Tegarden & Associates, Inc.

105 Point East Drive, Nashville, TN 37216-1403
Telephone 615-226-2300

Interstate Natural Gas Pipeline Industry

2016 Cost of Capital Study

●Prepared by Tegarden & Associates • 105 Point East Drive • Nashville, TN 37216 • 615-226-2300 • Fax: 615-226-4488 • e-mail: tegarden@comcast.net

Table of Contents

Purpose of the Cost of Capital Study 1

Introduction and Scope 1

Executive Summary - Cost of Capital 1

Interstate Natural Gas Pipeline Property Tax Forum 2

General Economic Trends - 2016 3
- Economic Background 3
- Economic Forecast for 2016 5
  - Interest Rates and Inflation for 2016 6
  - What Forecasters Got Right & Wrong in 2015 and Expectations for 2016 8
    - Crude Oil 8
    - Real Gross Domestic Product 9
    - Unemployment Rate 9
    - Average Monthly Change in Total Nonfarm Payrolls 9
    - Inflation (consumer-price index, annual change) 10
- Summary 10

Natural Gas Pipeline Industry - 2016 11
- Pipeline MLPs 12
- The Pipeline MLP Industry Consolidation 13
- Products & Markets 13
- Short-Term Natural Gas Outlook 15
- Stunted profit 15
- Executive Summary of Natural Gas Transportation 15
- Gas Pipeline Transportation Business Locations 16
- Structural Risk Analysis 17
- Growth Risk Analysis 17
- Sensitivity Risk Analysis 18
  - Electric power consumption: 18
  - Industrial production index: 18
  - World price of natural gas: 19
  - Prime rate: 19
  - World price of crude oil: 19
- Barriers to Entry 19
- Basis of Competition 20
- Natural Gas Pipeline Transportation Outlook 20
- Growing Natural Gas Production for 2016 21
- Summary 22

Weighted Average Cost of Capital (WACC) 23

Cost of Capital Study Results 25

Capital Structure 25

Cost of Debt 39
Mergent Utility Bond Yields 44
Mergent Corporate Bond Yields 45

Cost of Equity 47
Summary of Cost of Equity Calculations 48
DCF Method 49
Summary of DCF Method Indicators - January 1, 2016 52
Risk Premium Method 63
Summary of Risk Premium Indicators - January 1, 2016 65
US 30-Year T-Bonds, 5-Year T-Bonds, and 30-Day T-Bills 71
Capital Asset Pricing Model 72
Summary of CAPM Indicators - January 1, 2016 74
Cost of Equity Indication Using Expected Risk Premium 81

Flotation Cost Adjustment 90

Other Issues Regarding the Cost of Capital 100
Geometric Mean vs. Arithmetic Mean 100
Income Return 101
Equity Risk Premium Puzzle 102
Survivorship Bias 102

Supplement to the Cost of Capital Study 104
Rates of Return 104
Categories of Capitalization 105
Direct Capitalization 105
Yield Capitalization 108
Estimation of Income to Capitalize 110

Size Premium 114

Common Terms

AEO	Annual Energy Outlook
Bcf/d	Billion cubic feet per day
CAPM	Capital Asset Pricing Model
CPI	Consumer Price Index
DCF	Discounted Cash Flow
EIA	Energy Information Administration
FED	Federal Reserve
FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
GP	General Partner
GRI	Gas Research Institute
GSR	Gas Supply Realignment
GTI	Gas Technology Institute
INGAA	Interstate Natural Gas Association of America
IBES	Institutional Brokers Estimate System
INGPC	Interstate Natural Gas Pipeline Company
INGPI	Interstate Natural Gas Pipeline Industry
INGPPTF	Interstate Natural Gas Pipeline Property Tax Forum
K_D	Cost of Debt
K_E	Cost of Equity
LDC	Local Distribution Company
LNG	Liquified Natural Gas
M&A	*Mergers and Acquisitions*
MLP	Master Limited Partnership
NUOI	Net Utility Operating Income
OCS	Outer Continental Shelf
PFRB	Philadelphia Federal Reserve Bank
PUHCA	Public Utility Holding Company Act
RP	Risk Premium
SBBI	*Stocks, Bonds, Bills & Inflation*
SFV	Straight Fixed Variable
S&P	Standard & Poor's
STEO	Short-Term Energy Outlook
VL	*The Value Line Investment Survey*
WACC	Weighted Average Cost of Capital
WSJ	*Wall Street Journal*
YTM	Yield to Maturity

2016 Cost of Capital Study of the Interstate Natural Gas Pipeline Industry for the Interstate Natural Gas Pipeline Property Tax Forum January 1, 2016

Purpose of the Cost of Capital Study

The purpose of the cost of capital study is to provide the Interstate Natural Gas Pipeline Property Tax Forum (INGPPTF) with a cost of capital study for the Interstate Natural Gas Pipeline Industry (INGPI) as of January 1, 2016. This cost of capital can be used to capitalize the net cash flow for the typical interstate natural gas pipeline company for the purpose of estimating market value. The cost of capital derived in this study is the cost of capital for the typical interstate natural gas pipeline company at January 1, 2016, and is not representative of any particular interstate pipeline company. Thus, we advise against its random use by anyone without first examining and determining the differences between the specific pipeline company and the typical pipeline represented by the cost of capital herein and adjusting for the differences accordingly. For example, additional adjustments must be made to reflect the enhanced risk associated with an investment in the operating assets of companies which are considered below investment grade.

Introduction and Scope

This copyrighted study was prepared for the Interstate Natural Gas Pipeline Property Tax Forum, and any use of this material by any entity other than those approved by the INGPPTF is expressly prohibited by the authors, who reserve all rights to any reproduction. We have reviewed financial and economic information, analytical reports, and statistical data in order to estimate the cost of capital of the Interstate Natural Gas Pipeline Industry as of January 1, 2016.

Executive Summary - Cost of Capital

Based on our analysis and investigation, we have calculated the weighted average cost of capital (WACC) for the INGPI to be **10.70%** as of January 1, 2016. The cost of capital

developed in this study is also known as the discount rate[1] and is appropriate to use in discounting the after-tax operating cash flows projected as of January 1, 2016, for determination of the market value of the operating assets, tangible and intangible, of the typical interstate natural gas pipeline. After-tax operating cash flows are known as earnings before the deduction of interest, depreciation and amortization and after the deduction of taxes and capital expenditures. For market valuation purposes, this level of cash flow is estimated typically by assuming that depreciation and amortization equals capital expenditures. Thus, the cash flow to be discounted is assumed to be equal to what is commonly known in the INGPI as net utility operating income (NUOI). The detailed discussion of the derivation of the weighted average cost of capital along with supporting documentation begins on page 23.

Interstate Natural Gas Pipeline Property Tax Forum

The INGPPTF represents approximately 62 companies engaged in the transportation of natural gas. Only a few of the parents of these companies have common equity traded on the major financial markets. Thus, the financial information from the actually traded INGPPTF members (primarily parent companies) may not, by itself, be indicative of the actual cost of capital for the interstate natural gas pipeline industry. The 2016 membership roster of the INGPPTF is listed below:

Boardwalk Pipeline
- Texas Gas Transmission, LLC

Columbia Gas/Gulf Transmission Corporation
Dominion Transmission Corporation
Kern River Gas Transmission
Kinder Morgan, Inc.
- Tennessee Gas Pipeline
- Southern Natural Gas
- El Paso Natural Gas
- Mojave Pipeline
- Colorado Interstate Gas
- Cheyenne Plains Pipeline
- Wyoming Interstate Company
- Natural Gas Pipeline Company of America
- Midcontinent Express Pipeline
- TransColorado Gas Pipeline
- Louisiana Pipeline
- Bear Creek Storage
- Elba Express
- Gulf LNG
- Ruby Pipeline, LLC
- Southern LNG
- Young Gas Storage

MDU Resources Group, Inc.
National Fuel Gas Supply Corporation
Northern Natural Gas Company
Oneok Partners, LP
- Guardian Pipeline Company
- Midwestern Gas Transmission Company
- OKTEX Pipeline

[1] A rate of return used to convert a monetary sum, payable or receivable in the future, into present value. Theoretically it should reflect the opportunity cost of capital, i.e., the rate of return the capital can earn if put to other uses having similar risk. [See *The Dictionary of Real Estate Appraisal*, 5th ed., (Chicago: Appraisal Institute, 2010) 246.]

- Viking Gas Transmission Company
- Questar Pipeline Company
- Spectra Energy - Canada
  - West Coast Pipelines & Field Services
  - West Coast Gas Services, Inc.
  - Maritimes and Northeast Pipeline (Canada)
  - Spectra Energy Empress L.P.
  - Union Gas Limited
  - St. Clair Pipelines (1996)
  - Market Hub Partners
  - Spectra Energy Income Fund
- Spectra Energy Corp
  - Texas Eastern Transmission
  - Algonquin Gas Transmission
  - Gulf Stream Natural Gas Transmission
  - Maritimes and Northeast Pipeline
  - East Tennessee Natural Gas
- TransCanada Corporation
  - TransCanada Pipelines Limited
- TransCanada Corp – US Pipelines
  - ANR Pipeline
  - North Baja Pipeline
  - Portland Natural Gas Transmission
  - GTN Pipeline System
  - Tuscarora Gas Transmission
  - Great Lakes Gas Transmission
  - Iroquois Gas Transmission
  - Bisan Pipeline LLC
  - Northern Border Pipeline Company
- Williams Companies, Inc.
  - Transcontinental Gas Pipeline Company LLC
  - Northwest Pipeline Company LLC

General Economic Trends - 2016

Economic Background

The Great Recession in the U.S. started in December 2007 and lasted for 18 months. In late 2008, in an effort to help kick-start the economy, the Federal Reserve (Fed) initiated its generous bond buying program (quantitative easing) and sent short-term interest rates tumbling to near zero. The low interest rate environment was supposed to encourage banks to lend more money to businesses and people.

This didn't happen exactly like it was supposed to. Instead of making it easier to get money, America's big banks tightened their lending rules, taking the opportunity to strategically invest the money themselves. Granted, the banks were more than willing to lend to well-heeled Americans. Keeping interest rates artificially low has made it cheaper to borrow and is generally recognized as the fuel that's been propelling the stock market increasingly higher.

Since the Federal Reserve enacted its quantitative easing strategy, the S&P 500 has soared more than 200% in value. During the same time-frame, the number of Americans receiving food stamps has essentially doubled to 46.23 million, or one-sixth of the American population.

As a broader measure, since the Great Recession began, the top one percent of earners have seen their incomes rise more than 30%, while the bottom 99% saw their earnings rise 0.4%. During the so-called recovery, the top one percent captured 95% of the total growth in the U.S. Unfortunately, the widening gap has slowed the five-year recovery and contributed to *Standard & Poor's (S&P)* cutting its growth estimates for the economy. Because (in part) of the income

disparity, *S&P* estimates the economy will grow 2.5% annually for the next decade—down from a forecast six years ago of 2.8%, according to John Whitefoot of Profit Confidential on January 21, 2015.[2]

According to Goldman Sachs on the 14th of January 2016, the fair value for the S&P 500 index on December 1, 2015, was 2,100. By the middle of January 2016, the S&P 500 has fallen 10%. In 2016 alone, the S&P 500 has fallen over seven percent.[3]

Keep in mind that after three years of double-digit growth, the S&P 500 closed out 2015 down 0.7%. That was a year Goldman Sachs predicted the S&P 500 would deliver a "modest total return of 5% in 2015," with the U.S. economy expanding at a brisk pace and corporations boosting sales.[4] U.S. companies didn't exactly boost sales in 2015. The estimated earnings decline in the fourth quarter of 2015 is forecast at -5.3%. At the end of the third quarter, the forecasted earnings decline for Q4 2015 was just -0.6%. If the index reports a decline in fourth-quarter earnings, it will be the first time the index has seen three consecutive quarters of year-over-year declines since the first quarter of 2009 to the third quarter of 2009. (Source: "Earnings Insight," FactSet, January 8, 2016.)

The estimated revenue decline for the fourth quarter of 2015 is -3.3%. If this is the final revenue decline for the quarter, it will be the first time the index has seen four consecutive quarters of year-over-year revenue declines since the fourth quarter of 2008 through the third

---

[2] Whitefoot, John. "What is the U.S. Economic Outlook for 2015?," *Profit Confidential*, January 21, 2015, http://www.profitconfidential.com/economic-analysis/economic-outlook-for-2015.

[3] Gotkine, Elliott and Roxana Zega. "Goldman Sees 11% Upside in S&P 500 After an `Emotional' Selloff," *Bloomberg*, January 14, 2016, http://finance.yahoo.com/news/goldman-sees-11-upside-p-110512886.html.

[4] Udland, Myles. "The Stock Market In 2015 Will Be… Meh," *Business Insider*, November 20, 2014, http://www.businessinsider.com/goldman-sachs-2015-sp-500-target-2100-2014-11.

quarter of 2009.[5]

Economic Forecast for 2016

2016 will be an interesting year no matter what. Which direction it goes depends on whom you ask. Bankers see the worst start of the year for stocks as an emotional response to economic news, which they believe is really quite strong.

The biggest question hanging over the economy and financial markets is whether the U.S. economy can remain strong while so much of the world teeters. Most economists think the American economy will continue to expand, but weakness abroad is heightening their concern about U.S. growth. Forecasters in The *Wall Street Journal's* latest survey of economists say there is a 17% chance the U.S. will enter recession in 2016, the highest risk in three years. 80% of forecasters said they see risks to the economy to the downside.[6]

The Wall Street Journal's recession forecast is conservative when compared to the CNBC Fed Survey which reported that the chances of a recession in the United States are at their highest levels since the fall of 2011. The survey also showed recession fears rising for the sixth straight time among respondents, and are now sitting at 28.8%..

One fairly reliable recession indicator, according to CNBC, the spread between the 2-year and 10-year bonds has weakened just about to its lowest level since the last recession. But it tends to signal recession at zero. So at 118 basis points, it's softer, but not soft enough to signal recession.[7]

"To lose the U.S. expansion, there has to be some transfer mechanism of global angst to the domestic U.S. economy," said Ellen Zentner, chief U.S. economist of Morgan Stanley. Deteriorating credit markets or falling stocks could do the trick, she said.

The reason economists aren't more worried: The U.S. relies on trade less than many of the world's largest nations. While exports from the U.S. have expanded over recent decades, they account for only about 13% of gross domestic product, less than any other large economy except Brazil. If the rest of the world falters, a relatively small share of U.S. production will be

---

[5] Whitefoot, John, "Stock Market Crash: Here's Why the U.S. Economy Is Doomed in 2016," Profit Confidential, January 15, 2016, http://www.profitconfidential.com/stock-market/stock-market-crash-heres-why-the-u-s-economy-is-doomed-in-2016.

[6] Zumbrun, Josh. "Economists See Continued U.S. Expansion, Heightened Global Risk," *The Wall Street Journal*, January 14, 2016, http://www.wsj.com/articles/economists-see-continued-u-s-expansion-heightened-global-risk-1452783683.

[7] Imbert, Fred, Steve Liesman. "US recession probability at highest levels since fall 2011: Survey," CNBC, January 18, 2016, http://www.cnbc.com/2016/01/18/us-recession-probability-at-highest-levels-since-fall-2011-survey.html

exporting into the weakness.

But that hasn't prevented dramatic rumblings in financial markets. As mentioned above, the stock market has declined nearly 10% since its peak last year amid fears that the weak global economy will sap the U.S. strength. Crude oil in January 2016 traded below $30 a barrel for the first time in a decade, reflecting weak global demand and portending further struggles for oil producers.[8]

"These are uncharted waters as linkages are stronger now than ever before," said Nathaniel Karp, chief economist of BBVA Compass. *The Wall Street Journal's* survey of financial, business and academic economists found that 57% believe the U.S. is at least "somewhat exposed" to the risk of reduced trade and 79% said the U.S. is exposed through its financial markets.

Still, the U.S. domestic economy has over 100 million people working in service industries—primarily transacting with other U.S. firms and individuals— in fields such as health care; education; professional and business services; retail; transportation; and leisure and hospitality. These industries aren't as easily knocked off course by slowing growth in China or a recession in Brazil.[9]

2016 projections for the economy, according to *Value Line* in its "Economic and Stock Market Commentary" of January 15, 2016, projected that 2016, as a whole, would be better and more consistent than its two predecessors, with growth possibly averaging 2.5%, or so, which *Value Line* felt should be enough for the Fed to vote in several interest rate hikes this year.[10]

Interest Rates and Inflation for 2016

Federal Reserve officials expressed trepidation as they decided in December of 2015 on a historic interest-rate increase. The decision to raise rates, which the Fed kept near zero for seven years, was unanimous. But minutes of the Fed's December policy meeting, released January 6, 2016, revealed that some officials expressed concern that inflation would linger below their 2% objective.

That, in addition to the stifling effects on the U.S. economy of a strong U.S. dollar and slow growth overseas, could restrain the Fed's desire to follow through with additional rate increases in 2016. At the meeting, they expressed "significant concern about still-low readings on actual inflation" in addition to "uncertainty and risks present in the inflation outlook.

---

[8] *Op. Cit.*, Zumbrun, Josh.

[9] *Ibid.*

[10] "Economic and Stock Market Commentary," *The Value Line Investment Survey*, Selection & Opinion, January 15, 2016, 3801-3812.

In theory, inflation should pick up as joblessness falls and slack in the economy diminishes. With that in mind, "nearly all" of the Fed officials at the meeting had become "reasonably confident" inflation would rise in the months ahead," the minutes said.

Traders in futures markets see the Fed moving short-term rates up in two more quarter-percentage-point increments by year-end, to just under 1%, while Fed officials have penciled in four increases to just below 1.5%.[11]

Reuters poll of over 90 economists projects that in 2016 the Federal Reserve will raises interest rates only three times as it faces a more subdued outlook for both the U.S. and world economies. It appears that there is no consensus among economists on the number of interest rates raises for 2016 (2, 3, or 4 interest rate raises).[12]

The world's largest economy is a bulwark for an increasingly shaky global one, and has the most immediate positive prospects for generating inflation with a very low unemployment rate and a solid pace of private hiring. But a storm has blown through global markets in January 2016, hitting stock markets, commodities and oil prices based on renewed worries that China, the world's second largest economy, is struggling.

That has already led economists to tone down their optimism over U.S. prospects, underscoring the view that the Fed will be forced to follow up December 2016's interest rate rise. The *Reuters* economists' poll found that the U.S. economy will grow 2.5 percent in 2016, the same as predicted for 2015 and down from the 2.8 percent they were expecting a year ago - a decent pace but not enough to generate a strong rebound in inflation.[13]

"U.S. economic growth appears to have shifted to a lower gear in the final months of 2015," noted Northern Trust economists Carl Tannenbaum and Asha Bangalore. "It has left many concerned about the well-being of the economy and raised questions about the Federal Reserve's recent hike of the policy rate," they wrote, stressing that this does not reflect "a widespread deceleration of economic activity."

While growth in 2016 is unlikely to be spectacular, respondents only saw a 15 percent chance of the economy sliding into a recession. A majority of those who answered an additional question said they expect the current business cycle to come to an end in the next two to three

---

[11] Hilsenrath, Jon. "Fed Minutes Reveal Officials' Concern About Low Inflation," The Wall Street Journal, January 6, 2016, http://www.wsj.com/articles/fomc-minutes-officials-in-december-expressed-significant-concern-about-inflation-1452107043.

[12] Ramesh, Aaradhana and Megan Cassella. "Fed to hike rates three times in 2016, economic outlook subdued: poll," *Reuters*, January 14, 2016, http://www.reuters.com/article/us-economy-poll-usa-idUSKCN0US1UG20160114.

[13] *Ibid.*

years. When it raised rates in December of 2015, the Fed expressed confidence that inflation would pick up before long. But most analysts, even the ones more optimistic about growth, remain skeptical that will happen.

Core PCE inflation (the price index for personal consumption expenditures), the key inflation indicator monitored by the Federal Open Market Committee, is likely to be just 1.6 percent in 2016. It is expected to pick up to 1.8 percent in 2017, under the Fed's goal of 2.0 percent.[14]

What Forecasters Got Right & Wrong in 2015 and Expectations for 2016[15]

Economists expect the price of a barrel of oil to increase in 2016. But take that prediction with a grain of salt—forecasting the price of oil was the biggest mistake forecasters made in 2015. *The Wall Street Journal's* panel of the leading business and academic forecasters predictions and results follow. Predictions are notoriously difficult, but businesses and policy makers need some sort of best guess. For this year, that guess is that the economy will continue to grow, while improvement in the labor market will slow. Still, many economists are starting the year with an elevated eye out for risks.

To assess the predictions, Josh Zumbrun of The Wall Street Journal looked back at the forecasts made in January 2015's Wall Street Journal survey of economists, the actual 2015 results and the projections for 2016. The forecasts follow.

Crude Oil

Oil and economic forecasting did not mix well in 2015. It's clear what threw prognosticators and policy makers for the biggest loop with their economic forecasts for 2015: oil. Crude oil prices stayed unexpectedly low this year and those low prices didn't prove as beneficial as many had hoped.

In 2015 the price of oil had collapsed but many expected it to gradually rebound. Lower gas prices usually provided a boost to consumers, and higher gas prices certainly hurt consumers, but the boom that many had hoped for failed to materialize. In other words, estimates of oil prices and inflation rates were too high. Forecasting the price of oil, and the economic impacts from its collapse, was the biggest mistake forecasters made in 2015. So take with a grain of salt

---

[14] *Ibid.*

[15] The entire section is from Josh Zumbrun, The Wall Street Journal, "What Forecasters Expect From the Economy in2016, January 14, 2016, http://blogs.wsj.com/2016/01/14/what-forecasters-expect-from-the-economy-in-2016, and What Economic Forecasters Got Right, and Wrong, in 2015, December 30, 2015, http://blogs.wsj.com/economics/2015/12/30/what-economic-forecasters-got-right-and-wrong-in-2015/.

their prediction that oil prices will begin to climb back up.

2015 Prediction:	Average forecast for December 2015: $63/barrel
2015 Actual:	Actual as of December 29: about $38 barrel
2016 Prediction:	Average forecast for December 2016: $43.46/barrel

Real Gross Domestic Product

The first look at data for the fourth quarter of 2015 won't be published until the end of January 2016, but it appears likely that forecasters were too optimistic. Comparing the third quarter of 2015 to the same period in 2014, the economy only grew 2.1%. Once again, it's possible to identify oil as the culprit for a forecasting miss. Many had thought low oil prices would give consumers a significant lift, but whatever lift people got from low oil doesn't appear sufficient to power the economy to 3% growth. For 2016 the economists are starting the year on a slightly less optimistic note.

2015 Prediction:	Average forecast for fourth quarter of 2015: 3%
2015 Actual:	Actual: due in January. 2.1% as of the third quarter of 2015
2016 Prediction:	Average forecast for 2016: 2.5%

Unemployment Rate

Forecasts for the labor market appear to have done pretty well. Expectations that the unemployment rate would continue its decline proved correct. The unemployment rate could still tick down, or up, slightly when the final December figure is released the end of January 2016, but it appears economists did fairly well on this one.

