How does the Vermont public utility commission ("commission") recognize**
4 **this principle?**

5 A14. The Commission has repetitively cited the Bluefield and Hope standards in
6 various proceedings. For example, the Commission stated, citing the Bluefield:¹

7 The basic standard for an appropriate rate of ROE is as follows:

8
9 A public utility is entitled to such rates as will permit it to earn a
10 return on the value of the property which it employs for the
11 convenience of the public equal to that generally being made at the
12 same time and in the same general part of the country on
13 investments in other business undertakings which are attended by
14 corresponding risks and uncertainties; but it has no constitutional
15 right to profits such as are realized or anticipated in highly
16 profitable enterprises or speculative ventures. The return should be
17 reasonably sufficient to assure confidence in the financial
18 soundness of the utility and should be adequate, under efficient and
19 economical management, to maintain and support its credit and
20 enable it to raise the money necessary for the proper discharge of
21 its public duties." Bluefield Water Works & Improvement Co. v.
22 Public Serv. Comm'n, 262 U.S. 679, 692-93 (1923). See also
23 Duquesne Light Company v. Barasch, 488 U.S. 299, 310 (1989).

24
25 These principles have been incorporated into Vermont statute and
26 have been endorsed repeatedly by the Vermont Supreme Court.

27
28 The Commission fully realizes the importance of balancing the interests of
29 investors and customers.

¹Final Order, Investigation into Green Mountain Power Corporation's tariff filing requesting an overall rate decrease in the amount of 0.03%, to take effect October 1, 2014, and Petition of Green Mountain Power Corporation for approval of an Alternative Regulation Plan, pursuant to 30 V.S.A. § 218d., case nos: 8190 and 8191, August 25, 2014.

1 **Q15. Does the regulatory standard include guidelines on setting a company's**
2 **rates?**

3 A15. Yes. Utilities are a natural monopoly. If left unregulated, companies in the
4 utility industry have every incentive to charge customers prices that maximize
5 the company's profit. The amount of product that a utility would provide to the
6 customers would be at a level that is lower than socially optimum, and the price
7 will be higher than the price level of a perfectly competitive industry. Thus,
8 utility firms are typically regulated by jurisdictional authorities. The
9 jurisdictional authorities set rules to make sure that customers will be able to
10 obtain services at reasonable rates and customers will not be charged too high
11 a price. In the meantime, utilities would still earn a fair return for their investors,
12 and they can make investments for the long-term benefit of the consumers.
13 Standards have been set from these guidelines:

14 1. The most important factor in determining the required ROE of a
15 utility is risk. Utilities face smaller degrees of risk compared to most other
16 businesses; a utility's return, therefore, should be lower than other riskier
17 businesses.

18 2. Utilities should earn returns comparable to other businesses with
19 similar degrees of risk in order to maintain their financial soundness, including
20 maintaining their credit standing, and attracting capital for investment.

1 These guidelines ensure that utility customers receive adequate service at a
2 reasonable price and companies make reasonable returns on their investment.

3 **Q16. Is your estimation of required return based on these standards?**

4 A16. Yes, my estimation of the required ROE is based on these standards. I
5 recommend the Commission award a ROE based on the required market return
6 so the Company can maintain its financial integrity. In the meantime, utility
7 customers can obtain the service at a reasonable cost.

8 **Q17. What analytical methodology do you employ in this case to analyze VGS’
9 cost of capital?**

10 A17. VGS is not an independent, publicly traded company. It is a subsidiary of
11 NNEEC, which means that VGS’s financial condition is not regularly reported
12 to the market. However, the standard cost of capital analysis still applies –
13 potential investors will consider the expected financial returns on an investment
14 in comparison to the market returns on other available alternatives. VGS
15 operates in the general economic and industry environment, thus its financial
16 performances are also related to the overall economic and industry
17 performances. For this reason, my analysis was broad in scope. I studied the
18 underlying economic environment, Federal Reserve policy, the investors’ likely
19 expectation of future returns, and the utility industry’s expected returns in the
20 current market.

1 **Q18. How did you take market risks into account when performing the cost of**
2 **capital analysis for VGS?**

3 A18. I utilized standard DCF, CAPM, and RP methodologies to evaluate a group of
4 comparable companies. In particular, the CAPM model and the RP model take
5 the market risk explicitly into consideration. Financial theory suggests that
6 investors are compensated for bearing systematic market risks, but not
7 individual company risks. Even though it can be argued that VGS may face
8 some unique risks, as every company does, it is the systematic market risk (such
9 as risks associated with market-wide environmental policies, regulations,
10 general capital market, economic conditions, etc.) VGS faces that should be
11 taken into consideration. This risk-reward principle is the basis for the analysis
12 of required cost of capital for the company, as in other industries. In addition,
13 the RP methodology recognizes a relationship between interest rate and a risk
14 premium based on the utilities' authorized ROE and market interest rate. I will
15 go over the detailed methodologies in later sections.

16 **Q19. In your opinion, are any of the models you used are better than the others?**

17 A19. Economic models are theories describing the real world. The models have their
18 underlying assumptions and focus more on specific aspects of the markets than
19 others. As market conditions are complicated, it is difficult for any single
20 economic/financial model to capture all aspects of the expected returns of the
21 investors. In this sense, a combination of models gives a better measurement of

1 the expected returns of the investors. The recent Federal Energy Regulatory
2 Commission (“FERC”) Opinion No. 569-A clearly recognizes this need to
3 incorporate more than one model to determine the expected ROE: “We continue
4 to find that ROE determinations should consider multiple models, both to
5 capture the variety of models used by investors and to mitigate model risk.”²

6 I agree with FERC’s policy statement.

7
8 In the past, this Commission has considered the evidence on ROE presented by
9 the use of several standard models such as DCF, CAPM and RP models.³

10 **Q20. Did you select a proxy group for the estimation of the company’s return on**
11 **equity?**

12 A20. Yes, VGS is a subsidiary of NNEEC and it is not publicly traded. A
13 conventional approach for companies like VGS is to select a proxy group of
14 comparable companies, which would enable a reliable analysis that avoids the
15 potential bias associated with a small set of companies. Therefore, I have
16 selected a group of gas utility companies that are similar to the target company,
17 VGS.

18 **Q21. What criteria did you rely on to select the group of comparable companies**
19 **when you performed the analysis of the cost of capital for VGS?**

² FERC Opinion N0. 569-A Order on Rehearing (Issued May 21, 2020), par 43.

³ In the past, the Commission has considered the results obtained from various models presented by ROE witnesses representing the utilities and the Department in various cases such as No. 19-0513-TF, No. 8190 and 8191.

1 A21. I selected gas distribution utilities that are representative of the risk
2 characteristics of VGS. I selected companies that are publicly traded and whose
3 main business is gas distribution and selling to end-users. The starting list is
4 comprised of the gas utility companies by *Value Line*. I avoided companies that
5 were involved in mergers as the stocks of those companies would be evaluated
6 by investors differently than under normal market conditions. Analysts
7 typically would exclude companies that had reduced or halted dividend
8 payment and companies that have negative dividend growth projections for the
9 DCF analysis; I used the same set of the companies for both the DCF and
10 CAPM analysis.

11 **Q22. Why did you use *Value Line*-listed companies as a starting point for the**
12 **selection of the comparable companies?**

13 A22. *Value Line* represents a respected, broadly available, and specialized source of
14 financial information. In addition, *Value Line* provides an independent source
15 of information for the investment community because it does not have any
16 financial interest in the companies it covers.

17 **Q23. Please list the group of gas distribution utilities that you identified for the**
18 **proxy group.**

19 A23. I selected the following regulated electric utilities:

20 Atmos Energy Corp

21 New Jersey Resources

1 NiSource
2 N.W. Natural
3 One Gas Inc
4 South Jersey Industries
5 Southwest Gas
6 Spire Inc
7 UGI

8 II. THE GENERAL ECONOMIC CONDITION

9 **Q24. Could you explain how economic conditions can affect the cost of capital**
10 **of VGS at the present time?**

11 A24. The public utility industry is characterized by large capital investment because
12 it is capital-intensive. The most relevant economic variables to the cost of
13 capital are interest rate and expected inflation, as both are critical factors
14 considered by investors to set their expected returns when making investment
15 decisions. As in standard economic theory, what matters to investors is the real
16 return. Both the interest rate and expected inflation influence the real return on
17 investment directly.

18
19 In the current economic environment, both interest rate (especially the short-
20 term interest rate) and expected inflation are influenced by Federal Reserve
21 economic policies and its accompanying actions in the financial market to

1 achieve its set objectives, even though economic variables can be influenced to
2 different degrees.

3 **Q25. What are the Federal Reserve’s objectives and actions in the current**
4 **economic conditions?**

5 A25. In the past, at the onset of and during the recession, the Federal Reserve
6 provided mostly short-term credit to add liquidity to the market to counteract
7 the effect of recession. In the early period of the recovery from the 2008-2009
8 recession, the Federal Reserve continued its accommodative monetary policy
9 as the unemployment level was still higher than the objective set by the Federal
10 Reserve. For example, the Federal Reserve stated in its July 2013 Monetary
11 Policy Report:⁴

12 With unemployment still well above normal levels and inflation
13 below its longer-run objective, the Federal Open Market
14 Committee (“FOMC”) has continued its highly accommodative
15 monetary policy this year by maintaining its forward guidance
16 with regard to the target for the federal funds rate and continuing
17 its program of large-scale asset purchases.

18
19 The Federal Reserve’s monetary easing has injected a large amount of liquidity
20 to the financial market.

21
22 The Federal Reserve started to scale back its quantitative easing, or
23 accommodative monetary policy, due to improvement in labor market
24 conditions in 2014. As the U.S. economy continued to cruise through

⁴ http://www.federalreserve.gov/monetarypolicy/mpr_20130717_part2.htm

1 expansion, the Federal Reserve has changed its policy stance from being
2 accommodative to tightening. In 2019 however, the Federal Reserve cut interest
3 rates three times to fend off possible slowdowns in the U.S. economy brought
4 on by the trade wars between China and the United States.

5 **Q26. What are some of the major consequences of the Federal Reserve's recent**
6 **policies?**

7 A26. The injection of a large amount of liquidity into the financial market before
8 2019 has caused short-term interest rates to fall to a historically low level. In
9 addition, the short-term interest rates are cyclical as they respond to the Federal
10 Reserve's monetary policy manipulations, but the long-term interest rate is
11 significantly less so. I illustrate this in Attachment PSD-ZZ-2.

12
13 Attachment PSD-ZZ-2 shows that the short-term interest rate, in this case the
14 3-month Treasury bond yield, fluctuated in response to business cycle and the
15 monetary policy change. For example, at the onset of the last recession, when
16 the Federal Reserve adopted Quantitative Ease ("QE"), the short-term interest
17 rate dropped precipitously to a level that was almost zero; however, the long-
18 term interest rate, in this case the 30-year Treasury bond yield continued its
19 downward trend. One can hardly see its cyclical behavior. However, through
20 all its movement, a downward trend is clearly observable. Up until 2019, the
21 Federal Reserve started to relax its QE policy, the short-term interest rate

1 responded by going up from almost 0.0% to over 2% before declining again as
2 the Federal Reserve started to cut interest rates to offset the impact of COVID-
3 19 on the U.S. economy. However, the long-term interest rate shows no obvious
4 sign of responding to the Federal Reserve’s monetary policy changes. As we
5 can observe from Attachment PSD-ZZ-2, the short-term interest rate dropped
6 again to almost 0% in the beginning of 2021 while the long-term interest rate
7 inched up and moved in the opposite direction of the short-term interest rate
8 change.

9
10 Another possible consequence of the Federal Reserve’s monetary
11 accommodation policy is inflation. If the monetary policy does not tighten in a
12 timely fashion in response to economic expansion, then it creates upward
13 pressure on the inflation; however, there is no evidence of expected inflation
14 rate change and the market expectation of inflation is quite stable. For example,
15 the Federal Reserve September 20, 2017 Statement⁵ reported:

16 On a 12-month basis, overall inflation and the measure
17 excluding food and energy prices have declined this year and
18 are running below 2 percent. Market-based measures of
19 inflation compensation remain low; survey-based measures
20 of longer-term inflation expectations are little changed, on
21 balance.

22
23 In its November 5, 2020 Press Release, the Federal Reserve Board stated⁶:

⁵ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20170920a.htm>

⁶ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20201105a.htm>

1 The Committee seeks to achieve maximum employment
2 and inflation at the rate of 2 percent over the longer run.
3 With inflation running persistently below this longer-run
4 goal, the Committee will aim to achieve inflation
5 moderately above 2 percent for some time so that inflation
6 averages 2 percent over time and longer-term inflation
7 expectations remain well anchored at 2 percent. The
8 Committee expects to maintain an accommodative stance
9 of monetary policy until these outcomes are achieved.
10

11 In its April 28, 2021 Statement⁷, the Federal Reserve Board reiterated the same
12 language exactly, signaling that the policy stance of the Federal Reserve will
13 not change and the inflation target is maintained at exactly the same level.

14 I am confident that the Federal Reserve will continue its policy to maintain
15 maximum employment and low inflation objectives.

16 **Q27. How will the consequences of the Federal Reserve’s policy concern**
17 **investors?**

18 A27. Investors are concerned about their investment returns. The Federal Reserve
19 increased the money supply to add liquidity to the financial market, but it will
20 need to decrease the money supply in order to drain the liquidity and reduce
21 inflation pressure. A reduction in the money supply will cause short-term
22 interest rates to increase, as is the case for the period of late 2015 until late 2019.

23 It is also shown in Attachment PSD-ZZ-2.

⁷ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20210428a.htm>

1 **Q28. When the Federal Reserve tightens money supply and short-term interest**
2 **rate increases, do the required returns for investors increase?**

3 A28. Not necessarily. There are two kinds of interest rates in the marketplace: short-
4 term interest rates and long-term interest rates. In the case of determining
5 required returns for investors, it is the long-term interest rates that matter.
6 Investors in the utility industry face long-term investment decisions rather than
7 short-term investment decisions. In this consideration, how the short-term
8 interest rates fare is less relevant to them.

9
10 As the Federal Reserve tightens the money supply, interest rates generally will
11 increase; however, the Federal Reserve policies that were used to counteract
12 business cycles are generally considered short-term policies and they mainly
13 influence short-term interest rates. As I discussed above, the short-term interest
14 rates are very responsive to the Federal Reserve policy, while the long-term
15 interest rates (such as 30-year Treasury-bond yield) are not responsive to the
16 QE policy or tightening monetary policy. The opposite movements in the short-
17 term interest rate and long-term interest rate since mid-2021 in Attachment
18 PSD-ZZ-2 demonstrate just that. For this reason, it is not expected that the
19 monetary policy stance will have much effect on the long-term interest rates,
20 and thus, the required return on capital.

21

1 It is critically important to note that the long-term interest rates have been
2 declining, irrespective of the monetary policy during the business cycles. And,
3 again, it is the long-term interest rates that matter to investors. Therefore, the
4 current monetary policy, or the future monetary policy that targets short-term
5 economic fluctuations, has little effect on the required return on equity. It is
6 erroneous to argue that an interest rate increase leads to higher required cost of
7 capital without distinguishing between short-term interest rates and long-term
8 interest rates.

9 **Q29. Are there any reasons for the steady decline in the long-term interest rates**
10 **in the last 40 years?**

11 A29. Yes, many economic factors have contributed to the long-term decline of long-
12 term interest rates. Professors and Economists Obstfeld and Tesar, in an article
13 they wrote when they were serving on the Council of Economic Advisers under
14 President Obama, have summarized these factors succinctly. They named the
15 following factors whose effects on interest rates are likely to be transitory:

- 16 • Fiscal, monetary, and exchange rate policies
- 17 • Inflation risk and the term premium
- 18 • Private-sector deleveraging

19 They also named some factors that are likely longer-lived:

- 20 • Lower long-run growth in output and productivity
- 21 • Shifting demographics

- 1 • The global saving glut
- 2 • Shortage of safe assets
- 3 • Tail risks and “unknown unknowns”

4 In conclusion, they suggest “there is no definitive answer to how long current
5 long-term interest rates will persist and whether they will settle at levels below
6 those previously expected. Most factors, however, suggest that long-term
7 interest rates will be lower in the long run compared with their levels before the
8 financial crisis.”⁸

9 **Q30. How has the Federal Reserve responded to Covid-19?**

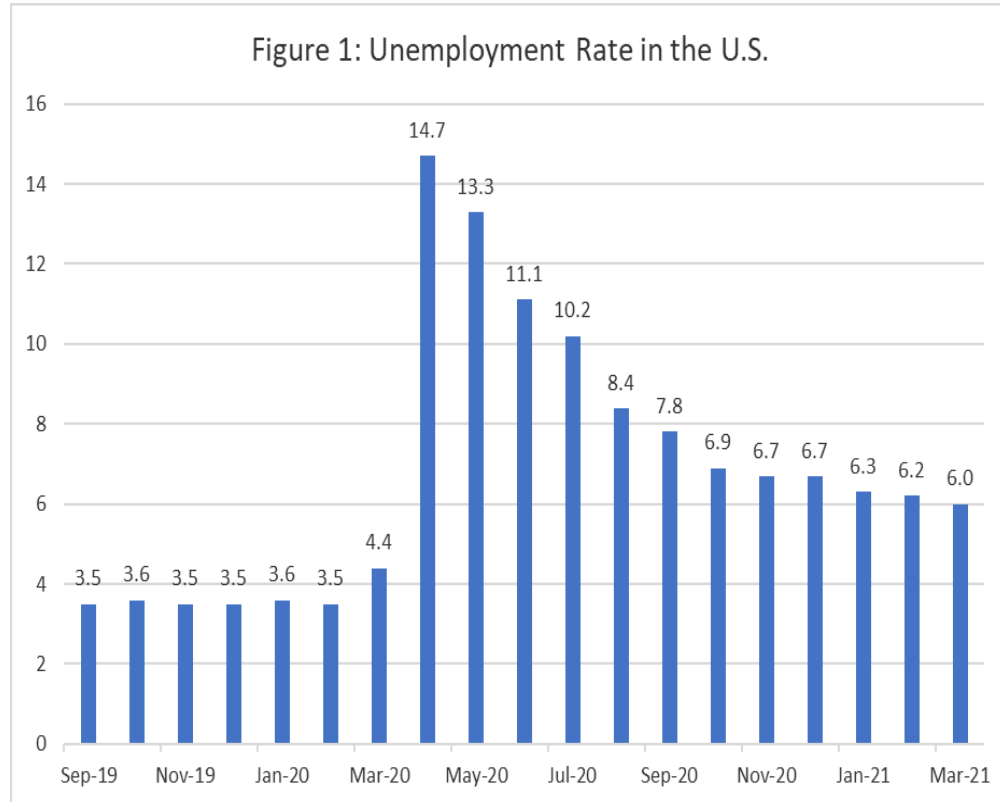
10 A30. Since its outbreak in Wuhan, China on December 31, 2019 and subsequent
11 identification as the COVID-19 virus, commonly referred to as the Coronavirus,
12 close to 160 million known infections and 3.328 million deaths have occurred
13 as of May 11, 2021.⁹

14
15 The impact on the U.S. financial markets has been severe. Since all-time highs
16 in February 2020, the Dow Jones Industrial Average, NASDAQ Composite,
17 and S&P 500 Index have declined approximately 27%, 25%, and 30%,
18 respectively. As a result, the U.S. equity markets have lost \$11.5 trillion in
19 capitalization since peaking in February 2020. In April 2020, the U.S.

⁸ Maurice Obstfeld and Linda Tesar, “The decline in long-term interest rate,” whitehouse.gov, 2015.
<https://obamawhitehouse.archives.gov/blog/2015/07/14/decline-long-term-interest-rates>

⁹ <https://www.worldometers.info/coronavirus/>

1 unemployment rate reached 14.7%, followed by gradual declines in subsequent
2 months (see Figure 1 below).