In 2015, the unemployment rate dropped to 5% from 5.6%. Economists only expect the rate to fall 0.3 percentage points this year. If correct, that would be the smallest drop since the unemployment rate began to decline after the recession in 2009.

2015 Prediction:	Average forecast for December 2015: 5.2%
2015 Actual:	Actual as of November 2015: 5%
2016 Prediction:	Average forecast for December 2016: 4.7%

Average Monthly Change in Total Nonfarm Payrolls

Economists appear to have been very close with their forecasts that the economy would continue to add somewhat over 200,000 jobs a month during 2015. The monthly pace of job creation is also expected to slow in 2016.

2015 Prediction:	Average forecast for 2015: 231,000
2015 Actual:	Actual for 12 months through November 2015: 219,000
2016 Prediction:	Average forecast by quarter: First quarter: 202,000; Second quarter:

196,000; Third quarter: 185,000; and Fourth quarter: 180,000

Inflation (consumer-price index, annual change)

With higher oil prices, the U.S. inflation rate would certainly be higher. While there's still a chance for December's inflation rate to come in higher than November's, it's looking likely that economists will have significantly overestimated the amount of inflation in 2015. The Federal Reserve also expected inflation to bounce back more sharply. In December 2014, Fed officials forecast an inflation rate of between 1% and 1.6%. (Fed officials forecast a separate index, known as the personal consumption expenditures price index, but it was also at 0.4% in November.)

In 2016 economists expect inflation to rebound from its persistently low levels, but that's largely due to guesses about what the price of oil will do. The Federal Reserve, too, is banking on higher inflation as it slowly begins to raise interest rates.

2015 Prediction:	Average forecast for December 2015: 1.6%
2015 Actual:	Actual as of November 2015: 0.4%
2016 Prediction:	Average forecast for December 2016: 2.2%

Summary

Not surprisingly, Wall Street is off to a woeful start in 2016, with the Dow Jones Industrial Average falling more than a thousand points in the first week of 2016. Investors are worried about falling oil prices, the tense global situation, and the uncertainties engendered by the start of the quarterly earnings seasons.

The U.S. economy should continue to grow faster than its potential this year, supporting further interest-rate increases by the Federal Reserve, New York Fed President William C. Dudley said. Dudley downplayed a recent string of weak economic data, prospects for "greater turbulence" in global financial markets driven by emerging-market weakness, and a drop in inflation expectations at a time price gains are lagging the central bank's 2 percent objective. In December 2015, Fed Chair Janet Yellen and her colleagues on the Federal Open Market Committee elected to raise the benchmark federal funds rate from near zero, where it had been held since December 2008. [16]

Martin Feldstein, a Harvard University economist and former chairman of the White House Council of Economic Advisers under President Ronald Reagan, said "The U.S. economy is now in very good shape. We're essentially at full employment, with the overall unemployment

---

[16] Boesler, Matthew. "Dudley Says Economic Outlook Little Changed Since Rate Rise," *Bloomberg* Business, January 15, 2016, http://www.bloomberg.com/news/articles/2016-01-15/dudley-says-economic-outlook-little-changed-since-fed-meeting.

rate at 5%, and the unemployment rate among college graduates a remarkably low 2.5%. Looking ahead, the growth of GDP in 2016 will be limited by the absence of excess capacity in the economy rather than by a lack of demand. The primary risk to the U.S. economy in the coming year is probably the mispricing of assets and the provision of high-risk loans, both of which are the result from excessive reaching for yield by investors and lenders because of the very low interest rates at all maturities that have prevailed in recent years."[17]

Douglas Holtz-Eakin, president of the American Action Forum and former director of the Congressional Budget Office, reported that the greatest challenge facing the U.S. is the pace of economic growth. During the postwar era, growth in per capita income permitted the standard of living to double in just more than 30 years—one person's working career. Under the burden of a regulatory explosion, ballooning federal debt, poor business investment in the recovery, higher taxes and other sources of slower productivity growth, doubling the standard of living is now projected to take roughly 70 years.[18]

At stated earlier in the Economic Forecast for 2016 section of this report, 2016 will be an interesting year no matter what. Which direction it goes depends on whom you ask. Economists have not been able to accurately predict the United States economy in the recent past and there is no indication that 2016 will be any different.

Natural Gas Pipeline Industry - 2016

Interstate pipelines have both utility and merchant energy characteristics. They are similar to monopoly utilities in that they require significant capital expenditures, involve a permitting process, and are subject to price controls. However, an interstate pipeline company can expand its service territory through new permitting and construction, whereas this is not usually the case for local distribution companies (LDCs). Pipelines and LDCs are also subject to competition from other pipelines that are built close enough to contend for institutional customers.

Pipelines differ from LDCs in that their business generally relies on a limited number of large institutional customers (including wholesale marketers, exploration and production companies, LDCs, and large industrial companies). Such high customer concentration increases the risks associated with bad debt expense. The location of natural gas supply sources and shifts

---

[17] Leubsdorf, Ben. "How Will the U.S. Fare in 2016 and Beyond? Top Economists Break Out Their Crystal Balls," *The Wall Street Journal*, January 4, 2016, http:logs.wsj.com/economics/2016/01/04/how-will-the-u-s-fare-in-2016-and-beyond-top-economists-break-out-their-crystal-balls.

[18] "Could the Economy Tank in 2016?" Politico, January 3, 2016, http://www.politico.com/magazine/story/2016/01/economist-forecast-2016-213499.

in consumption patterns affect pipeline capacity utilization. A change in a source means new pipelines are needed to transmit gas from growing production centers (such as the Rockies). The use of LNG imported via tanker also effects the need for and utilization of pipeline assets.

The demand side of the equation is subject to potential secular shifts. For example, growth in the number of gas fired electric generating plants has had a major impact on geographical demand patterns. Many pipeline companies historically have engaged in various unregulated merchant energy activities through subsidiary operations. A company may not have a low-risk profile just because it owns substantial regulated pipeline assets.[19]

Pipeline MLPs

A number of pure-play pipeline businesses are owned by master limited partnerships (MLPs). MLPs trade on exchanges just like common stocks, but the businesses avoid income taxation by paying out nearly all free cash flows to shareholders. These income-oriented investments generally trade based on their yield, distribution growth potential, and volatility of cash flows. Because MLPs cannot use operating cash flows for growth-oriented capital expenditures, they depend on the ability to raise fresh debt and equity capital to fund new investment. Unlike other pipeline companies, pension funds generally cannot hold MLPs due to current tax obligations generated from their partnership structure. Accordingly, shares of publicly traded MLP's generally are held by smaller retail investors.[20]

The Pipeline Master Limited Partnership (MLP) Industry is ranked in the bottom quartile of all industries covered in *The Value Line Investment Survey (VL)*. Pipeline MLPs are high-yield equities that afford exposure to growing energy demand with minimal risk of commodity price fluctuations.

The MLP Industry consists of tax-advantaged oil and gas transporting, processing and distribution companies. Usually, they do not pay state or federal corporate income taxes. Instead, the general partnerships typically pay out all of their distributable income to unit-holders (usually, earnings plus depletion, depreciation, and amortization and other noncash expenses, minus maintenance capital spending and payouts to the general partners) less a small portion retained to fund growth.[21] MLPs own storage, processing, and transportation assets, and charge

---

[19] Glickman, Stewart, CFA. "Natural Gas Distribution," *Standard & Poor's*, January 2015, 43-44.

[20] *Ibid*, 44.

[21] Also, the natural gas pipeline MLP industry has its limitations as most were formed for income tax purposes and typically have lower betas and more debt than the typical corporation in the same industry. MLPs face a smaller pool of potential investors than traditional corporations

customers fees for usage. They do not usually take title to hydrocarbons and, thus, are not generally directly exposed to commodity prices. MLPs are operated by a general partner, which often trades separately.[22]

The Pipeline MLP Industry Consolidation

The MLP companies in the natural gas industry, according to *Value Line's* Fong, have begun to trim their capital expenditure budgets in an effort to focus on the best growth opportunities. With West Texas Intermediate (WTI) crude oil hovering near five year lows, many companies in this space have had to reevaluate which fields are worth pursuing. As a result, *Value Line* expects pipeline expansions to focus on proven geographic regions and, as a safer play, companies will likely utilize acquisitions as a means to grow. One of the recent deals is the merger of MarkWest Energy Partners with MPLX LP. This would create the nation's second largest natural gas processor and fourth biggest MLP. On December 4, 2015 MPLX LP (NYSE: MPLX) and MarkWest Energy Partners closed on their previously announced merger and MarkWest is now a wholly owned subsidiary of MPLX.[23]

Products & Markets

Operators in the Gas Pipeline Transportation industry are expected to earn the bulk of their revenue from fees paid for hauling natural gas from processing plants to local distribution systems via pipelines. Gas is usually transported through more than one pipeline or pipeline system, with each operator charging a fee. The Federal Energy Regulatory Commission (FERC) regulates these fees according to operating and maintenance expenses, and an allowed return on investment set as a percentage of the capital invested in facilities. The FERC generally sets rates on a pipeline-by-pipeline basis and a maximum allowable rate is usually established. However, according to the Interstate Natural Gas Association of America (INGAA), pipeline customers often negotiate discounts below the cap.

Industry operators transport different types of natural gas for customers. The natural gas transported by industry operators usually comes from four different types of wells: gas, oil, shale

---

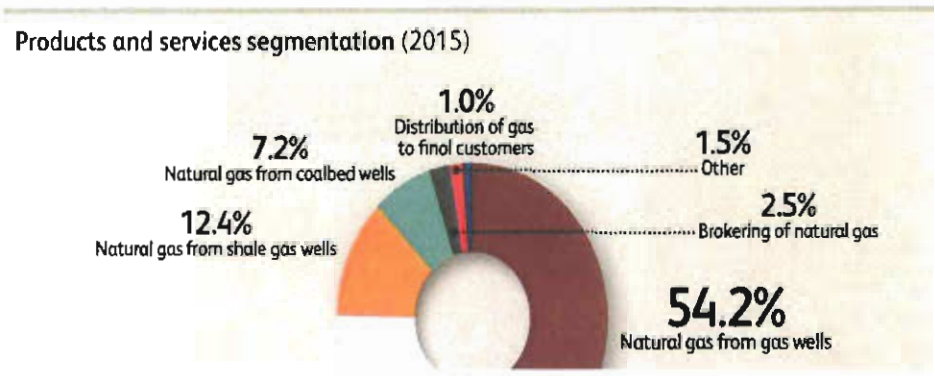
because institutional investors, such as pension funds, are not allowed to hold MLP units without incurring tax liability. These large investors do not ordinarily pay taxes, so they tend to shy away from MLPs. Institutional investors represent the majority of investor dollars in the market, so eliminating them reduces the potential demand for MLP units.

[22] Fong, Bryan J. "Pipeline MLPs", *The Value Line Investment Survey*, December 4, 2015, 611.

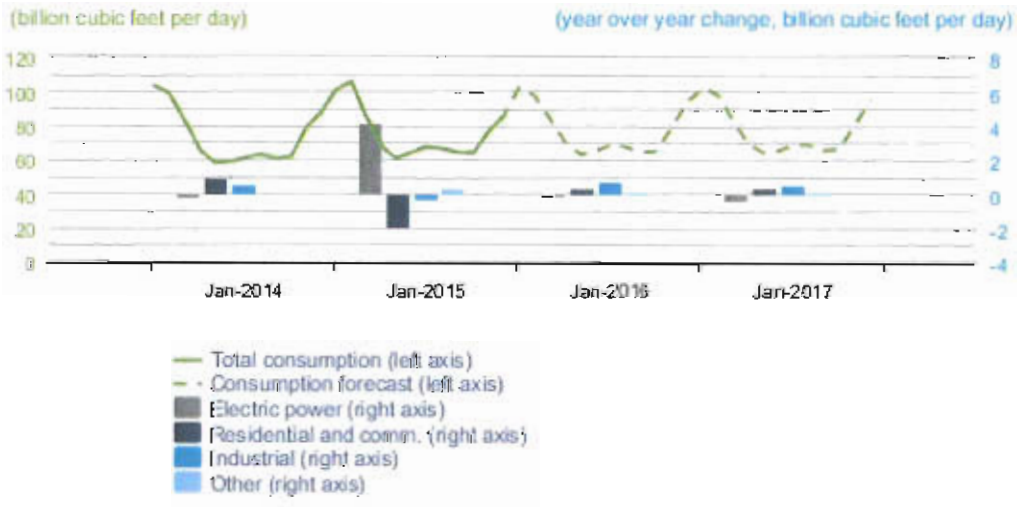
[23] *Ibid.*

gas and coalbed gas. Shale gas has grown rapidly during the five years trough 2015, as large discoveries in shale basins have resulted in producers extracting natural gas at accelerating rates. According to the Energy Information Administration (EIA), shale gas production is expected to grow from 7.8 trillion cubic feet in 2011 to 16.7 trillion cubic feet in 2040. In the five years through 2015, natural gas derived from gas, oil and coalbed wells has been decreasing, as producers have started shifting their focus to shale gas due to the abundance of shale regions and the development of more sophisticated drilling methods.

Some operators also act as brokers, either arranging gas sales on an agency basis or arranging for the sale of transportation rights. Regulation is in place to separate gas transmission from gas marketing, which has led to the decline of this product segment. All other activities combined account for only a small fraction of industry revenue. A map of Products and Services Segmentation of Natural Gas in 2015 along with a U.S. Natural Gas Consumption (2014-2017) chart follows.



U.S. Natural Gas Consumption



eia Source: Short-Term Energy Outlook, January 2016

Short-Term Natural Gas Outlook

Forecast Henry Hub spot prices are expected to average $2.65/MMBtu in 2016 and $3.22/MMBtu in 2017, compared with an average of $2.63/MMBtu in 2015. Although annual average prices for 2015 and 2016 are similar, prices are forecast to rise through much of 2016, from prices that began the year near $2/MMBtu. Price increases reflect consumption growth, mainly from the industrial sector, that outpaces production growth in 2016.

The EIA expects production growth will be relatively flat in 2016, partly in response to lower prices and declining rig activity. With higher prices in 2017, and as new consumption and more export capacity comes online, EIA projects production will pick up slightly.[24]

Stunted profit

The industry's exposure to commodity price volatility is limited because operators typically do not own the natural gas that they transport, leading to relatively steady revenue and profit. Nevertheless, rising capital costs associated with the construction of pipeline expansion will prevent profit from keeping up with revenue growth. Moreover, interest rates are expected to rise in the next five years, increasing the costs associated with heavy investments that require borrowing capital. In 2020, the prime rate is forecast to increase to 6.8%, up from 3.3% in 2015. As operators accelerate their investments in expansion, with the hope of receiving rate increases from the FERC, profit is projected to contract slightly from 8.4% of revenue in 2015 to 8.1% in 2020, according to Ulama.[25].

Executive Summary of Natural Gas Transportation

The Gas Pipeline Transportation industry has experienced growth over the past five years, as natural gas production picks up. Industry operators generally do not own the natural gas they transport, and instead generate revenue from the fees paid by distributors and set by the FERC. Consumption of natural gas has increased over the past five years, spurring production and demand from industry operators. In the five years to 2015, industry revenue is expected to increase at an annualized rate of 1.6%% to $27.4 billion. More pronounced growth has been limited by slow growth in prices, as gas production outpaces demand. In 2015, revenue is expected to increase by 3.1%.

Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity. Advances in hydraulic fracturing technology have enabled previously

---

[24] "Short-Term Energy Outlook," U.S. Energy Information Administration, January 12, 2016, p. https://www.eia.gov/forecasts/steo/report/natgas.cfm.

[25] Ulama, Darryle. "Gas Pipeline Transportation in the US," *IBISWorld* Industry Report 48621, October 2015, 9.

untapped reserves to be utilized. For example, large discoveries of natural gas reserves in the Marcellus Shale Basin, located in the northern Appalachians, have led to substantial growth in the amount of natural gas that requires transporting. Increased supply has maintained low gas prices, encouraging higher demand. Industry operators are investing heavily in expanding their infrastructure to maintain capacity, which has depressed profit margins from 11.1% in 2010 to 8.4% in 2015. On the positive side, infrastructure upgrades and additional capital costs have allowed for rate increases, which have translated into revenue growth. The FERC accelerated its rate increases during the past five years as industry operators invested more into their assets to accommodate the growing volume of transported natural gas.

Ulama reported that industry growth was forecast to sustain in the five years to 2020. Electricity generation operators will continue to demand natural gas at higher volumes, as they decrease their dependence on imported oil, and natural gas prices remain near historic lows. Natural gas extraction operators will also expand production in shale basins during this time period, which will lead to continued growth in the amount of gas that needs to be transported. To accommodate the increase in production from shale deposits, industry operators will continue to extend their pipelines, which will cause rates to continue rising. Due to these positive trends, revenue is projected to grow at an annualized rate of 3.5% to $32.4 billion in the five years to 2020.[26]

Gas Pipeline Transportation Business Locations

The geographic spread of the Gas Pipeline Transportation industry is difficult to isolate because many pipelines extend across state and regional boundaries. Therefore, the starting point of interstate pipelines (where natural gas is sourced) and the volume of gas delivered is used as the basis for geographic spread.

Using this framework, the Southwest region is the most prominent (accounting for more than 31.8% of interstate natural gas shipments), followed by the Southeast (31.0%) and the Plains (10.6%). The most significant states are Texas, which account for 21.9% of establishments, and Louisiana, which account for 9.2% of establishments. About 6.0% of natural gas shipments originate in the Gulf of Mexico and are split between the Southeast and Southwest regions for the purposes of this analysis reports Darryle Ulama in the Gas Pipeline Transportation in the US industry report.

Regional gas markets in the U.S. have different demographics, differing weather patterns and distinct natural gas customer profiles. In the colder, seasonal markets, regional transportation and distribution systems are designed to meet space-heating demands by residential and commercial customers, and they are interlaced with backup storage and peaking

---

[26] *Ibid.*, 4.

facilities. In markets where seasonality is not a main issue, natural gas demand is mainly determined by electric power generation or industrial use. In these regions, storage is needed to support short-term demand fluctuations and system balancing.[27]

Gas Pipeline Transportation Risk Rating

IBISWorld Inc. annually produces an *IBISWorld* Industry Risk Rating Report. In December 2015, the "Gas Pipeline Transportation in the US: 48621" Risk Rating Report was released. This industry group comprises establishments primarily engaged in the pipeline transportation of natural gas from processing plants to local distribution systems using pipelines and does not include the recovery of natural gas from wells or the processing of natural gas. The forecast period encompasses all of 2016. Three types of risk are recognized in their analysis. These are: risk arising from within the industry itself (structural risk), risks arising from the expected future performance of the industry (growth risk) and risk arising from economic forces (sensitivity risk). The results follow.[28]

Structural Risk Analysis — is forecast to be MEDIUM-LOW over the outlook period from a LOW over 2016. Operators are exposed to moderate revenue volatility, which requires prudent management of cash flows and planning in the face of uncertain demand. Businesses that fail to account for these challenges are at a risk for sudden losses or diminished margins. Additionally, firms face a moderate amount of competition, which exacerbates risk by placing downward pressure on prices and profit margins. However a positive for operators within the industry are the high barriers to entry, which protect against higher competition in the long run by reducing the ability of new operators to enter the marketplace.[29]

Growth Risk Analysis — is expected to be MEDIUM-LOW over the outlook period. *IBISWorld* forecasts that annual industry revenue will grow 2.9% to $27.8 billion. In comparison, revenue expanded 2.1% per year between 2013 and 2015. The Gas Pipeline Transportation industry has experienced growth over the past five years, as natural gas production has picked up.

Industry operators generally do not own the natural gas they transport, and instead generate revenue from the fees paid by distributors and set by the FERC. Consumption of natural gas has increased over the past five years, spurring production and demand from industry operators. More pronounced growth has been limited by slow growth in prices, as gas production

---

[27] *Ibid,* 16.

[28] "*IBISWorld* Industry Risk Rating Report 48621, Gas Pipeline Transportation in the US," *IBISWorld,* December 2015, 2.

[29] *Ibid.*, 2-3.

outpaces demand.

Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity. Advances in hydraulic fracturing technology have enabled previously untapped reserves to be utilized. For example, large discoveries of natural gas reserves in the Marcellus Shale Basin, located in the northern Appalachians, have led to substantial growth in the amount of natural gas that requires transporting. Increased supply has maintained low gas prices, encouraging higher demand. Industry operators are investing heavily in expanding their infrastructure to maintain capacity, which has depressed profit margins from 11.1% in 2010 to 8.4% in 2015. On the positive side, infrastructure upgrades and additional capital costs have allowed for rate increases, which have translated into revenue growth. The FERC accelerated its rate increases during the past five years as industry operators invested more into their assets to accommodate the growing volume of transported natural gas. Industry growth is forecast to sustain in the five years to 2020. Electricity generation operators will continue to demand natural gas at higher volumes, as they decrease their dependence on imported oil, and natural gas prices remain near historic lows. Natural gas extraction operators will also expand production in shale basins during this time period, which will lead to continued growth in the amount of gas that needs to be transported. To accommodate the increase in production from shale deposits, industry operators will continue to extend their pipelines, which will cause rates to continue rising. Due to these positive trends, revenue is projected to grow at an annualized rate of 3.5% to $32.4 billion in the five years to 2020.[30]

Sensitivity Risk Analysis — is forecast to be LOW over the outlook period, down from MEDIUM-LOW in 2015. The two factors with the most significant impact on the industry are electric power consumption and the industrial production index. A rise in either of these factors will lower industry risk.

Electric power consumption: The demand for gas from electricity generators plays a key role in determining the volume of gas transported by the industry. An increase in electric power consumption generally leads to an increase in the demand for natural gas, and higher volumes of transported gas lead to an increase in industry revenue. Conversely, a decline in electric power consumption lowers the demand for natural gas, depressing industry revenue. This factor's contribution to risk is expected to decrease in the coming year.

Industrial production index: Industrial activity is an important indicator of energy consumption, including natural gas, because these operations often demand a significant amount of energy in their day-to-day functions. As industrial production activity increases, manufacturers will require more energy, including natural gas; thus,

---

[30] *Ibid.*, 3, 8.

more natural gas will need to be transported. This factor's contribution to risk is expected to increase in 2016.

World price of natural gas: The price of natural gas has a direct impact on the volume of gas demanded for transmission by pipeline. An increase in the price of natural gas will lower demand, which will lead to lower transport activity within the industry; conversely, a decline in prices will encourage natural gas consumption, increasing the volume of transported gas. The world price of natural gas was expected to decline by the end of 2015. This factor's contribution to risk is expected to increase in 2016.

Prime rate: The prime rate refers to the interest rates charged by banks to their most creditworthy and largest corporate customers. The large capital exposure and investments required of most pipelines make interest rates a key factor in the cost structure of industry operators. Growth in interest rates will generally have a negative effect on industry profit, as they increase the cost of financing operations. The prime rate is projected to increase again during 2016. This factor's contribution to risk is expected to increase in 2016.