3
4 As a result, the U.S. economy suffered significantly with steep GDP declines.
5 The GDP declined in the second quarter of 2020 at an annual rate of 32.9% as
6 restaurants and retailers closed their doors in a desperate effort to slow the
7 spread of the virus. This decline was more than three times as sharp as the
8 previous record — 10% in 1958 — and nearly four times more than the worst
9 quarter during the Great Recession.

10

1 On March 15, 2020, and in response to the COVID-19 virus risk, the Federal
2 Reserve Open Market Committee decided to lower the target range for the
3 federal funds rate to 0% to 0.25%. The Committee expects to maintain this
4 target range until it is confident that the economy has weathered recent events
5 and is on track to achieve its maximum employment and price stability goals.

6 **Q31. In your opinion, are these policy moves targeting short-term interest rates**
7 **or long-term interest rates?**

8 A31. These policy moves are anti-recessionary policy of the Federal Reserve. The
9 specific interest rate targeted is the federal funds rate, which is an overnight or
10 extremely short-term rate. I expect it to have a minimum impact on the long-
11 term interest rates as I have discussed above.

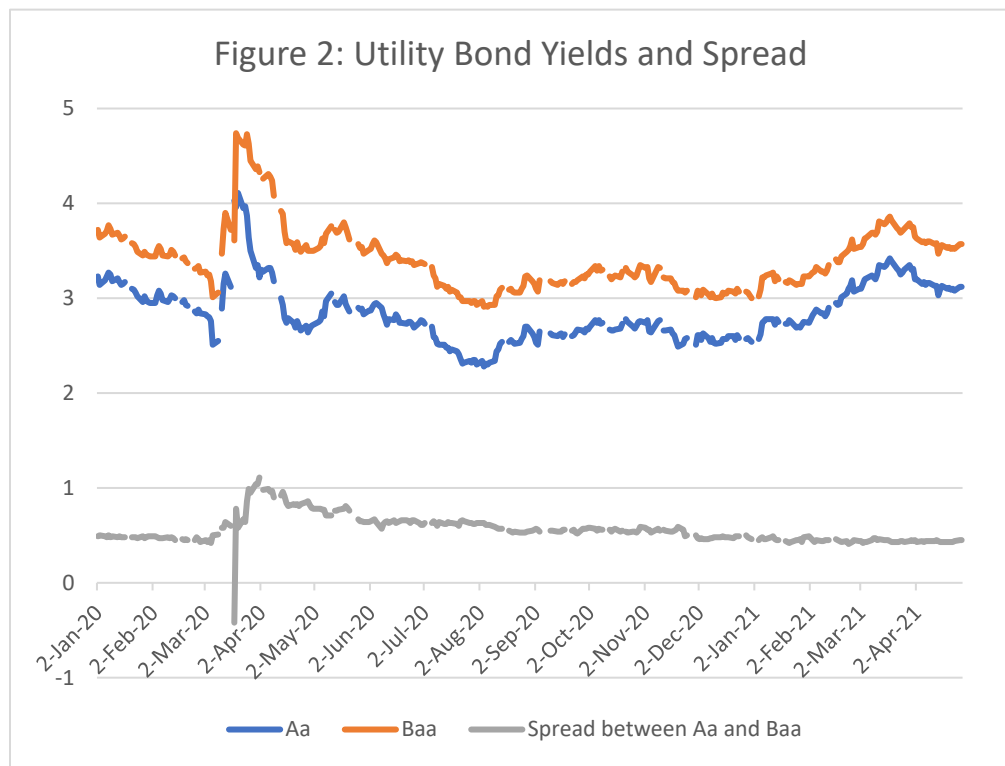
12 **Q32. How has COVID-19 impacted the capital market and the required returns**
13 **on equity of utility companies?**

14 A32. The utility industry and the capital market in general have been affected
15 significantly by the COVID-19 virus. There are at least several changes that
16 have impacted the required returns on capital.

17
18 The utility bond yield and spread increased noticeably at the breakout of the
19 pandemic. The following chart shows that both the yields and the spread
20 increased significantly in March of 2020; however, the bond market has
21 stabilized since as both the utility bond yield and spread have declined to the

1 pre-pandemic levels (see Figure 2 below). As a matter of fact, the spread, the
2 measure of relative risks between the bonds of different grade, has declined to
3 a level that is slightly lower than the spread before the onset of the pandemic,
4 signaling the recognition of a more stable market by the investors.

5

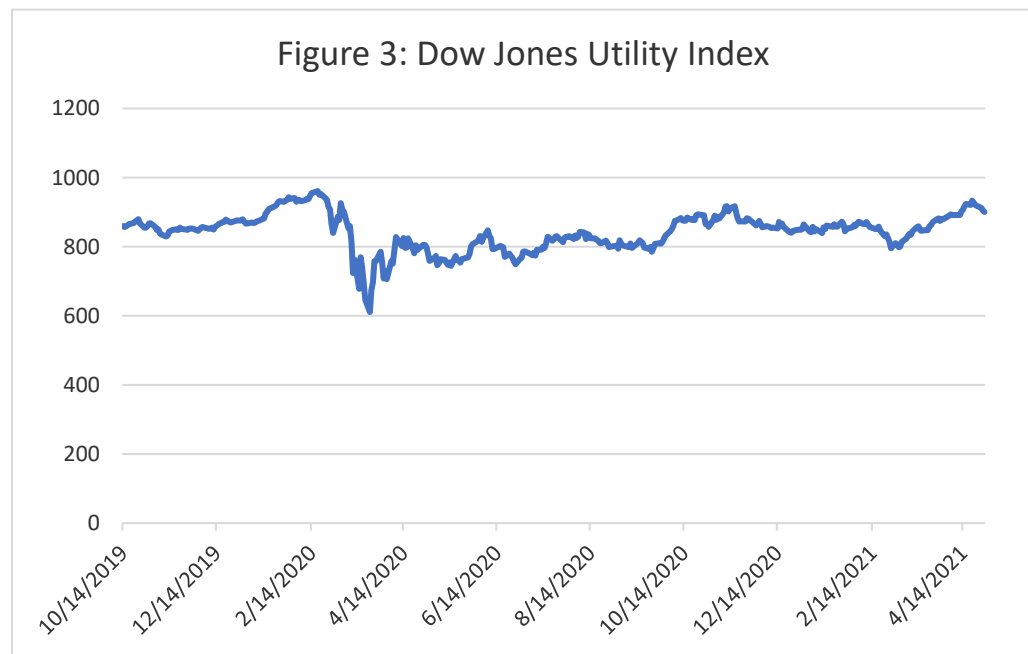


6

7 In addition, utility stock prices have declined and rebounded since March 2020.
8 Figure 3 below shows the Dow Jones utility index for the last year. There was
9 a sharp decline in utility stock prices in March of 2020, followed by volatilities
10 in the stock prices with the index hovering around 80. This has implications
11 concerning the dividend yield as dividend yield is a part of return on equity in

1 the DCF model. As stock prices decline with no changes in the dividend payout,
2 utility companies' dividend yields would increase; however, the stock prices of
3 the utility stocks have more or less returned to the pre-pandemic levels as recent
4 as April 2021.

5

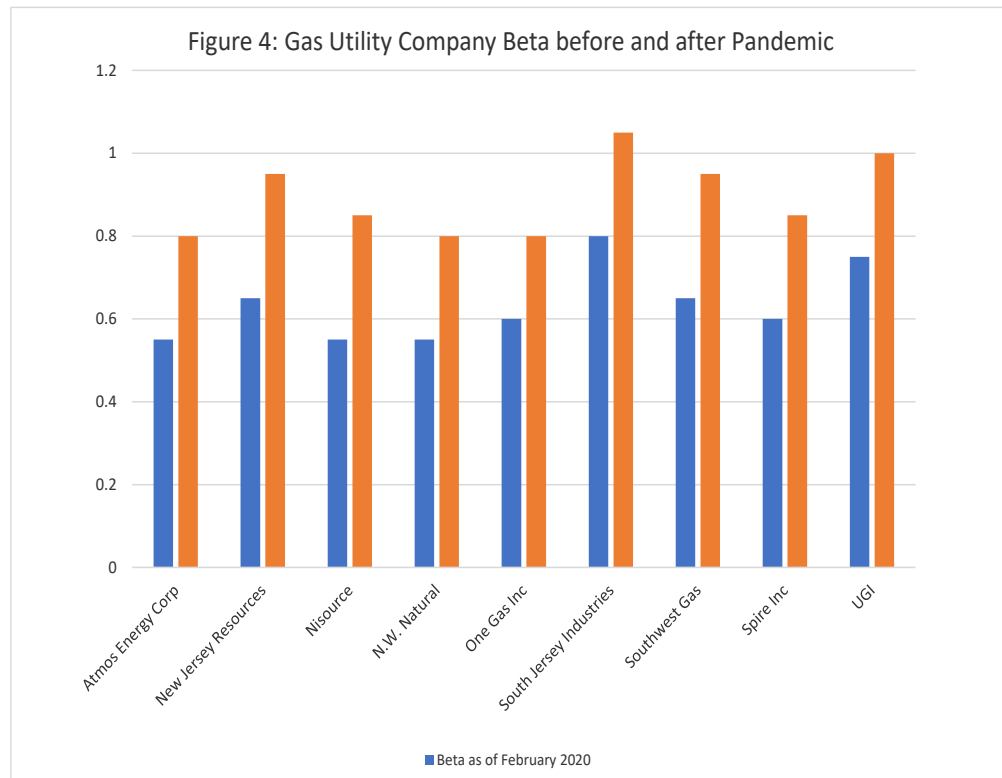


6

7 **Q33. Do you think the market risks faced by the utility industry have increased**
8 **as well?**

9 A33. One measure of the utility company stock price risk is the association of its
10 stock price fluctuation with market price movement; this is the so-called beta.
11 Figure 4 shows the beta value change for each gas utility company in *Value*
12 *Line* proxy group before and during the pandemic. The average value of beta
13 before the pandemic was 0.63 as of February 2020 while the value in early

1 October 2020 was 0.89, a substantial increase in the risk of the utility stocks
2 with respect to the market index. The increase in these beta values is likely
3 temporary and the beta values will return to a more normal level when the
4 pandemic is over and the economy returns to the normal condition. In this sense,
5 the return on equity measured by the CAPM model will be higher than the ROE
6 under normal economic and capital market conditions as the ROE generated by
7 the CAPM model crucially depends on the beta estimates. However, the high
8 beta values for gas utilities are transitory and will return to a more normal level.



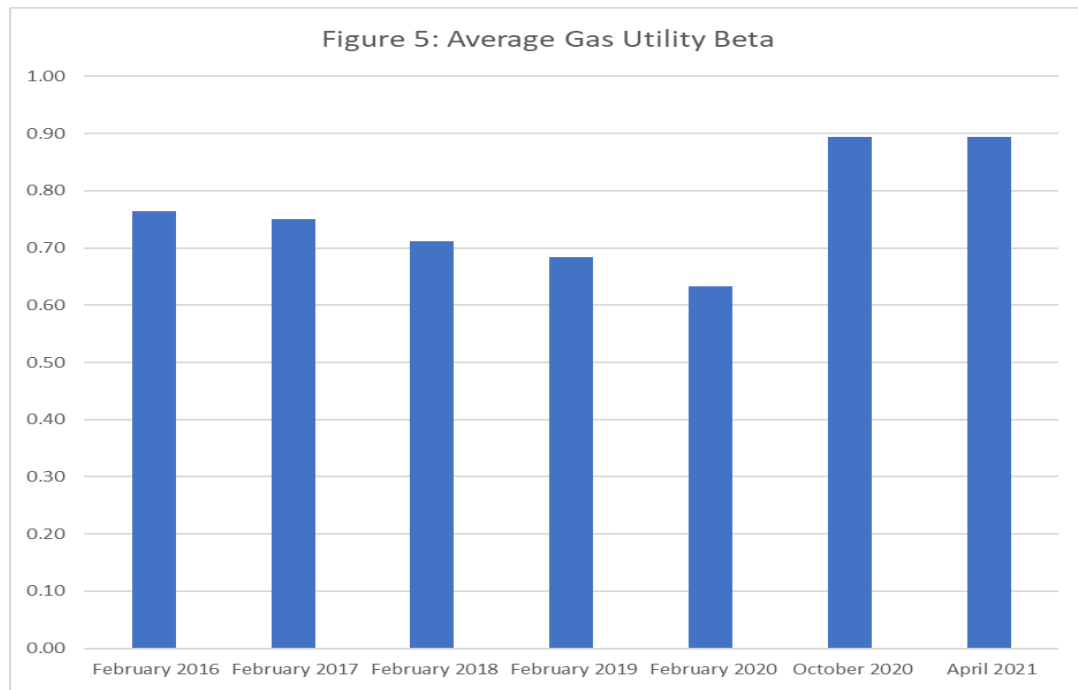
9

10 **Q34. Why do you suggest that the higher beta values are transitory?**

1 A34. The COVID-19 pandemic is an unprecedented episode in many ways. As we
2 have shown earlier, the pandemic has increased the risks of the gas utilities as
3 shown by the increased yield spread, and decreased stock prices of the utility
4 firms as well as companies in general. We also have shown, since then, that the
5 utility yield spread has returned to pre-pandemic levels (Figure 2) and the utility
6 stock index has returned to roughly the pre-pandemic level as well (Figure 3).
7 However, the change in the riskiness of the utility stocks (to more or less a
8 normal level) will not lead to immediate drops in the estimated beta values due
9 to the way that *Value Line* calculates the beta. When *Value Line* calculates the
10 beta values for the companies, its regression of the utility weekly returns on
11 market index returns covers a time period of five years. The estimated high beta
12 value will gradually and eventually decline to the more normal level, lagging
13 behind the actual decline in the riskiness of the utility stocks.

14
15 Figure 5 below shows that the average pre-pandemic gas utility beta remained
16 in the range of 0.6 top 0.8 with a declining pattern towards 2020, then all of a
17 sudden, the Value Line beta spiked to a high level of close to 0.9. In my opinion,
18 the high value of the beta only reflects a temporary increase in the riskiness of
19 the utility stocks and it does not represent the normal riskiness of the gas utilities
20 as their stock prices are generally much less volatile than the market during
21 normal times. As I do not have access to the historical values of the *Value Line*

1 gas utility beta before 2016, I have estimated the raw beta values of the gas
2 utility companies using the same approach *Value Line* adopted except for the
3 additional adjustment for the long-term tendency of raw betas approaching 1.0.
4



5

6 **Q35. How did you estimate the gas utility beta?**

7 A35. I followed the method adopted by *Value Line* to produce the beta for each of
8 the companies in my proxy group except for One Gas, Inc. as its stock price
9 series only started in 2014. *Value Line* “derive(s) the Beta coefficient from a
10 regression analysis of the relationship between weekly percentage changes in
11 the price of a stock and weekly percentage changes in the NYSE Composite

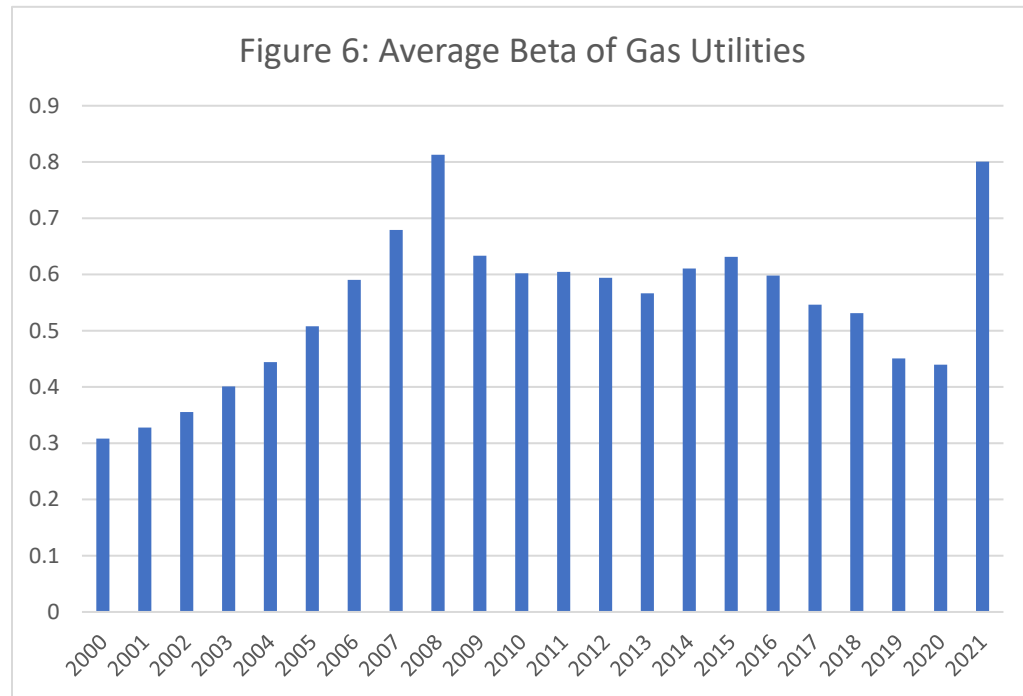
1 Index over a period of five years.”¹⁰ I downloaded stock price data for the gas
2 utilities and the NYSE Composite Index for the period of January 1, 1995 to
3 the end of March 2021. I then calculated the weekly percentage changes of the
4 prices and ran a regression of the stock returns on the composite index return. I
5 ran the regression for a five-year period with the period ending on December
6 31 of each year, and I have run the regression once a year. For example, the
7 2000 beta value was obtained from the regression over the sample period of
8 January 1, 1995 to December 31, 1999. The rest of the beta values were
9 obtained the same way.

10
11 Figure 6 shows the average beta values of the gas utilities from 2000 on. There
12 was a gradual increase in the beta value before 2007 followed by a jump in beta
13 for 2008. December 2007 was the beginning of the Great Recession. The beta
14 value dropped after the spike and then stayed lower for more than 10 years
15 during that period of normal economic conditions. The large spike for 2021
16 captured the increase in the volatility or the risk of utility stocks; however, the
17 high beta value is not normal and I expect it to decline significantly in future
18 years to reflect the decline in the riskiness of the utility stocks after the
19 pandemic. Again, as I have stated earlier, the *Value Line* regression coefficient
20 lags behind the actual changes in utility stock riskiness due to the lengthy

¹⁰ https://www.valueline.com/tools/educational_articles/stocks/using_beta.aspx#.YKXTlqhKhPZ

1 regression sample period.

2



3

4

5

III. CAPITAL STRUCTURE AND COST OF DEBT

6

Q36. What is VGS's proposed capital structure?

7

A36. The Company proposed a hypothetical capital structure of 50% equity, 42% long-term debt, and 8% short-term debt. This capital structure is the imputed capital structure as approved by the Commission in the last rate case.

8

9

Q37. Do you agree with the company's proposed capital structure?

10

A37. I have studied the capital structure of the comparable companies. Attachment

11

PSD-ZZ-3 presents the equity ratio of the companies for the past 10 years as

12

1 well as the expected equity ratio by *Value Line*. The equity ratio of 50% is
2 consistent with the industry norm, so I accept the Company's proposed capital
3 structure.

4 **Q38. What is the cost of debt?**

5 A38. VGS's cost of long-term debt is 4.83% and the cost of short-term debt is 0.83%.

6 As this is the cost of the debt of the Company at the filing date, I accept this
7 embedded cost.

8 IV. COST OF COMMON STOCK

9 **Q39. What measures of cost of common stock equity have you used to calculate**
10 **the company's cost of capital?**

11 A39. I used three common methods of cost of equity calculations, namely, the DCF
12 method, the CAPM, and the RP model. The first two methods examine an
13 individual company's financial information. I also use the RP method to obtain
14 the equity premium for the whole gas utility capital market. All three methods
15 are market based and they are recognized methods used in cost of capital
16 proceedings.

17
18 The DCF method is based on anticipation of a company's future earnings and
19 growth opportunities, so one requirement for the selection of the company is
20 that company needs to pay dividends to equity owners. The CAPM model is
21 based on the risk premium concept. Both the DCF and CAPM models take into

1 account the investors' understanding and expectation of the economic
2 environment, at present and in the future, and the current industry and company-
3 specific information. The RP model utilizes the negative empirical relationship
4 between interest rate and the expected risk premium which is the difference
5 between the expected return (one representation is the firm's authorized ROE)
6 and interest rate.

7 **Q40. Please define and explain the DCF methodology for measuring the cost of**
8 **common equity.**

9 A40. The DCF method calculates the required return for an investor as follows:

$$K = \frac{D}{P} + g$$

10
11
12 where: K = cost of common equity
13 D = expected next-period dividend per share
14 P = price per share and
15 g = growth rate of dividends, or alternatively, common
16 stock earnings.

17
18 In the equation, "K" is the required rate of return on investment by investors.

19 It is also the discount rate that is used to convert the future cash flows from the
20 investment into the present value. "D" is the expected next-period amount of
21 dividend paid to equity holders. "P" is the current market price of the common
22 stock, representing the current valuation of the company by the market. So
23 "D/P" is the expected next-period dividend yield on the company's common
24 stock. And "g" is the expected growth rate of the dividend or earnings.

25 **Q41. What does the cost of equity calculated from DCF represent?**

1 A41. The DCF method, as cited in the most common form, generates an estimate of
2 the return required for an investor to measure against alternative investment
3 opportunities. This represents the minimal return in order for a company to
4 attract and maintain investment in the company's common equity. It represents
5 the investor's expectation based on available current market information.

6 **Q42. What forms of the DCF model have you used in calculating the cost of**
7 **equity?**

8 A42. When the DCF model is used to calculate required return on equity, the
9 appropriate EPS growth rate must be used because the model looks at the
10 perpetual EPS growth rate. The constant growth DCF model is a standard DCF
11 model used in practically all cost of capital proceedings. The correct use of the
12 growth rate is essential to the correct valuation of the required return. I used a
13 two-step DCF model to estimate ROE which I will explain more in the next
14 section.

15 V. CONSTANT GROWTH DCF MODEL

16 **Q43. What stock price did you use in your constant growth DCF model?**

17 A43. I have reviewed and used the six-month average of stock prices. Stock price
18 varies on a daily basis. The use of a six-month average reduces the impact of
19 price volatility and reasonably represents the normal market condition
20 concerning the value of the stock. As the market price can be volatile on a daily
21 basis, I first calculated the average of monthly highs and lows as the monthly

1 price. A six-month average limits the impact of abnormal stock price
2 fluctuations. This method of calculating the average stock price is also the
3 method adopted by FERC. The sample period I used for the stock prices runs
4 from October 1, 2020 through March 31, 2021.

5 **Q44. How did you calculate dividend yield?**

6 A44. The dividend yield is calculated as the ratio of expected dividend at the end of
7 the first period to the stock price at the beginning of the period. I collected the
8 quarterly dividend for the same six-month period with the ending date matching
9 the ending date of the stock price. I annualized the quarterly dividend by
10 multiplying the quarterly dividend by 4. Then for each month, I calculated the
11 dividend yield by dividing the annual dividend by the monthly stock price. The
12 dividend yield for the six-month period is the average of the monthly dividend
13 yield during the period. In the DCF model, dividend yield is the expected next-
14 period dividend. I multiplied the dividend yield by one half of the expected
15 dividend growth rate to reflect the fact that the dividend is paid quarterly.

16 **Q45. What growth rate information did you use in the calculation of the roe?**

17 A45. The stock price and dividend information is known to the investors; however,
18 the expected dividend growth rates are not directly observable and need to be
19 estimated. Investors project the dividend growth rate based on all available
20 information; therefore, I have chosen the projected 3-5-year EPS growth rate
21 by Institutional Brokers Estimate System (“IBES”). The IBES provides some

1 of the most comprehensive financial information in business investment. IBES
2 projected growth rates represent a consensus of multiple analysts, including
3 some of the analysts included in First Call and Zacks. The IBES source of
4 projected earnings is widely used by the market and is publicly available. The
5 IBES growth rates obtained is reported in Attachment PSD-ZZ-4.

6 **Q46. Did you use IBES projected EPS growth rate as the final form of earnings**
7 **growth rate?**

8 A46. No, I did not adopt the IBES earnings forecast as the final estimate of the
9 earnings growth rate, and I have only used the IBES projected earnings growth
10 rate in projecting the expected dividend yield at the end of the first period. As
11 IBES earnings forecast is typically not of very long term – 3 to 5 years
12 maximum - I also used the long-term growth rate to correctly calculate the
13 earnings growth rate in the long term. To obtain a more reliable measure of EPS
14 growth in the long term, I have used a weighting scheme that FERC adopted,
15 known as the Two-Step DCF method.

16 **Q47. What is the two-step DCF method?**

17 A47. In the two-step method, relatively short-term earnings growth forecasts, such as
18 IBES projections, are obtained first. In the second step, the constant growth rate
19 (g) is augmented by a measure of the long-term growth, and then the overall
20 earnings growth rate is the weighted average of relatively short-term growth
21 rate projections and the long-term growth projections.

1 **Q48. What is the long-term growth rate you used and how did you determine**
2 **the weights?**

3 A48. I have used the GDP growth rate as the measure of the long-term growth rate.
4 In perpetuity, the value of the stock market should grow at the same rate as the
5 economy grows. The two sources of the expected growth I used are [1] Energy
6 Information Administration, Annual Energy Outlook (AEO) 2020 and [2]
7 Social Security Administration, 2020 OASDI Trustees Report. These two
8 sources are frequently cited in cost of capital proceedings. For example, FERC
9 requires the calculation of the EPS growth rate incorporating these two sources
10 of long-term economic projections in addition to the projections by IHS Global
11 Insight.

12
13 When calculating the expected future earnings growth rate, I used the weights
14 of 2/3 and 1/3 for the IBES growth rate and the GDP growth rate respectively.
15 The detailed calculation of the long-term growth rate is shown in Attachment
16 PSD-ZZ-5. My assessment of the long-term economic growth, based on most
17 recent available information from these sources, is 4.26%.

18 **Q49. Please summarize your roe result based on the constant growth DCF**
19 **models?**

20 A49. After adding the expected dividend yield to expected earnings growth rate for
21 the two-step DCF models, I obtained a ROE of 8.90% based on the median and

1 8.66% based on the average value. Attachment PSD-ZZ-6 shows the
2 calculation of the ROE by the DCF model, and the table below summarizes the
3 result of the DCF model.

Table 3: ROE Estimate by DCF

	ROE by DCF
Min	7.44%
Max	10.08%
Median	8.90%
Average	8.66%
Midpoint	8.76%

4

5

VI. THE CAPM METHOD

6 **Q50. Please describe the CAPM method in the calculation of the cost of common**
7 **equity.**

8 A50. The CAPM method is based on the analysis of risks. There are two types of
9 risks to consider; one is the kind of risk that investors can diversify away or
10 reduce by combining different investments into a portfolio, the other is the
11 market risk an investor cannot reduce by diversification. Therefore, the CAPM
12 method is a risk premium model based on the calculation of the risk differential
13 between investments on the market portfolio and the individual stock. The
14 calculation of the required rate of return on the company's stock is as follows:

15

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

16

17

Where: K = the required return.

18

R_F = the risk-free rate.

19

R_M = the required overall market return; and

20

β = beta, a measure of a given security's risk relative to that
21 of the overall market.

21

1
2 The idea of calculating the required return on the individual investment from
3 CAPM is to find the equivalent return for an investor based on the relative risk
4 of the investment as compared to the alternative investment opportunities.
5 Here, the alternative investment opportunity is usually assumed as the market
6 portfolio. This is a model that suggests investors should be compensated for
7 bearing risks. Typically, the risk-free rate is a benchmark investment on which
8 investors can be compensated for not bearing any risks. The benchmark risk-
9 free rates are typically Treasury security yields. The market return is the return
10 on all other available investment alternatives to the investor. This is typically a
11 rate generated from a relevant market index. The risk of the firm's common
12 stock is reflected in the beta of the company, which measures the relative stock
13 price volatility of the company compared to the overall market. Therefore, the
14 CAPM model has two general components: one is the risk-free rate, and the
15 other is the company risk premium, which is the product of the company's beta
16 and market risk premium ($\beta \times \text{MRP}$). The market risk premium (MRP) is the
17 difference between the expected market return and the risk-free rate ($R_M - R_F$).

18 **Q51. Please explain your CAPM calculations.**

19 A51. I used the 30-year Treasury bond yield as the benchmark risk-free rate. I
20 obtained the betas for the comparable companies from *Value Line*. Finally, I
21 developed a measure of market risk premium based on the DCF model applied
22 to S&P 500 dividend paying companies.

1 **Q52. Please describe the risk-free rate.**

2 A52. I used the six-month average yield on 30-year Treasury bonds. As utility
3 investments are usually long term, a longer-term Treasury bond would reflect
4 the market condition better for the investments. The yield reflects all market
5 information known to investors at the time including the possibility of future
6 interest rate increase. Thus, the 30-year Treasury bond yield is a best measure
7 of the required return on risk-free instrument.

8 **Q53. Please explain the beta of the comparable companies.**

9 A53. Betas measure the connection between the company's stock volatilities and the
10 overall market volatilities. Many professional financial services, including
11 *Value Line*, provide the estimate of the company beta. As it is generally known
12 that a raw beta obtained from the regression of the company stock returns on
13 market returns tends to move toward 1, *Value Line* has adjusted its estimated
14 betas accordingly. The *Value Line* beta values are appropriately estimated to
15 measure the company's stock price variations compared to the overall market
16 index in normal economic conditions. Therefore, the product of the company's
17 beta and market risk premium is supposedly to produce the company's risk
18 premium.

19 **Q54. You stated earlier that the most recent beta values from *Value Line* are too**
20 **high and do not reflect the normal riskiness of the utility stocks. How did**
21 **you correct this problem?**

1 A54. As I explained earlier, the current gas utility beta values from *Value Line* are
2 too high, not reflecting the true riskiness of the gas utility stocks. As the
3 economy starts to return to normal, beta values of the gas utilities will decline.
4 *Value Line* calculates the beta value based on data for a five-year period, thus
5 it will take some time for the pandemic effect to be transitioned out. For this
6 reason, I have calculated the average value of beta for each company based on
7 the beta value at of the end of March 2021 and February 2020. I used the
8 average beta value instead of reverting back to the February 2020 beta value to
9 account for the possible delays in returning beta value to a more normal level.

10 **Q55. Please describe your analysis of market risk premium.**

11 A55. As the CAPM model estimates the expected return on equity, the market risk
12 premium should be the expected equity market return over the risk-free rate.
13 The estimate of the market equity risk premium is perhaps the most contentious
14 issue for the financial market; however, there are generally accepted ways to
15 estimate the equity risk premium. One method is to obtain the expected market
16 return via DCF method. Many jurisdictional authorities, including FERC,
17 accept the market return calculated using a DCF method. A very important
18 feature of this methodology is that it is forward looking.

19 **Q56. Please explain what market index you have used.**

20 A56. I have used the S&P 500 index to represent the overall equity market. After
21 obtaining the name of the companies included in the market index, I have

1 excluded the companies that do not pay dividends and the companies that have
2 negative projected earnings growth rates and growth rates higher than 20%. If
3 a company has a negative earnings growth rate, it will not be sustainable in the
4 long run. Similarly, it is not possible for a company to have an earnings growth
5 rate of 20% forever; therefore, I have eliminated those companies from the list.
6 The final sample included more than 300 companies, which is large enough to
7 represent the broad spectrum of the businesses in the U.S. economy.

8 **Q57. Why did you exclude non-dividend paying companies from the**
9 **calculations?**

10 A57. I have excluded companies in the S&P 500 index that do not pay dividend or
11 have negative dividend growth rates. The DCF model is based on the premise
12 that a company's value is based on future dividends to the investors. The model
13 breaks down if no dividend is issued to the investors. In other words, the DCF
14 model cannot be applied to companies that do not issue dividends. The expected
15 market return is then the weighted average of individual company returns (ROE
16 derived from the DCF model) with the market capitalization being the weight.

17 **Q58. Did you use a one-step DCF model or a two-step DCF model to obtain the**
18 **individual company's ROE?**

19 A58. I used a two-step DCF model to calculate the ROE of an individual company.
20 A weighted growth rate by the short-term and long-term growth rate can better
21 capture the nature of the expected long-term dividend growth rate. I used the

1 IBES projected earnings growth rate as the short-term expected earnings growth
2 rate and the weighted value of IBES projected earnings growth and expected
3 GDP growth rate as the long-term growth rate.

4 **Q59. What is your estimated market risk premium?**

5 A59. My estimated market return is 10.45% and market risk premium is 8.6% by the
6 two-step DCF method. These results are presented in Attachment PSD-ZZ-7.

7 **Q60. What is your estimated ROE based on the CAPM model?**

8 A60. I used the following method to obtain the estimates of the ROE: I applied the
9 market risk premium obtained from the two-step DCF model to each
10 comparable company's beta to obtain beta-adjusted company risk premium and
11 then added to the risk-free rate. Then I calculated the average and median of the
12 individual company's ROE based on the CAPM model. The final result of ROE
13 in Attachment PSD-ZZ-8 shows the application and the results of the method.
14 Table 4 below shows the summary of the CAPM model result.

Table 4: ROE Estimate by CAPM

	ROE by CAPM
Min	7.66%
Max	9.81%
Median	8.09%
Average	8.42%
Midpoint	8.73%

15

16 The median from the calculation is 8.09%, and the mean value ROE
17 estimate is 8.42%. The increase in the beta values of proxy companies during
18 the pandemic would have led to a much higher ROE estimate. My use of

1 average beta value mitigated the problem, leading to a much more reasonable
2 estimate of required return on equity.

3 VII. THE RISK PREMIUM MODEL

4 **Q61. Have you used any other method to estimate the ROE?**

5 A61. Yes. The other method that I used is the RP, or bond return plus equity risk
6 premium model, which is another risk-based model.

7 **Q62. Please describe the principal idea behind the RP model.**

8 A62. The RP model is based on the idea that equity owners or stockholders require
9 higher returns than the bond holders who simply hold less risky bonds.
10 Therefore, this risk-reward relationship reflects the basic principle in financial
11 economics. The return on equity is then equal to bond yield plus a form of risk
12 premium which is the difference between expected returns of the stocks and
13 bond yield.

14 **Q63. How can this model be estimated to generate expected ROE?**

15 A63. There are many versions of the RP models, depending on the stock returns and
16 interest rates used. One typical form of the risk premium is measured by the
17 difference between a utility's authorized ROE and a particular kind of long-
18 term interest rate, frequently being the 30-year bond yield. The relationship
19 between equity risk premium and bond yield is empirically obtained through
20 regression of risk premium on bond yield. Then, the estimated regression
21 equation coefficients are used to obtain the expected ROE given the bond yield.

1 **Q64. Please explain how you obtained the risk premium data and how you**
2 **empirically estimated the relationship between risk premium and interest**
3 **rate?**

4 A64. I used the authorized ROEs from past gas utility rate cases since 1980 to
5 represent the expected returns and then subtracted the long-term interest rate,
6 in this case, the 30-year Treasury bond yield, to generate the risk premium. I
7 have included only past rate cases of fully integrated gas utilities in my sample.
8 I have included fully litigated cases. The inclusion of the settled cases does not
9 make any material difference as the obtained ROEs are essentially the same
10 using either the fully litigated sample or litigated plus settled sample.

11
12 Then I regressed the risk premium on interest rate to obtain the relationship
13 between the risk premium and the interest rate. In order to capture the interest
14 rate for the rate case as closely as possible, I have averaged the 30-year Treasury
15 bond yield for the period of the rate case, i.e., from the filing date to the decision
16 date. This estimated relationship has been utilized to estimate the risk premium
17 given the current interest rate. I have calculated the average length of a typical
18 rate case and my result revealed that the average period is about 9 months. I
19 then used the average Treasury bond yield during the last 9 months (up to March
20 31, 2021) as the interest rate. The estimated risk premium then is added to the
21 interest rate to yield the expected ROE.

1 **Q65. Using the current 30-year bond yield, what is your estimate of ROE per the**
2 **RP method?**

3 A65. My estimated risk premium is 7.05%. See Attachment PSD-ZZ-9. With the 30-
4 year Treasury bond yield at 1.68%, my estimate of the ROE using the risk
5 premium method is 8.74%.

6 VIII. VGS ROE

7 **Q66. What is the ROE VGS is seeking?**

8 A66. VGS is seeking an 8.8% ROE.

9 **Q67. How did VGS calculate the ROE?**

10 A67. VGS used an indexing method proposed in VGS's Alternative Regulation Plan
11 ("ARP"). The baseline ROE is the ROE approved in the last rate case, 8.65%.
12 The baseline ROE is then adjusted for this case by one-half of the change in
13 composite 10-year Treasury bond yield.

14 **Q68. In light of your estimated required ROE, how reasonable is the VGS'**
15 **requested return on equity rate of 8.8%?**

16 A68. VGS's requested ROE of the 8.8% is slightly higher than the estimate I have
17 obtained using well-established economic models. My average ROE from the
18 three methods is 8.6%, the median is 8.49%, and the midpoint is 8.74%. Even
19 though the 8.8% requested ROE is higher than my market value-based ROE, I
20 regard the 8.8% ROE as generally reasonable and acceptable.

1 **Q69. VGS stated that “the index method is consistent with “VGS’ commitment**
2 **in the ARP and the commission’s review of last year’s case, and it provides**
3 **a sound basis that promotes affordability for their customers, particularly**
4 **as Vermonters continue to face challenging economic circumstances as a**
5 **result the current pandemic.”¹¹ How do you view the statement?**

6 A69. The principles in setting the ROE are to enable the utilities to have access to
7 capital for their capital investments. The required ROE of the utilities should be
8 the minimum required ROE by the market. Even though the economic condition
9 of the rate payers is not a factor in determining the ROE, I do applaud VGS for
10 considering the public interest of Vermonters, especially when many
11 Vermonters are facing economic challenges during the pandemic.

12 **Q70. VGS also stated that it “believes a comprehensive review of current equity**
13 **market would demonstrate that a higher ROE would be needed to reflect**
14 **a fair rate of return to attract capital for similarly situated utilities.”¹² Do**
15 **you agree with this assessment?**

16 A70. I do not agree with this statement based on my independent evaluation of the
17 capital market conditions. As I have shown, utilizing the generally accepted
18 methodologies which are also accepted by the Commission in the past rate cases
19 and applying these models to the most recent economic and capital market data,

¹¹ Direct Testimony of Andrea McNeil, February 16, 2021, page 15.

¹² Direct Testimony of Andrea McNeil, February 16, 2021, page 15.

1 I have obtained a required return on equity slightly lower, not higher, than what
2 the Company is seeking.

3 IX. CONCLUSIONS

4 **Q71. Does this conclude your direct testimony?**

5 A71. Yes, it does.

Zhen Zhu
C.H. Guernsey and Company
5555 North Grand Blvd,
OKC, OK 73112

EDUCATION:

Ph.D., Economics, University of Michigan, 1994
M.A., Economics, Bowling Green State University, 1987
B.A., Business Administration, People's University of China, 1985

EXPERIENCE RECORD:

2000-Present C. H. Guernsey & Company, Oklahoma City, Okla.

Dr. Zhu is an Economist specializing in the areas of cost of capital and cost of service analysis for electric and gas utilities. He has provided analyses and support in many public utility (both electric and gas) cost-of-capital cases and cost of service cases. He has been providing consulting services on behalf of the State Water Project of California (an Intervenor) in the Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric Transmission Formula rate cases. Most recently, he is involved with providing consulting services to the Duke Energy Progress rate case intervention for the US Army. He has also presented cost of capital direct testimony and rebuttal testimony in the rate case of Dominion Energy South Carolina on behalf of the US Army.