World price of crude oil: Natural gas competes with other energy sources, such as coal and oil, and the price movements of these commodities will influence the demand for natural gas. Although commodity prices are typically volatile, an increase in oil prices will generally increase demand for substitute energy sources such as natural gas. Conversely, a decline in oil prices will typically decrease demand for natural gas. The world price of crude oil declined during 2015. This factor's contribution to risk is expected to increase in 2015.[31]

Barriers to Entry

Barriers to entry into the Gas Pipeline Transportation industry are high and tend to be only surmountable by large industry enterprises. Typically, opportunities to enter the industry arise when the construction of new pipelines is necessary or consolidation occurs. For example, the recent sale of some of the assets formerly owned by Enron gave potential entrants a chance to enter the industry or enabled active industry players to expand their existing position.

The amount of capital required to fund construction of gas pipelines is the most significant entry barrier. Pipeline infrastructure is a costly endeavor, and potential entrants must incur high initial investments before securing supply of natural gas and demand for transport services. Additionally, gas pipeline operations require skilled construction, engineering and managerial staff.

In addition, large initial contracts must be secured in order to make the pipeline viable.

---

[31] *Ibid*, 3.

Large contracts are typically awarded to existing firms with extensive infrastructure and a history of regulation compliance. Potential entrants could find it difficult to compete with established enterprises in securing these contracts.

Lastly, state and federal regulation on safety and energy act as strong barriers to entry. Compliance with various state laws that regulate energy transport and Federal Energy Regulatory Commission standards must be achieved before commencing operations. Since most pipeline infrastructure cross state boundaries, compliance with a number of governing authorities at the federal level is often required.[32]

Basis of Competition

The Gas Pipeline Transportation industry has a moderate level of competition according to *IBISWorld*. The fixed nature of natural gas pipelines, federal regulation and shared source of natural gas limits competition between industry firms in the short term. However, in the longer term, the potential for new pipeline infrastructure and expanded capacity to meet demand and volume growth will spur competition.

Since 1993, operators in the Gas Pipeline Transportation industry have been prevented from buying and selling gas and are only permitted to charge for gas transportation. This standardized the fees charged to pipeline users. The Federal Energy Regulatory Commission is in charge of regulating these fees at the interstate level, whereas state authorities are in charge of intrastate pipelines.[33]

Natural Gas Pipeline Transportation Outlook

The Gas Pipeline Transportation industry is projected to expand in the five years to 2020, with revenue forecast to grow at an annualized rate of 3.5% to $32.4 billion. The industry is highly regulated and charges customers based on rates established by the Federal Energy Regulatory Commission. During the next five years, the FERC will accept more rate increase applications, as industry operators continue expanding capacity and building new pipelines. The need for greater capacity will come from rising demand from electricity generators and increasing production in regions close to natural gas reserves. Additionally, supply pushes, a financing mechanism in which gas producers provide capital for pipeline extensions, will become more common.[34]

Value Line's Michael Napoli also agreed with *IBISWorld* in its positive outlook.

---

[32] *Ibid.*, 5.

[33] *Ibid.*, 6.

[34] *Op. Cit.,* Ulama, 8.

According to Napoli, the Natural Gas (Diversified) Industry[35] has experienced their share of challenges in recent times. An unfavorable pricing environment has hurt the performance of industry participants, and this will probably continue to be the case in the near term. Thus, revenues and earnings will likely fall for a number of natural gas companies in the current year. Nevertheless, the long-term picture, according to Napoli, looks somewhat rosier, and *Value Line* envisions healthy improvement for the industry out to the end of the decade.

Natural gas quotations have continued to trend lower in last months of 2015. Strong inventory builds, continuing production growth, and expectations for warm 2016 winter temperatures have all been contributing factors. In December 2015, natural gas spot prices approximated $2.20 per mmbtu (benchmark Henry Hub). It remains unclear whether prices will decline further as the winter sets in. Inventory levels and the demand for heating and cooling will continue to affect prices. Industrial sector consumption will likely pick up somewhat in 2016, as new projects (particularly in the chemicals sector) come on line over the next few months. Greater industrial demand and restrictions in supply are two factors that ought to contribute to a comeback in prices down the road.[36]

Growing Natural Gas Production for 2016

U.S. natural gas prices should remain below $4.00/MMBtu for the "next several years" as production continues to outpace demand, *Standard & Poor's* Ratings Services reported in August of 2015. Carolyn Davis of *National Gas Intelligence* reported on January 12, 2016, that a multi-year low may be in the offing for natural gas prices in 2016, as strong northeast production compresses Henry Hub pricing and supply continues to overrun demand.

The U.S. gas market likely won't rebalance until 2017, based on a study of liquefied natural gas (LNG) exports and industrial demand additions, said Cowen and Co. analysts Charles Robertson II and Shawn Lockman. "The demand awakens, but we have a bad feeling about natural gas for 2016," the analysts said.

Without a cold blast in the late January/February 2016 timeframe, the first quarter 2016 $2.50/Mcf pricing looks optimistic at this time. Robertson and Lockman expect to see stored gas competing with produced gas in late March/early April of 2016. Without supply being curtailed in the Northeast, natural gas prices may not recover until the winter 2016-17 season. The analysts also project $2.75/Mcf in 2017, reflecting the coal-to-gas switching demand returning to coal."

---

[35] The Diversified Natural Gas Industry consists of companies that produce, market, and transport natural gas. It is labeled "diversified" because operations can vary widely among natural gas companies.

[36] Napoli, Michael F. "Natural Gas (Diversified) Industry," *Value Line Investment Survey*, December 4, 2015, 520.

Cowen is estimating that gas demand will increase by 8.25 Bcf/d over the next three years primarily driven by growth in gas-fired power plants, LNG exports and industrial demand.[37]

Summary

More pronounced growth has been limited by slow growth in prices, as gas production outpaces demand. Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity. Advances in hydraulic fracturing technology have enabled previously untapped reserves to be utilized. However, there has been little to moderate technological change in the industry. Pipeline transportation is a well-established service, and the technology required to move natural gas has not changed significantly in the past 10 years, according to Ulama. The industry is expected to exhibit a solid performance during the five years to 2020, as natural gas production increases. Even with rising demand and capacity expansion, however, heavy initial investments and steady revenue growth underline this mature industry.[38]

Jimmy Vallee, a Houston-based energy attorney, wrote in USA Today on January 29, 2016, that economic calamity is what will occur from a prolonged period of low oil and gas prices. In fact, according to Vallee, it is already happening. Job losses, corporate loan defaults, reduced investments and an end to the recent reshoring trend are all propelling the U.S. toward recession, according to Vallee. While conventional wisdom suggests celebration of low oil and gas prices as a consumer spending trigger, don't count on it, says Vallee. Massive layoffs have hit the oil and gas industry and the pain is spreading.

The bad news continues with corporate defaults in the oil industry surging: 42 companies filed for bankruptcy in 2015, and many analysts expect that number to double in 2016 if commodity prices do not rebound substantially. Banks are now setting aside significant loan loss reserves as they prepare for a wave of energy defaults in the coming months. This is no joy in extended low oil prices. It is an economic train wreck already in process.[39]

Whether evaluating a natural gas transmission pipeline company or an oil pipeline transportation company, it is as important to assess the underlying business risk as it is to

---

[37] Davis, Carolyn. "'Bad Feeling' For Natural Gas Prices; Henry Hub Forecast to Collapse Below $2.00 (January 12, 2016) and U.S. Natural Gas Prices Below $4.00 For 'Several Years,' says *S&P*" (August 4, 2015), *Natural Gas Intelligence*, "http://www.naturalgasintel.com/articles/104972-bad-feeling-for-natural-gas-prices-henry-hub-forecast-to-collapse-below-200 and http://www.naturalgasintel.com/articles/103204-us-natural-gas-prices-below-400-for-several-years-says-sp.

[38] Ulama, Darryle. *IBISWorld* Industry Report 48621, Gas Pipeline Transportation in the US, October 2015, 4, 11.

[39] Vallee, Jimmy. "Celebrate cheaper oil: Our view," *USA Today*, January 29, 2016, 7A.

determine the company's financial risk. Both of these risk elements are heavily influenced by volatility, which is ever present in both pipeline industries mentioned above, and are elevated for the 2016 appraisal year.

All of the political and economic factors discussed in this section will affect the typical investor's cost of capital as the elements of business and financial risk increases. The additional risk attributable to the natural gas pipeline industry should be reflected in the development of the cost of capital.

Weighted Average Cost of Capital (WACC)

The return investors require on investments of comparable risk is what the cost of capital measures. Rational investors will not accept a particular investment opportunity if the expected return on that opportunity is less than the cost of capital required to compensate for the risk involved. The weighted average cost of capital (WACC) is also known in the appraisal and financial community as the opportunity cost of capital. The WACC is used primarily for making long-term capital investment decisions by investors and purchasers. Accordingly, the WACC is used by appraisers to estimate ***market value***.[40] To calculate market value, the appraiser discounts expected future income (cash flow) by the rate of return offered by comparable investment alternatives. [All of the annual "income" figures used in appraising income-producing properties are *cash flows* rather than accrual accounting incomes.[41]] This rate of return is often referred to as the discount rate or the opportunity cost of capital.[42] The Appraisal Institute has defined opportunity cost as quoted below:

> *Opportunity cost is the net cost of opportunities not chosen or options foregone, denied or lost.* An investor who selects one investment forgoes the opportunity to invest in other available investments...Opportunity cost is related to the principle of substitution, and is particularly significant in estimating the rates of return

---

[40] Market value is defined by the Appraisal Institute as, "The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self-interest, and assuming that neither is under undue duress." See *The Appraisal of Real Estate*, 14th ed., (Chicago: Appraisal Institute, 2013), 58.

[41] William N. Kinnard, Jr., *Income Property Valuation*, (Lexington: Heath Lexington Books, 1982), 70.

[42] Richard A. Brealey and Stewart C. Meyers, *Principles of Corporate Finance*, 4th ed., (New York: McGraw-Hill, 1991), 13.

necessary to attract capital. By analyzing and comparing the prospective rates of return offered by alternative investment opportunities, an appraiser can estimate the required rate of return for the property being appraised.[43]

The estimated cost of capital in this report for the Interstate Natural Gas Pipeline Industry as of January 1, 2016, is based on the generally accepted appraisal methodology known as the band of investment technique. The band of investment technique consists of the following steps:

1. Analyze and determine the appropriate capital structure.
2. Identify the appropriate cost for each financing band of the capital structure.
3. Weight the appropriate cost for each financing band by the relative proportion of the capital structure represented by each financing band.

The sum of the weighted costs for the financing bands represents the weighted average cost of capital. This weighted cost of capital is typically known as the discount rate in appraisal literature and the algebraic formula is shown in Figure 1.

$$K = (D \times K_d) + (E \times K_e)$$

where

K = *Weighted Average Cost of Capital*
D = *Proportion of Debt in Capital Structure*
K_d = *Cost of Debt*
E = *Proportion of Equity in Capital Structure*
K_e = *Cost of Equity*

Figure 1

In explaining the estimation of the cost of capital, Ibbotson Associates states:

> The cost of capital is always an expectational or forward-looking concept. While the past performance of an investment and other historical information can be good guides and are often used to estimate the required rate of return on capital, the expectations of future events are the only factors that actually determine the cost of capital. An investor contributes capital to a firm with the expectation that the business' future performance will provide a fair return on the investment. If past performance were the criterion most important to investors, no one would invest in start-up ventures. It should also be noted that the cost of capital is a function of the investment, not the investor.[44]

---

[43] *The Appraisal of Real Estate*, 11th ed. (Chicago: Appraisal Institute, 1996) 44. See also *The Dictionary of Real Estate Appraisal*, 5th ed., (Chicago: Appraisal Institute, 2010) 139.

[44] *SBBI (Stocks, Bonds, Bills and Inflation)*, 2013 Yearbook: Valuation Edition, (Chicago: Morningstar, Inc., 2013), 21.

Cost of Capital Study Results

The cost of capital for the Interstate Natural Gas Pipeline Industry as of January 1, 2016 is estimated to be 10.69% (rounded to **10.70%**) as the shown on the following chart. Following the chart are explanations of the derivation of each of the component parts of the cost of capital study.

Capital	Portion	Cost	Product
Debt	35.00%	6.57%	2.30%
Equity	65.00%	12.90%	8.39%
Totals	100.00%		10.69%

Capital Structure

Economists and appraisers measure a firm's capital structure in terms of the market values of its debt and equity because that is the best measure of the amounts of debt and equity that investors have invested in the company on a going-forward basis. Furthermore, economists and appraisers generally agree that the goal of management is to maximize the value of the firm, where the value of the firm is the sum of the market value of the firm's debt and equity. Only by measuring a firm's capital structure in terms of market values can its managers choose a financing strategy that maximizes the value of the firm.

For estimating the cost of capital for the INGPI, it is appropriate to use the typical market capital structure for similar interstate natural gas pipeline companies. There is very little debate about this concept, however for clarity we note the following statements from Brigham and Gapenski and from Damodaran.

> We are absolutely convinced that the procedures we recommend are correct — namely, firms should focus on market value capital structures and base their cost of capital calculations on market value weights. Because market values do change, it would be impossible to keep the actual capital structure on target at all times, but this fact in no way detracts from the validity of market value targets.[45]

> The weights assigned to equity and debt in calculating the weighted average cost of capital have to be based upon market value, not book value. The rationale rests on the fact that the cost of capital measures the cost of issuing securities, stocks as

---

[45] Eugene F. Brigham and Louis C. Gapenski, *Financial Management*, 7th ed. (New York: The Dryden Press, 1994), 599.

well as bonds, to finance projects, and that these securities are issued at market value, not at book value.[46]

In the appraisal process or in developing the cost of capital to be used in the appraisal process the appraiser must utilize the market capital structure for all types of appraisal. Even when public utilities are strictly regulated, it is necessary for the appraiser to use the market capital structure unless the book capital structure is found to be the same as the market capital structure. The market capital structure may vary significantly from the book capital structure for most interstate natural gas pipelines. Thus, investors are concerned with the capital structure they will use to finance the purchase of an interstate natural gas pipeline, and that will always be the typical market capital structure.

It is also important to note what elements of capital comprise the makeup of the ***capital structure*** from an appraisal standpoint. The capital structure consists only of long-term debt, common stock, and where appropriate, preferred stock. The capital structure should not be confused with *financial structure* or any other term used in financial literature. To understand what elements comprise the capital structure it is important to define capital structure and financial structure, which are defined as follows:

> **CAPITAL STRUCTURE** corporation's financial framework, including LONG-TERM DEBT, PREFERRED STOCK, and NET WORTH. It is distinguished from FINANCIAL STRUCTURE, which includes additional sources of capital such as short-term debt, accounts payable, and other liabilities.[47]

> **FINANCIAL STRUCTURE** makeup of the right-hand side of a company's BALANCE SHEET, which includes all the ways its assets are financed, such as trade accounts payable and short-term borrowings as well as long-term debt and ownership equity. Financial structure is distinguished from CAPITAL STRUCTURE, which includes only long-term debt and equity.[48]

It is also important to note that neither accumulated depreciation or accumulated deferred income taxes are included in capital structure. Some appraisers have mistakenly included accumulated deferred income taxes in constructing a firm's capital structure. This is simply

---

[46] Aswath Damodaran, *Investment Valuation*, (New York, NY: John Wiley & Sons, Inc., 1996), 64.

[47] John Downes and Jordan Elliot Goodman, *Dictionary of Finance and Investment Terms*, (New York: Barron's, 1985), 54.

[48] *Ibid.*, 132.

wrong for estimating the cost of capital and for appraisal purposes. The following quotation from *Financial Management* addresses this issue quite well:

> Since depreciation-generated funds have the same cost as the firm's WACC when retained earnings are used for the equity component, it is not necessary to consider them when estimating the WACC...Therefore, deferred taxes, like depreciation, have a cost equal to the firm's WACC using retained earnings as the equity component. Indeed, deferred taxes arise solely because a firm records a different depreciation expense on its tax books than on the books used to report income to shareholders... Deferred taxes are treated the same way as depreciation cash flows: they are not included when estimating the firm's WACC...[49]

The appropriate capital structure for use in estimating the INGPI's cost of capital is the expected capital structure that a typical purchaser would likely use to finance the purchase of the operating assets of a company within this industry. This typical purchaser would take into account the regulatory agency's allowed rate of return in analyzing the risk profile and selecting the market capital *structure*. Thus, an analysis of the typical market capital structure used in the interstate natural gas pipeline industry is appropriate.

The market capital structure developed for the INGPI was calculated from information obtained from *Value Line Investment Survey* data base (*Value Line*) and *Standard & Poor's Compustat* data base as of January 2016. The capital structure study involved the following companies we believe to be representative of the interstate natural gas transmission pipeline industry: 18 large (sales over $1 billion) companies classified by *Value Line* as the Natural Gas (Diversified) Industry (from the *Value Line* full data base of 6,150 companies), using both *Value Line* and S&P data; a combination of 35 large companies from both the *Value Line* natural gas (diversified) group and the large *Value Line* Natural Gas Utility distribution group; 20 large (sales over $1 billion) natural gas Pipeline MLPs; and 12 companies heavily involved with natural gas pipelines from the Interstate Natural Gas Pipeline Property Tax Forum group, which have traded common stock listed by *Standard and Poor's*. We also considered the 28 companies from the *S&P* 500 which have **BBB-** rated long-term debt (the same rating as the typical interstate natural gas pipeline company). Ultimately, to retain a particular rating status by the major rating agencies, companies must maintain a certain level of equity and the ability to pay their long-term debt obligations. Thus, it is important to consider the capital structures of companies with similar ratings and similar risk in estimating the appropriate capital structure.

The results indicate that the market capital structure for the industry is approximately

---

[49] Eugene F. Brigham and Louis C. Gapenski, *Financial Management*, 7th ed. (New York: The Dryden Press, 1994), 368-369.

35% debt, essentially no preferred stock, and 65% equity. For each of the above mentioned groups of companies, we calculated simple average, the market weighted average, and median capital structure for each grouping using data reported both by *Value Line* and *Standard & Poor's*. As many traditional interstate natural gas pipelines have become subsidiaries of other pipelines and other energy companies, there are only a few members of the Interstate Natural Gas Pipeline Property Tax Forum group, which have traded common stock. Thus, we are inclined to give less consideration to the data from the Forum group. Also, the natural gas pipeline MLP industry has its limitations as most were formed for income tax purposes and typically have lower betas and more debt than the typical corporation in the same industry. MLPs face a smaller pool of potential investors than traditional corporations because institutional investors, such as pension funds, are not allowed to hold MLP units without incurring tax liability. These large investors do not ordinarily pay taxes, so they tend to shy away from MLPs. Institutional investors represent the majority of investor dollars in the market, so eliminating them reduces the potential demand for MLP units. Thus, a little less reliance is given to the MLP group as well.

For purposes of analysis we used the market capital structure for each company. The market value of the common equity portion of the capital structure was determined by multiplying the number of shares outstanding times the recent price reported by *Value Line* and/or *Standard & Poor's*. As surrogates for the market value of debt and preferred stock we substituted the book value of each. The market values of both debt and equity are always preferred, if available. Since the book value of debt is usually close to market value, book value is usually used for the debt weight. Ibbotson states, "Therefore, in most cases the market value of debt in the capital structure is assumed to be the book value of debt."[50] Only a few companies in this industry have issued preferred stock and, like debt, we used book value as a surrogate for the market value of preferred stock. Our recent analysis indicates that book values for long-term debt and preferred stock are fairly reasonable approximations for market value at the present time, thus book value can be substituted as a reasonable proxy for the market value of debt and preferred stock capital.

A summary of the capital structure analysis follows along with the supporting calculations for each of the company groups.

---

[50] *SBBI (Stocks, Bonds, Bills and Inflation), 2013 Yearbook: Valuation Edition*, (Chicago: Morningstar, Inc., 2013) 14-15.

Summary of Capital Structure Data - 2016

Value Line Data - Medians	Debt	Pref. Stk.	Com. Stk.
Natural Gas Diversified Industry (Large)	34.17%	0.00%	65.83%
Natural Gas Div. & Nat. Gas Utility (Large)	28.64%	0.00%	71.37%
Natural Gas Pipeline MLPs (Large)	53.48%	0.00%	46.52%
Interstate Natural Gas Pipeline Forum (Pipelines)	43.89%	0.00%	56.11%
S&P 500 Companies with "BBB-" Rated Debt	26.81%	0.00%	72.79%

S&P Data - Mkt. Medians	Debt	Pref. Stk.	Com. Stk.
Natural Gas Diversified Industry (Large)	36.24%	0.00%	63.64%
Natural Gas Div. & Nat. Gas Utility (Large)	30.98%	0.00%	69.02%
Natural Gas Pipeline MLPs (Large)	48.66%	0.00%	51.34%
Interstate Natural Gas Pipeline Forum (Pipelines)	41.64%	0.00%	58.36%
S&P 500 Companies with "BBB-" Rated Debt	24.03%	0.00%	73.73%

Value Line Data - Mkt. Wtd. Avg.	Debt	Pref. Stk.	Com. Stk.
Natural Gas Diversified Industry (Large)	28.74%	0.53%	70.73%
Natural Gas Div. & Nat. Gas Utility (Large)	29.69%	0.36%	69.95%
Natural Gas Pipeline MLPs (Large)	45.30%	0.01%	54.69%
Interstate Natural Gas Pipeline Forum (Pipelines)	45.53%	0.00%	54.47%
S&P 500 Companies with "BBB-" Rated Debt	33.02%	1.29%	65.69%

S&P Data - Mkt. Wtd. Avg.	Debt	Pref. Stk.	Com. Stk.
Natural Gas Diversified Industry (Large)	28.64%	0.54%	70.85%
Natural Gas Div. & Nat. Gas Utility (Large)	28.85%	0.35%	70.81%
Natural Gas Pipeline MLPs (Large)	41.20%	0.01%	58.79%
Interstate Natural Gas Pipeline Forum (Pipelines)	43.97%	0.64%	55.39%
S&P 500 Companies with "BBB-" Rated Debt	30.63%	1.15%	68.22%

Natural Gas Diversified Industry (Large)
Capital Structure (VL Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
Antero Resources Corp.	AR	43.16%	0.00%	56.84%
Cabot Oil & Gas 'A'	COG	22.72%	0.00%	77.28%
Chesapeake Energy	CHK	78.49%	0.00%	21.51%
Cimarex Energy	XEC	16.23%	0.00%	83.77%
Concho Resources	CXO	27.83%	0.00%	72.17%
Devon Energy	DVN	49.71%	0.00%	50.29%
Encana Corp.	ECA			
Energen Corp.	EGN	20.90%	0.00%	79.10%
EOG Resources	EOG	15.09%	0.00%	84.91%
EQT Corp.	EQT	26.26%	0.00%	73.74%
MDU Resources	MDU	37.04%	0.00%	62.96%
National Fuel Gas	NFG	37.07%	0.00%	62.93%
Newfield Exploration	NFX	31.30%	0.00%	68.70%
Pengrowth Energy	PGH			
QEP Resources	QEP	49.10%	0.00%	50.90%
Questar Corp.	STR	23.12%	0.00%	76.88%
Southwestern Energy	SWN	51.69%	19.12%	29.19%
WPX Energy	WPX	66.00%	6.58%	27.42%
	Average	37.23%	1.61%	61.16%
	Median	34.17%	0.00%	65.83%
	Wtd. Avg.	28.74%	0.53%	70.73%

Source: *Value Line*, January 2016.