Dr. Zhu also specialized in areas such as load forecasting, natural gas market analysis and modeling, gas price and underground storage forecasting, risk management and hedging strategy, financial analysis of merger potential, and other economic and statistical analyses. He has performed various studies regarding natural gas market risk management, price and volatility determination, market efficiency, and the analysis of gas pipelines. He has also performed numerous power price analyses, load analyses, weather normalization, and demand and energy forecasts for electric IOUs and cooperatives, evaluation of solar energy projects, corporate merger activities, stock market and foreign exchange market volatility, and financial market deregulation. Dr. Zhu has been instrumental in successfully modeling the storage injections and withdrawals from the U.S. natural gas reservoirs and the impact of these net supply changes on natural gas prices. Dr. Zhu and other Guernsey economists have received national recognition for successfully modeling the prices of natural gas in the physical market and at many trading hubs used in pricing natural gas in today's markets.

Dr. Zhu has testified in cases before several public service commissions regarding cost of capital, long-term demand and load forecasts, fuel price projections, and other issues.

Dr. Zhu is also Dr. Michael Metzger Endowed Chair and Professor of Economics at the University of Central Oklahoma.

Dr. Zhu teaches Master's level Energy Finance courses (Energy Valuation and Investment, Trading, and Risk Management) for the Mewbourne School of Petroleum and Geological Engineering and International Finance, Trade, and other courses for Advanced Programs at the University of Oklahoma.

SPECIFIC EXPERIENCE:

Natural Gas

Dr. Zhu has developed and maintains natural gas futures contract pricing models and natural gas storage models. He has also developed and maintained natural gas pricing models for multiple

delivery points for a large Texas-based electric distribution cooperative and several other cooperatives. Dr. Zhu devised hedging strategies for several utilities and has done extensive study of natural gas price and natural gas markets.

Cost of Capital

Dr. Zhu has provided testimony and support in many gas and electric utility cost of capital cases.

Dr. Zhu is a ROE expert on a rate case of Columbia Gas Transmission LLC on behalf of Ohio Consumers Counsel before FERC.

Dr. Zhu serves as a ROE expert in the rate case of Dominion Energy South Carolina, and submitted direct and rebuttal testimonies before the South Carolina Public Service Commission on behalf of the US Army and other Executive Agencies.

Dr. Zhu has assisted Department of Defense on Duke Energy Progress rate case in North Carolina on cost of capital and capital structure issues, DOCKET NO. E-2, SUB 1219, 2019-2020.

Dr. Zhu has assisted clients in Illinois on cases pending at FERC on ROE issues based on the new FERC ROE methodology.

Dr. Zhu has been providing consulting services, specifically related to capital structure and return on equity, to and on behalf of the State Water Project of California (an Intervenor) in the Southern California Edison, Pacific Gas & Electric, and San Diego Gas & Electric Transmission Formula rate cases. Teaming with legal counsel, Dr. Zhu represents and negotiates on behalf of client at settlement conferences conducted at FERC in Washington DC.

Dr. Zhu testified on cost of capital on behalf of Michigan Attorney General's Office before Michigan Public Service Commission in the Matter of the Application of Indiana Michigan Power Company for authority to increase its rates in the sale of electricity energy and for approval of depreciation accrual rates and other related matters, Case No. U-18370, 2017.

In addition, Dr. Zhu has studied the connection of the U.S. economy and U.S. gas and electric utility return on equities, and the determination of the ROE. The studies have been published in trade, industrial, and academic journals.

Load Forecasting & Statistical Analysis, and other Financial and Economic Analysis

Dr. Zhu examined factors determining future fuel prices and loads, and then provided expert testimony services related to fuel prices and load forecasts for the following projects:

Dr. Zhu testified on energy and demand forecasts, and fuel price forecast issues before the Georgia Public Service Commission in Georgia Power Company's application for Approval of its 2007 Integrated Resource Plan, Docket No. 24505-U, 2007.

Dr. Zhu presented expert testimony before the Oklahoma Corporation Commission on fuel cost/pricing issues, providing rebuttal testimony before the Corporation Commission of the State of Oklahoma, in the Application of Blue Canyon Windpower II, LLC for establishment of purchased power rates and a purchase power contract with DUKE – Public Service Company of Oklahoma, pursuant to PURPA, Cause No. PUD 20030063, 2004.

Dr. Zhu presented expert testimony before the South Carolina Public Service Commission Docket No. 2008-196-E: "Combined Application of SCE&G for the Construction and Operation of a Nuclear Facility in Jenkinsville, S. Car." regarding load forecast and fuel forecast issues.

Dr. Zhu has performed numerous studies of financial markets and published extensively in financial economics, energy economics and other economics/finance fields.

Dr. Zhu studied the impact of government regulation on stock price volatilities using the event study methodology and the study was published in Journal of Financial Services Review and many other journals.

Dr. Zhu has used many time series models to study the financial prices including exchange rates, stock prices, and natural gas futures prices and so on. The studies have been published in many leading academic journals.

Other Consulting Experience

Dr. Zhu developed and maintained GUERNSEY's LDC, DisCo, and GenCo stock price indices, developed fuel cost and hedging strategies for utilities, and developed and maintains load forecast models.

Dr. Zhu has been involved in the inventory forecast system development, merger intervention projects for gas and electric utilities, integrated resource planning projects, survey design and statistical analysis, weather normalization studies and many others.

Previous Professional Experience:

Dr. Zhu has served as an Assistant Professor of Economics at The University of Oklahoma, a Research Fellow of Financial Research Institute at the University of Missouri, and as an Instructor and Teaching Assistant in the Department of Economics at the University of Michigan.

SELECTED RECENT PUBLICATIONS AND PROFESSIONAL PAPERS

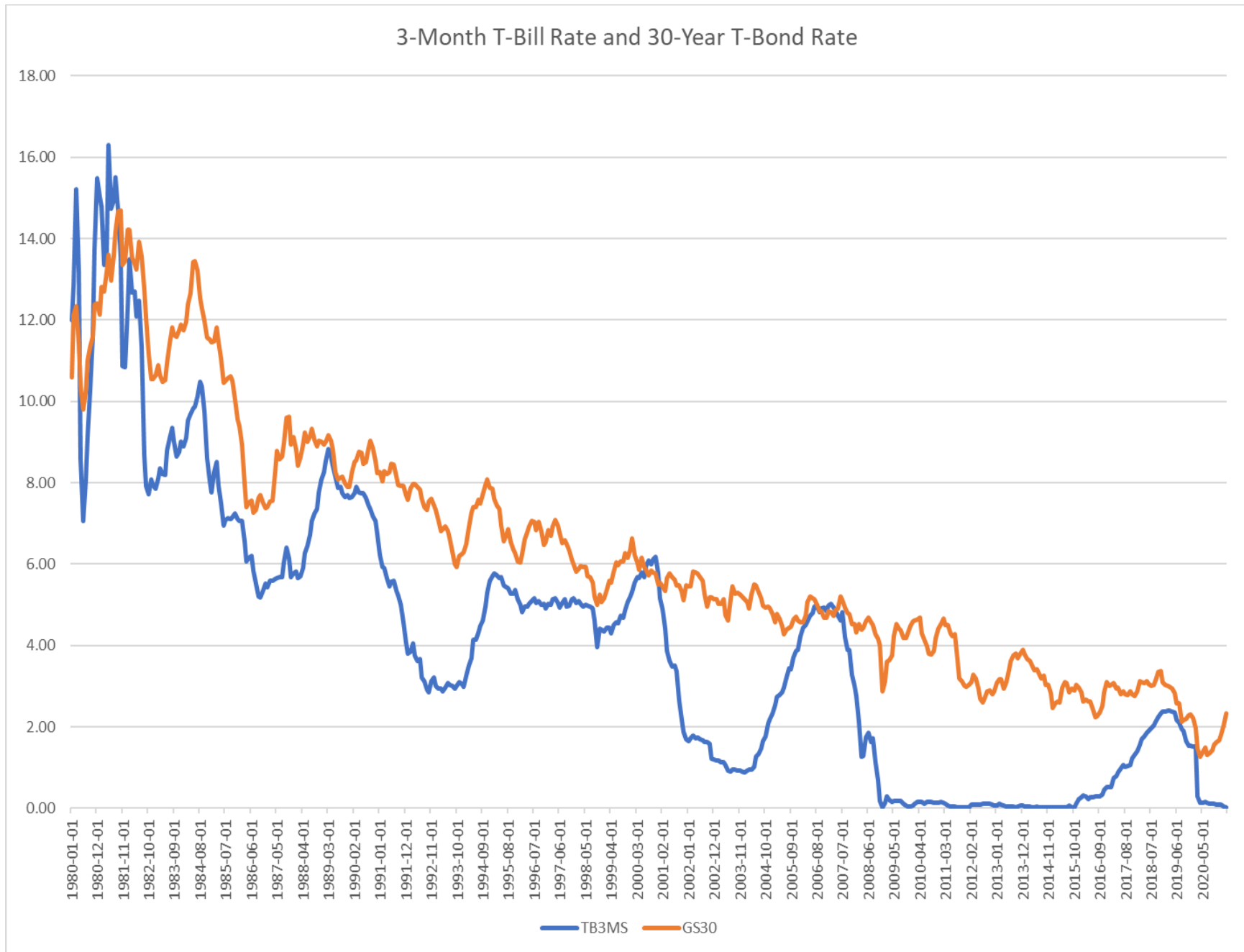
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PROFESSIONAL ACTIVITIES / HONORS:

Barnabas Fellow, UCO, 2011-2012
Distinguished Paper Award, Association of Public and Business Administration, 2008
Faculty Research Merit Award, UCO, 2007, 2009, 2011
OSEHE-EPSCor Summer grant Writing Institute, UCO, 2008
Faculty Incentive Awards, Graduate College, UCO, 2007, 2008, 2009
McGraw-Hill Irwin Distinguished Paper Award, Southwestern Society of Economists, 2006.
Marquis' Who's Who in American Education, 2003.
Research Fellow, Financial Research Institute, University of Missouri, 2001, 2002.
Hauptman Fellow, University of Central Oklahoma, 2001.
Distinguished Researcher Award, College of Business, University of Central Oklahoma, 2002.
Marquis Who's Who in America: Finance and Industry, 1999
ODE Professor of the Year, 1997-1998, University of Oklahoma
Member, American Finance Association, International Association for Energy Economists



		Common Equity Ratio												Expected	
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2024-2026
1	Atmos Energy Corp ATO	54.6	50.6	54.7	51.2	55.7	56.5	61.3	56	65.7	62	60	60	60	60
2	New Jersey Resources NJR	62.8	64.5	60.8	63.4	61.8	56.8	52.3	55.4	54.6	50.2	44.9	45.5	45	45.5
3	Nisource NI	45.3	44.4	44.9	43.7	43.1	39.3	40.2	36.5	37.9	36.9	44.5	45	45	45
4	N.W. Natural NWN	53.9	52.7	51.5	52.4	55.2	57.5	55.6	52.1	51.9	51.8	51.5	51	53.5	57
5	One Gas Inc OGS					59.9	60.5	61.3	62.2	61.4	62.3	58	60	60	60
6	South Jersey Industries SJI	62.6	59.5	55	54.9	52	50.8	61.5	51.5	37.6	40.8	39	38.5	38	42
7	Southwest Gas SWX	50.9	56.8	50.8	50.6	47.6	50.7	51.8	50.2	51.7	52.1	49.5	49.5	50	52
8	Spire Inc SR	59.5	61.1	63.9	53.4	44.9	47	49.1	50	54.3	55	51	51	51	55
9	UGI UGI	56	48.4	40	41.3	43.6	43.9	43.1	44.2	47	39.8	40.8	43	44.5	49.5
	Average	55.70	54.75	52.70	51.36	51.53	51.44	52.91	50.90	51.34	50.10	48.80	49.28	49.67	51.78
	Median	55.3	54.75	53.1	51.8	52	50.8	52.3	51.5	51.9	51.8	49.5	49.5	50	52

Data source: Value Line

IBES Earnings Growth Estimates

Company		Market Cap (Billion)		Earning Growth Estimates IBES
Atmos Energy Corp	ATO	11.7	Large Cap	7.17%
New Jersey Resources	NJR	3.5	Mid Cap	6.00%
Nisource	NI	8.6	Large Cap	3.39%
N.W. Natural	NWN	1.4	Mid Cap	3.10%
One Gas Inc	OGS	3.9	Mid Cap	5.00%
South Jersey Industries	SJI	2.4	Mid Cap	4.60%
Southwest Gas	SWX	3.5	Mid Cap	4.00%
Spire Inc	SR	3.3	Mid Cap	5.70%
UGI	UGI	8.1	Large Cap	7.35%
Average				5.15%

Projected earnings growth rates were obtained from Finance.yahoo.com as of April 23, 2021
List was based on the Feb 26, 2021 issue of Value Line

		Nominal GDP (\$ Billion)		
		2023	2050	Compounded Annual Growth Rate
[1]. EIA				
	Real GDP	20,170	34,365	
	GDP Deflator	1,175	2,213	
		23,699,750	76,049,745	4.41%
[2]. SSA Trustees Report		25,369	75,119	4.10%
Average Projected GDP Growth Rate				4.26%

[1]. Energy Information Administration, Annual Energy Outlook 2021 (February 2021)

[2]. Social Security Administration, 2020 OASDI Trustees Report, Table VI.G6-Selected Economic Variables

DCF Analysis - IBES Earnings Estimates

	Dividend Yield [1]	Adjusted Dividend [2]	Earnings Growth [3]	Adjusted Earnings Growth [4]	ROE [5]
Company	Dividend Yield	Adjusted Dividend Yield	IBES	Based on GDP and IBES	ROE (Two Step DCF)
1 Atmos Energy Corp	2.60%	2.697%	7.17%	6.20%	8.90%
2 New Jersey Resources	3.73%	3.842%	6.00%	5.42%	9.26%
3 Nisource	3.69%	3.756%	3.39%	3.68%	7.44%
4 N.W. Natural	4.06%	4.122%	3.10%	3.49%	7.61%
5 One Gas Inc	2.96%	3.030%	5.00%	4.75%	7.78%
6 South Jersey Industries	5.25%	5.373%	4.60%	4.49%	9.86%
7 Southwest Gas	3.54%	3.607%	4.00%	4.09%	7.69%
8 Spire Inc	3.97%	4.083%	5.70%	5.22%	9.30%
9 UGI	3.62%	3.758%	7.35%	6.32%	10.08%
Min					7.44%
Max					10.08%
Median					8.90%
Average	3.71%	3.81%	5.15%	4.85%	8.66%
Midpoint					8.76%

- [1]. 6-month average dividend yield October 1, 2020 to March 31, 2021
 [2]. [1] adjusted by IBES projected earnings growth rate.
 [3]. IBES Earnings growth projection from Yahoo.finance.com as of April 28, 2021.
 [4]. Adjusted earnings growth based on IBES Projection*2/3+ GDP Growth Rate*1/3
 [5]. [2]+[4]

Symbol	Security	Market Capitalization (billion)	Forward Dividend Yield	Trailing Dividend Yield	Projected	Adjusted Dividend Yield	Adjusted EPS Growth	ROE by DCF	Weighted ROE	Check Sum
					Next 5 Year Earnings Growth Rate by IBES (%)					
MMM	3M Company	115.07	2.98	2.96	8.04	3.079	6.779	9.858	0.04828	0.00490
AOS	A.O. Smith Corp	11.02	1.55	1.46	8	1.518	6.753	8.271	0.00388	0.00047
ABT	Abbott Laboratories	220.61	1.5	1.35	15.58	1.455	11.806	13.261	0.12451	0.00939
ABBV	AbbVie Inc.	190.44	4.77	4.44	4.03	4.529	4.106	8.635	0.06999	0.00810
ABMD	Abiomed	14.95			17.1					
ACN	Accenture	182.41	1.22	1.19	9.75	1.248	7.919	9.167	0.07117	0.00776
ATVI	Activision Blizzard	74.75	0.5	0.5	17.83	0.545	13.306	13.850	0.04406	0.00318
ADBE	Adobe Inc.	250.99			17.5					
AAP	Advance Auto Parts	12.69	0.52	0.52	12.56	0.553	9.793	10.345	0.00559	0.00054
AMD	Advanced Micro Devices	96.28			26.31					
AES	AES Corp	18.93	2.13	2.03	8.15	2.113	6.853	8.965	0.00722	0.00081
AFL	Aflac	36.75	2.51	2.13	6.11	2.195	5.493	7.688	0.01202	0.00156
A	Agilent Technologies	41.01	0.59	0.55	10.8	0.580	8.619	9.199	0.01606	0.00175
APD	Air Products & Chemicals	63.61	2.11	1.88	9.01	1.965	7.426	9.391	0.02542	0.00271
AKAM	Akamai Technologies	17.2			12					
ALK	Alaska Air Group	8.32		0.56	-18.5					
ALB	Albemarle Corporation	17.74	1.05	1.04	25.61					
ARE	Alexandria Real Estate Equities	26.05	2.43	2.37	0.1	2.371	1.486	3.857	0.00428	0.00111
ALXN	Alexion Pharmaceuticals	36.16			8.78					
ALGN	Align Technology	47.98			24.14					
ALLE	Allegion	12.02	1.09	0.97	4.2	0.990	4.219	5.210	0.00266	0.00051
LNT	Alliant Energy	14.05	2.8	2.65	5.5	2.723	5.086	7.809	0.00467	0.00060
ALL	Allstate Corp	36.7	2.64	1.76	-0.4					
GOOGL	Alphabet Inc. (Class A)	1550			16.95					
GOOG	Alphabet Inc. (Class C)	1550			16.95					
MO	Altria Group Inc	96.89	7.29	7.2	4.42	7.359	4.366	11.725	0.04835	0.00412
AMZN	Amazon.com Inc.	1700			38.37					
AMCR	AmcOR plc	18.67	3.96	3.96	7.43	4.107	6.373	10.480	0.00833	0.00079
AEE	Ameren Corp	21.52	2.56	2.33	7.5	2.417	6.419	8.837	0.00809	0.00092
AAL	American Airlines Group	14.13		0.49	-45.7					
AEP	American Electric Power	44.03	3.28	3.15	6.15	3.247	5.519	8.766	0.01643	0.00187
AXP	American Express	116.58	1.19	1.19	15.83	1.284	11.973	13.257	0.06577	0.00496

Exhibit PSD-ZZ-7 Market Risk Premium

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AIG	American International Group	40.62	2.74	2.81	17.3	3.053	12.953	16.006	0.02767	0.00173
AMT	American Tower Corp.	110.54	1.96	1.79	17.31	1.945	12.959	14.904	0.07012	0.00470
AWK	American Water Works	29.06	1.36	1.33	8.6	1.387	7.153	8.540	0.01056	0.00124
AMP	Ameriprise Financial	29.01	1.72	1.69	15.36	1.820	11.659	13.479	0.01664	0.00123
ABC	AmerisourceBergen	24.5	1.46	1.41	9.17	1.475	7.533	9.007	0.00939	0.00104
AME	Ametek	30.66	0.61	0.55	-1.2					
AMGN	Amgen Inc.	147.39	2.72	2.47	6.91	2.555	6.026	8.581	0.05383	0.00627
APH	Amphenol Corp	41.04	1.74	0.78	11.2	0.824	8.886	9.710	0.01696	0.00175
ADI	Analog Devices Inc.	58.84	1.79	1.65	11.78	1.747	9.273	11.020	0.02760	0.00250
ANSS	ANSYS Inc.	32.58			8					
ANTM	Anthem	91.99	1.18	1	13.59	1.068	10.479	11.547	0.04521	0.00391
AON	Aon plc	54.08	0.87	0.76	10.41	0.800	8.359	9.159	0.02108	0.00230
APA	APA Corporation	6.83	0.59	0.59	-24					
AAPL	Apple Inc.	2260	0.62	0.61	14.94	0.656	11.379	12.035	1.15754	0.09618
AMAT	Applied Materials Inc.	122.72	0.75	0.68	21.43					
APTV	Aptiv PLC	38.15		0.16	42.87					
ADM	Archer-Daniels-Midland Co	32.79	2.52	2.45	4.3	2.503	4.286	6.789	0.00947	0.00140
ANET	Arista Networks	24.17			6.6					
AJG	Arthur J. Gallagher & Co.	26.7	1.41	1.32	9.67	1.384	7.866	9.250	0.01051	0.00114
AIZ	Assurant	9.32	1.71	1.66	19.4	1.821	14.353	16.174	0.00642	0.00040
T	AT&T Inc.	213.8	6.94	6.96	0.99	6.994	2.079	9.074	0.08256	0.00910
ATO	Atmos Energy	13.05	2.45	2.25	7.17	2.331	6.199	8.530	0.00474	0.00056
ADSK	Autodesk Inc.	63.73			35.58					
ADP	Automatic Data Processing	82.57	1.93	1.9	10.26	1.997	8.259	10.257	0.03604	0.00351
AZO	AutoZone Inc	32.96			6.7					
AVB	AvalonBay Communities	26.5	3.3	3.3	2.54	3.342	3.113	6.454	0.00728	0.00113
AVY	Avery Dennison Corp	16.49	1.25	1.19	7.84	1.237	6.646	7.883	0.00553	0.00070
BKR	Baker Hughes Co	20.85	3.59		3.25	3.590	3.586	7.176	0.00637	0.00089
BLL	Ball Corp	29.86	0.65	0.65	13.59	0.694	10.479	11.173	0.01420	0.00127
BAC	Bank of America Corp	327.1	1.89	1.89	1.11	1.900	2.159	4.060	0.05651	0.01392
BAX	Baxter International Inc.	43.78	1.13	1.1	9	1.150	7.419	8.569	0.01597	0.00186
BDX	Becton Dickinson	75.82	1.29	1.25	2.4	1.265	3.019	4.284	0.01382	0.00323
BRK.B	Berkshire Hathaway	620.9			23.3					
BBY	Best Buy Co. Inc.	29.72	2.36	1.98	9.63	2.075	7.839	9.915	0.01254	0.00126
BIO	Bio-Rad Laboratories	18.64			17.8					
BIIB	Biogen Inc.	41.18			-10.23					
BLK	BlackRock	123.86	2.05	1.87	12.66	1.988	9.859	11.848	0.06245	0.00527
BA	Boeing Company	144.85		0.88	12.33	0.934	9.639	10.573	0.06518	0.00616
BKNG	Booking Holdings Inc	100.61			135.59					

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BWA	BorgWarner	11.7	1.42	1.42	19.64	1.559	14.513	16.072	0.00800	0.00050
BXP	Boston Properties	16.56	3.69	3.69	7	3.819	6.086	9.905	0.00698	0.00070
BSX	Boston Scientific	58.11			11.22					
BMY	Bristol-Myers Squibb	146.23	2.97	2.78	7.73	2.887	6.573	9.460	0.05887	0.00622
AVGO	Broadcom Inc.	195.49	3.15	3	8.6	3.129	7.153	10.282	0.08554	0.00832
BR	Broadridge Financial Solutions	18.18	1.45	1.4	10	1.470	8.086	9.556	0.00739	0.00077
BF.B	Brown-Forman Corp.	34.7	0.95	0.92	7.53	0.955	6.439	7.394	0.01092	0.00148
CHRW	C. H. Robinson Worldwide	13.05	2.05	2.05	10.16	2.154	8.193	10.347	0.00575	0.00056
COG	Cabot Oil & Gas	6.61	2.44	2.44	43.75					
CDNS	Cadence Design Systems	39.61			11.1					
CZR	Caesars Entertainment	18.48			27.5					
CPB	Campbell Soup	14.97	2.95	2.83	8.64	2.952	7.179	10.131	0.00645	0.00064
COF	Capital One Financial	60.05	1.22	0.76	4.19	0.776	4.213	4.988	0.01275	0.00256
CAH	Cardinal Health Inc.	18	3.18	3.18	7.6	3.301	6.486	9.787	0.00750	0.00077
KMX	Carmax Inc	20.85			6.34					
CCL	Carnival Corp.	30.62		0	-114.9					
CARR	Carrier Global	36.96	1.13		9.32	1.130	7.633	8.763	0.01378	0.00157
CTLT	Catalent	18.83			15.97					
CAT	Caterpillar Inc.	127.25	1.81	1.81	-1.11					
CBOE	Cboe Global Markets	11.22	1.61	1.04	2.4	1.052	3.019	4.072	0.00194	0.00048
CBRE	CBRE Group	27.38			11					
CDW	CDW	25.86	0.88	0.85	11.59	0.899	9.146	10.045	0.01106	0.00110
CE	Celanese	18.03	1.75	1.59	21.06					
CNC	Centene Corporation	38.05			10.53					
CNP	CenterPoint Energy	13.12	2.64	3.05	4.66	3.121	4.526	7.647	0.00427	0.00056
CERN	Cerner	22.76	1.18	1.01	11.51	1.068	9.093	10.161	0.00984	0.00097
CF	CF Industries Holdings Inc	10.15	2.6	2.6	-5.21					
SCHW	Charles Schwab Corporation	122.05	1.13	1.13	17.03	1.226	12.773	13.999	0.07271	0.00519
CHTR	Charter Communications	138.72			35.33					
CVX	Chevron Corp.	199.09	5	5.09	-4.9					
CMG	Chipotle Mexican Grill	43.26			52.78					
CB	Chubb Limited	72.72	1.98	1.91	22.88					
CHD	Church & Dwight	21.55	1.13	1.08	8.71	1.127	7.226	8.353	0.00766	0.00092
CI	Cigna	87.71	1.58	0.02	10.35	0.021	8.319	8.340	0.03113	0.00373
CINF	Cincinnati Financial	17.14	2.36	2.24	7.92	2.329	6.699	9.028	0.00659	0.00073
CTAS	Cintas Corporation	36.82	0.88	1.25	12.85	1.330	9.986	11.316	0.01773	0.00157
CSCO	Cisco Systems	218.65	2.86	2.78	5.81	2.861	5.293	8.153	0.07587	0.00931
C	Citigroup Inc.	151.18	2.92	2.19	10.91	2.309	8.693	11.002	0.07079	0.00643
CFG	Citizens Financial Group	19.06	3.65	3.65	-2.76					

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CTXS	Citrix Systems	17.24	1.07	1.01	11.85	1.070	9.319	10.389	0.00762	0.00073
CME	CME Group Inc.	74.53	1.75	1.65	4.84	1.690	4.646	6.336	0.02010	0.00317
CMS	CMS Energy	18.55	2.67	2.5	7.2	2.590	6.219	8.809	0.00695	0.00079
KO	Coca-Cola Company	232.7	3.11	2.27	9.05	2.373	7.453	9.825	0.09730	0.00990
CTSH	Cognizant Technology Solutions	42.78	1.19	1.11	3.4	1.129	3.686	4.815	0.00877	0.00182
CL	Colgate-Palmolive	68.12	2.21	2.15	7.46	2.230	6.393	8.623	0.02500	0.00290
CMCSA	Comcast Corp.	248	1.85	1.7	14.57	1.824	11.133	12.956	0.13675	0.01055
CMA	Comerica Inc.	9.39	4.04	4.04	-10.7					
CAG	Conagra Brands	18.02	2.87	2.55	6.33	2.631	5.639	8.270	0.00634	0.00077
COP	ConocoPhillips	69.08	3.54	3.47	-8.5					
ED	Consolidated Edison	26.8	3.91	3.86	2.95	3.917	3.386	7.303	0.00833	0.00114
STZ	Constellation Brands	46.08	1.28	1.26	9.35	1.319	7.653	8.971	0.01759	0.00196
CPRT	Copart Inc	29.18			22.3					
GLW	Corning Inc.	35.23	2.11	1.93	23.5					
CTVA	Corteva	35.18	1.11	0.55	18.25	0.600	13.586	14.186	0.02124	0.00150
COST	Costco Wholesale Corp.	163.54	0.85	0.75	8.64	0.782	7.179	7.962	0.05541	0.00696
CCI	Crown Castle	77.63	2.91	2.69	19.6	2.954	14.486	17.440	0.05762	0.00330
CSX	CSX Corp.	74.77	1.14	0.79	15.34	0.851	11.646	12.496	0.03977	0.00318
CMI	Cummins Inc.	38.74	2.08	2.03	14.98	2.182	11.406	13.588	0.02240	0.00165
CVS	CVS Health	99.63	2.63	2.63	3.77	2.680	3.933	6.612	0.02804	0.00424
DHI	D. R. Horton	33.44	0.87	0.79	17.9	0.861	13.353	14.213	0.02023	0.00142
DHR	Danaher Corp.	173.32	0.35	0.3	12.39	0.319	9.679	9.998	0.07375	0.00738
DRI	Darden Restaurants	19.1	1.08	0.47	36.64					
DVA	DaVita Inc.	12.31			13.83					
DE	Deere & Co.	120.07	0.97	0.82	34.43					
DAL	Delta Air Lines Inc.	29.83		0.01	-23.7					
XRAY	Dentsply Sirona	14.29	0.61	0.61	24.08					
DVN	Devon Energy	14.73	2.86	2	25					
DXCM	DexCom	38.69			23.6					
FANG	Diamondback Energy	14.04	2.06	2.05	50.12					
DLR	Digital Realty Trust Inc	41.03	3.07	2.97	30.98					
DFS	Discover Financial Services	31.33	1.82	1.82	6.27	1.877	5.599	7.476	0.00997	0.00133
DISCA	Discovery Inc. (Series A)	16.39			10.54					
DISCK	Discovery Inc. (Series C)	16.39			12.9					
DISH	Dish Network	19.51			-23.01					
DG	Dollar General	51.86	0.77	0.66	13.57	0.705	10.466	11.171	0.02465	0.00221
DLTR	Dollar Tree	27.39			9.78					
D	Dominion Energy	63.46	3.15	4.31	2.78	4.370	3.273	7.642	0.02064	0.00270
DPZ	Domino's Pizza	15.44	0.94	0.78	10.43	0.821	8.373	9.193	0.00604	0.00066

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DOV	Dover Corporation	20.85	1.37	1.36	9.93	1.428	8.039	9.467	0.00840	0.00089
DOW	Dow Inc.	48.2	4.48	4.48	-5.43					
DTE	DTE Energy Co.	27.25	3.06	2.91	4.65	2.978	4.519	7.497	0.00869	0.00116
DUK	Duke Energy	77.44	3.81	3.77	5	3.864	4.753	8.617	0.02840	0.00330
DRE	Duke Realty Corp	16.63	2.14	2.14	6	2.204	5.419	7.623	0.00540	0.00071
DD	DuPont de Nemours Inc	40.16	1.56	1.6	29.8					
DXC	DXC Technology	8.06		0	-8.82					
EMN	Eastman Chemical	15.69	2.46	2.38	3.83	2.426	3.973	6.398	0.00427	0.00067
ETN	Eaton Corporation	56.23	2.2	2.11	15.73	2.276	11.906	14.182	0.03394	0.00239
EBAY	eBay Inc.	43.41	1.13	1.04	18.79	1.138	13.946	15.084	0.02787	0.00185
ECL	Ecolab Inc.	63.18	0.87	0.86	17.07	0.933	12.799	13.733	0.03693	0.00269
EIX	Edison Int'l	23.18	4.31	4.19	4.5	4.284	4.419	8.703	0.00859	0.00099
EW	Edwards Lifesciences	55.75			12.99					
EA	Electronic Arts	40.16	0.49	0.12	14.52	0.129	11.099	11.228	0.01919	0.00171
EMR	Emerson Electric Company	55.32	2.22	2.21	9.87	2.319	7.999	10.318	0.02429	0.00235
ENPH	Enphase Energy	19.93			37.7					
ETR	Entergy Corp.	21.44	3.52	3.46	5.5	3.555	5.086	8.641	0.00788	0.00091
EOG	EOG Resources	41.61	2.31	2.19	54.9					
EFX	Equifax Inc.	23.38	0.81	0.81	10.63	0.853	8.506	9.359	0.00931	0.00100
EQIX	Equinix	63.43	1.58	1.47	28.95					
EQR	Equity Residential	27.06	3.25	3.25	6.1	3.349	5.486	8.835	0.01017	0.00115
ESS	Essex Property Trust Inc.	18.82	2.84	2.82	7.9	2.931	6.686	9.617	0.00770	0.00080
EL	Estée Lauder Companies	113.29	0.69	0.48	21.1					
ETSY	Etsy	26.87			48.1					
RE	Everest Re Group Ltd.	10.53	2.36	2.36	62.7					
EVRG	Evergy	14.5	3.38	3.16	5.8	3.252	5.286	8.538	0.00527	0.00062
ES	Eversource Energy	30.79	2.66	2.51	7.05	2.598	6.119	8.718	0.01142	0.00131
EXC	Exelon Corp.	45.09	3.34	3.34	-0.34					
EXPE	Expedia Group	25.02		0.2	-15.06					
EXPD	Expeditors	18.63	0.94	0.94	4.26	0.960	4.259	5.219	0.00414	0.00079
EXR	Extra Space Storage	19.24	2.73	2.46	6	2.534	5.419	7.953	0.00651	0.00082
XOM	Exxon Mobil Corp.	239.87	6.29	6.29	10.59	6.623	8.479	15.102	0.15417	0.01021
FFIV	F5 Networks	12.76			6.04		5.446			
FB	Facebook Inc.	869.94			21.5					
FAST	Fastenal Co	29.18	2.19	2.01	7.95	2.090	6.719	8.809	0.01094	0.00124
FRT	Federal Realty Investment Trust	8.32	3.96	3.94	6.7	4.072	5.886	9.958	0.00353	0.00035
FDX	FedEx Corporation	76.31	0.93	0.93	29.41					
FIS	Fidelity National Information Services	94.43	1.03	0.92	13.97	0.984	10.733	11.717	0.04709	0.00402
FITB	Fifth Third Bancorp	25.9	2.96	2.22	-2.98					

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FRC	First Republic Bank	31.3	0.51	0.48	12.14	0.509	9.513	10.022	0.01335	0.00133
FE	FirstEnergy Corp	19.42	4.3	4.3	-1.97					
FISV	Fiserv Inc	83.03			18.79					
FLT	FleetCor Technologies Inc	24.31			14.47					
FLIR	FLIR Systems	7.69	1.17	1.17	6.4	1.207	5.686	6.893	0.00226	0.00033
FMC	FMC Corporation	14.63	1.7	1.59	9	1.662	7.419	9.081	0.00565	0.00062
F	Ford Motor Company	48.81		1.31	28.46					
FTNT	Fortinet	33.62			15					
FTV	Fortive Corp	24.47	0.39	0.39	7.05	0.404	6.119	6.523	0.00679	0.00104
FBHS	Fortune Brands Home & Security	14.29	1.03	0.95	9.25	0.994	7.586	8.580	0.00522	0.00061
FOXA	Fox Corporation (Class A)	22.03	1.22	1.22	3.87	1.244	3.999	5.243	0.00492	0.00094
FOX	Fox Corporation (Class B)	22.03	1.26	1.26	9.2	1.318	7.553	8.871	0.00832	0.00094
BEN	Franklin Resources	15.19	3.85	3.75	5.64	3.856	5.179	9.035	0.00584	0.00065
FCX	Freeport-McMoRan Inc.	52.38	0.84	0.14	41.83					
GPS	Gap Inc.	11.91	3.05	0.76	4.9	0.779	4.686	5.465	0.00277	0.00051
GRMN	Garmin Ltd.	26.93	1.91	1.77	6.37	1.826	5.666	7.492	0.00859	0.00115
IT	Gartner Inc	16.65			9.95					
GNRC	Generac Holdings	20.88			8					
GD	General Dynamics	52.31		2.39	4.83	2.448	4.639	7.087	0.01578	0.00223
GE	General Electric	114.73	0.31	0.31	322.8					
GIS	General Mills	37.39	3.27	3.21	4.16	3.277	4.193	7.469	0.01189	0.00159
GM	General Motors	84.6		0.68	11.74	0.720	9.246	9.966	0.03588	0.00360
GPC	Genuine Parts	17.33	2.73	2.65	4.6	2.711	4.486	7.197	0.00531	0.00074
GILD	Gilead Sciences	83.03	4.28	4.1	2.95	4.160	3.386	7.546	0.02667	0.00353
GPN	Global Payments Inc.	63.71	0.36	0.37	9.73	0.388	7.906	8.294	0.02249	0.00271
GL	Globe Life Inc.	12.22	0.76	0.67	7.37	0.695	6.333	7.027	0.00365	0.00052
GS	Goldman Sachs Group	114.06	1.49	1.51	16.8	1.637	12.619	14.256	0.06920	0.00485
GWV	Grainger (W.W.) Inc.	21.41	1.44	1.44	12.65	1.531	9.853	11.384	0.01037	0.00091
HAL	Halliburton Co.	16.97	0.91	0.91	15.5	0.981	11.753	12.733	0.00920	0.00072
HBI	Hanesbrands Inc	6.9	3.04	3.04	4.66	3.111	4.526	7.637	0.00224	0.00029
HIG	Hartford Financial Svc.Gp.	23.67	2.08	1.98	4.44	2.024	4.379	6.403	0.00645	0.00101
HAS	Hasbro Inc.	13.48	2.78	2.81	16.9	3.047	12.686	15.733	0.00903	0.00057
HCA	HCA Healthcare	66.56	1	0.22	12.39	0.234	9.679	9.913	0.02808	0.00283
PEAK	Healthpeak Properties	18.35	3.52		2.5	3.520	3.086	6.606	0.00516	0.00078
HSIC	Henry Schein	10.29			14.43					
HES	Hess Corporation	20.88	1.47	1.48	-23.4					
HPE	Hewlett Packard Enterprise	20.75	3	3.05	12.51	3.241	9.759	13.000	0.01148	0.00088
HLT	Hilton Worldwide Holdings Inc	35.66		0.12	-6.25					
HFC	HollyFrontier Corp	5.6	4.15	4.15	-6.61					

HOLX	Hologic	19.35			10.47					
HD	Home Depot	348.33	2.04	1.9	8.71	1.983	7.226	9.209	0.13651	0.01482
HON	Honeywell Int'l Inc.	160.42	1.64	1.6	11.98	1.696	9.406	11.102	0.07579	0.00683
HRL	Hormel Foods Corp.	25.3	2.07	1.99	3.7	2.027	3.886	5.913	0.00637	0.00108
HST	Host Hotels & Resorts	12.33		1.18	28.4					
HWM	Howmet Aerospace	14.19			27.53					
HPQ	HP Inc.	42.01	2.29	2.16	15.07	2.323	11.466	13.789	0.02465	0.00179
HUM	Humana Inc.	56.16	0.63	0.56	12.28	0.594	9.606	10.200	0.02438	0.00239
HBAN	Huntington Bancshares	16.54	3.87	3.96	-2.15					
HII	Huntington Ingalls Industries	8.41	2.19	2.04	1.05	2.051	2.119	4.170	0.00149	0.00036
IEX	IDEX Corporation	16.75	0.9	0.9	11.5	0.952	9.086	10.038	0.00716	0.00071
IDXX	Idexx Laboratories	46.33			16.09					
INFO	IHS Markit	44.04	0.77	0.68	11.45	0.719	9.053	9.771	0.01831	0.00187
ITW	Illinois Tool Works	70.9	2.01	1.98	12.55	2.104	9.786	11.890	0.03588	0.00302
ILMN	Illumina Inc	59			21.5					
INCY	Incyte	18.59			20.89					
IR	Ingersoll Rand	21.32		4.21	16.19	4.551	12.213	16.763	0.01521	0.00091
INTC	Intel Corp.	263.68	2.22	2.07	5.43	2.126	5.039	7.165	0.08041	0.01122
ICE	Intercontinental Exchange	67.94	1.1	1	10.08	1.050	8.139	9.190	0.02657	0.00289
IBM	International Business Machines	118.96	4.72	4.54	5.61	4.667	5.159	9.827	0.04975	0.00506
IFF	International Flavors & Fragrances	35.8	2.14	2.11	10	2.216	8.086	10.301	0.01570	0.00152
IP	International Paper	22.54	3.6	3.6	25.83					
IPG	Interpublic Group	12.07	3.52	3.32	5.05	3.404	4.786	8.190	0.00421	0.00051
INTU	Intuit Inc.	111.01	0.58	0.55	12.3	0.584	9.619	10.203	0.04820	0.00472
ISRG	Intuitive Surgical Inc.	96.02			10.03		8.106			
IVZ	Invesco Ltd.	11.9	2.35	2.35	9.46	2.461	7.726	10.187	0.00516	0.00051
IPGP	IPG Photonics Corp.	11.76			45.6					
IQV	IQVIA Holdings Inc.	41.34			15.69					
IRM	Iron Mountain Incorporated	11.62	6.15	6.15	1.7	6.202	2.553	8.755	0.00433	0.00049
JBHT	J. B. Hunt Transport Services	17.62	0.67	0.65	21.53					
JKHY	Jack Henry & Associates	12.26	1.11	1.04	10.02	1.092	8.099	9.191	0.00480	0.00052
J	Jacobs Engineering Group	17.33	0.62		13.38	0.620	10.339	10.959	0.00808	0.00074
SJM	JM Smucker	14.31	2.69	2.68	-0.42					
JNJ	Johnson & Johnson	438.29	2.55	1.82	8.5	1.897	7.086	8.983	0.16756	0.01865
JCI	Johnson Controls International	43.96	1.75	1.68	14.25	1.800	10.919	12.719	0.02380	0.00187
JPM	JPMorgan Chase & Co.	451.86	2.39	2.39	1.28	2.405	2.273	4.678	0.08996	0.01923
JNPR	Juniper Networks	8.51	3.13	3.13	6.65	3.234	5.853	9.087	0.00329	0.00036
KSU	Kansas City Southern	23.42	0.73	0.6	15.71	0.647	11.893	12.540	0.01250	0.00100
K	Kellogg Co.	21.56	3.58	3.53	2.73	3.578	3.239	6.817	0.00626	0.00092