Natural Gas Diversified Industry (Large)
Capital Structure (S&P Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
ANTERO RESOURCES CORP	AR	42.19%	0.00%	57.81%
CABOT OIL & GAS CORP	COG	21.60%	0.00%	78.40%
CHESAPEAKE ENERGY CORP	CHK	63.90%	18.28%	17.82%
CIMAREX ENERGY CO	XEC	15.07%	0.00%	84.93%
CONCHO RESOURCES INC	CXO	25.49%	0.00%	74.51%
DEVON ENERGY CORP	DVN	46.43%	0.00%	53.57%
ENCANA CORP	ECA	60.18%	0.00%	39.82%
ENERGEN CORP	EGN	18.86%	0.00%	81.14%
EOG RESOURCES INC	EOG	14.11%	0.00%	85.89%
EQT CORP	EQT	26.17%	0.00%	73.83%
MDU RESOURCES GROUP INC	MDU	35.91%	0.27%	63.83%
NATIONAL FUEL GAS CO	NFG	36.56%	0.00%	63.44%
NEWFIELD EXPLORATION CO	NFX	31.95%	0.00%	68.05%
PENGROWTH ENERGY CORP	PGH	78.55%	0.00%	21.45%
QEP RESOURCES INC	QEP	46.30%	0.00%	53.70%
QUESTAR CORP	STR	22.77%	0.00%	77.23%
SOUTHWESTERN ENERGY CO	SWN	63.04%	0.00%	36.96%
WPX ENERGY INC	WPX	63.92%	6.37%	29.71%
	Average	39.61%	1.38%	59.01%
	Median	36.24%	0.00%	63.64%
	Wtd. Avg.	28.64%	0.52%	70.85%

Source: *S&P Compustat*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility (Large)
Capital Structure (VL Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
AGL Resources	GAS	29.23%	0.00%	70.77%
AmeriGas Partners	APU	39.82%	0.00%	60.18%
Atmos Energy	ATO	28.04%	0.00%	71.96%
Cabot Oil & Gas 'A'	COG	22.72%	0.00%	77.28%
Callon Pete Co	CPE	42.24%	8.36%	49.40%
Chesapeake Energy	CHK	78.49%	0.00%	21.51%
Chesapeake Utilities	CPK	15.59%	0.00%	84.41%
Cimarex Energy	XEC	16.23%	0.00%	83.77%
Concho Resources	CXO	27.83%	0.00%	72.17%
Corning Natural Gas Holding	CNIG	25.37%	0.00%	74.63%
Delta Natural Gas	DGAS	25.86%	0.00%	74.14%
Devon Energy	DVN	49.71%	0.00%	50.29%
Energen Corp.	EGN	20.90%	0.00%	79.10%
EOG Resources	EOG	15.09%	0.00%	84.91%
EQT Corp.	EQT	26.26%	0.00%	73.74%
Gas Natural Inc	EGAS	3.23%	0.00%	96.77%
Laclede Group	LG	40.48%	0.00%	59.52%
MDU Resources	MDU	37.04%	0.00%	62.96%
National Fuel Gas	NFG	37.07%	0.00%	62.93%
New Jersey Resources	NJR	22.69%	0.00%	77.31%
Newfield Exploration	NFX	31.30%	0.00%	68.70%
NiSource Inc.	NI	49.69%	0.00%	50.31%
Northwest Nat. Gas	NWN	30.88%	0.00%	69.12%
Pengrowth Energy	PGH			
Piedmont Natural Gas	PNY	23.27%	0.00%	76.73%
QEP Resources	QEP	49.10%	0.00%	50.90%
Questar Corp.	STR	23.12%	0.00%	76.88%
RGC Resources Inc	RGCO	23.16%	0.00%	76.84%
South Jersey Inds.	SJI	36.34%	0.00%	63.66%
Southwest Gas	SWX	36.73%	0.00%	63.27%
Southwestern Energy	SWN	51.69%	19.12%	29.19%
Star Gas Partners L.P.	SGU	18.28%	0.00%	81.72%
Targa Resources Corp	TRGP	83.17%	0.00%	16.83%
UGI Corp.	UGI	38.71%	0.00%	61.29%
WGL Holdings Inc.	WGL	23.71%	0.70%	75.59%
	Average	33.03%	0.83%	66.14%
	Median	28.64%	0.00%	71.37%
	Wtd. Avg.	29.69%	0.36%	69.95%

Source: *Value Line*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility (Large)
Capital Structure (S&P Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
AGL RESOURCES INC	GAS	29.10%	0.00%	70.90%
AMERIGAS PARTNERS -LP	APU	41.67%	0.00%	58.33%
ATMOS ENERGY CORP	ATO	27.74%	0.00%	72.26%
CABOT OIL & GAS CORP	COG	21.60%	0.00%	78.40%
CALLON PETROLEUM CO/DE	CPE	41.92%	0.00%	58.08%
CHESAPEAKE ENERGY CORP	CHK	63.90%	18.28%	17.82%
CHESAPEAKE UTILITIES CORP	CPK	15.25%	0.00%	84.75%
CIMAREX ENERGY CO	XEC	15.07%	0.00%	84.93%
CONCHO RESOURCES INC	CXO	25.49%	0.00%	74.51%
CORNING NATURAL GAS HLDG CP	CNIG	23.70%	0.00%	76.30%
DELTA NATURAL GAS CO INC	DGAS	25.96%	0.00%	74.04%
DEVON ENERGY CORP	DVN	46.43%	0.00%	53.57%
ENERGEN CORP	EGN	18.86%	0.00%	81.14%
EOG RESOURCES INC	EOG	14.11%	0.00%	85.89%
EQT CORP	EQT	26.17%	0.00%	73.83%
GAS NATURAL INC	EGAS	34.28%	0.00%	65.72%
LACLEDE GROUP INC	LG	40.76%	0.00%	59.24%
MDU RESOURCES GROUP INC	MDU	35.91%	0.27%	63.83%
NATIONAL FUEL GAS CO	NFG	36.56%	0.00%	63.44%
NEW JERSEY RESOURCES CORP	NJR	23.03%	0.00%	76.97%
NEWFIELD EXPLORATION CO	NFX	31.95%	0.00%	68.05%
NISOURCE INC	NI	49.68%	0.00%	50.32%
NORTHWEST NATURAL GAS CO	NWN	30.98%	0.00%	69.02%
PENGROWTH ENERGY CORP	PGH	78.55%	0.00%	21.45%
PIEDMONT NATURAL GAS CO	PNY	24.83%	0.00%	75.17%
QEP RESOURCES INC	QEP	46.30%	0.00%	53.70%
QUESTAR CORP	STR	22.77%	0.00%	77.23%
RGC RESOURCES INC	RGCO	23.08%	0.00%	76.92%
SOUTH JERSEY INDUSTRIES INC	SJI	37.17%	0.00%	62.83%
SOUTHWEST GAS CORP	SWX	37.09%	0.00%	62.91%
SOUTHWESTERN ENERGY CO	SWN	63.04%	0.00%	36.96%
STAR GAS PARTNERS -LP	SGU	17.44%	0.00%	82.56%
TARGA RESOURCES CORP	TRGP	79.67%	0.00%	20.33%
UGI CORP	UGI	37.16%	0.00%	62.84%
WGL HOLDINGS INC	WGL	23.00%	0.69%	76.31%
	Average	34.58%	0.55%	64.87%
	Median	30.98%	0.00%	69.02%
	Wtd. Avg.	28.85%	0.35%	70.81%

Source: *S&P Compustat*, January 2016.

Natural Gas Pipeline MLPs - Large
Capital Structure (VL Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
Boardwalk Pipeline	BWP	54.42%	0.00%	45.58%
Cheniere Energy Partners L.P.	CQP	68.72%	0.00%	31.28%
DCP Midstream Partners	DPM	47.03%	0.00%	52.97%
Energy Transfer	ETP	65.45%	0.00%	34.55%
Energy Transfer Equity L.P.	ETE	76.65%	0.07%	23.28%
EnLink Midstream Part.	ENLK	37.82%	0.00%	62.18%
Enterprise Products	EPD	30.06%	0.00%	69.94%
Ferrellgas Partners L.P.	FGP	52.54%	0.00%	47.46%
Martin Midstream Ptnrs L.P.	MMLP	56.23%	0.00%	43.77%
Midcoast Energy Partners LP	MEP	69.82%	0.00%	30.18%
ONEOK Partners L.P.	OKS	46.10%	0.00%	53.90%
Plains GP Holdings LP	PAGP	84.23%	0.00%	15.77%
Southcross Energy Partners L.P	SXE	84.33%	0.00%	15.67%
Spectra Energy Partners LP	SEP	31.24%	0.00%	68.76%
Suburban Propane	SPH	45.97%	0.00%	54.03%
Tallgrass Energy Partners LP	TEP	23.04%	0.00%	76.96%
Targa Resources Partners LP	NGLS	68.85%	0.00%	31.15%
TC PipeLines LP	TCP	38.81%	0.00%	61.19%
Western Gas Partners LP	WES	30.76%	0.00%	69.24%
Williams Partners L.P.	WPZ	55.29%	0.00%	44.71%
	Average	53.37%	0.00%	46.63%
	Median	53.48%	0.00%	46.52%
	Wtd. Avg.	45.30%	0.01%	54.69%

Source: *Value Line*, January 2016.

Natural Gas Pipeline MLPs - Large

Capital Structure (S&P Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
BOARDWALK PIPELINE PRTNRS-LP	BWP	51.57%	0.00%	48.43%
CHENIERE ENERGY PARTNERS LP	CQP	56.08%	0.00%	43.92%
DCP MIDSTREAM PARTNERS LP	DPM	43.50%	0.00%	56.50%
ENERGY TRANSFER EQUITY LP	ETE	71.68%	0.00%	28.32%
ENERGY TRANSFER PARTNERS -LP	ETP	62.10%	0.07%	37.82%
ENLINK MIDSTREAM PARTNERS LP	ENLK	34.36%	0.00%	65.64%
ENTERPRISE PRODS PRTNRS -LP	EPD	28.89%	0.00%	71.11%
FERRELLGAS PARTNERS -LP	FGP	52.25%	0.00%	47.75%
MARTIN MIDSTREAM PARTNERS LP	MMLP	53.25%	0.00%	46.75%
MIDCOAST ENERGY PARTNERS LP	MEP	65.10%	0.00%	34.90%
ONEOK PARTNERS -LP	OKS	41.64%	0.00%	58.36%
PLAINS GP HOLDINGS LP	PAGP			
SOUTHCROSS ENERGY PRTNRS LP	SXE	74.08%	0.00%	25.92%
SPECTRA ENERGY PARTNERS LP	SEP	29.02%	0.00%	70.98%
SUBURBAN PROPANE PRTNRS -LP	SPH	45.75%	0.00%	54.25%
TALLGRASS ENERGY PRT LP	TEP	21.80%	0.00%	78.20%
TARGA RESOURCES PARTNERS LP	NGLS	63.59%	0.00%	36.41%
TC PIPELINES LP	TCP	36.59%	0.00%	63.41%
WESTERN GAS PARTNERS LP	WES	31.20%	0.00%	68.80%
WILLIAMS PARTNERS LP	WPZ			
	Average	47.91%	0.00%	52.08%
	Median	48.66%	0.00%	51.34%
	Wtd. Avg.	41.20%	0.01%	58.79%

Source: *S&P Compustat*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
Capital Structure (VL Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
Boardwalk Pipeline	BWP	54.42%	0.00%	45.58%
Dominion Resources	D	36.30%	0.00%	63.70%
Kinder Morgan Inc.	KMI	56.73%	0.00%	43.27%
MDU Resources	MDU	37.04%	0.00%	62.96%
National Fuel Gas	NFG	37.07%	0.00%	62.93%
ONEOK Partners L.P.	OKS	46.10%	0.00%	53.90%
Questar Corp.	STR	23.12%	0.00%	76.88%
Spectra Energy	SE	43.89%	0.00%	56.11%
Spectra Energy Partners LP	SEP	31.24%	0.00%	68.76%
TransCanada Corp.	TRP			
Williams Cos.	WMB	58.55%	0.00%	41.45%
Williams Partners L.P.	WPZ	55.29%	0.00%	44.71%
	Average	43.61%	0.00%	56.39%
	Median	43.89%	0.00%	56.11%
	Wtd. Avg.	45.53%	0.00%	54.47%

Source: *Value Line*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
Capital Structure (S&P Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
BOARDWALK PIPELINE PRTNRS-LP	BWP	51.57%	0.00%	48.43%
DOMINION RESOURCES INC	D	36.61%	0.00%	63.39%
KINDER MORGAN INC	KMI	55.60%	0.00%	44.40%
MDU RESOURCES GROUP INC	MDU	35.91%	0.27%	63.83%
NATIONAL FUEL GAS CO	NFG	36.56%	0.00%	63.44%
ONEOK PARTNERS -LP	OKS	41.64%	0.00%	58.36%
QUESTAR CORP	STR	22.77%	0.00%	77.23%
SPECTRA ENERGY CORP	SE	44.13%	0.88%	54.99%
SPECTRA ENERGY PARTNERS LP	SEP	29.02%	0.00%	70.98%
TRANSCANADA CORP	TRP	46.71%	3.98%	49.31%
WILLIAMS COS INC	WMB	53.11%	0.00%	46.89%
WILLIAMS PARTNERS LP	WPZ			
	Average	41.24%	0.47%	58.30%
	Median	41.64%	0.00%	58.36%
	Wtd. Avg.	43.97%	0.64%	55.39%

Source: *S&P Compustat*, January 2016.

All Companies in S&P 500 with "BBB-" Rated Debt

Capital Structure (VL Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
Advance Auto Parts	AAP	10.61%	0.00%	89.39%
Alcoa Inc.	AA	45.49%	0.29%	54.22%
Amer. Tower 'A'	AMT	28.53%	3.32%	68.16%
Coach Inc.	COH	8.75%	0.00%	91.25%
ConAgra Foods	CAG	26.50%	0.00%	73.50%
Crown Castle Int'l	CCI	29.26%	2.38%	68.36%
Darden Restaurants	DRI	15.22%	0.00%	84.78%
Discover Fin'l Svcs.	DFS	51.62%	1.25%	47.14%
Dun & Bradstreet	DNB	33.57%	0.00%	66.43%
Expedia Inc.	EXPE	14.24%	0.00%	85.76%
FirstEnergy Corp.	FE	59.28%	0.00%	40.72%
Ford Motor	F	67.35%	0.00%	32.65%
Gap (The) Inc.	GPS	10.97%	0.00%	89.03%
General Motors	GM	45.71%	0.00%	54.29%
Harman Int'l	HAR	14.55%	0.00%	85.45%
Harris Corp.	HRS	31.40%	0.00%	68.60%
Interpublic Group	IPG	14.91%	0.00%	85.09%
Kansas City South'n	KSU	23.49%	0.06%	76.45%
Kinder Morgan Inc.	KMI	56.73%	0.00%	43.27%
Kraft Heinz Co.	KHC	27.12%	15.92%	56.95%
L-3 Communic.	LLL	30.17%	0.00%	69.83%
Motorola Solutions	MSI	27.92%	0.00%	72.08%
Newell Rubbermaid	NWL	16.29%	0.00%	83.71%
Reynolds American	RAI	20.09%	0.00%	79.91%
Viacom Inc. 'B'	VIAB	45.30%	0.00%	54.70%
Whole Foods Market	WFM	0.51%	0.00%	99.49%
Zions Bancorp.	ZION	19.32%	0.00%	80.68%
Zoetis Inc.	ZTS	12.21%	0.00%	87.79%
	Average	28.11%	0.83%	71.06%
	Median	26.81%	0.00%	72.79%
	Wtd. Avg.	33.02%	1.29%	65.69%

Source: *Value Line*, January 2016.

S&P 500 Companies with "BBB-" Rated Debt

Capital Structure (S&P Data) - January 1, 2016

Company Name	Ticker	LTD %	PS %	CS %
ADVANCE AUTO PARTS INC	AAP	10.50%	0.00%	89.50%
ALCOA INC	AA	41.17%	0.26%	58.56%
AMERICAN TOWER CORP	AMT	29.26%	0.00%	70.74%
COACH INC	COH	8.79%	0.00%	91.21%
CONAGRA FOODS INC	CAG	25.91%	0.00%	74.09%
CROWN CASTLE INTL CORP	CCI	29.44%	0.00%	70.56%
DARDEN RESTAURANTS INC	DRI	5.11%	0.00%	94.89%
DISCOVER FINANCIAL SVCS INC	DFS	50.22%	1.18%	48.60%
DUN & BRADSTREET CORP	DNB	31.91%	0.00%	68.09%
EXPEDIA INC	EXPE	13.30%	0.00%	86.70%
FIRSTENERGY CORP	FE	58.72%	0.00%	41.28%
FORD MOTOR CO	F	60.87%	0.00%	39.13%
GAP INC	GPS	11.76%	0.00%	88.24%
GENERAL MOTORS CO	GM	42.61%	0.00%	57.39%
HARMAN INTERNATIONAL INDS	HAR	13.60%	0.00%	86.40%
HARRIS CORP	HRS	31.23%	0.00%	68.77%
INTERPUBLIC GROUP OF COS	IPG	14.63%	0.00%	85.37%
KANSAS CITY SOUTHERN	KSU	22.14%	0.06%	77.80%
KINDER MORGAN INC	KMI	55.60%	0.00%	44.40%
KRAFT HEINZ CO	KHC	20.72%	6.83%	72.45%
L-3 COMMUNICATIONS HLDGS INC	LLL	29.49%	0.00%	70.51%
MOTOROLA SOLUTIONS INC	MSI	26.63%	0.00%	73.37%
NEWELL RUBBERMAID INC	NWL	15.12%	0.00%	84.88%
REYNOLDS AMERICAN INC	RAI	20.47%	0.00%	79.53%
VIACOM INC	VIAB	42.81%	0.00%	57.19%
WHOLE FOODS MARKET INC	WFM	0.53%	0.00%	99.47%
ZIONS BANCORPORATION	ZION	12.55%	13.34%	74.10%
ZOETIS INC	ZTS	11.90%	0.00%	88.10%
	Average	26.32%	0.77%	72.90%
	Median	24.03%	0.00%	73.73%
	Wtd. Avg.	30.63%	1.15%	68.22%

Source: *S&P Compustat*, January 2016.

Cost of Debt

The expected return on debt, or the cost of debt capital (K_d), is the rate that investors would incur when financing the purchase of the operating assets of an interstate natural gas pipeline company. It is the cost of debt that is appropriate for the cost of capital study and it is relatively simple to estimate. Unlike the cost of equity, the required return on debt is directly observable in the market. It is best approximated by the current yield to maturity (YTM) on the applicable debt. The YTM is the rate of return the existing bondholders expect to receive, and it is also a good estimate of K_d (cost of debt), the rate of return that new bondholders would require.[51] Often an average of recent yields is also used. The yield exemplifies the market's expectation of future returns. If the market's expectations of future debt returns were different from those implicit in the price, the market price of the debt would be bid up or down so that the market's expectations were reflected in the price.[52]

From information in *Standard and Poor's Compustat* and *Mergent Bond Record* databases we found the *Standard & Poor's* and *Moody's* long-term senior debt ratings to range from **BB+** to **BBB** and **Ba1** to **Baa2,** respectively, for the typical interstate natural gas pipeline. The predominant ratings were **BBB-** and **Baa3**, respectively. This information is presented in the following table:

Summary of Pipeline Long-Term Debt Ratings - January 1, 2016

Averages	S&P Ratings		Moody's Ratings	
Natural Gas Diversified Industry (Large)	BBB-	12	Baa3	12
Natural Gas Div. & Nat. Gas Utility (Large)	BBB	11	Baa2	11
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	Baa2	11
Natural Gas Pipeline MLPs (Large)	BB+	13	Ba1	13
Average	**BBB-**	**12**	**Baa3**	**12**

Medians				
Natural Gas Diversified Industry (Large)	BBB-	12	Baa3	12
Natural Gas Div. & Nat. Gas Utility (Large)	BBB+	10	Baa2	11
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	Baa3	12
Natural Gas Pipeline MLPs (Large)	BBB-	12	Baa3	12
Average	**BBB-**	**11**	**Baa3**	**12**

The S&P and Moody's bond ratings for these groups begins on the following page.

---

[51] Brigham, Eugene F. & Michael C. Ehrhardt, *Financial Management: Theory and Practice*, 10th ed. (Thomson Learning, Inc.: Stamford, CT, 2002), 423.

[52] *Stocks, Bonds, Bills and Inflation: 2013 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2013), 24

Natural Gas Diversified & Oil/Gas Dist. - Large
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	SP & Mdy Avg. Yields
ANTERO RESOURCES CORP	AR	BB	14	Ba3	15	9.12
CABOT OIL & GAS CORP	COG					
CHESAPEAKE ENERGY CORP	CHK	B	17	B3	18	13.04
CIMAREX ENERGY CO	XEC	BBB-	12	Baa3	12	6.80
CONCHO RESOURCES INC	CXO	BB+	13	Ba2	14	9.12
DEVON ENERGY CORP	DVN	BBB+	10	Baa1	10	5.02
ENBRIDGE INC	ENB	BBB+	10	Baa2	11	5.02
ENCANA CORP	ECA	BBB	11	Baa2	11	5.55
ENERGEN CORP	EGN	BB	14	Ba2	14	9.12
EOG RESOURCES INC	EOG	A-	9	A3	9	4.66
EQT CORP	EQT	BBB	11	Baa3	12	5.55
KINDER MORGAN INC	KMI	BBB-	12	Baa3	12	6.80
MDU RESOURCES GROUP INC	MDU	BBB+	10			5.02
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa2	11	5.55
NEWFIELD EXPLORATION CO	NFX	BBB-	12	Ba1	13	6.80
NGL ENERGY PARTNERS LP	NGL	BB-	15	B2	17	8.17
ONEOK INC	OKE	BB+	13	Ba1	13	9.12
PEMBINA PIPELINE CORP	PBA	BBB	11			
PENGROWTH ENERGY CORP	PGH					
QEP RESOURCES INC	QEP	BB+	13	Ba1	13	9.12
QUESTAR CORP	STR	A	8	A2	8	4.35
SOUTHWESTERN ENERGY CO	SWN	BBB-	12	Baa3	12	6.80
SPECTRA ENERGY CORP	SE	BBB	11	Baa2	11	5.55
TRANSCANADA CORP	TRP	A-	9			4.66
WILLIAMS COS INC	WMB	BB+	13	Ba1	13	9.12
WORLD FUEL SERVICES CORP	INT					
WPX ENERGY INC	WPX	BB	14	Ba1	13	9.12
	Average	BBB-	12	Baa3	12	6.80
	Median	BBB-	12	Baa3	12	6.80

Source: *S&P Compustat & Mergent,* January 2016.

Natural Gas Div. Ind. & Natural Gas Utility

Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	SP & Mdy Avg. Yields
AGL RESOURCES INC	GAS	BBB+	10			5.02
AMERIGAS PARTNERS -LP	APU			Ba3	15	
ATMOS ENERGY CORP	ATO	A-	9	A2	8	4.66
CABOT OIL & GAS CORP	COG					
CALLON PETROLEUM CO/DE	CPE					
CHESAPEAKE ENERGY CORP	CHK	B	17	B3	18	13.04
CHESAPEAKE UTILITIES CORP	CPK					
CIMAREX ENERGY CO	XEC	BBB-	12	Baa3	12	6.80
CONCHO RESOURCES INC	CXO	BB+	13	Ba2	14	9.12
CORNING NAT. GAS HLDG CP	CNIG					
DELTA NATURAL GAS CO INC	DGAS					
DEVON ENERGY CORP	DVN	BBB+	10	Baa1	10	5.02
ENERGEN CORP	EGN	BB	14	Ba2	14	9.12
EOG RESOURCES INC	EOG	A-	9	A3	9	4.66
EQT CORP	EQT	BBB	11	Baa3	12	5.55
GAS NATURAL INC	EGAS			Baa3	12	
LACLEDE GROUP INC	LG	A-	9	A1	7	4.66
MDU RESOURCES GROUP INC	MDU	BBB+	10			5.02
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa2	11	5.55
NEW JERSEY RESOURCES CORP	NJR					
NEWFIELD EXPLORATION CO	NFX	BBB-	12	Ba1	13	6.80
NISOURCE INC	NI	BBB+	10	Baa2	11	5.02
NORTHWEST NATURAL GAS CO	NWN	A+	7	A1	7	4.49
PENGROWTH ENERGY CORP	PGH					
PIEDMONT NATURAL GAS CO	PNY	A	8	A2	8	4.35
QEP RESOURCES INC	QEP	BB+	13	Ba1	13	9.12
QUESTAR CORP	STR	A	8	A2	8	4.35
RGC RESOURCES INC	RGCO					
SOUTH JERSEY INDUSTRIES INC	SJI	BBB+	10	Aa3	6	5.02
SOUTHWEST GAS CORP	SWX	BBB+	10	A3	9	5.02
SOUTHWESTERN ENERGY CO	SWN	BBB-	12	Baa3	12	6.80
STAR GAS PARTNERS -LP	SGU					
TARGA RESOURCES CORP	TRGP	B+	16			11.01
UGI CORP	UGI			A2	8	
WGL HOLDINGS INC	WGL	A+	7	A3	9	4.49
	Average	BBB	11	Baa2	11	5.55
	Median	BBB+	10	Baa2	11	5.02

Source: *S&P Compustat & Mergent,* January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	SP & Mdy Avg. Yields
BOARDWALK PIPELINE PRT-LP	BWP	BBB-	12	Baa3	12	6.80
DOMINION RESOURCES INC	D	A-	9	Baa2	11	4.66
KINDER MORGAN INC	KMI	BBB-	12	Baa3	12	6.80
MDU RESOURCES GROUP INC	MDU	BBB+	10			
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa2	11	5.55
ONEOK INC	OKE	BB+	13	Ba1	13	9.12
QUESTAR CORP	STR	A	8	A2	8	4.35
SPECTRA ENERGY CORP	SE	BBB	11	Baa2	11	5.55
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	Baa2	11	5.55
TRANSCANADA CORP	TRP	A-	9			
WILLIAMS COS INC	WMB	BB+	13	Ba1	13	9.12
WILLIAMS PARTNERS LP	WPZ	BBB-	12	Baa3	12	6.80
	Average	BBB	11	Baa2	11	5.55
	Median	BBB	11	Baa3	12	5.55

Source: *S&P Compustat & Mergent,* January 2016

Natural Gas Pipeline MLPs - Large
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	SP & Mdy Avg. Yields
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	Baa3	12	6.80
CHENIERE ENERGY PARTNERS LP	CQP	BB	14			9.12
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	Ba2	14	9.12
ENERGY TRANSFER EQUITY LP	ETE	BB	14	Ba2	14	9.12
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	Baa3	12	6.80
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB	11	Baa3	12	5.55
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	Baa1	10	5.02
FERRELLGAS PARTNERS -LP	FGP	B+	16	B2	17	11.01
MARTIN MIDSTREAM PARTNERS LP	MMLP	B+	16	B3	18	11.01
MIDCOAST ENERGY PARTNERS LP	MEP					
ONEOK PARTNERS -LP	OKS	BBB	11	Baa2	11	5.55
PLAINS GP HOLDINGS LP	PAGP					
SOUTHCROSS ENERGY PRTNRS LP	SXE	B-	18			
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	Baa2	11	5.55
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	Ba3	15	8.17
TALLGRASS ENERGY PRT LP	TEP					
TARGA RESOURCES PARTNERS LP	NGLS	BB+	13	Ba2	14	9.12
TC PIPELINES LP	TCP	BBB-	12	Baa2	11	6.80
WESTERN GAS PARTNERS LP	WES	BBB-	12	Baa3	12	6.80
WILLIAMS PARTNERS LP	WPZ	BBB-	12	Baa3	12	6.80
	Average	BB+	13	Ba1	13	9.12
	Median	BBB-	12	Baa3	12	6.80

Source: *S&P Compustat & Mergent,* January 2016.

The following table indicates the long-term debt ratings and yields to maturity for the Standard & Poor's and Mergent (Moody's ratings) bond database at January 1, 2016. Also, the Standard & Poor's and Moody's long-term bond yield data for BBB- and Baa3, respectively, is shown.

Standard & Poor's & Moody's Ratings & Yields
January 1, 2016

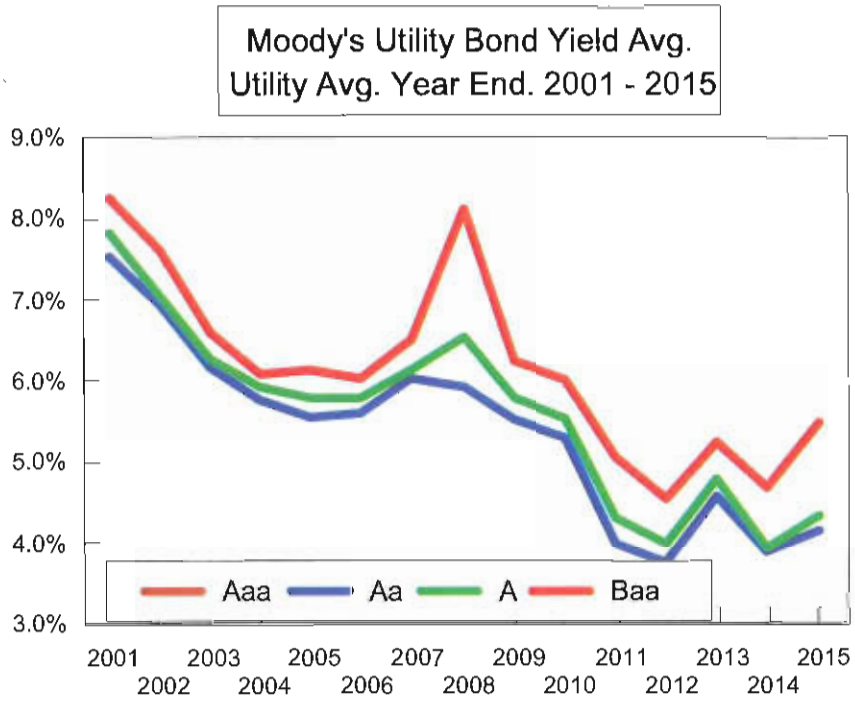
S&P	Yield	Moody's	Yield	Average
AAA	3.97	Aaa	3.97	3.97
AA+	4.32	Aa1	4.46	4.39
AA	4.38	Aa2	4.26	4.32
AA-	4.53	Aa3	4.32	4.43
A+	4.52	A1	4.46	4.49
A	4.44	A2	4.50	4.47
A-	4.67	A3	4.64	4.66
BBB+	4.99	Baa1	5.04	5.02
BBB	5.91	Baa2	5.76	5.84
BBB-	6.84	Baa3	6.75	6.80

Mergent Bond Record & *Standard & Poor's Database*, Jan. 2016.

Bloomberg Long-Term Bond Yields by Rating				
Rating	20Y	25Y	30Y	Average
A+	4.43	4.41	4.38	4.41
A	5.00	4.67	4.32	4.67
A-	4.67	4.76	4.74	4.72
BBB+	5.45	5.43	4.97	5.28
BBB	6.22	6.63	5.79	6.21
BBB-	6.87	6.75	6.14	6.59
BB+	7.32	7.49	N/A	7.40
BB	8.52	9.99	10.30	9.60
BB-	9.63	7.99	10.13	9.25

Source: *Bloomberg* Database - Dec. 31, 2015.

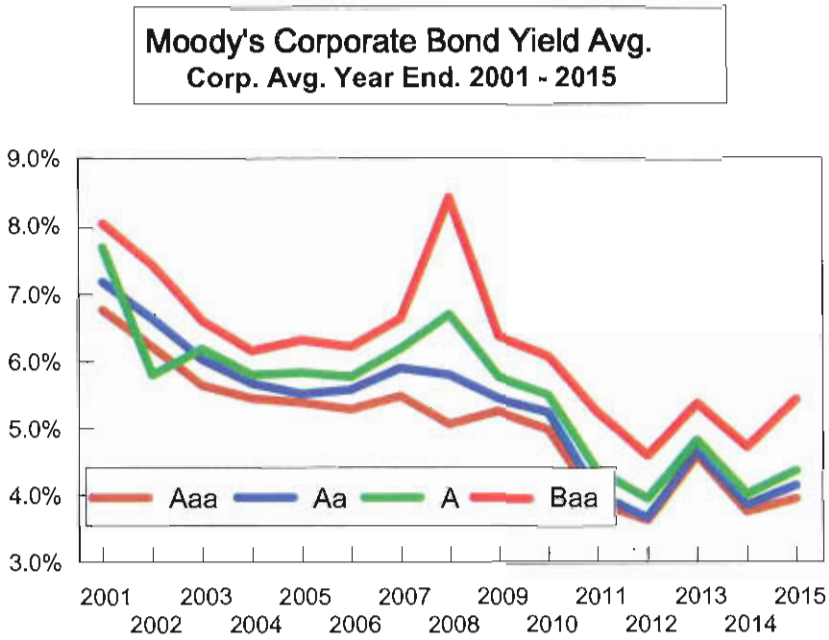
Mergent Utility Bond Yields



Public Utility Bond Yields - Year End Data (2001 - 2015)				
Year End Date	Aaa	Aa	A	Baa
2001	7.53%	7.53%	7.83%	8.27%
2002	---	6.94%	7.07%	7.61%
2003	---	6.18%	6.27%	6.61%
2004	---	5.78%	5.92%	6.10%
2005	---	5.55%	5.80%	6.14%
2006	---	5.62%	5.81%	6.05%
2007	---	6.03%	6.16%	6.51%
2008	---	5.93%	6.54%	8.13%
2009	---	5.52%	5.79%	6.26%
2010	---	5.32%	5.56%	6.04%
2011	---	4.00%	4.33%	5.07%
2012	---	3.75%	4.00%	4.56%
2013	---	4.59%	4.81%	5.25%
2014	---	3.90%	3.95%	4.70%
2015	---	4.16%	4.35%	5.55%

Source: Mergent's Bond Record, January 2002 - 2016

Mergent Corporate Bond Yields



Corp. Bond Yields - Year End Data (2001 - 2015)				
Year End Date	Aaa	Aa	A	Baa
2001	6.76%	7.19%	7.70%	8.05%
2002	6.21%	6.63%	5.80%	7.45%
2003	5.65%	6.02%	6.19%	6.60%
2004	5.47%	5.69%	5.82%	6.15%
2005	5.38%	5.51%	5.84%	6.33%
2006	5.29%	5.58%	5.78%	6.22%
2007	5.49%	5.91%	6.19%	6.65%
2008	5.06%	5.81%	6.70%	8.45%
2009	5.26%	5.44%	5.77%	6.37%
2010	5.02%	5.26%	5.52%	6.10%
2011	3.93%	4.03%	4.40%	5.25%
2012	3.65%	3.70%	3.98%	4.63%
2013	4.62%	4.68%	4.85%	5.38%
2014	3.79%	3.89%	4.05%	4.74%
2015	3.97%	4.16%	4.38%	5.46%

Source: Mergent's Bond Record, January 2002 - 2016

At the end of 2015, there is a significant difference in the yields to maturity for long-term bonds in the BBB category. The yields range from approximately 5.00% for BBB+ to approximately 6.80% for BBB- depending on the reporting agency. *Reuters Bonds Online* reports the yields for Baa2/BBB to be **7.26%** for utilities at December 31, 2015.[53] The average yields for all corporate bonds rated **Baa3/BBB-** by Moody's and Standard & Poor's was **6.80%** as of January 1, 2016. The average yields for Bloomberg corporate bonds ranging from 20 to 30 years to maturity was **6.59%** at December 31, 2015. Mergent reports the year end 2015 yields for long-term utility and corporate bonds, respectively, to be **5.55%** and **5.46%** for the generic category of Baa (the mid-range rating) for long-term bonds. From the information discussed and displayed above we estimated the appropriate cost of debt capital rated **BBB-** to be **6.50%** at January 1, 2016 for the typical interstate natural gas pipeline company. This estimate recognizes that the typical interstate natural gas pipeline's typical bond rating is from Baa2 to Baa3 or BBB to BBB-, with the majority having a Baa3/BBB- rating – one rating above junk bond status – and the market for bonds of this rating were quite volatile at the beginning of January 2016.

[53] Bonds Online has changed its method of reporting the long-term bond yields and no longer computes bond yields similar to what it has published in past years. Thus, we are inclined to give less weight to this indicator for this year.

Cost of Equity

We have estimated the cost of equity capital by employing several methods. The market cost of equity is generally considered to be the most difficult part of computing the cost of capital because it relies on interpretation of projections by market analysts as well as the projections of the equity models used by the appraiser. The market cost of equity capital is equal to the rate of return *expected* by investors at their perceived level of risk for a company's equity. There are several methods used to estimate the cost of equity capital. The most common methods are the Gordon growth model sometimes referred to as the discounted cash flow method (or DCF method), the risk premium method (RP), and the capital asset pricing model (CAPM).

All estimates of the cost of equity rates fall into one of two classes. They are either (1) add-ons to an interest rate, or (2) ratios of return to investment. Add-on estimates of the cost of equity capital include RP and the CAPM. The DCF method is a ratio of return to investment.

After computing the cost of equity by the DCF, RP, and CAPM methods, the data was analyzed and reconciled to obtain the cost of equity capital before flotation costs of **12.35%**. On the following page is a summary of the cost of equity calculations by each of the methods employed. The summary page is followed by an explanation of each method and the indicators found therein.

Summary of Cost of Equity Calculations

DCF Indicators - January 1, 2016

Company Groups	*Value Line* Data		S&P (IBES) Data	
	Average	Median	Average	Median
Natural Gas Diversified Industry (Large)	10.33	9.41	16.24	10.34
Natural Gas Div. & Nat. Gas Utility (Large)	10.03	9.73	12.90	9.85
Natural Gas Pipeline MLPs (Large)	21.20	19.23	22.75	18.66
Interstate Natural Gas Pipeline Forum (Pipelines)	13.78	11.65	10.23	10.16
S&P Screened Comparables Group	18.75	17.71	23.92	15.61
S&P 500 Companies with "BBB-" Rated Debt	13.71	14.42	12.57	11.68
Averages	14.63	13.69	16.44	12.72

The discounted cash flow method for above industry groups were calculated as follows:

Using *Value Line* data and *Value Line* earnings growth estimates and S&P's *Compustat* data with *Institutional Brokers Estimate System* (IBES) earnings growth.

Risk Premium Indicators - January 1, 2016

General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
30-Year Treasury Bonds (ex post)	3.01	6.90	9.91
30-Year Treasury Bonds (ex ante)	3.01	9.57	12.58

Risk Premium Indicators by Groups

Indicators	Median S&P Rating		Reuters Yields	Risk Prem. Indicator
	Rating	Number		
Natural Gas Diversified Industry (Large)	BBB-	12	6.80	12.60
Natural Gas Div. & Nat. Gas Utility (Large)	BBB+	10	5.02	10.82
Natural Gas Pipeline MLPs (Large)	BBB-	12	6.80	12.60
Interstate Natural Gas Pipeline Forum (Pipes)	BBB	11	5.55	11.35
S&P Screened Comparables Group	BBB	11	5.55	11.35
Average	BBB	11	5.94	11.74

* Base Rate: Average YTM S&P and Moody's.

Risk Premium: Simulated *SBBI* Methodology (see p. 112).

Capital Asset Pricing Model (CAPM) - January 1, 2016

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
CAPM Indicator *				
Long-Term Gov't Bonds (ex post)	3.01	6.90	1.05	10.26
Long-Term Gov't Bonds (ex ante)	3.01	9.57	1.05	13.06

CAPM Formula: Ke = Rf + B(Rp)

* CAPM Indicator is based upon a *Value Line* beta of 1.05 & Federal Reserve data 12/31/15.

DCF Method

The discounted cash flow method of estimating the cost of equity is based on the formula shown in Figure 2. Our computations using the DCF method are based upon information from the *Standard and Poor's Compustat* database, *Institutional Brokers Estimate System* (IBES), and the *Value Line Investment Survey* database. We began our analysis by screening the *Standard and Poor's* database of approximately 9,345 companies for companies with risk equal to the risk of the typical interstate natural gas pipeline. As a measure of financial risk the average *Standard and Poor's* rating on the long-term debt of companies comprising the large natural gas pipeline industry was **BBB-**. (Several of these companies have double-B rated debt.) Our first screening process was to find all companies having a *S&P* senior debt rating of BBB to BBB- (the mid-rated triple-B debt to the lowest level triple-B debt). This screening will give us a list of companies that have long-term debt which is believed to be either equal in risk or slightly less risky than the typical interstate natural gas pipeline. This measure is indicative of financial risk for the companies.

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

where

K_e = *Cost of equity*
D_1 = *Expected Dividend in year* 1
P_0 = *Current price of stock*
g = *Growth in dividends*

Figure 2

Next we screened the surviving group of companies by the return on net plant investment (before taxes). This is a measure of business risk and measures the ability of a company to compete in the market and maintain its rate of return before income taxes. From this calculation we screened out all companies varying more than fifty percent from the average return of the interstate natural gas pipelines industry.

Next we screened the surviving group of companies by their S&P adjusted betas. Beta is a measurement of the sensitivity of a company's stock price to the overall fluctuation in the *Standard & Poor's 500* (*S&P 500*) Index Price. For example, a beta of 1.5 indicates that a company's stock price tends to rise (or fall) 1.5%, with a 1% rise (or fall) in the index price. The S&P adjusted beta of the interstate natural gas pipeline industry averages approximately 1.00 presently. Thus we excluded all companies with *S&P* adjusted betas less than 0.90 and greater than 1.10. In our judgment, this range is a reasonable range of betas to use for comparison purposes in determining comparables of approximate risk to the natural gas pipelines. A table of risk screening data follows.

Pipeline Risk Screening Data - January 1, 2016
Natural Gas Diversified & Oil/Gas Distribution/MLP - Large

Company Name	Ticker	S&P Debt Rating Letter	S&P Debt Rating Number	S&P Adj. Beta	Return on Net Invest.
AGL RESOURCES INC	GAS	BBB+	10	0.32	12.02
AMERIGAS PARTNERS -LP	APU			0.56	26.38
ATMOS ENERGY CORP	ATO	A-	9	0.64	8.50
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	0.81	5.25
CABOT OIL & GAS CORP	COG			0.93	1.75
CALLON PETROLEUM CO/DE	CPE			1.54	5.58
CHENIERE ENERGY PARTNERS LP	CQP	BB	14	1.26	(0.01)
CHESAPEAKE ENERGY CORP	CHK	B	17	1.23	11.09
CHESAPEAKE UTILITIES CORP	CPK			0.61	10.03
CIMAREX ENERGY CO	XEC	BBB-	12	1.68	11.39
CONCHO RESOURCES INC	CXO	BB+	13	1.47	1.95
CORNING NATURAL GAS HLDG CP	CNIG			0.66	6.94
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	1.20	9.05
DELTA NATURAL GAS CO INC	DGAS			0.75	9.39
DEVON ENERGY CORP	DVN	BBB+	10	1.51	15.48
ENERGEN CORP	EGN	BB	14	1.44	5.07
ENERGY TRANSFER EQUITY LP	ETE	BB	14	1.29	7.11
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	1.06	8.32
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB	11	1.08	7.22
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	0.90	11.51
EOG RESOURCES INC	EOG	A-	9	1.30	16.04
EQT CORP	EQT	BBB	11	1.01	10.78
FERRELLGAS PARTNERS -LP	FGP	B+	16	0.70	15.38
GAS NATURAL INC	EGAS			0.42	5.04
LACLEDE GROUP INC	LG	A-	9	0.59	9.38
MARTIN MIDSTREAM PARTNERS LP	MMLP	B+	16	1.05	7.25
MDU RESOURCES GROUP INC	MDU	BBB+	10	0.91	8.83
MIDCOAST ENERGY PARTNERS LP	MEP			2.08	4.05
NATIONAL FUEL GAS CO	NFG	BBB	11	1.32	9.51
NEW JERSEY RESOURCES CORP	NJR			0.71	11.67
NEWFIELD EXPLORATION CO	NFX	BBB-	12	1.23	6.83
NISOURCE INC	NI	BBB+	10	0.41	7.77
NORTHWEST NATURAL GAS CO	NWN	A+	7	0.56	7.73
ONEOK PARTNERS -LP	OKS	BBB	11	0.62	9.90
PENGROWTH ENERGY CORP	PGH			1.65	0.15
PIEDMONT NATURAL GAS CO	PNY	A	8	0.98	6.39
PLAINS GP HOLDINGS LP	PAGP			1.21	14.58
QEP RESOURCES INC	QEP	BB+	13	1.59	(9.65)
QUESTAR CORP	STR	A	8	0.75	10.87
RGC RESOURCES INC	RGCO			0.37	8.43
SOUTH JERSEY INDUSTRIES INC	SJI	BBB+	10	0.82	8.03
SOUTHCROSS ENERGY PRTNRS LP	SXE	B-	18	1.69	0.51
SOUTHWEST GAS CORP	SWX	BBB+	10	0.76	7.78
SOUTHWESTERN ENERGY CO	SWN	BBB-	12	1.29	10.01
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	0.77	9.36
STAR GAS PARTNERS -LP	SGU			0.52	162.71

Pipeline Risk Screening Data - January 1, 2016 (cont.)
Natural Gas Diversified & Oil/Gas Distribution/MLP - Large

Company Name	Ticker	S&P Debt Rating Letter	S&P Debt Rating Number	S&P Adj. Beta	Return on Net Invest.
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	0.82	25.94
TALLGRASS ENERGY PRT LP	TEP			0.90	2.88
TARGA RESOURCES CORP	TRGP	B+	16	1.51	13.28
TARGA RESOURCES PARTNERS LP	NGLS	BB+	13	1.02	13.54
TC PIPELINES LP	TCP	BBB-	12	0.75	8.43
UGI CORP	UGI			0.84	15.83
WESTERN GAS PARTNERS LP	WES	BBB-	12	0.86	8.87
WGL HOLDINGS INC	WGL	A+	7	0.72	7.10
WILLIAMS PARTNERS LP	WPZ	BBB-	12	0.93	5.03
	Average	BBB-	12	0.99	11.53

Source: *S&P Compustat*, January 2016.