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KEY	KeyCorp	19.05	3.62	3.62	11.4	3.826	9.019	12.846	0.01041	0.00081
KEYS	Keysight Technologies	27.04			12.41					
KMB	Kimberly-Clark	47.06	3.22	3.03	3.65	3.085	3.853	6.938	0.01390	0.00200
KIM	Kimco Realty	8.55	3.52	2.68	4.6	2.742	4.486	7.228	0.00263	0.00036
KMI	Kinder Morgan	37.46	6.29	6.29	1.63	6.341	2.506	8.847	0.01410	0.00159
KLAC	KLA Corporation	49.98	1.09	1.05	14.9	1.128	11.353	12.481	0.02655	0.00213
KHC	Kraft Heinz Co	50.09	3.85	3.85	-2.88					
KR	Kroger Co.	28.4	1.9	1.85	7.6	1.920	6.486	8.406	0.01016	0.00121
LB	L Brands Inc.	18.21		0.46	14.02	0.492	10.766	11.258	0.00872	0.00077
LHX	L3Harris Technologies	43.32	1.92	1.41	10.43	1.484	8.373	9.856	0.01817	0.00184
LH	Laboratory Corp. of America Holding	25.6			-1.08					
LRCX	Lam Research	91.64	0.81	0.76	25.15					
LW	Lamb Weston Holdings Inc	11.58	1.19	1.14	10.65	1.201	8.519	9.720	0.00479	0.00049
LVS	Las Vegas Sands	46.41		0	-6.25					
LEG	Leggett & Platt	6.54	3.18	3.18	5.2	3.263	4.886	8.149	0.00227	0.00028
LDOS	Leidos Holdings	14.35	1.34	1.34	9.48	1.404	7.739	9.143	0.00558	0.00061
LEN	Lennar Corp.	32.41	0.98	0.74	10.7	0.780	8.553	9.332	0.01287	0.00138
LLY	Lilly (Eli) & Co.	181.49	1.78	1.55	12.73	1.649	9.906	11.555	0.08925	0.00772
LNC	Lincoln National	12.48	2.64	2.55	30.45					
LIN	Linde plc	151.6	1.45	1.32	11.71	1.397	9.226	10.623	0.06854	0.00645
LYV	Live Nation Entertainment	17.79			80.3					
LKQ	LKQ Corporation	13.51			33.5					
LMT	Lockheed Martin Corp.	107.95	2.69	2.58	6.04	2.658	5.446	8.104	0.03723	0.00459
L	Loews Corp.	14.46	0.46	0.46	14.03	0.492	10.773	11.265	0.00693	0.00062
LOW	Lowe's Cos.	149.35	1.18	1.13	14.21	1.210	10.893	12.103	0.07693	0.00636
LUMN	Lumen Technologies	14.15	7.75		3	7.750	3.419	11.169	0.00673	0.00060
LYB	LyondellBasell	35.84	3.88	3.88	-4.07					
MTB	M&T Bank	19.94	2.88	2.88	15.2	3.099	11.553	14.651	0.01243	0.00085
MRO	Marathon Oil Corp.	8.38	1.15	0.57	-19.63					
MPC	Marathon Petroleum	34.76	4.35	4.35	-6.76					
MKTX	MarketAxess	19.88	0.5	0.46	10.44	0.484	8.379	8.863	0.00750	0.00085
MAR	Marriott International	48.39		0.33	612.6					
MMC	Marsh & McLennan	64.93	1.46	1.44	8.93	1.504	7.373	8.877	0.02453	0.00276
MLM	Martin Marietta Materials	21.49	0.65	0.64	8.85	0.668	7.319	7.988	0.00731	0.00091
MAS	Masco Corp.	16.12	1.47	0.86	10.25	0.904	8.253	9.157	0.00628	0.00069
MA	Mastercard Inc.	383.61	0.46	0.43	15	0.462	11.419	11.881	0.19398	0.01633
MXIM	Maxim Integrated Products	24.82		1.01	18.44	1.103	13.713	14.816	0.01565	0.00106
MKC	McCormick & Co.	24.57	1.48	1.38	6	1.421	5.419	6.841	0.00715	0.00105
MCD	McDonald's Corp.	173.9	2.22	2.17	18.2	2.367	13.553	15.920	0.11782	0.00740

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MCK	McKesson Corp.	31.2	0.86	0.85	10.46	0.894	8.393	9.287	0.01233	0.00133
MDT	Medtronic plc	172.93	1.78	1.75	9.08	1.829	7.473	9.302	0.06846	0.00736
MRK	Merck & Co.	196.58	3.28	3.08	8.7	3.214	7.219	10.433	0.08729	0.00837
MET	MetLife Inc.	55.78	2.94	2.91	4.5	2.975	4.419	7.395	0.01755	0.00237
MTD	Mettler Toledo	29.91			13.8					
MGM	MGM Resorts International	20.39	0.03	0.38	49					
MCHP	Microchip Technology	42.62	1.01	0.95	11.8	1.006	9.286	10.292	0.01867	0.00181
MU	Micron Technology	99.14			60.47					
MSFT	Microsoft Corp.	1950	0.86	0.82	18.2	0.895	13.553	14.447	1.19896	0.08299
MAA	Mid-America Apartments	17.28	2.62	2.56	7	2.650	6.086	8.735	0.00642	0.00074
MHK	Mohawk Industries	14.3			4					
TAP	Molson Coors Beverage Company	11.54		1.07	2.74	1.085	3.246	4.331	0.00213	0.00049
MDLZ	Mondelez International	82.58	2.12	2.01	9.44	2.105	7.713	9.817	0.03450	0.00351
MPWR	Monolithic Power Systems	16.86	0.64	0.53	25					
MNST	Monster Beverage	51.68			15.35					
MCO	Moody's Corp	60.02	0.76	0.69	9.28	0.722	7.606	8.328	0.02127	0.00255
MS	Morgan Stanley	147.01	1.77	1.77	4.28	1.808	4.273	6.080	0.03804	0.00626
MSI	Motorola Solutions Inc.	31.78	1.52	1.41	5.88	1.451	5.339	6.791	0.00918	0.00135
MSCI	MSCI Inc	39.18	0.66	0.62	14.37	0.665	10.999	11.664	0.01945	0.00167
NDAQ	Nasdaq Inc.	26.26	1.23	1.22	6.9	1.262	6.019	7.281	0.00814	0.00112
NTAP	NetApp	17.3	2.53	2.53	7.66	2.627	6.526	9.153	0.00674	0.00074
NFLX	Netflix Inc.	225.39			44.77					
NWL	Newell Brands	11.26	3.41	3.41	2.03	3.445	2.773	6.217	0.00298	0.00048
NEM	Newmont Corporation	52.4	3.29	2.17	-1.14					
NWSA	News Corp (Class A)	15.41	0.73	0.73	49.01					
NWS	News Corp (Class B)	15.41	0.79	0.79						
NEE	NextEra Energy	157.96	1.98	1.8	8.49	1.876	7.079	8.956	0.06020	0.00672
NLSN	Nielsen Holdings	9.07	0.97	0.95	5.3	0.975	4.953	5.928	0.00229	0.00039
NKE	Nike Inc.	212.21	0.85	0.8	34.55					
NI	NiSource Inc.	10.21	3.38	3.27	3.39	3.325	3.679	7.005	0.00304	0.00043
NSC	Norfolk Southern Corp.	73.51	1.41	1.34	13.87	1.433	10.666	12.099	0.03785	0.00313
NTRS	Northern Trust Corp.	22.32	2.62	2.62	7.16	2.714	6.193	8.906	0.00846	0.00095
NOC	Northrop Grumman	55.76	1.68	1.64	5.18	1.682	4.873	6.555	0.01556	0.00237
NLOK	NortonLifeLock	12.58	2.27		21.9					
NCLH	Norwegian Cruise Line Holdings	10.3			-24.13					
NOV	NOV Inc.	5.17		0.38	18.9	0.416	14.019	14.435	0.00318	0.00022
NRG	NRG Energy	9.26	3.44	3.24	-12.7					
NUE	Nucor Corp.	23.75	2.02	2.01	8.22	2.093	6.899	8.992	0.00909	0.00101
NVDA	Nvidia Corporation	394.63	0.1	0.1	21.84					

NVR	NVR Inc.	18.32			4.8					
NXPI	NXP Semiconductors	55.46	1.16	0.75	16.76	0.813	12.593	13.405	0.03164	0.00236
ORLY	O'Reilly Automotive	37.09			10.07					
OXY	Occidental Petroleum	22.91	0.16	3.35	-5.15					
ODFL	Old Dominion Freight Line	29.39	0.32	0.24	16.52	0.260	12.433	12.692	0.01588	0.00125
OMC	Omnicom Group	16.96	3.47	3.23	9.5	3.383	7.753	11.136	0.00804	0.00072
OKE	Oneok	22.56	7.17	7.17	7.8	7.450	6.619	14.069	0.01351	0.00096
ORCL	Oracle Corp.	227.08	1.67	1.25	12.2	1.326	9.553	10.879	0.10514	0.00966
OTIS	Otis Worldwide	30.53	1.36		8.99	1.360	7.413	8.773	0.01140	0.00130
PCAR	Paccar	31.97	1.37	1.37	22.4					
PKG	Packaging Corporation of America	13.51	2.81	2.37	12.04	2.513	9.446	11.959	0.00688	0.00057
PH	Parker-Hannifin	41.45	1.11	1.11	14.94	1.193	11.379	12.572	0.02218	0.00176
PAYX	Paychex Inc.	35.14	2.52	2.52	4.85	2.581	4.653	7.234	0.01082	0.00150
PAYC	Paycom	23.98			26.05					
PYPL	PayPal	316.9			22.82					
PENN	Penn National Gaming	15.64			141.92					
PNR	Pentair plc	10.54	1.24	1.18	7.9	1.227	6.686	7.912	0.00355	0.00045
PBCT	People's United Financial	7.62	4.04	4.03	13.73	4.307	10.573	14.879	0.00483	0.00032
PEP	PepsiCo Inc.	199.18	2.78	2.78	9.18	2.908	7.539	10.447	0.08856	0.00848
PKI	PerkinElmer	15.01	0.21	0.21	17.2	0.228	12.886	13.114	0.00838	0.00064
PRGO	Perrigo	5.62	2.28	2.11	10	2.216	8.086	10.301	0.00246	0.00024
PFE	Pfizer Inc.	220.5	3.95	3.85	10.07	4.044	8.133	12.176	0.11427	0.00938
PM	Philip Morris International	146.5	5.1	5.06	10.87	5.335	8.666	14.001	0.08729	0.00623
PSX	Phillips 66	34.46	4.77	4.67	-7.75					
PNW	Pinnacle West Capital	9.6	3.9	3.73	3.5	3.795	3.753	7.548	0.00308	0.00041
PXD	Pioneer Natural Resources	31.63	1.52	1.5	91.92					
PNC	PNC Financial Services	72.99	2.63	2.63	-1.62					
POOL	Pool Corporation	15.35	0.6	0.59	17	0.640	12.753	13.393	0.00875	0.00065
PPG	PPG Industries	39.67	1.24	1.23	12.99	1.310	10.079	11.389	0.01923	0.00169
PPL	PPL Corp.	22.42	5.63	5.63	-16.2					
PFG	Principal Financial Group	17.29	3.56	3.56	7.05	3.685	6.119	9.805	0.00721	0.00074
PG	Procter & Gamble	339.21	2.54	2.33	8.68	2.431	7.206	9.637	0.13912	0.01444
PGR	Progressive Corp.	59.22	0.4	4.84	-8.65					
PLD	Prologis	83.27	2.2	2.07	-6.05					
PRU	Prudential Financial	39.1	4.7	4.49	6.21	4.629	5.559	10.189	0.01695	0.00166
PEG	Public Service Enterprise Group (PSEG)	32.06	3.21	3.08	2.45	3.118	3.053	6.170	0.00842	0.00136
PSA	Public Storage	47.82	2.92	2.92	17	3.168	12.753	15.921	0.03240	0.00204
PHM	PulteGroup	14.34	1.05	0.9	13.8	0.962	10.619	11.581	0.00707	0.00061
PVH	PVH Corp.	7.56		0.03	-4.87					

QRVO	Qorvo	21.78			16.5					
QCOM	Qualcomm	157.01	2	1.89	24.48					
PWR	Quanta Services Inc.	13.37	0.25	0.22	15.95	0.238	12.053	12.290	0.00699	0.00057
DGX	Quest Diagnostics	17.07	1.91	1.72	9.22	1.799	7.566	9.365	0.00680	0.00073
RL	Ralph Lauren Corporation	9.11		0.56	4.97	0.574	4.733	5.306	0.00206	0.00039
RJF	Raymond James Financial	17.51	1.23	1.18	18.66	1.290	13.859	15.149	0.01129	0.00075
RTX	Raytheon Technologies	116.87	2.41		24					
O	Realty Income Corporation	25.15	4.07	4.04	5.45	4.150	5.053	9.203	0.00985	0.00107
REG	Regency Centers Corporation	10.15	3.86	3.86	9.1	4.036	7.486	11.522	0.00498	0.00043
REGN	Regeneron Pharmaceuticals	53.53			11.11					
RF	Regions Financial Corp.	20.37	3.02	3.02	-21.6					
RSG	Republic Services Inc	33.78	1.61	1.57	7.7	1.630	6.553	8.183	0.01176	0.00144
RMD	ResMed	30.19	0.75	0.75	22.1					
RHI	Robert Half International	9.41	1.84	1.65	2.7	1.672	3.219	4.891	0.00196	0.00040
ROK	Rockwell Automation Inc.	30.57	1.6	1.54	10.79	1.623	8.613	10.236	0.01332	0.00130
ROL	Rollins Inc.	17.31	0.91	0.68	8.2	0.708	6.886	7.594	0.00559	0.00074
ROP	Roper Technologies	44.42	0.52	0.49	9.7	0.514	7.886	8.400	0.01588	0.00189
ROST	Ross Stores	46.33	0.9	0.22	46.74					
RCL	Royal Caribbean Group	21.33		0.92	58.7					
SPGI	S&P Global Inc.	91.31	0.8	0.7	10.96	0.738	8.726	9.464	0.03678	0.00389
CRM	Salesforce.com	212.29			12.92					
SBAC	SBA Communications	31.47	0.79	0.68	104.68					
SLB	Schlumberger Ltd.	36.76	1.94	3.4	41.84					
STX	Seagate Technology	19	3.2	3.12	6.74	3.225	5.913	9.138	0.00739	0.00081
SEE	Sealed Air	7.43	1.31	1.31	7.6	1.360	6.486	7.846	0.00248	0.00032
SRE	Sempra Energy	41.85	3.17	3.02	5.2	3.099	4.886	7.984	0.01422	0.00178
NOW	ServiceNow	107.16			23.5					
SHW	Sherwin-Williams	71.52	0.81	0.66	9.7	0.692	7.886	8.578	0.02611	0.00304
SPG	Simon Property Group Inc	38.25	4.42	5.1	8.6	5.319	7.153	12.472	0.02030	0.00163
SWKS	Skyworks Solutions	31.33	1.07	1.01	11.95	1.070	9.386	10.456	0.01394	0.00133
SNA	Snap-on	12.82	2.08	1.89	7.95	1.965	6.719	8.684	0.00474	0.00055
SO	Southern Company	68.79	4.02	3.86	6.49	3.985	5.746	9.731	0.02849	0.00293
LUV	Southwest Airlines	36.89		0.29	-21					
SWK	Stanley Black & Decker	33.07	1.36	1.35	9.95	1.417	8.053	9.470	0.01333	0.00141
SBUX	Starbucks Corp.	136.88	1.54	1.47	50.86					
STT	State Street Corp.	27.89	2.6	2.6	16.38	2.813	12.339	15.152	0.01799	0.00119
STE	Steris	18.14	0.75	0.72	10	0.756	8.086	8.842	0.00683	0.00077
SYK	Stryker Corp.	99.31	0.95	0.89	12.41	0.945	9.693	10.638	0.04496	0.00423
SIVB	SVB Financial	28.01			8					

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SYF	Synchrony Financial	24.07	2.22	2.19	3.05	2.223	3.453	5.676	0.00581	0.00102
SNPS	Synopsys Inc.	39.73			11.5					
SYF	Sysco Corp.	42.06	2.18	2.18	23.41					
TMUS	T-Mobile US	164.04			34.95					
TROW	T. Rowe Price Group	40.45	2.41	2.01	13.43	2.145	10.373	12.518	0.02155	0.00172
TTWO	Take-Two Interactive	20.49			17.21					
TPR	Tapestry Inc.	12.94		0.75	48.12					
TGT	Target Corp.	103.35	1.32	1.3	9.94	1.365	8.046	9.410	0.04139	0.00440
TEL	TE Connectivity Ltd.	44.17	1.56	1.42	11	1.498	8.753	10.251	0.01927	0.00188
TDY	Teledyne Technologies	16.16			12.8					
TFX	Teleflex	20.19	0.31	0.31	11	0.327	8.753	9.080	0.00780	0.00086
TER	Teradyne	21.04	0.31	0.31	12.76	0.330	9.926	10.256	0.00918	0.00090
TSLA	Tesla Inc.	685.94			35.7					
TXN	Texas Instruments	171.01	2.16	1.97	10	2.069	8.086	10.154	0.07390	0.00728
TXT	Textron Inc.	13.43	0.14	0.14	25.26					
BK	The Bank of New York Mellon	40.78	2.63	2.63	12.83	2.799	9.973	12.771	0.02217	0.00174
CLX	The Clorox Company	24.46	2.27	2.24	5.07	2.297	4.799	7.096	0.00739	0.00104
COO	The Cooper Companies	19.64	0.01	0.01	10	0.011	8.086	8.096	0.00677	0.00084
HSY	The Hershey Company	33.56	1.97	1.94	7.6	2.014	6.486	8.500	0.01214	0.00143
MOS	The Mosaic Company	12.67	0.6	0.6	7	0.621	6.086	6.707	0.00362	0.00054
TRV	The Travelers Companies	39.16	2.24	2.16	5.99	2.225	5.413	7.637	0.01273	0.00167
DIS	The Walt Disney Company	339.93		0.48	47.73					
TMO	Thermo Fisher Scientific	191.65	0.22	0.18	4.09	0.184	4.146	4.330	0.03531	0.00816
TJX	TJX Companies Inc.	82.58	1.52	0.38	63.31					
TSCO	Tractor Supply Company	21.27	1.15	0.83	11.13	0.876	8.839	9.715	0.00879	0.00091
TT	Trane Technologies plc	41	1.38		12.56	1.380	9.793	11.173	0.01950	0.00174
TDG	TransDigm Group	32.58			15.48					
TRMB	Trimble Inc.	20.36			10					
TFC	Truist Financial	77.19	3.23		8.9	3.230	7.353	10.583	0.03476	0.00329
TWTR	Twitter Inc.	52.47			0.43					
TYL	Tyler Technologies	18.4			10					
TSN	Tyson Foods	28.65	2.24	2.11	4.45	2.157	4.386	6.543	0.00798	0.00122
USB	U.S. Bancorp	86.41	2.95	2.95	6	3.039	5.419	8.458	0.03110	0.00368
UDR	UDR Inc.	13.6	3.12	3.1	-34.21					
ULTA	Ulta Beauty	18.59			41.8					
UAA	Under Armour (Class A)	9.34			-4.5					
UA	Under Armour (Class C)	9.34			21.8					
UNP	Union Pacific Corp	148.48	1.74	1.74	12.94	1.853	10.046	11.898	0.07519	0.00632
UAL	United Airlines Holdings	17.79			-25.4					