Surviving the screening process are ten (10) companies, which in general should be approximately of equal or slightly less risk when compared to the interstate natural gas pipeline industry. These companies are shown in the following table.

Alcoa Inc.	EQT Corp.
Buckeye Partners LP	Plains All American Pipeline LP
Enbridge Energy Partners LP	Plum Creek Timber, Inc.
Energy Transfer Partners LP	Southwest Airlines
Enlink Midstream Partners LP	Spectra Energy Corp.

In addition to performing a DCF analysis for the companies listed above of approximately equal or slightly less risk to the interstate natural gas pipelines, we performed additional DCF analyses on five (5) other groups of companies using both *Value Line* and *S&P* data – 18 large (sales over $1 billion) companies classified by *Value Line* as the Natural Gas (Diversified) Industry (from the *Value Line* full data base of 6,150 companies); a combination of 35 large companies from both the *Value Line* natural gas (diversified) group and the large *Value Line* Natural Gas Utility distribution group; 20 large (sales over $1 billion) natural gas Pipeline MLPs; 12 companies heavily involved with natural gas pipelines from the Interstate Natural Gas Pipeline Property Tax Forum group, which have traded common stock listed by *Standard and Poor's*; and the 28 companies from the *S&P* 500 which have **"BBB-"** rated long-term debt (the same rating as the typical interstate natural gas pipeline company).

We used financial data from two independent sources, *Standard and Poor's Compustat* database of approximately 9,345 companies, and the *Value Line Investment Survey* full database of approximately 6,150 companies. The two independent sources of data gave us two sets of

growth estimates for the six groups of companies. The growth estimates considered were provided by *Value Line* and the *Institutional Brokers Estimate System* (IBES) through the *Standard and Poor's Compustat* database. From these analysts' projections we calculated DCF indicators on all groupings and calculated a simple average and median indicator. We gave the most weight to the median indicator in each grouping. The median indicator is not affected by extreme values and outliers and thus is a very good indicator of central tendency of a representative sample of companies. We placed the most confidence in the estimates provided by the IBES projections, because these estimates were provided by a large group of financial analysts who monitor these companies.[54] It is our opinion, based on this documented data, that the appropriate cost of equity for the interstate natural gas pipeline industry by the DCF method is **14.00%** as of January 1, 2016. The result of all of the DCF analysis and research can be found below and on the following pages.

Summary of DCF Method Indicators - January 1, 2016

Company Groups	*Value Line* Data		S&P (IBES) Data	
	Average	Median	Average	Median
Natural Gas Diversified Industry (Large)	10.33	9.41	16.24	10.34
Nat. Gas Diversified & Natural Gas Utility (Large)	10.03	9.73	12.90	9.85
Natural Gas Pipeline MLPs (Large)	21.20	19.23	22.75	18.66
Interstate Natural Gas Pipeline Forum (Pipelines)	13.78	11.65	10.23	10.16
S&P Screened Comparables Group	18.75	17.71	23.92	15.61
All Companies in S&P 500 with "BBB-" Rated Debt	13.71	14.42	12.57	11.68
Averages	14.63	13.69	16.44	12.72

The discounted cash flow method for above industry groups were calculated as follows:
Using *Value Line* data and *Value Line* earnings growth estimates and *S&P's Compustat* data with *Institutional Brokers Estimate System* (IBES) earnings growth.

[54] The Institutional Brokers Estimate System (IBES) is a database provided through *Standard & Poor's Compustat* of earnings expectations obtained from more than 3,500 security analysts from over 300 contributing firms.

Natural Gas Diversified Industry (Large)
DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Antero Resources Corp.	AR			
Cabot Oil & Gas 'A'	COG	0.47	30.50	30.97
Chesapeake Energy	CHK		7.00	
Cimarex Energy	XEC	0.71	4.00	4.71
Concho Resources	CXO		11.00	
Devon Energy	DVN	3.09	6.00	9.09
Encana Corp.	ECA	1.24	(1.50)	
Energen Corp.	EGN	0.19	8.00	8.19
EOG Resources	EOG	1.03	2.00	3.03
EQT Corp.	EQT	0.23	14.00	14.23
MDU Resources	MDU	4.04	6.50	10.54
National Fuel Gas	NFG	3.73	6.00	9.73
Newfield Exploration	NFX		9.50	
Pengrowth Energy	PGH	5.71		
QEP Resources	QEP	0.84	1.50	2.34
Questar Corp.	STR	4.43	6.00	10.43
Southwestern Energy	SWN		(4.00)	
WPX Energy	WPX			
	Average	2.14	7.10	10.33
	Median	1.14	6.00	9.41

Source: *Value Line*, January 2016.

Natural Gas Diversified Industry (Large)
DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
ANTERO RESOURCES CORP	AR		(20.51)	
CABOT OIL & GAS CORP	COG	0.64	41.55	42.19
CHESAPEAKE ENERGY CORP	CHK		(36.25)	
CIMAREX ENERGY CO	XEC	0.51	(29.16)	
CONCHO RESOURCES INC	CXO		25.00	
DEVON ENERGY CORP	DVN	2.91	(3.05)	
ENCANA CORP	ECA	3.77	(31.49)	
ENERGEN CORP	EGN			
EOG RESOURCES INC	EOG	0.75	(20.35)	
EQT CORP	EQT	0.18	(20.68)	
MDU RESOURCES GROUP INC	MDU	4.34	6.00	10.34
NATIONAL FUEL GAS CO	NFG	3.80	2.90	6.70
NEWFIELD EXPLORATION CO	NFX		3.00	
PENGROWTH ENERGY CORP	PGH			
QEP RESOURCES INC	QEP	0.69	15.00	15.69
QUESTAR CORP	STR	4.39	1.90	6.29
SOUTHWESTERN ENERGY CO	SWN		(35.10)	
WPX ENERGY INC	WPX			
	Average	2.20	(6.75)	16.24
	Median	1.83	(3.05)	10.34

Source: *S&P Compustat*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility (Large)
DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
AGL Resources	GAS	3.19	6.50	9.69
AmeriGas Partners	APU		6.99	
Atmos Energy	ATO	2.65	7.00	9.65
Cabot Oil & Gas 'A'	COG	0.47	30.50	30.97
Callon Pete Co	CPE			
Chesapeake Energy	CHK		7.00	
Chesapeake Utilities	CPK	1.95	8.50	10.45
Cimarex Energy	XEC	0.71	4.00	4.71
Concho Resources	CXO		11.00	
Corning Natural Gas Holding	CNIG			
Delta Natural Gas	DGAS			
Devon Energy	DVN	3.09	6.00	9.09
Energen Corp.	EGN	0.19	8.00	8.19
EOG Resources	EOG	1.03	2.00	3.03
EQT Corp.	EQT	0.23	14.00	14.23
Gas Natural Inc	EGAS			
Laclede Group	LG	3.23	10.00	13.23
MDU Resources	MDU	4.04	6.50	10.54
National Fuel Gas	NFG	3.73	6.00	9.73
New Jersey Resources	NJR	2.84	3.50	6.34
Newfield Exploration	NFX		9.50	
NiSource Inc.	NI	3.12	(1.50)	
Northwest Nat. Gas	NWN	3.63	7.00	10.63
Pengrowth Energy	PGH	5.71		
Piedmont Natural Gas	PNY	2.31	3.00	5.31
QEP Resources	QEP	0.84	1.50	2.34
Questar Corp.	STR	4.43	6.00	10.43
RGC Resources Inc	RGCO			
South Jersey Inds.	SJI	4.49	7.00	11.49
Southwest Gas	SWX	3.05	7.00	10.05
Southwestern Energy	SWN		(4.00)	
Star Gas Partners L.P.	SGU			
Targa Resources Corp	TRGP		17.90	
UGI Corp.	UGI	2.68	9.50	12.18
WGL Holdings Inc.	WGL	2.84	5.50	8.34
	Average	2.63	7.35	10.03
	Median	2.84	7.00	9.73

Source: *Value Line*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility (Large)
DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
AGL RESOURCES INC	GAS	2.86	(10.60)	
AMERIGAS PARTNERS -LP	APU	11.76	9.50	21.26
ATMOS ENERGY CORP	ATO	2.85	7.00	9.85
CABOT OIL & GAS CORP	COG	0.64	41.55	42.19
CALLON PETROLEUM CO/DE	CPE			
CHESAPEAKE ENERGY CORP	CHK		(36.25)	
CHESAPEAKE UTILITIES CORP	CPK			
CIMAREX ENERGY CO	XEC	0.51	(29.16)	
CONCHO RESOURCES INC	CXO		25.00	25.00
CORNING NATURAL GAS HLDG CP	CNIG			
DELTA NATURAL GAS CO INC	DGAS			
DEVON ENERGY CORP	DVN	2.91	(3.05)	
ENERGEN CORP	EGN			
EOG RESOURCES INC	EOG	0.75	(20.35)	
EQT CORP	EQT	0.18	(20.68)	
GAS NATURAL INC	EGAS			
LACLEDE GROUP INC	LG	3.45	4.59	8.04
MDU RESOURCES GROUP INC	MDU	4.34	6.00	10.34
NATIONAL FUEL GAS CO	NFG	3.80	2.90	6.70
NEW JERSEY RESOURCES CORP	NJR	3.10	6.50	9.60
NEWFIELD EXPLORATION CO	NFX		3.00	3.00
NISOURCE INC	NI	2.77	(12.90)	
NORTHWEST NATURAL GAS CO	NWN	3.84	4.00	7.84
PENGROWTH ENERGY CORP	PGH			
PIEDMONT NATURAL GAS CO	PNY	2.43	5.00	7.43
QEP RESOURCES INC	QEP	0.69	15.00	15.69
QUESTAR CORP	STR	4.39	1.90	6.29
RGC RESOURCES INC	RGCO			
SOUTH JERSEY INDUSTRIES INC	SJI			
SOUTHWEST GAS CORP	SWX	3.05	4.00	7.05
SOUTHWESTERN ENERGY CO	SWN		(35.10)	
STAR GAS PARTNERS -LP	SGU			
TARGA RESOURCES CORP	TRGP	13.87	3.10	16.97
UGI CORP	UGI	2.91	8.00	10.91
WGL HOLDINGS INC	WGL	3.17	8.00	11.17
	Average	3.54	(0.52)	12.90
	Median	2.91	4.00	9.85

Source: *S&P Compustat*, January 2016.

Natural Gas Pipeline MLPs - Large
DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Boardwalk Pipeline	BWP	3.23	11.50	14.73
Cheniere Energy Partners L.P.	CQP			
DCP Midstream Partners	DPM	13.10	5.00	18.10
Energy Transfer	ETP	13.01	13.00	26.01
Energy Transfer Equity L.P.	ETE		17.00	
EnLink Midstream Part.	ENLK	9.96		
Enterprise Products	EPD	6.38	9.00	15.38
Ferrellgas Partners L.P.	FGP		35.40	
Martin Midstream Ptnrs L.P.	MMLP		1.00	
Midcoast Energy Partners LP	MEP		(22.80)	
ONEOK Partners L.P.	OKS	11.31	(1.00)	
Plains GP Holdings LP	PAGP		10.25	
Southcross Energy Partners L.P	SXE		2.00	
Spectra Energy Partners LP	SEP		5.70	
Suburban Propane	SPH	15.13	17.50	32.63
Tallgrass Energy Partners LP	TEP		19.00	
Targa Resources Partners LP	NGLS		8.53	
TC PipeLines LP	TCP		6.60	
Western Gas Partners LP	WES		30.00	
Williams Partners L.P.	WPZ	12.86	7.50	20.36
	Average	10.62	9.73	21.20
	Median	12.09	8.77	19.23

Source: *Value Line*, January 2016.

Natural Gas Pipeline MLPs - Large
DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
BOARDWALK PIPELINE PRTNRS-LP	BWP	3.33	8.14	11.48
CHENIERE ENERGY PARTNERS LP	CQP			
DCP MIDSTREAM PARTNERS LP	DPM	12.77	1.00	13.77
ENERGY TRANSFER EQUITY LP	ETE	10.37	25.00	35.37
ENERGY TRANSFER PARTNERS -LP	ETP	16.73	33.69	50.42
ENLINK MIDSTREAM PARTNERS LP	ENLK	11.38	20.95	32.33
ENTERPRISE PRODS PRTNRS -LP	EPD	6.24	3.65	9.89
FERRELLGAS PARTNERS -LP	FGP			
MARTIN MIDSTREAM PARTNERS LP	MMLP	15.13	1.00	16.13
MIDCOAST ENERGY PARTNERS LP	MEP			
ONEOK PARTNERS -LP	OKS	10.12	(3.53)	6.58
PLAINS GP HOLDINGS LP	PAGP			
SOUTHCROSS ENERGY PRTNRS LP	SXE			
SPECTRA ENERGY PARTNERS LP	SEP	5.56	5.90	11.46
SUBURBAN PROPANE PRTNRS -LP	SPH	15.12	3.54	18.66
TALLGRASS ENERGY PRT LP	TEP	8.19	40.62	48.81
TARGA RESOURCES PARTNERS LP	NGLS	16.45	(17.58)	
TC PIPELINES LP	TCP	7.99	11.55	19.54
WESTERN GAS PARTNERS LP	WES	7.43	13.85	21.27
WILLIAMS PARTNERS LP	WPZ			
	Average	10.49	10.56	22.75
	Median	10.25	7.02	18.66

Source: *S&P Compustat*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Boardwalk Pipeline	BWP	3.23	11.50	14.73
Dominion Resources	D	4.07	8.00	12.07
Kinder Morgan Inc.	KMI	3.43	13.00	16.43
MDU Resources	MDU	4.04	6.50	10.54
National Fuel Gas	NFG	3.73	6.00	9.73
ONEOK Partners L.P.	OKS	11.31	(1.00)	10.31
Questar Corp.	STR	4.43	6.00	10.43
Spectra Energy	SE	6.23	5.00	11.23
Spectra Energy Partners LP	SEP	0.00	5.70	5.70
TransCanada Corp.	TRP	6.38	11.00	17.38
Williams Cos.	WMB	10.48	16.00	26.48
Williams Partners L.P.	WPZ	12.86	7.50	20.36
	Average	5.85	7.93	13.78
	Median	4.25	7.00	11.65

Source: *Value Line*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
BOARDWALK PIPELINE PRTNRS-LP	BWP	3.33	8.14	11.48
DOMINION RESOURCES INC	D	4.06	5.93	9.98
KINDER MORGAN INC	KMI	14.21	3.90	18.11
MDU RESOURCES GROUP INC	MDU	4.34	6.00	10.34
NATIONAL FUEL GAS CO	NFG	3.80	2.90	6.70
ONEOK PARTNERS -LP	OKS	10.12	(3.53)	6.58
QUESTAR CORP	STR	4.39	1.90	6.29
SPECTRA ENERGY CORP	SE	6.49	5.00	11.49
SPECTRA ENERGY PARTNERS LP	SEP	5.56	5.90	11.46
TRANSCANADA CORP	TRP	4.84	5.02	9.87
WILLIAMS COS INC	WMB			
WILLIAMS PARTNERS LP	WPZ			
	Average	6.11	4.12	10.23
	Median	4.62	5.01	10.16

Source: *S&P Compustat*, January 2016.

Pipeline Screened Comparables Group
DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Alcoa Inc.	AA	1.20	17.00	18.20
Buckeye Partners L.P.	BPL	7.72	9.50	17.22
Enbridge Energy Partners L.P.	EEP		26.90	
Energy Transfer	ETP	13.01	13.00	26.01
EnLink Midstream Part.	ENLK	9.96		
EQT Corp.	EQT	0.23	14.00	14.23
Plains All Amer. Pipe.	PAA	12.29	8.00	20.29
Plum Creek Timber	PCL	3.64	9.50	13.14
Southwest Airlines	LUV	0.69	29.00	29.69
Spectra Energy	SE	6.23	5.00	11.23
	Average	6.11	14.66	18.75
	Median	6.23	13.00	17.71

Source: *Value Line*, January 2016.

Pipeline Screened Comparables Group
DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
ALCOA INC	AA	1.26	3.60	4.86
BUCKEYE PARTNERS LP	BPL	7.41	4.00	11.41
ENBRIDGE ENERGY PRTNRS -LP	EEP	12.97	28.30	41.27
ENERGY TRANSFER PARTNERS -LP	ETP	16.73	33.69	50.42
ENLINK MIDSTREAM PARTNERS LP	ENLK	11.38	20.95	32.33
EQT CORP	EQT	0.18	(20.68)	
PLAINS ALL AMER PIPELNE -LP	PAA	12.46	2.80	15.26
PLUM CREEK TIMBER CO INC	PCL	4.11	11.50	15.61
SOUTHWEST AIRLINES	LUV	0.92	31.70	32.62
SPECTRA ENERGY CORP	SE	6.49	5.00	11.49
	Average	7.39	12.09	23.92
	Median	6.95	8.25	15.61

Source: *S&P Compustat*, January 2016.

S&P 500 Companies with "BBB-" Rated Debt

DCF Indicator (VL Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Advance Auto Parts	AAP	0.15	13.50	13.65
Alcoa Inc.	AA	1.20	17.00	18.20
Amer. Tower 'A'	AMT	2.08	14.50	16.58
Coach Inc.	COH	4.13	1.50	5.63
ConAgra Foods	CAG	2.34	6.00	8.34
Crown Castle Int'l	CCI	4.06	23.50	27.56
Darden Restaurants	DRI	3.11	11.50	14.61
Discover Fin'l Svcs.	DFS	2.06	4.00	6.06
Dun & Bradstreet	DNB	1.74	4.50	6.24
Expedia Inc.	EXPE	0.76	23.00	23.76
FirstEnergy Corp.	FE	4.55	7.00	11.55
Ford Motor	F	4.23	10.00	14.23
Gap (The) Inc.	GPS	3.72	6.50	10.22
General Motors	GM	4.19	12.00	16.19
Harman Int'l	HAR	1.47	20.00	21.47
Harris Corp.	HRS	2.33	7.00	9.33
Interpublic Group	IPG	2.29	12.50	14.79
Kansas City South'n	KSU	1.77	13.00	14.77
Kinder Morgan Inc.	KMI	3.43	13.00	16.43
Kraft Heinz Co.	KHC	3.11		
L-3 Communic.	LLL	2.15	6.00	8.15
Motorola Solutions	MSI	2.45	4.50	6.95
Newell Rubbermaid	NWL	1.73	14.00	15.73
Reynolds American	RAI	3.08	13.50	16.58
Viacom Inc. 'B'	VIAB	3.91	11.00	14.91
Whole Foods Market	WFM	1.71	10.50	12.21
Zions Bancorp.	ZION	0.94	11.50	12.44
Zoetis Inc.	ZTS	0.78		
	Average	2.48	11.19	13.71
	Median	2.31	11.50	14.42

Source: *Value Line*, January 2016.

S&P 500 Companies with "BBB-" Rated Debt

DCF Indicator (S&P Data) - January 1, 2016

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
ADVANCE AUTO PARTS INC	AAP	0.18	12.70	12.88
ALCOA INC	AA	1.26	3.60	4.86
AMERICAN TOWER CORP	AMT	2.22	9.70	11.92
COACH INC	COH	4.48	8.67	13.15
CONAGRA FOODS INC	CAG	2.54	7.05	9.59
CROWN CASTLE INTL CORP	CCI	4.76	16.15	20.91
DARDEN RESTAURANTS INC	DRI	3.99	15.30	19.29
DISCOVER FINANCIAL SVCS INC	DFS	2.26	8.05	10.30
DUN & BRADSTREET CORP	DNB	1.87	5.00	6.87
EXPEDIA INC	EXPE	0.94	22.08	23.02
FIRSTENERGY CORP	FE	4.55	0.31	4.86
FORD MOTOR CO	F	5.13	20.50	25.63
GAP INC	GPS	3.94	5.90	9.84
GENERAL MOTORS CO	GM	5.16	21.93	27.09
HARMAN INTERNATIONAL INDS	HAR	1.71	15.00	16.71
HARRIS CORP	HRS	2.35	1.90	4.25
INTERPUBLIC GROUP OF COS	IPG	2.25	9.05	11.30
KANSAS CITY SOUTHERN	KSU	1.83	3.68	5.51
KINDER MORGAN INC	KMI	14.21	3.90	18.11
KRAFT HEINZ CO	KHC	3.22	2.00	5.22
L-3 COMMUNICATIONS HLDGS INC	LLL	2.22	1.90	4.12
MOTOROLA SOLUTIONS INC	MSI	2.64	10.00	12.64
NEWELL RUBBERMAID INC	NWL	1.89	9.55	11.44
REYNOLDS AMERICAN INC	RAI	3.54	13.35	16.89
VIACOM INC	VIAB	4.24	9.20	13.44
WHOLE FOODS MARKET INC	WFM	1.66	6.85	8.51
ZIONS BANCORPORATION	ZION	0.96	9.29	10.25
ZOETIS INC	ZTS	0.78	12.70	13.48
	Average	3.10	9.48	12.57
	Median	2.31	9.13	11.68

Source: *S&P Compustat*, January 2016.

Risk Premium Method

The risk premium method is a standard method of estimating the cost of equity (K_e) based on the formula in Figure 3. This method sums two elements of risk — a risk free rate, which is the price of time (the reward for deferring consumption and for not exposing funds to risk), and a risk premium, which is the additional reward for assuming risk. The nominal risk free rate includes the real risk free rate and an inflation premium. The risk premium includes an interest rate risk, business risk, financial risk, and liquidity risk. All of these elements are included when calculating equity cost by the risk premium method.

$$K_e = R_f + R_p$$

where

K_e = *Cost of equity*
R_f = *Risk free rate*
R_p = *Risk premium*

Figure 3

Our risk premium calculations included computations for two categories of risk premium indicators — general indicators and indicators for specific groups. These groups are the *Value Line* Natural Gas Diversified Industry (large companies – with over $1 billion in annual sales); the *Value Line* Natural Gas Diversified lndustry combined with the *Value Line Natural Gas Utilities* (large companies – with over $1 billion in annual sales); the large *Natural Gas Pipeline MLPs*; the Interstate Natural Gas Pipeline Forum Group (with subsidiaries) that are heavily involved with pipelines, and the S&P Screened Comparables Group as described on page 49. Our ex post risk premiums were derived from a simulated *SBBI* methodology as shown on page 112. This risk premium was cross-checked for reasonableness by information from *Value Line*.[55] Our *ex ante* risk premium indicator was derived from the expected cost of equity for the

---

[55] In an effort to check the long-term risk premium of 6.90%, we performed our own calculations to confirm the reasonableness of this figure. The risk premium figure is supported by our own calculations of risk premium by using the CAPM formula in Figure A. From *Value Line* we know the 3-5 year annual total return on their S&P 500 database is 11.47% and that the 5-year beta is 1.04 for this database (see statistics for database, *Value Line*, January 2016). Further, we know the long-term treasury bond rate was 3.01% at January 1, 2016. Therefore, we can substitute all the known elements into the CAPM formula and solve for RP as shown in Figure B. The result of this calculation is a risk premium indicator of 8.13%, which well supports the long-term government bond risk premium of 6.90%.

$$K_e = R_f + \beta(R_p)$$

Figure A

Solve for R_p

$$R_p = \frac{K_e - R_f}{\beta}$$

$$R_p = \frac{0.1147 - 0.0301}{1.04}$$

$$R_p = 0.0813$$

Figure B

companies making up the *S&P 500* (which are expected to pay dividends). We developed the weighted average cost of capital (weighted by market value) for the *S&P 500*, which was 12.58%. (*This ex ante risk premium, while high by historical standards, is partially the result of very low yields – among the lowest in over 50 years – on long term Treasury bonds.*) The market-weighted average is appropriate because the monthly fundamental beta is estimated based upon the sensitivity of a company's stock price to the overall fluctuation in the *S&P 500* index price (with the *S&P 500* being the surrogate for the market in general). The market-weighted average gives most weight to the highest market value stocks and is a very good indicator of the central tendency of the overall market cost of capital. Our relevant current 'safe rates' for the general indicators were derived from the Federal Reserve at December 31, 2015. The 'safe rates' (or base rates) used for each company within the company groupings were the average of the *Standard & Poor's* and *Moody's* long-term yields for the bond rating for each company in *Standard & Poor's Compustat* database (January, 2016). The average yield to maturity for each company's bond rating was added to the corporate bond risk premium of 5.8% (as calculated on page 113) to obtain an individual estimate for each company in the group. Thus, the risk premium indicators for the individual groups are specific for each company within the group and, thus, as individualized as possible for each company.

The general Risk Premium (or equity build-up method) indicators, using the calculated risk premium, indicates a cost of equity capital of 9.91% (ex post) and 12.58% (ex ante). The range for all calculations of risk premium indicators using the indicators by specific company groups are between 10.82% and 12.60%. A reasonable view of these results would indicate a correlated risk premium indicator for the specific company groups to be approximately 11.75%.

The long-term bond risk premium indicators are well supported by the estimates derived from the specific indicators from the yields to maturity of all of the groups of interstate natural gas pipeline industry long-term bonds. We believe the appropriate cost of equity for the typical interstate natural gas pipeline by the risk premium method as of January 1, 2016, was **11.75%**. This conclusion gives weight and consideration to all indicators. A summary of the cost of equity indicators by the risk premium method (or equity build-up method) follows and the supporting data follows afterward.

Summary of Risk Premium Indicators - January 1, 2016

General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
30-year Treasury Bonds (ex post)	3.01	6.90	9.91
30-year Treasury Bonds (ex ante)	3.01	9.57	12.58

Risk Premium Indicators by Groups

Indicators	Median S&P Rating		Reuters Yields	Risk Prem Indicator
	Rating	Number		
Natural Gas Diversified Industry (Large)	BBB-	12	6.80	12.60
Natural Gas Diversified & Natural Gas Utility (Large)	BBB+	10	5.02	10.82
Natural Gas Pipeline MLPs (Large)	BBB-	12	6.80	12.60
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	5.55	11.35
Pipeline Screened Comparables Group	BBB	11	5.55	11.35
Average	BBB	11	5.94	11.74

* Base Rate: Average YTM S&P and Moody's.
Risk Premium Simulated *SBBI* Methodology (see p.112).

Natural Gas Diversified Industry (Large)
Risk Premium Indicator - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	SP & Mdy Avg. Yields	Risk Prem Indicator
ANTERO RESOURCES CORP	AR	BB	14	9.12	14.92
CABOT OIL & GAS CORP	COG				
CHESAPEAKE ENERGY CORP	CHK	B	17	13.04	18.84
CIMAREX ENERGY CO	XEC	BBB-	12	6.80	12.60
CONCHO RESOURCES INC	CXO	BB+	13	9.12	14.92
DEVON ENERGY CORP	DVN	BBB+	10	5.02	10.82
ENCANA CORP	ECA	BBB	11	5.55	11.35
ENERGEN CORP	EGN	BB	14	9.12	14.92
EOG RESOURCES INC	EOG	A-	9	4.66	10.46
EQT CORP	EQT	BBB	11	5.55	11.35
MDU RESOURCES GROUP INC	MDU	BBB+	10	5.02	10.82
NATIONAL FUEL GAS CO	NFG	BBB	11	5.55	11.35
NEWFIELD EXPLORATION CO	NFX	BBB-	12	6.80	12.60
PENGROWTH ENERGY CORP	PGH				
QEP RESOURCES INC	QEP	BB+	13	9.12	14.92
QUESTAR CORP	STR	A	8	4.35	10.15
SOUTHWESTERN ENERGY CO	SWN	BBB-	12	6.80	12.60
WPX ENERGY INC	WPX	BB	14	9.12	14.92
	Average	BBB-	12	6.80	12.60
	Median	BBB-	12	6.80	12.60

Source: *S&P Compustat & Mergent*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	SP & Mdy Avg. Yields	Risk Prem Indicator
AGL RESOURCES INC	GAS	BBB+	10	5.02	10.82
AMERIGAS PARTNERS -LP	APU				
ATMOS ENERGY CORP	ATO	A-	9	4.66	10.46
CABOT OIL & GAS CORP	COG				
CALLON PETROLEUM CO/DE	CPE				
CHESAPEAKE ENERGY CORP	CHK	B	17	13.04	18.84
CHESAPEAKE UTILITIES CORP	CPK				
CIMAREX ENERGY CO	XEC	BBB-	12	6.80	12.60
CONCHO RESOURCES INC	CXO	BB+	13	9.12	14.92
CORNING NATURAL GAS HLDG CP	CNIG				
DELTA NATURAL GAS CO INC	DGAS				
DEVON ENERGY CORP	DVN	BBB+	10	5.02	10.82
ENERGEN CORP	EGN	BB	14	9.12	14.92
EOG RESOURCES INC	EOG	A-	9	4.66	10.46
EQT CORP	EQT	BBB	11	5.55	11.35
GAS NATURAL INC	EGAS				
LACLEDE GROUP INC	LG	A-	9	4.66	10.46
MDU RESOURCES GROUP INC	MDU	BBB+	10	5.02	10.82
NATIONAL FUEL GAS CO	NFG	BBB	11	5.55	11.35
NEW JERSEY RESOURCES CORP	NJR				
NEWFIELD EXPLORATION CO	NFX	BBB-	12	6.80	12.60
NISOURCE INC	NI	BBB+	10	5.02	10.82
NORTHWEST NATURAL GAS CO	NWN	A+	7	4.49	10.29
PENGROWTH ENERGY CORP	PGH				
PIEDMONT NATURAL GAS CO	PNY	A	8	4.35	10.15
QEP RESOURCES INC	QEP	BB+	13	9.12	14.92
QUESTAR CORP	STR	A	8	4.35	10.15
RGC RESOURCES INC	RGCO				
SOUTH JERSEY INDUSTRIES INC	SJI	BBB+	10	5.02	10.82
SOUTHWEST GAS CORP	SWX	BBB+	10	5.02	10.82
SOUTHWESTERN ENERGY CO	SWN	BBB-	12	6.80	12.60
STAR GAS PARTNERS -LP	SGU				
TARGA RESOURCES CORP	TRGP	B+	16	11.01	16.81
UGI CORP	UGI				
WGL HOLDINGS INC	WGL	A+	7	4.49	10.29
	Average	BBB	11	5.55	11.35
	Median	BBB+	10	5.02	10.82

Source: *S&P Compustat & Mergent*, January 2016.

Natural Gas Pipeline MLPs - Large
Risk Premium Indicator - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	SP & Mdy Avg. Yields	Risk Prem Indicator
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	6.80	12.60
CHENIERE ENERGY PARTNERS LP	CQP	BB	14	9.12	14.92
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	9.12	14.92
ENERGY TRANSFER EQUITY LP	ETE	BB	14	9.12	14.92
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	6.80	12.60
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB	11	5.55	11.35
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	5.02	10.82
FERRELLGAS PARTNERS -LP	FGP	B+	16	11.01	16.81
MARTIN MIDSTREAM PARTNERS LP	MMLP	B+	16	11.01	16.81
MIDCOAST ENERGY PARTNERS LP	MEP				
ONEOK PARTNERS -LP	OKS	BBB	11	5.55	11.35
PLAINS GP HOLDINGS LP	PAGP				
SOUTHCROSS ENERGY PRTNRS LP	SXE	B-	18	7.64	13.44
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	5.55	11.35
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	8.17	13.97
TALLGRASS ENERGY PRT LP	TEP				
TARGA RESOURCES PARTNERS LP	NGLS	BB+	13	9.12	14.92
TC PIPELINES LP	TCP	BBB-	12	6.80	12.60
WESTERN GAS PARTNERS LP	WES	BBB-	12	6.80	12.60
WILLIAMS PARTNERS LP	WPZ	BBB-	12	6.80	12.60
	Average	BB+	13	9.12	14.92
	Median	BBB-	12	6.80	12.60

Source: *S&P Compustat & Mergent*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
Risk Premium Indicator - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	SP & Mdy Avg. Yields	Risk Prem Indicator
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	6.80	12.60
DOMINION RESOURCES INC	D	A-	9	4.66	10.46
KINDER MORGAN INC	KMI	BBB-	12	6.80	12.60
MDU RESOURCES GROUP INC	MDU	BBB+	10	5.02	10.82
NATIONAL FUEL GAS CO	NFG	BBB	11	5.55	11.35
ONEOK INC	OKE	BB+	13	9.12	14.92
QUESTAR CORP	STR	A	8	4.35	10.15
SPECTRA ENERGY CORP	SE	BBB	11	5.55	11.35
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	5.55	11.35
TRANSCANADA CORP	TRP	A-	9	4.66	10.46
WILLIAMS COS INC	WMB	BB+	13	9.12	14.92
WILLIAMS PARTNERS LP	WPZ	BBB-	12	6.80	12.60
	Average	BBB	11	5.55	11.35
	Median	BBB	11	5.55	11.35

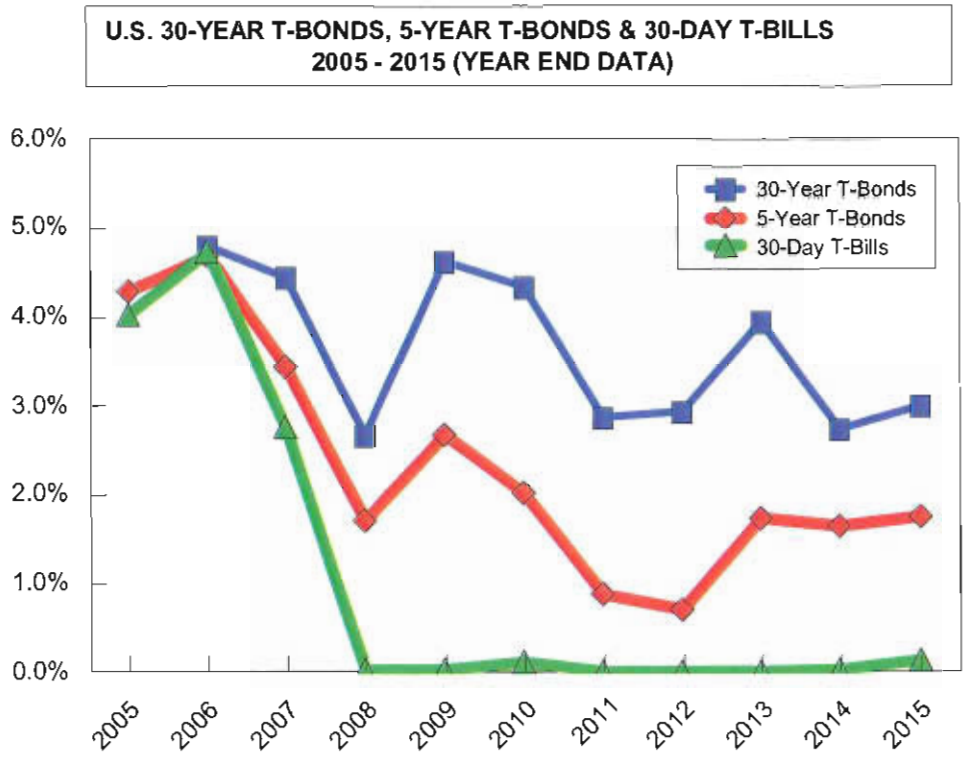
Source: *S&P Compustat & Mergent*, January 2016.

Pipeline Screened Comparables Group
Risk Premium Indicator - January 1, 2016

Company Name	Ticker	S&P Rating	Numerical Rating	SP & Mdy Avg. Yields	Risk Prem Indicator
ALCOA INC	AA	BBB-	12	6.80	12.60
BUCKEYE PARTNERS LP	BPL	BBB-	12	6.80	12.60
ENBRIDGE ENERGY PRTNRS -LP	EEP	BBB	11	5.55	11.35
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	6.80	12.60
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB	11	5.55	11.35
EQT CORP	EQT	BBB	11	5.55	11.35
PLAINS ALL AMER PIPELNE -LP	PAA	BBB	11	5.55	11.35
PLUM CREEK TIMBER CO INC	PCL	BBB	11	5.55	11.35
SOUTHWEST AIRLINES	LUV	BBB	11	5.55	11.35
SPECTRA ENERGY CORP	SE	BBB	11	5.55	11.35
	Average	BBB	11	5.55	11.35
	Median	BBB	11	5.55	11.35

Source: *S&P Compustat & Mergent*, January 2016.

US 30-Year T-Bonds, 5-Year T-Bonds, and 30-Day T-Bills



U.S. 30-YEAR TREASURY BONDS
U.S. 5-YEAR TREASURY BONDS
U.S. 30-DAY TREASURY BILLS

Year End Date	30-Year T-Bonds	5 -Year T-Bonds	30-DAY T-Bills
2005		4.30%	4.05%
2006	4.81%	4.70%	4.75%
2007	4.45%	3.45%	2.76%
2008	2.69%	1.72%	0.04%
2009	4.63%	2.69%	0.04%
2010	4.34%	2.02%	0.11%
2011	2.89%	0.89%	0.01%
2012	2.95%	0.72%	0.02%
2013	3.96%	1.75%	0.01%
2014	2.75%	1.65%	0.03%
2015	3.01%	1.76%	0.14%

Source: Federal Reserve, Dec. 31, 2015.

Capital Asset Pricing Model

The capital asset pricing model (CAPM) is a generally accepted method of estimating the cost of equity (K_e) based on the formula shown in Figure 4. It is the preferred method of estimating the cost of equity by some analysts. The CAPM method is much like the risk premium method, however the risk premium is adjusted by beta before it is added to the appropriate risk level. The two elements of risk are a risk free rate, which is the price of time (the reward for postponing consumption and for not exposing funds to risk), and a risk premium, which is the additional compensation for assuming risk. The nominal risk free rate includes the real risk free rate and an inflation premium. The risk premium includes an interest rate risk, business risk, financial risk, and liquidity risk. All of these elements are accounted for when we calculate the cost of equity using the CAPM method.

$$K_e = R_f + \beta R_p$$

where

K_e = *Cost of equity*
R_f = *Risk free rate*
β = *Beta*
R_p = *Risk premium*

Figure 4

Our *ex post* CAPM calculations were based upon the long-term risk premium using the data provided by Morningstar and Duff & Phelps, and simulated for 2016 on page 112. The indicated cost of equity by this method was 10.26% at January 1, 2016. Our *ex ante* CAPM calculations were based upon the expected risk premium of 9.57% derived from the market-weighted average of the cost of equity capital less the current long-term Treasury bond rate. The indicated cost of equity by this method was 13.06% at January 1, 2016.

Our 'safe rates' for the CAPM calculations were derived as described in the risk premium method discussed earlier. Our beta estimate of 1.05 was based on observing the average and median *Value Line* betas from each of the groups. The average and median betas are shown in Figure 5. The calculated forward-looking (*ex ante*) CAPM indicator was found by deriving an expected risk premium from the S&P 500 companies. The *ex ante* CAPM indicator is a good check on the reliability of the standard CAPM because it is

Group of Companies	Avg.	Med.
Value Line Betas VL Nat Gas Divers. (Large)	1.33	1.38
VL Nat Gas Divers & Nat Gas Utility (Large)	1.01	0.90
VL NG Pipeline MLPs (Large)	0.97	0.98
Nat Gas PL Forum (pipes)	0.95	0.98
S&P Screened Comps.	1.01	1.00
S&P 500 BBB- rated debt	1.03	1.05

Figure 5 - *Value Line* Betas

forward looking. All prospective investment in interstate natural gas pipeline companies is based on an expectation of future benefits. This is consistent with the fundamental principle underlying the income approach, which is the principle of anticipation. Further, this *ex ante* method is discussed in the *Cost of Capital* as follows:

> The ex ante risk premium is a forward looking premium. The Gordon Growth Model is applied to determine the resulting risk premium. The premium is determined by first estimating the cost of equity for the proxy market. The proxy market is a market large enough to remove the effects of non-diversification. Typically, the S&P 500 or the NYSE is used as this proxy...
>
> The first step in deriving the ex ante risk premium is to use a single-stage discounted cash flow analysis (otherwise known as the Gordon Growth Model) to calculate the cost of equity for the market proxy, (i.e., the S&P 500). The cost of equity is calculated by using the most recent I/B/E/S consensus long-term growth rates for each firm in the S&P 500 and adding it to the dividend growth yield. I/B/E/S is a service that polls analysts about their growth estimates for individual stocks. The dividend yield for the S&P 500 should be an estimate for Year 1's dividend (D_1). D_1 can be estimated by multiplying the S&P 500's current weighted average dividend yield (D_0) by 1 plus its weighted average long-term earnings growth rate. By adding the weighted average long-term growth rate to the dividend yield at the end of Year 1, the cost of equity is estimated. If for example, the long-term growth rate is equal to 10% and the current dividend yield is 4%, then the cost of equity is (4% x 1.1) + 10%, or 14.40 %. This can also be described in the following formula:
>
> $$K_{e500} = DY \; x \; (1 + g) + g$$
>
> Where:
> DY = dividend yield
> G = long-term growth
> K_{e500} = cost of equity for the S&P 500
>
> The second step is to calculate the risk premium of the S&P 500 (RP_{500}). For the CAPM, the ex ante risk premium is calculated by subtracting the risk-free rate (R_f), from the cost of equity for the S&P 500. For the build up method, the ex ante risk premium is calculated by subtracting the weighted average bond yield for the S&P 500 from the cost of equity for the S&P 500.[56]

---

[56] Pratt, Shannon P. *Cost of Capital, Estimation and Applications*, (NY: John Wiley & Sons, Inc. 1998) 178.

$$RP_{500} = K_{e500} - R_f$$

In order to perform the *ex ante* CAPM indicator we derived the expected cost of equity for the companies making up the *S&P 500* (which are expected to pay dividends). We developed the weighted average cost of capital (weighted by market value) for the *S&P 500*, which was 12.58%. We then subtracted the current long-term Treasury bond rate of 3.01% to obtain the expected equity risk premium of 9.57%. The market-weighted average is appropriate because the monthly fundamental beta is estimated based upon the sensitivity of a company's stock price to the overall fluctuation in the *S&P 500* index price (with the *S&P 500* being the surrogate for the market in general). The market-weighted average gives most weight to the highest market value stocks and is a very good indicator of the central tendency of the overall market cost of capital.

Based upon the analysis presented and considering all the relevant facts, we believe the appropriate cost of equity capital indicated by the CAPM method is **12.00%** at January 1, 2016. This conclusion gives weight and consideration to both indicators, with most emphasis on the ex ante indicator. A summary of the CAPM indicators and the supporting data begins below and on the following page.

Summary of CAPM Indicators - January 1, 2016

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
CAPM Indicator *				
Long-Term Gov't Bonds (ex post)	3.01	6.90	1.05	10.26
Long-Term Gov't Bonds (ex ante)	3.01	9.57	1.05	13.06

CAPM Formula: Ke = Rf + B(Rp)

* CAPM Indicator is based upon a *Value Line* beta of 1.05 & Federal Reserve data December 31, 2015.

On the following tables are the *Value Line* betas for the various groups of pipeline and comparable companies. Shown after the betas for the various groups are the calculations for the *ex ante* CAPM with supporting data from *Standard & Poor's Compustat* at January 1, 2016.

Natural Gas Diversified Industry (Large)
Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
Antero Resources Corp.	AR	1.40
Cabot Oil & Gas 'A'	COG	1.10
Chesapeake Energy	CHK	1.55
Cimarex Energy	XEC	1.50
Concho Resources	CXO	1.45
Devon Energy	DVN	1.35
Encana Corp.	ECA	1.30
Energen Corp.	EGN	1.40
EOG Resources	EOG	1.40
EQT Corp.	EQT	1.10
MDU Resources	MDU	1.00
National Fuel Gas	NFG	1.10
Newfield Exploration	NFX	1.65
Pengrowth Energy	PGH	1.35
QEP Resources	QEP	1.45
Questar Corp.	STR	0.85
Southwestern Energy	SWN	1.20
WPX Energy	WPX	1.80
	Average	1.33
	Median	1.38

Source: *Value Line*, January 2016.

Natural Gas Div. Ind. & Natural Gas Utility (Large)
Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
AGL Resources	GAS	0.60
AmeriGas Partners	APU	0.65
Atmos Energy	ATO	0.80
Cabot Oil & Gas 'A'	COG	1.10
Callon Pete Co	CPE	2.05
Chesapeake Energy	CHK	1.55
Chesapeake Utilities	CPK	0.65
Cimarex Energy	XEC	1.50
Concho Resources	CXO	1.45
Corning Natural Gas Holding	CNIG	0.55
Delta Natural Gas	DGAS	0.55
Devon Energy	DVN	1.35
Energen Corp.	EGN	1.40
EOG Resources	EOG	1.40
EQT Corp.	EQT	1.10
Gas Natural Inc	EGAS	0.50
Laclede Group	LG	0.70
MDU Resources	MDU	1.00
National Fuel Gas	NFG	1.10
New Jersey Resources	NJR	0.80
Newfield Exploration	NFX	1.65
NiSource Inc.	NI	
Northwest Nat. Gas	NWN	0.65
Pengrowth Energy	PGH	1.35
Piedmont Natural Gas	PNY	0.75
QEP Resources	QEP	1.45
Questar Corp.	STR	0.85
RGC Resources Inc	RGCO	0.45
South Jersey Inds.	SJI	0.80
Southwest Gas	SWX	0.80
Southwestern Energy	SWN	1.20
Star Gas Partners L.P.	SGU	0.55
Targa Resources Corp	TRGP	1.35
UGI Corp.	UGI	0.95
WGL Holdings Inc.	WGL	0.75
	Average	1.01
	Median	0.90

Source: *Value Line*, January 2016.