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UPS	United Parcel Service	155.25	2.28	2.26	10.06	2.374	8.126	10.500	0.06937	0.00661
URI	United Rentals Inc.	22.91			9.6					
UNH	UnitedHealth Group Inc.	368.52	1.25	1.25	12.62	1.329	9.833	11.161	0.17505	0.01568
UHS	Universal Health Services	12.43	0.54	0.14	7.32	0.145	6.299	6.444	0.00341	0.00053
UNM	Unum Group	5.94	3.95	3.95	2.63	4.002	3.173	7.174	0.00181	0.00025
VLO	Valero Energy	28.96	5.71	5.58	-13					
VAR	Varian Medical Systems	16.26			9.9					
VTR	Ventas Inc	20.55	3.23	3.85	-0.5					
VRSN	Verisign Inc.	23.37			8					
VRSK	Verisk Analytics	30.1	0.63	0.58	10.32	0.610	8.299	8.909	0.01141	0.00128
VZ	Verizon Communications	241.73	4.32	4.27	2.84	4.331	3.313	7.643	0.07863	0.01029
VRTX	Vertex Pharmaceuticals Inc	56.73			11.94					
VFC	VF Corporation	34.09	2.25	2.22	9.89	2.330	8.013	10.342	0.01500	0.00145
VIAC	ViacomCBS	25.84	2.35		-4.13					
VTRS	Viatis	15.99			-3.65					
V	Visa Inc.	501.49	0.56	0.55	15.53	0.593	11.773	12.365	0.26391	0.02134
VNO	Vornado Realty Trust	8.52	4.66	5.23	17.33	5.683	12.973	18.656	0.00676	0.00036
VMC	Vulcan Materials	23.15	0.83	0.77	13.75	0.823	10.586	11.409	0.01124	0.00099
WRB	W. R. Berkley Corporation	14.31	0.6	0.58	26.31					
WBA	Walgreens Boots Alliance	46.5	3.46	3.44	3.63	3.502	3.839	7.342	0.01453	0.00198
WMT	Walmart	396.11	1.56	1.53	6.29	1.578	5.613	7.191	0.12122	0.01686
WM	Waste Management Inc.	57.21	1.7	1.61	11.17	1.700	8.866	10.566	0.02573	0.00243
WAT	Waters Corporation	18.69			7.17					
WEC	WEC Energy Group	30.58	2.79	2.6	6.1	2.679	5.486	8.165	0.01063	0.00130
WFC	Wells Fargo	176.16	0.93	1.87	113.07					
WELL	Welltower Inc.	31.78	3.2	3.2	13	3.408	10.086	13.494	0.01825	0.00135
WST	West Pharmaceutical Services	23.4	0.21	0.2	22.6					
WDC	Western Digital	21.09		0.72	-22					
WU	Western Union Co	10.62	3.59	3.43	9.25	3.589	7.586	11.175	0.00505	0.00045
WAB	Westinghouse Air Brake Technologies Corp	15.26	0.58	0.58	7.3	0.601	6.286	6.887	0.00447	0.00065
WRK	WestRock	14.4	1.49	1.98	24.38					
WY	Weyerhaeuser	29.44	1.78	1.34	5	1.374	4.753	6.126	0.00768	0.00125
WHR	Whirlpool Corp.	14.73	2.39	2.07	3.3	2.104	3.619	5.723	0.00359	0.00063
WMB	Williams Companies	28.62	6.96	6.79	5	6.960	4.753	11.712	0.01427	0.00122
WLTW	Willis Towers Watson	30.6	1.2	1.18	5.66	1.213	5.193	6.406	0.00834	0.00130
WYNN	Wynn Resorts Ltd	15		0.79	-1.1					
XEL	Xcel Energy Inc	38.5	2.57	2.41	6.3	2.486	5.619	8.105	0.01328	0.00164
XLNX	Xilinx	31		1.19	9	1.244	7.419	8.663	0.01150	0.00133

XYL	Xylem Inc.	19.55	1.02	0.95	18.16	1.036	13.526	14.562	0.01212	0.00083
YUM	Yum! Brands Inc	35.25	1.7	1.63	12.61	1.733	9.826	11.559	0.01734	0.00150
ZBRA	Zebra Technologies	27.26			10					
ZBH	Zimmer Biomet	35.81	0.54	0.54	11.29	0.570	8.946	9.516	0.01450	0.00152
ZION	Zions Bancorp	8.79	2.53	2.53	-32.4					
ZTS	Zoetis	80.15	0.59	0.47	11.43	0.497	9.039	9.536	0.03253	0.00341

Total Market Capitalization
39309
Total Market Cap - Adjusted
23497

2.05 7.63 9.69

Market
Return
10.45

Total
1.00000

Average 30-year T-bond yield October 2020 - March 2021

1.85

Market Risk Premium

8.60

Notes:

Market Capitalization was obtained as of April 23, 2021

So were forward dividend yield, trailing dividend yield and projected next 5-year earnings growth.

From Finance.yahoo.com

Total Market Capitalization - Adjusted: exclude market capitalization of companies with negative or higher than 20% earnings growth rate

Company	CAPM				
	[1]	[2]	[3]	[4]	[5]
	Beta	Risk Free Rate	Market Risk Premium	Adjusted RP	ROE
Atmos Energy Corp	0.675	1.85%	8.60%	5.81%	7.66%
New Jersey Resources	0.8	1.85%	8.60%	6.88%	8.73%
Nisource	0.7	1.85%	8.60%	6.02%	7.87%
N.W. Natural	0.675	1.85%	8.60%	5.81%	7.66%
One Gas Inc	0.7	1.85%	8.60%	6.02%	7.87%
South Jersey Industries	0.925	1.85%	8.60%	7.96%	9.81%
Southwest Gas	0.8	1.85%	8.60%	6.88%	8.73%
Spire Inc	0.725	1.85%	8.60%	6.24%	8.09%
UGI	0.875	1.85%	8.60%	7.53%	9.38%
Min	0.68				7.66%
Max	0.93				9.81%
Median	0.73				8.09%
Average	0.76				8.42%
Midpoint	0.80				8.73%

Filing Date	Decision Date	Authorized ROE	Rate Case Duration (months)	Interest Rate	Risk Premium
12/3/1980	7/2/1981	14.00	7	12.83	1.17
4/28/1995	11/27/1995	13.60	7	6.63	6.97
5/25/1990	12/21/1990	13.60	7	8.65	4.95
11/30/1982	6/30/1983	14.80	7	10.66	4.14
2/1/2005	12/9/2005	9.70	10	4.55	5.15
12/29/2004	11/2/2005	9.70	10	4.55	5.15
1/30/1996	11/27/1996	11.30	10	6.78	4.52
11/24/1980	7/21/1981	15.78	7	12.86	2.92
11/24/2004	9/19/2005	9.45	9	4.58	4.87
4/9/1993	2/9/1994	10.70	10	6.41	4.29
3/21/1985	12/6/1985	12.00	8	10.67	1.33
8/27/1982	9/30/1983	16.15	13	11.03	5.12
11/18/1980	10/29/1981	16.50	11	13.31	3.19
11/2/1979	5/29/1980	16.00	6	11.04	4.96
5/1/2019	12/9/2020	9.10	19	1.90	7.20
8/31/2007	12/24/2008	10.00	16	4.39	5.61
12/9/2004	2/15/2006	9.50	14	4.59	4.91
5/5/2000	10/24/2001	11.00	17	5.66	5.34
11/7/1990	2/27/1992	11.75	15	8.11	3.64
7/2/1990	8/12/1993	10.75	37	7.82	2.93
4/20/1989	8/31/1990	12.50	16	8.38	4.12
4/20/1989	8/31/1990	12.50	16	8.38	4.12
9/23/1983	6/13/1984	15.50	8	12.21	3.29
3/2/1982	9/30/1982	16.50	7	13.22	3.28
6/2/1980	4/30/1981	15.00	11	11.76	3.24
4/8/2011	4/24/2012	9.75	12	3.51	6.24
11/7/2008	4/1/2010	9.50	17	4.09	5.41
7/13/2006	11/27/2007	10.00	16	4.86	5.14
5/3/1993	6/16/1994	10.50	13	6.60	3.90
4/20/2012	12/20/2012	10.40	8	2.81	7.59
4/22/2019	12/19/2019	10.20	8	2.41	7.79
4/20/2012	12/20/2012	10.30	8	2.81	7.49
7/1/1980	12/30/1980	14.50	6	11.45	3.05
4/22/2019	12/19/2019	10.05	8	2.41	7.64
4/20/2012	12/20/2012	10.10	8	2.81	7.29
2/13/2002	3/16/2004	10.90	25	5.06	5.84
2/13/2002	3/16/2004	10.90	25	5.06	5.84
7/2/1982	11/17/1982	16.00	4	12.18	3.82

2/1/2019	5/19/2020	9.20	15	2.29	6.91
7/17/2000	3/15/2001	11.25	8	5.64	5.61
11/2/1998	6/8/1999	11.25	7	5.41	5.84
6/5/1996	1/31/1997	11.25	8	6.82	4.43
1/20/1993	11/26/1993	11.00	10	6.59	4.41
5/18/1981	12/1/1981	15.70	6	13.86	1.84
5/7/1980	12/12/1980	15.45	7	11.04	4.41
3/26/1980	5/27/1980	14.60	2	11.07	3.53
7/8/2013	1/22/2014	9.18	6	3.77	5.41
1/16/2009	6/30/2009	9.31	5	3.89	5.42
11/9/1999	5/25/2000	10.80	6	6.20	4.60
4/10/1995	10/13/1995	10.76	6	6.78	3.98
6/17/1993	12/16/1993	11.20	6	6.26	4.94
3/13/1989	8/23/1989	12.90	5	8.56	4.34
4/16/1984	9/12/1984	15.90	4	13.02	2.88
1/24/1983	6/30/1983	15.90	5	10.70	5.20
12/18/1981	5/25/1982	16.25	5	13.71	2.54
1/17/1980	6/25/1980	14.25	5	11.19	3.06
7/1/1988	12/21/1988	12.90	5	9.07	3.83
8/8/1987	2/4/1988	12.60	6	9.15	3.45
11/25/1985	6/11/1986	14.00	6	8.44	5.56
7/15/1983	12/8/1983	15.90	4	11.65	4.25
7/30/1982	12/14/1982	16.40	4	11.58	4.82
7/2/1981	11/25/1981	16.10	4	14.14	1.96
7/2/1981	11/25/1981	16.10	4	14.14	1.96
5/5/1980	10/9/1980	14.50	5	10.60	3.90
5/5/1980	10/9/1980	14.50	5	10.60	3.90
1/20/2009	7/17/2009	9.26	5	3.95	5.31
7/15/1999	1/28/2000	10.71	6	6.23	4.48
10/13/1989	3/28/1990	13.00	5	8.18	4.82
3/6/1987	10/20/1987	12.60	7	8.74	3.86
7/24/1984	1/2/1985	16.00	5	12.01	3.99
6/21/1982	11/2/1982	16.25	4	12.55	3.70
5/28/1981	8/25/1981	15.45	2	13.48	1.97
6/6/1980	11/6/1980	14.35	5	10.86	3.49
7/24/2001	1/30/2002	11.00	6	5.39	5.61
3/30/1992	8/26/1992	12.43	4	7.74	4.69
2/26/2016	3/1/2017	9.25	12	2.64	6.61
2/29/2012	5/10/2013	9.25	14	2.94	6.31
2/7/2003	11/10/2003	10.60	9	4.89	5.71
6/19/2001	10/30/2002	10.60	16	5.38	5.22
12/18/1992	10/8/1993	11.50	9	6.75	4.75
1/22/1988	10/27/1988	12.95	9	8.93	4.02

10/23/1985	9/5/1986	13.30	10	8.31	4.99
4/14/1982	2/25/1983	15.70	10	12.05	3.65
4/24/1981	2/9/1982	14.95	9	13.87	1.08
8/3/1984	2/22/1985	14.86	6	11.82	3.04
5/8/1981	12/15/1981	15.81	7	13.82	1.99
6/3/2019	12/19/2019	10.25	6	2.31	7.94
5/3/2010	11/3/2010	10.75	6	3.97	6.78
8/24/2001	4/29/2002	11.00	8	5.44	5.56
11/26/1997	6/30/1998	11.00	7	5.88	5.12
3/31/1993	9/29/1993	11.00	6	6.59	4.41
3/31/1992	9/30/1992	11.60	6	7.67	3.93
5/31/1991	11/26/1991	12.00	5	8.14	3.86
3/30/1990	9/18/1990	12.75	5	8.69	4.06
5/27/1987	11/29/1988	12.75	18	8.98	3.77
3/27/1986	9/23/1986	12.75	6	7.43	5.32
3/29/1985	9/23/1985	15.30	5	10.78	4.52
4/2/1984	9/25/1984	16.25	5	12.92	3.33
3/31/1983	9/30/1983	16.25	6	11.11	5.14
3/31/1982	9/30/1982	16.70	6	13.17	3.53
7/2/1981	12/22/1981	16.00	5	14.01	1.99
7/20/1979	1/18/1980	14.00	6	9.70	4.30
10/1/2009	3/31/2010	10.70	6	4.48	6.22
3/20/2008	9/19/2008	10.70	6	4.50	6.20
5/20/2005	12/20/2005	10.13	7	4.51	5.62
7/28/1981	9/3/1982	15.50	13	13.76	1.74
5/24/1992	11/25/1992	12.00	6	7.56	4.44
11/9/1992	9/1/1993	11.25	9	6.95	4.30
6/30/1989	4/30/1990	12.45	10	8.22	4.23
10/1/1981	7/2/1982	15.10	9	13.78	1.32
9/15/1980	4/30/1981	13.60	7	12.38	1.22
5/11/1984	8/21/1984	14.64	3	13.18	1.46
8/30/1982	2/10/1983	15.00	5	11.02	3.98
12/30/1980	3/3/1982	15.00	14	13.54	1.46
8/1/1980	7/31/1981	14.20	12	12.47	1.73
5/1/1980	11/6/1981	15.17	18	12.43	2.74
8/1/1978	7/31/1981	13.50	36	10.90	2.60
6/22/1978	8/1/1980	12.50	25	9.91	2.59
3/29/1978	4/29/1980	12.50	25	9.86	2.64
2/6/2004	9/9/2004	10.40	7	5.12	5.28
3/17/1982	9/17/1982	15.25	6	13.29	1.96
3/20/1981	10/20/1981	15.25	7	13.72	1.53
3/17/1980	8/11/1980	14.85	4	10.68	4.17
8/12/2016	4/28/2017	9.50	8	2.82	6.68

4/30/1982	11/4/1982	15.75	6	12.77	2.98
9/3/1981	2/9/1982	15.75	5	14.11	1.64
5/14/1980	10/31/1980	14.50	5	10.75	3.75
2/21/2020	1/13/2021	9.67	10	1.47	8.20
1/25/2013	12/18/2013	9.08	10	3.46	5.62
2/18/2011	1/10/2012	9.06	10	3.78	5.28
6/5/2009	4/29/2010	9.40	10	4.46	4.94
6/5/2009	4/29/2010	9.19	10	4.46	4.73
6/5/2009	4/29/2010	9.40	10	4.46	4.94
11/2/2007	9/24/2008	10.68	10	4.49	6.19
11/2/2007	9/24/2008	10.68	10	4.49	6.19
11/2/2007	9/24/2008	10.68	10	4.49	6.19
11/27/2002	10/22/2003	10.46	10	4.88	5.58
11/27/2002	10/22/2003	10.71	10	4.88	5.83
11/22/2002	10/17/2003	10.54	10	4.88	5.66
6/29/1998	3/1/1999	10.65	8	5.29	5.36
6/29/1998	3/1/1999	10.65	8	5.29	5.36
1/14/1994	12/12/1994	11.82	11	7.38	4.44
5/14/1993	4/6/1994	11.24	10	6.44	4.80
4/24/1991	3/18/1992	12.50	10	8.03	4.47
2/22/1990	1/16/1991	13.25	10	8.63	4.62
1/16/1990	11/28/1990	12.75	10	8.66	4.09
2/19/1982	1/12/1983	15.50	10	12.47	3.03
1/4/1982	11/23/1982	15.50	10	13.02	2.48
5/6/1981	7/1/1982	16.00	14	13.78	2.22
5/1/1980	3/25/1981	15.30	10	11.47	3.83
2/15/1980	1/7/1981	14.30	10	11.33	2.97
6/2/2009	3/24/2010	10.13	9	4.43	5.70
10/19/2001	9/11/2002	11.20	10	5.41	5.79
9/1/1999	7/17/2000	11.06	10	6.15	4.91
9/1/1992	7/21/1993	11.78	10	7.13	4.65
11/23/1982	10/13/1983	15.52	10	10.94	4.58
10/2/1981	8/25/1982	16.00	10	13.68	2.32
7/11/1980	6/3/1981	14.67	10	12.17	2.50
2/26/2014	1/21/2015	9.05	10	3.22	5.83
7/31/2012	6/18/2013	9.28	10	2.98	6.30
2/15/2011	1/10/2012	9.45	10	3.79	5.66
2/13/2009	1/21/2010	10.33	11	4.21	6.12
3/9/2007	2/5/2008	9.99	11	4.79	5.20
12/16/1994	11/8/1995	11.30	10	7.04	4.26
12/14/1990	11/8/1991	12.75	10	8.19	4.56

11/2/1983	9/12/1984	15.60	10	12.49	3.11
3/18/1982	12/28/1982	15.25	9	12.47	2.78
1/21/1980	12/17/1980	14.40	11	11.30	3.10
11/9/2018	10/2/2019	9.73	10	2.77	6.96
3/10/2017	1/31/2018	9.80	10	2.86	6.94
4/29/2008	3/25/2009	10.17	11	4.00	6.17
11/4/2004	9/30/2005	10.51	11	4.59	5.92
5/8/1995	4/3/1996	11.13	11	6.46	4.67
1/27/1987	1/20/1988	12.75	11	8.67	4.08
8/6/1981	7/1/1982	15.55	10	13.89	1.66
2/9/1979	1/3/1980	12.55	10	9.34	3.21
2/26/2014	1/21/2015	9.05	10	3.22	5.83
7/31/2012	6/18/2013	9.28	10	2.98	6.30
2/15/2011	1/10/2012	9.45	10	3.79	5.66
2/13/2009	1/21/2010	10.23	11	4.21	6.02
3/9/2007	2/5/2008	10.19	11	4.79	5.40
12/16/1994	11/8/1995	11.10	10	7.04	4.06
11/15/1991	10/6/1992	12.25	10	7.71	4.54
12/15/1989	11/9/1990	13.25	10	8.61	4.64
10/17/1983	8/30/1984	15.60	10	12.45	3.15
2/3/1982	12/28/1982	15.25	10	12.65	2.60
1/21/1980	12/17/1980	14.20	11	11.30	2.90
2/6/1987	9/18/1987	13.00	7	8.45	4.55
7/8/1983	1/18/1984	15.53	6	11.67	3.86
3/25/1982	10/27/1982	17.00	7	12.94	4.06
6/11/1980	12/8/1980	16.40	6	11.14	5.26
11/12/1987	10/26/1988	13.50	11	8.95	4.55
11/16/1981	8/11/1982	17.11	8	13.63	3.48
6/28/2019	2/24/2020	9.10	8	2.24	6.86
5/15/1992	1/12/1993	12.00	8	7.55	4.45
8/17/1995	4/15/1996	10.50	8	6.36	4.14
11/25/1987	9/26/1988	12.40	10	8.95	3.45
10/18/1985	6/13/1986	13.55	7	8.70	4.85
12/16/1983	8/9/1984	15.33	7	12.62	2.71
4/7/1982	12/3/1982	15.33	8	12.56	2.77
5/29/1981	1/25/1982	16.25	8	13.88	2.37
3/10/1981	11/4/1981	15.33	7	13.72	1.61
11/16/1979	7/23/1980	14.19	8	10.84	3.35
6/20/1979	3/5/1980	14.00	8	9.97	4.03
9/28/2018	5/7/2019	9.65	7	3.11	6.54
9/28/2017	5/3/2018	9.70	7	2.94	6.76

2/13/1990	9/13/1990	12.50	7	8.65	3.85
5/9/1986	10/31/1986	13.75	5	7.49	6.26
6/10/1983	12/1/1983	14.50	5	11.52	2.98
1/30/1989	10/6/1989	13.00	8	8.56	4.44
1/21/1988	10/21/1988	12.80	9	8.93	3.87
4/30/1984	10/18/1984	15.00	5	12.87	2.13
1/14/1983	7/5/1983	15.00	5	10.70	4.30
4/23/2010	10/21/2010	10.40	6	4.00	6.40
3/29/2001	1/31/2002	11.00	10	5.50	5.50
9/16/1992	7/23/1993	11.50	10	7.12	4.38
4/2/1990	10/2/1990	13.00	6	8.71	4.29
5/4/1984	10/24/1984	15.50	5	12.83	2.67
2/22/2000	9/27/2000	11.25	7	5.91	5.34
6/29/1990	12/21/1990	12.50	5	8.68	3.82
11/20/1987	7/1/1988	12.75	7	8.87	3.88
11/23/1983	5/16/1984	15.00	5	12.20	2.80
9/10/1982	3/2/1983	15.25	5	10.90	4.35
7/1/1981	1/4/1982	15.50	6	14.00	1.50
3/31/1980	9/24/1980	15.00	5	10.67	4.33
1/14/1988	11/15/1988	12.00	10	8.93	3.07
3/27/1986	2/24/1987	12.00	11	7.46	4.54
3/1/1985	9/25/1985	14.50	6	10.90	3.60
5/11/1984	10/2/1984	14.80	4	12.93	1.87
9/28/1982	6/27/1983	14.50	9	10.71	3.79
11/4/1981	5/20/1982	15.82	6	13.63	2.19
5/14/1980	10/28/1980	12.00	5	10.71	1.29
8/19/1987	7/8/1988	12.00	10	9.01	2.99
3/30/1987	11/24/1987	12.50	7	8.89	3.61
6/11/1985	5/28/1986	14.00	11	9.43	4.57
5/6/1983	9/26/1983	14.50	4	11.26	3.24
5/15/1981	10/26/1981	13.50	5	13.92	(0.42)
12/10/1982	12/12/1983	14.50	12	11.08	3.42
11/9/1979	11/17/1980	15.50	12	11.00	4.50
9/21/2018	11/7/2019	9.35	13	2.79	6.56
4/18/1980	4/9/1981	15.00	11	11.52	3.48
11/15/2017	9/28/2018	9.50	10	3.02	6.48
4/16/2010	11/2/2010	9.75	6	4.02	5.73
4/16/2003	10/31/2003	10.20	6	4.90	5.30
4/16/1993	10/29/1993	11.25	6	6.47	4.78
6/24/1988	9/30/1988	13.25	3	9.15	4.10
3/16/1982	9/30/1982	15.50	6	13.20	2.30

11/15/2017	9/28/2018	9.50	10	3.02	6.48
4/16/2010	11/2/2010	9.75	6	4.02	5.73
5/17/1982	11/30/1982	16.10	6	12.46	3.64
4/16/2013	2/28/2014	9.55	10	3.61	5.94
4/13/2012	11/1/2012	9.45	6	2.82	6.63
4/16/2009	10/30/2009	9.95	6	4.28	5.67
4/27/2005	11/30/2005	10.00	7	4.50	5.50
4/16/1992	10/30/1992	11.40	6	7.63	3.77
5/17/1982	11/30/1982	15.50	6	12.46	3.04
7/17/1981	1/31/1982	14.00	6	14.08	(0.08)
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1/14/2011	8/1/2011	9.20	6	4.42	4.78
9/16/2010	3/31/2011	9.45	6	4.31	5.14
7/17/2008	2/2/2009	10.05	6	3.86	6.19
12/17/2014	10/30/2015	9.80	10	2.81	6.99
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5/17/1982	11/30/1982	15.50	6	12.46	3.04
7/17/1979	1/31/1980	12.61	6	9.76	2.85
6/8/2018	1/4/2019	9.80	7	3.15	6.65
11/6/2015	6/3/2016	9.65	7	2.76	6.89
5/17/2013	12/13/2013	9.60	7	3.65	5.95
7/27/2012	2/22/2013	9.60	7	2.91	6.69
5/7/2010	12/6/2010	9.56	7	4.00	5.56
4/29/2005	12/21/2005	11.00	7	4.51	6.49
11/7/1999	6/19/2000	11.05	7	6.18	4.87
4/21/1995	11/20/1995	11.40	7	6.66	4.74
9/25/1992	4/23/1993	11.75	7	7.25	4.50
11/10/1986	5/5/1987	12.85	5	7.63	5.22
12/6/1982	7/1/1983	14.80	6	10.66	4.14
7/10/1981	2/8/1982	15.50	7	14.07	1.43
11/13/1979	6/10/1980	13.78	7	11.01	2.77
5/22/2019	12/18/2019	9.60	7	2.33	7.27
2/28/2013	9/23/2013	9.60	6	3.38	6.22
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11/22/2017	9/13/2018	10.00	9	3.01	6.99
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11/14/1980	10/2/1981	14.80	10	13.20	1.60
4/11/2017	2/21/2018	9.80	10	2.86	6.94
1/26/1999	12/14/1999	10.50	10	5.89	4.61
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3/9/1994	10/7/1994	11.87	7	7.43	4.44
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1/19/1983	8/18/1983	15.30	7	10.89	4.41

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6/10/1980	1/12/1981	14.95	7	11.30	3.65
8/24/1981	4/12/1982	15.10	7	14.02	1.08
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7/1/1983	3/23/1984	15.50	8	11.76	3.74
2/13/1981	2/11/1982	16.00	12	13.68	2.32
4/2/1979	5/8/1980	13.75	13	10.07	3.68
3/30/1984	2/15/1985	15.00	10	12.35	2.65
8/27/1981	10/8/1982	15.00	13	13.58	1.42
5/30/2006	6/29/2007	9.53	13	4.90	4.63
8/28/1995	2/13/1997	11.00	17	6.62	4.38
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8/24/1979	7/18/1980	13.80	10	10.54	3.26
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7/9/1982	9/16/1983	15.51	14	11.26	4.25

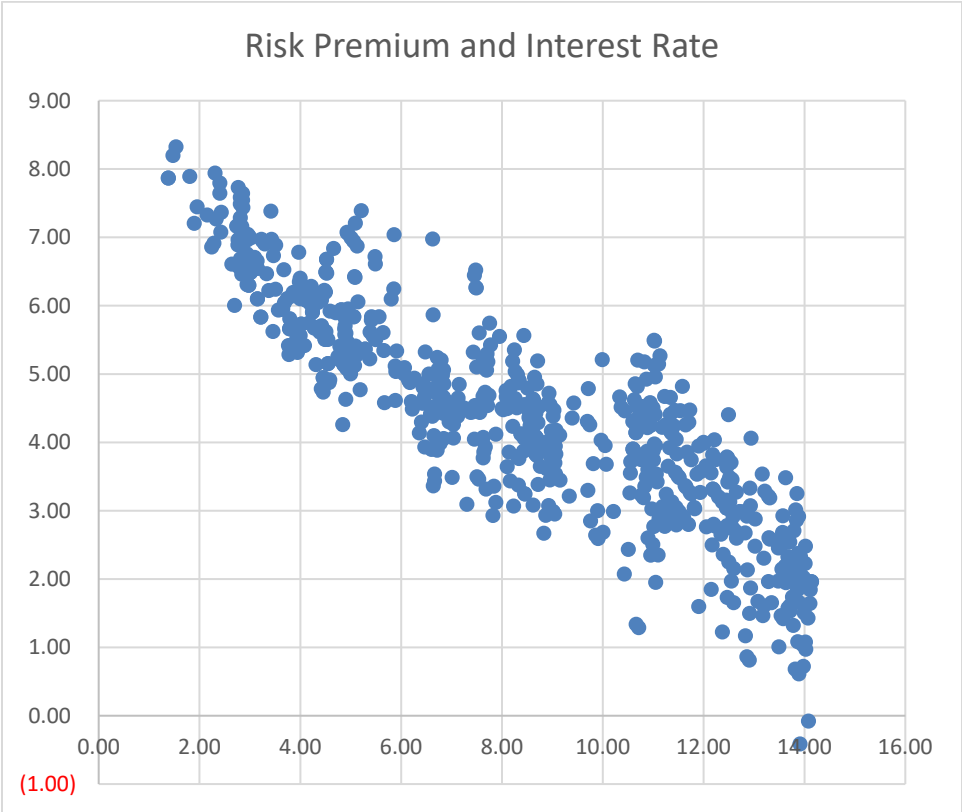
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10/16/1998	11/12/1999	10.25	13	5.67	4.58
4/24/2020	2/19/2021	9.86	10	1.54	8.32
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4/28/1988	1/26/1989	12.60	9	9.06	3.54
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4/15/1983	1/13/1984	15.50	9	11.37	4.13
4/27/2006	2/8/2007	10.40	9	4.93	5.47
4/29/1983	1/26/1984	15.90	9	11.43	4.47
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6/1/1989	11/28/1989	12.75	6	8.09	4.66
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6/13/1983	9/28/1983	14.25	3	11.46	2.79
5/3/2002	11/1/2002	12.60	6	5.21	7.39

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8/21/1986	2/13/1987	12.60	5	7.50	5.10
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11/16/2009	5/24/2010	10.05	6	4.55	5.50
1/26/2004	10/20/2004	10.20	8	5.08	5.12
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9/17/1982	3/16/1983	16.00	6	10.82	5.18
5/31/2012	12/4/2012	10.50	6	2.77	7.73
4/24/2009	1/26/2010	10.40	9	4.36	6.04
5/31/2006	3/29/2007	10.00	10	4.88	5.12
5/23/2003	5/25/2004	10.00	12	5.00	5.00
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3/31/2016	9/27/2016	9.50	6	2.43	7.07
6/3/2010	12/14/2010	10.33	6	3.98	6.35
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12/19/2007	6/27/2008	10.00	6	4.49	5.51
5/3/2002	12/30/2002	11.20	8	5.15	6.05
4/2/1993	1/10/1994	11.00	9	6.43	4.57
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8/8/1984	2/7/1985	14.85	6	11.82	3.03
1/9/1981	6/22/1981	16.00	5	12.93	3.07
1/4/1980	5/19/1980	15.50	4	11.46	4.04
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4/29/2009	12/22/2009	10.40	7	4.32	6.08
5/7/2007	12/14/2007	10.80	7	4.87	5.93
4/19/2005	12/12/2005	11.00	7	4.51	6.49
5/5/2004	12/22/2004	11.50	7	5.08	6.42
5/30/2003	1/13/2004	12.00	7	5.01	6.99
5/1/2002	2/28/2003	12.30	10	5.09	7.21
4/17/2000	11/28/2000	12.90	7	5.86	7.04
4/15/1998	12/10/1998	12.20	7	5.48	6.72
9/3/1996	7/17/1997	12.00	10	6.80	5.20
4/14/1994	12/8/1994	11.70	7	7.63	4.07
10/26/1992	6/3/1993	12.00	7	7.16	4.84
9/29/1989	6/15/1990	13.20	8	8.33	4.87
9/30/1988	6/8/1989	13.50	8	8.96	4.54
10/9/1987	6/14/1988	13.50	8	8.92	4.58
10/10/1986	5/28/1987	13.50	7	7.76	5.74
10/25/1985	5/29/1986	13.90	7	8.71	5.19
6/15/1984	7/26/1985	14.50	13	11.70	2.80
5/27/1983	2/28/1984	14.50	9	11.59	2.91
6/18/1982	6/2/1983	14.50	11	11.37	3.13
9/11/1981	7/22/1982	14.50	10	13.82	0.68
5/31/1979	2/14/1980	13.00	8	9.70	3.30
5/4/2017	12/7/2017	9.80	7	2.83	6.97
5/29/2015	12/3/2015	10.00	6	2.98	7.02
5/31/2013	12/5/2013	10.20	6	3.68	6.52
6/1/2011	12/22/2011	10.40	6	3.51	6.89
6/1/2007	1/8/2008	10.75	7	4.82	5.93
11/14/1997	9/15/1998	11.90	10	5.80	6.10
3/15/1996	11/26/1996	11.30	8	6.86	4.44
6/1/1995	12/14/1995	11.30	6	6.52	4.78
6/1/1992	1/12/1993	12.00	7	7.53	4.47
5/31/1991	12/19/1991	12.60	6	8.11	4.49
8/21/1989	12/27/1989	12.50	4	8.01	4.49
6/1/1987	12/22/1987	12.00	6	9.05	2.95
7/30/1982	7/19/1983	15.00	11	11.05	3.95

5/30/2014	11/14/2014	10.20	5	3.23	6.97
3/23/2012	11/28/2012	10.40	8	2.86	7.54
3/13/2009	12/18/2009	10.40	9	4.22	6.18
5/7/2007	1/17/2008	10.75	8	4.81	5.94
6/1/2005	1/25/2006	11.20	7	4.52	6.68
3/23/2012	11/28/2012	10.50	8	2.86	7.64
3/13/2009	12/18/2009	10.50	9	4.22	6.28
5/7/2007	1/17/2008	10.75	8	4.81	5.94
6/1/2005	1/25/2006	11.20	7	4.52	6.68
3/31/1993	11/12/1993	11.80	7	6.48	5.32
3/31/1992	10/29/1992	12.75	7	7.65	5.10
3/28/1991	10/15/1991	13.40	6	8.22	5.18
4/28/1989	10/31/1989	13.60	6	8.25	5.35
6/30/1986	12/30/1986	13.90	6	7.46	6.44
6/28/1985	12/20/1985	15.00	5	10.34	4.66
6/28/1984	12/20/1984	15.00	5	12.23	2.77
6/28/1983	12/29/1983	15.00	6	11.63	3.37
6/28/1982	1/18/1983	15.00	6	11.74	3.26
8/4/1981	4/6/1982	15.00	8	14.03	0.97
5/15/1980	12/18/1980	14.00	7	11.12	2.88
1/16/1996	2/13/1997	11.80	13	6.73	5.07
3/27/1995	9/11/1995	11.30	5	6.88	4.42
12/30/1992	8/31/1993	11.90	8	6.84	5.06
12/30/1991	10/13/1992	12.75	9	7.70	5.05
12/27/1990	8/29/1991	13.30	8	8.26	5.04
12/23/1987	9/27/1988	13.65	9	8.93	4.72
11/7/1983	8/28/1984	14.75	9	12.50	2.25
9/30/1982	9/8/1983	14.75	11	10.88	3.87
2/5/1982	10/28/1982	14.75	8	13.08	1.67
2/16/1981	9/29/1981	14.50	7	13.49	1.01
4/9/2014	6/6/2014	10.40	1	3.43	6.97
5/3/2012	6/15/2012	10.40	1	2.83	7.57
5/8/2009	12/18/2009	10.40	7	4.33	6.07
3/17/2006	1/19/2007	10.80	10	4.94	5.86
9/17/2004	7/19/2005	11.50	10	4.66	6.84
3/6/2003	12/19/2003	12.00	9	4.93	7.07
5/7/2002	4/3/2003	12.00	11	5.06	6.94
4/1/1996	4/29/1997	11.70	13	6.85	4.85
2/4/1994	12/8/1994	11.50	10	7.45	4.05
1/4/1993	9/30/1993	11.60	8	6.74	4.86
12/30/1991	12/22/1992	12.40	11	7.67	4.73
12/29/1989	6/27/1990	12.90	6	8.54	4.36
12/30/1988	11/9/1989	13.00	10	8.53	4.47

2/29/1988	10/13/1988	13.10	7	9.01	4.09
12/30/1985	8/14/1986	13.50	7	7.95	5.55
12/28/1984	8/29/1985	14.50	8	11.04	3.46
12/30/1983	10/9/1984	14.75	9	12.60	2.15
1/10/1983	8/31/1983	14.75	7	10.92	3.83
4/17/2015	11/19/2015	10.00	7	2.96	7.04
4/1/2014	11/6/2014	10.20	7	3.30	6.90
3/29/2013	11/6/2013	10.20	7	3.47	6.73
4/1/2010	1/13/2011	10.30	9	4.14	6.16
3/31/2006	1/11/2007	10.90	9	4.95	5.95
4/1/2005	12/22/2005	11.00	8	4.53	6.47
4/1/2004	12/21/2004	11.50	8	5.09	6.41
4/1/2003	12/19/2003	12.00	8	4.94	7.06
3/28/2002	3/20/2003	12.00	11	5.13	6.87
3/31/2000	11/30/2000	12.10	8	5.86	6.24
4/1/1998	12/17/1998	12.10	8	5.49	6.61
4/1/1996	2/20/1997	11.80	10	6.82	4.98
4/15/1994	12/19/1994	11.50	8	7.64	3.86
3/31/1993	12/21/1993	11.30	8	6.45	4.85
3/31/1992	12/22/1992	12.30	8	7.63	4.67
4/1/1991	12/19/1991	12.80	8	8.14	4.66
3/30/1990	12/18/1990	13.10	8	8.68	4.42
3/31/1989	12/21/1989	12.90	8	8.26	4.64
4/15/1988	1/27/1989	13.00	9	9.06	3.94
6/19/1987	1/29/1988	13.20	7	9.06	4.14
4/28/1986	7/10/1987	12.90	14	7.72	5.18
4/13/1984	1/31/1985	14.75	9	12.39	2.36
7/2/1982	3/24/1983	15.00	8	11.44	3.56
7/15/1981	4/27/1982	15.00	9	13.96	1.04
7/15/1980	5/21/1981	14.00	10	12.15	1.85
10/16/2008	11/20/2009	9.45	13	3.93	5.52
1/4/1993	10/29/1993	10.20	9	6.67	3.53
1/2/1980	10/28/1980	13.00	10	11.05	1.95
11/4/2011	10/31/2012	9.90	12	2.94	6.96
1/4/1993	10/29/1993	10.10	9	6.67	3.43
7/30/1982	6/7/1983	14.50	10	11.04	3.46
7/27/1981	6/2/1982	14.50	10	13.89	0.61
2/26/2010	12/23/2010	9.92	10	4.18	5.74
Average			8.7	8.3	4.4



SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.883388
R Square	0.780375
Adjusted R Square	0.780043
Standard Error	0.746141
Observations	663

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1307.572	1307.572	2348.677	9.4E-220
Residual	661	367.9966	0.556727		
Total	662	1675.569			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	7.720191	0.07371	104.7374	0	7.575457	7.864925
Interest Rate	-0.39655	0.008183	-48.4632	9.4E-220	-0.41262	-0.38048

Average Interest Rate for last 9 months:	1.68
Projected Risk Premium	7.05
Expected Return	8.74