Natural Gas Pipeline MLPs - Large
Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
Boardwalk Pipeline	BWP	0.75
Cheniere Energy Partners L.P.	CQP	1.10
DCP Midstream Partners	DPM	1.10
Energy Transfer	ETP	0.80
Energy Transfer Equity L.P.	ETE	1.20
EnLink Midstream Part.	ENLK	1.15
Enterprise Products	EPD	1.00
Ferrellgas Partners L.P.	FGP	0.70
Martin Midstream Ptnrs L.P.	MMLP	0.95
Midcoast Energy Partners LP	MEP	1.20
ONEOK Partners L.P.	OKS	0.85
Plains GP Holdings LP	PAGP	1.25
Southcross Energy Partners L.P.	SXE	0.80
Spectra Energy Partners LP	SEP	0.80
Suburban Propane	SPH	0.70
Tallgrass Energy Partners LP	TEP	1.25
Targa Resources Partners LP	NGLS	1.10
TC PipeLines LP	TCP	0.85
Western Gas Partners LP	WES	0.90
Williams Partners L.P.	WPZ	1.00
	Average	0.97
	Median	0.98

Source: *Value Line*, January 2016.

Interstate Natural Gas Pipeline Forum (Pipelines)
Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
Boardwalk Pipeline	BWP	0.75
Dominion Resources	D	0.70
Kinder Morgan Inc.	KMI	1.00
MDU Resources	MDU	1.00
National Fuel Gas	NFG	1.10
ONEOK Partners L.P.	OKS	0.85
Questar Corp.	STR	0.85
Spectra Energy	SE	1.05
Spectra Energy Partners LP	SEP	0.80
TransCanada Corp.	TRP	0.95
Williams Cos.	WMB	1.35
Williams Partners L.P.	WPZ	1.00
	Average	0.95
	Median	0.98

Source: *Value Line*, January 2016.

Pipeline Screened Comparables Group
Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
Alcoa Inc.	AA	1.40
Buckeye Partners L.P.	BPL	0.85
Enbridge Energy Partners L.P.	EEP	0.90
Energy Transfer	ETP	0.80
EnLink Midstream Part.	ENLK	1.15
EQT Corp.	EQT	1.10
Plains All Amer. Pipe.	PAA	0.95
Plum Creek Timber	PCL	0.80
Southwest Airlines	LUV	1.05
Spectra Energy	SE	1.05
	Average	1.01
	Median	1.00

Source: *Value Line*, January 2016.

S&P 500 Companies with "BBB-" Rated Debt

Beta (Value Line) - January 1, 2016

Company Name	Ticker	Beta
Advance Auto Parts	AAP	0.85
Alcoa Inc.	AA	1.40
Amer. Tower 'A'	AMT	0.85
Coach Inc.	COH	1.10
ConAgra Foods	CAG	0.70
Crown Castle Int'l	CCI	0.85
Darden Restaurants	DRI	0.85
Discover Fin'l Svcs.	DFS	1.05
Dun & Bradstreet	DNB	1.05
Expedia Inc.	EXPE	1.20
FirstEnergy Corp.	FE	0.70
Ford Motor	F	1.20
Gap (The) Inc.	GPS	0.95
General Motors	GM	1.20
Harman Int'l	HAR	1.50
Harris Corp.	HRS	1.05
Interpublic Group	IPG	1.25
Kansas City South'n	KSU	1.15
Kinder Morgan Inc.	KMI	1.00
Kraft Heinz Co.	KHC	
L-3 Communic.	LLL	1.00
Motorola Solutions	MSI	0.85
Newell Rubbermaid	NWL	1.15
Reynolds American	RAI	0.70
Viacom Inc. 'B'	VIAB	1.05
Whole Foods Market	WFM	0.90
Zions Bancorp.	ZION	1.25
Zoetis Inc.	ZTS	1.00
	Average	1.03
	Median	1.05

Source: *Value Line*, January 2016.

Cost of Equity Indication Using Expected Risk Premium
Weighted Average Cost of Equity for S&P 500 = Market Required Cost of Equity

CAPM Calculations:

					Cost of	
S&P 500 Expected Equity Cost (Wt. Avg)	12.58		**LT Gov't.**		**Equity by**	
Current Yield on L-T Gov't. Bonds	3.01		**Bond Yield**		**CAPM**	
Expected Equity Risk Premium	9.57					
Beta	1.05					
Adjusted Risk Premium	10.05	+	3.01	=	13.06	*Ex Ante*

Note: Forward-looking CAPM (Ex Ante) uses the weighted average expected return on the S&P 500 as the expected market return. The current US Government bond yield is deducted from the weighted average expected return to obtain the expected risk premium. The current beta is applied to the expected risk premium and the result is added to the current US Government bond yield to obtain the indicated cost of equity by the CAPM method.

(Calculations for expected market return for S&P 500 can be found on the following pages.)

Source: *Standard & Poor's Compustat* (January 2016).

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
3M CO	MMM	2.89	6.32	9.21	92,751.01
ABBOTT LABORATORIES	ABT	2.35	10.05	12.40	66,993.15
ABBVIE INC	ABBV	4.16	20.84	25.00	96,842.41
ACCENTURE PLC	ACN	2.31	9.62	11.93	65,617.02
ACE LTD	ACE	2.52	10.00	12.52	37,880.55
ACTIVISION BLIZZARD INC	ATVI	0.65	10.00	10.65	28,304.13
ADT CORP	ADT	2.83	11.00	13.83	5,439.62
ADVANCE AUTO PARTS INC	AAP	0.18	12.70	12.88	11,022.90
AETNA INC	AET	1.01	9.22	10.23	37,701.45
AFLAC INC	AFL	2.81	2.68	5.50	25,561.67
AGILENT TECHNOLOGIES INC	A	1.21	10.25	11.46	13,888.07
AIR PRODUCTS & CHEMICALS INC	APD	2.83	13.51	16.34	28,037.40
AIRGAS INC	ARG	1.85	6.70	8.55	9,986.98
ALCOA INC	AA	1.26	3.60	4.86	12,930.97
ALLEGION PLC	ALLE	0.70	15.20	15.90	6,322.52
ALLSTATE CORP	ALL	2.07	7.15	9.22	24,047.83
ALTRIA GROUP INC	MO	4.22	8.60	12.82	114,131.13
AMEREN CORP	AEE	4.17	6.00	10.17	10,489.11
AMERICAN AIRLINES GROUP INC	AAL	1.02	8.21	9.23	26,694.31
AMERICAN ELECTRIC POWER CO	AEP	4.03	4.81	8.84	28,599.91
AMERICAN EXPRESS CO	AXP	1.78	7.00	8.78	68,454.31
AMERICAN INTERNATIONAL GROUP	AIG	1.99	10.00	11.99	76,657.70
AMERICAN TOWER CORP	AMT	2.22	9.70	11.92	41,065.11
AMERIPRISE FINANCIAL INC	AMP	2.84	12.93	15.77	18,529.00
AMERISOURCEBERGEN CORP	ABC	1.51	15.00	16.51	21,326.20
AMETEK INC	AME	0.74	10.00	10.74	12,748.15
AMGEN INC	AMGN	2.14	9.95	12.09	122,450.06
AMPHENOL CORP	APH	1.15	7.10	8.25	16,100.47
ANALOG DEVICES	ADI	3.18	10.00	13.18	17,263.21
ANTHEM INC	ANTM	1.98	10.50	12.48	37,232.50
AON PLC	AON	1.43	9.50	10.93	25,257.89
APPLE INC	AAPL	2.26	14.24	16.50	586,859.31
APPLIED MATERIALS INC	AMAT	2.48	15.80	18.28	21,454.31
ARCHER-DANIELS-MIDLAND CO	ADM	3.14	2.88	6.02	21,888.42
ASSURANT INC	AIZ	2.70	8.60	11.30	5,302.67
AT&T INC	T	5.78	5.85	11.63	211,690.31
AUTOMATIC DATA PROCESSING	ADP	2.75	10.00	12.75	39,073.46
AVAGO TECHNOLOGIES LTD	AVGO	1.50	23.90	25.40	40,132.52
AVALONBAY COMMUNITIES INC	AVB	2.73	0.38	3.11	25,203.16
AVERY DENNISON CORP	AVY	2.60	10.10	12.70	5,708.45
BALL CORP	BLL	0.76	6.00	6.76	9,914.63
BANK OF AMERICA CORP	BAC	1.30	9.50	10.80	175,242.03
BANK OF NEW YORK MELLON CORP	BK	1.90	14.90	16.80	45,051.52
BARD (C.R.) INC	BCR	0.56	10.00	10.56	13,996.96
BAXALTA INC	BXLT	0.74	3.70	4.44	26,481.39
BAXTER INTERNATIONAL INC	BAX	1.34	11.15	12.49	20,868.74
BB&T CORP	BBT	3.03	6.10	9.13	29,497.47
BECTON DICKINSON & CO	BDX	1.94	13.45	15.39	32,692.66

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
BEST BUY CO INC	BBY	3.32	10.00	13.32	10,435.82
BLACKROCK INC	BLK	2.79	8.81	11.59	55,842.89
BLOCK H & R INC	HRB	2.67	11.00	13.67	7,859.49
BOEING CO	BA	2.76	9.80	12.56	96,872.98
BORGWARNER INC	BWA	1.32	9.90	11.22	9,689.79
BOSTON PROPERTIES INC	BXP	3.26	8.00	11.26	19,587.08
BRISTOL-MYERS SQUIBB CO	BMY	2.63	19.00	21.63	114,761.39
BROADCOM CORP -CL A	BRCM	1.03	6.85	7.88	32,437.02
BROWN FORMAN CORP	BF.B	1.48	8.00	9.48	20,905.17
C H ROBINSON WORLDWIDE INC	CHRW	3.05	10.00	13.05	8,914.88
CABOT OIL & GAS CORP	COG	0.64	41.55	42.19	7,321.45
CAMPBELL SOUP CO	CPB	2.49	5.05	7.54	16,292.13
CAPITAL ONE FINANCIAL CORP	COF	2.31	4.35	6.66	38,403.01
CARDINAL HEALTH INC	CAH	1.99	14.74	16.73	29,368.13
CARNIVAL CORP/PLC (USA)	CCL	2.58	17.00	19.58	32,149.19
CBS CORP	CBS	1.47	15.50	16.97	22,411.96
CENTERPOINT ENERGY INC	CNP	5.42	0.50	5.92	7,899.61
CF INDUSTRIES HOLDINGS INC	CF	3.14	6.80	9.94	9,511.79
CHUBB CORP	CB	1.83	6.36	8.19	30,116.71
CHURCH & DWIGHT INC	CHD	1.71	8.20	9.91	11,129.72
CIGNA CORP	CI	0.03	11.20	11.23	37,694.61
CINTAS CORP	CTAS	1.29	12.20	13.49	9,829.76
CISCO SYSTEMS INC	CSCO	3.40	10.00	13.40	137,840.92
CITIGROUP INC	C	0.51	32.32	32.83	154,162.73
CLOROX CO/DE	CLX	2.61	7.30	9.91	16,372.61
CME GROUP INC	CME	6.07	12.20	18.27	30,643.91
CMS ENERGY CORP	CMS	3.43	6.70	10.13	10,025.91
COACH INC	COH	4.48	8.67	13.15	9,083.16
COCA-COLA CO	KO	3.16	2.85	6.01	186,832.39
COLGATE-PALMOLIVE CO	CL	2.43	6.70	9.13	59,752.95
COMCAST CORP	CMCSA	2.01	13.65	15.66	137,489.78
COMERICA INC	CMA	2.11	5.13	7.24	7,392.83
CONAGRA FOODS INC	CAG	2.54	7.05	9.59	18,251.53
CONSOL ENERGY INC	CNX	0.56	11.57	12.13	1,809.53
CONSOLIDATED EDISON INC	ED	4.15	2.60	6.75	18,843.45
CONSTELLATION BRANDS -CL A	STZ	0.99	14.10	15.09	28,031.20
CORNING INC	GLW	2.65	1.10	3.75	21,624.95
COSTCO WHOLESALE CORP	COST	1.07	8.10	9.17	71,023.98
CROWN CASTLE INTL CORP	CCI	4.76	16.15	20.91	28,854.50
CSRA INC	CSRA	1.47	10.00	11.47	4,917.96
CSX CORP	CSX	2.92	5.19	8.11	25,299.82
CUMMINS INC	CMI	4.69	5.83	10.52	15,632.42
CVS HEALTH CORP	CVS	1.63	14.13	15.76	108,262.38
D R HORTON INC	DHI	1.18	18.50	19.68	11,837.36
DANAHER CORP	DHR	0.64	10.17	10.81	63,649.27
DARDEN RESTAURANTS INC	DRI	3.99	15.30	19.29	8,154.77
DELPHI AUTOMOTIVE PLC	DLPH	1.31	12.34	13.65	24,011.94
DELTA AIR LINES INC	DAL	1.35	26.55	27.90	39,866.37

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
DENTSPLY INTERNATL INC	XRAY	0.52	8.38	8.89	8,521.13
DISCOVER FINANCIAL SVCS INC	DFS	2.26	8.05	10.30	22,921.69
DISNEY (WALT) CO	DIS	1.53	13.00	14.53	173,715.94
DOLLAR GENERAL CORP	DG	1.40	14.04	15.43	20,909.50
DOMINION RESOURCES INC	D	4.06	5.93	9.98	40,268.39
DOVER CORP	DOV	3.01	10.00	13.01	9,500.97
DOW CHEMICAL	DOW	3.87	8.30	12.17	59,645.50
DR PEPPER SNAPPLE GROUP INC	DPS	2.20	7.00	9.20	17,604.73
DTE ENERGY CO	DTE	3.81	4.57	8.38	14,392.18
DU PONT (E I) DE NEMOURS	DD	2.31	1.20	3.51	58,368.71
DUKE ENERGY CORP	DUK	4.77	3.10	7.87	49,140.16
DUN & BRADSTREET CORP	DNB	1.87	5.00	6.87	3,755.30
EASTMAN CHEMICAL CO	EMN	2.92	7.05	9.97	10,032.53
EATON CORP PLC	ETN	4.54	7.50	12.04	24,084.11
ECOLAB INC	ECL	1.38	13.00	14.38	33,776.87
EMC CORP/MA	EMC	1.99	11.00	12.99	49,789.34
EMERSON ELECTRIC CO	EMR	4.20	5.68	9.88	31,154.84
EQUIFAX INC	EFX	1.16	11.15	12.31	13,194.67
EQUINIX INC	EQIX	2.57	15.00	17.57	18,110.74
EQUITY RESIDENTIAL	EQR	2.71	0.14	2.85	29,720.14
ESSEX PROPERTY TRUST	ESS	3.03	25.81	28.84	15,809.44
EVERSOURCE ENERGY	ES	3.48	6.53	10.01	16,198.94
EXELON CORP	EXC	4.64	4.00	8.64	25,536.29
EXPEDIA INC	EXPE	0.94	22.08	23.02	17,087.15
EXPEDITORS INTL WASH INC	EXPD	1.79	11.85	13.63	8,407.23
FASTENAL CO	FAST	2.94	7.00	9.94	11,825.35
FEDEX CORP	FDX	0.76	13.15	13.91	41,063.88
FIDELITY NATIONAL INFO SVCS	FIS	1.95	13.41	15.36	19,634.04
FIFTH THIRD BANCORP	FITB	2.71	4.89	7.60	15,966.05
FIRSTENERGY CORP	FE	4.55	0.31	4.86	13,423.12
FLIR SYSTEMS INC	FLIR	1.80	15.00	16.80	3,877.42
FLOWSERVE CORP	FLS	1.88	10.00	11.88	5,506.97
FLUOR CORP	FLR	1.89	6.25	8.14	6,686.92
FMC CORP	FMC	1.78	5.25	7.03	5,228.67
FORD MOTOR CO	F	5.13	20.50	25.63	54,919.69
GAMESTOP CORP	GME	5.71	11.15	16.86	2,934.95
GAP INC	GPS	3.94	5.90	9.84	9,926.98
GARMIN LTD	GRMN	5.81	5.85	11.66	7,075.01
GENERAL DYNAMICS CORP	GD	2.19	9.20	11.39	43,423.34
GENERAL ELECTRIC CO	GE	3.16	7.00	10.16	293,989.72
GENERAL MILLS INC	GIS	3.24	6.30	9.54	34,212.27
GENERAL MOTORS CO	GM	5.16	21.93	27.09	52,925.58
GENUINE PARTS CO	GPC	3.00	4.90	7.90	12,949.03
GILEAD SCIENCES INC	GILD	1.98	16.20	18.18	145,833.00
GOLDMAN SACHS GROUP INC	GS	1.55	7.10	8.65	76,874.59
GRAINGER (W W) INC	GWW	2.36	1.97	4.33	12,720.42
HANESBRANDS INC	HBI	1.54	13.41	14.95	11,531.32
HARLEY-DAVIDSON INC	HOG	3.02	10.40	13.42	8,708.53

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
HARMAN INTERNATIONAL INDS	HAR	1.71	15.00	16.71	6,696.54
HARRIS CORP	HRS	2.35	1.90	4.25	10,811.49
HARTFORD FINANCIAL SERVICES	HIG	2.07	7.00	9.07	17,801.65
HASBRO INC	HAS	3.02	10.70	13.72	8,394.67
HERSHEY CO	HSY	2.82	8.00	10.82	13,941.65
HEWLETT PACKARD ENTERPRISE	HPE	1.47	1.60	3.07	26,486.30
HOME DEPOT INC	HD	2.03	13.60	15.63	167,677.27
HONEYWELL INTERNATIONAL INC	HON	2.50	8.76	11.26	79,820.47
HORMEL FOODS CORP	HRL	1.42	12.40	13.82	20,895.23
HUMANA INC	HUM	0.73	11.75	12.48	26,459.47
HUNT (JB) TRANSPRT SVCS INC	JBHT	1.31	14.20	15.51	8,407.20
HUNTINGTON BANCSHARES	HBAN	2.75	8.48	11.23	8,811.05
ILLINOIS TOOL WORKS	ITW	2.57	8.24	10.81	33,688.44
INGERSOLL-RAND PLC	IR	2.28	8.60	10.88	14,433.40
INTEL CORP	INTC	3.02	8.50	11.52	162,569.55
INTERCONTINENTAL EXCHANGE	ICE	1.37	17.40	18.77	30,429.34
INTERPUBLIC GROUP OF COS	IPG	2.25	9.05	11.30	9,459.78
INTL BUSINESS MACHINES CORP	IBM	4.11	8.74	12.85	133,506.53
INTL FLAVORS & FRAGRANCES	IFF	2.01	7.35	9.36	9,601.11
INTL PAPER CO	IP	5.33	14.21	19.54	15,629.18
INTUIT INC	INTU	1.40	12.28	13.68	25,476.39
INVESCO LTD	IVZ	3.55	10.05	13.60	14,190.90
JOHNSON & JOHNSON	JNJ	3.09	5.80	8.89	284,220.50
JOHNSON CONTROLS INC	JCI	3.20	9.00	12.20	25,585.89
JPMORGAN CHASE & CO	JPM	2.90	8.70	11.60	243,065.02
JUNIPER NETWORKS INC	JNPR	1.63	12.50	14.13	10,649.52
KANSAS CITY SOUTHERN	KSU	1.83	3.68	5.51	8,149.19
KELLOGG CO	K	2.93	6.00	8.93	25,612.34
KEURIG GREEN MOUNTAIN INC	GMCR	1.45	13.50	14.95	13,423.04
KEYCORP	KEY	2.50	9.80	12.30	11,018.49
KIMBERLY-CLARK CORP	KMB	2.97	7.40	10.37	46,209.14
KINDER MORGAN INC	KMI	14.21	3.90	18.11	33,294.20
KLA-TENCOR CORP	KLAC	3.64	21.20	24.84	10,814.86
KOHL'S CORP	KSS	4.11	8.85	12.96	9,041.13
KRAFT HEINZ CO	KHC	3.22	2.00	5.22	88,291.06
KROGER CO	KR	1.12	11.43	12.54	40,772.66
L BRANDS INC	LB	4.58	9.67	14.25	27,733.57
L-3 COMMUNICATIONS HLDGS INC	LLL	2.22	1.90	4.12	9,368.15
LAM RESEARCH CORP	LRCX	1.68	11.30	12.98	12,579.49
LAUDER (ESTEE) COS INC -CL A	EL	1.53	12.45	13.98	19,600.22
LEGG MASON INC	LM	2.56	25.63	28.19	4,226.21
LEGGETT & PLATT INC	LEG	3.43	12.50	15.93	5,718.75
LENNAR CORP	LEN	0.37	14.50	14.87	10,014.70
LILLY (ELI) & CO	LLY	2.73	15.20	17.93	93,366.57
LINCOLN NATIONAL CORP	LNC	1.71	7.60	9.31	12,437.89
LINEAR TECHNOLOGY CORP	LLTC	3.08	8.85	11.93	10,156.49
LOCKHEED MARTIN CORP	LMT	3.27	7.55	10.81	66,729.11
LOEWS CORP	L	0.69	5.58	6.27	13,606.77

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
LOWE'S COMPANIES INC	LOW	1.73	17.15	18.88	69,584.59
LYONDELLBASELL INDUSTRIES NV	LYB	3.86	7.50	11.36	39,056.68
M & T BANK CORP	MTB	2.53	9.40	11.93	19,381.04
MACERICH CO	MAC	3.77	11.80	15.57	12,775.49
MACY'S INC	M	4.32	4.88	9.19	10,996.59
MARATHON PETROLEUM CORP	MPC	2.72	10.10	12.82	27,630.72
MARRIOTT INTL INC	MAR	1.85	23.80	25.65	17,218.35
MARSH & MCLENNAN COS	MMC	2.48	11.00	13.48	28,925.38
MARTIN MARIETTA MATERIALS	MLM	1.35	15.50	16.85	9,033.54
MASCO CORP	MAS	1.59	18.07	19.66	9,522.16
MASTERCARD INC	MA	0.75	14.76	15.51	107,118.78
MATTEL INC	MAT	5.73	2.45	8.18	9,220.25
MCCORMICK & CO INC	MKC	2.16	7.20	9.36	10,965.23
MCDONALD'S CORP	MCD	3.25	8.00	11.25	108,479.70
MCGRAW HILL FINANCIAL	MHFI	1.51	13.00	14.51	26,646.17
MCKESSON CORP	MCK	0.65	14.40	15.05	45,384.40
MEAD JOHNSON NUTRITION CO	MJN	2.26	8.00	10.26	15,563.65
MEDTRONIC PLC	MDT	2.11	6.69	8.80	108,161.52
MERCK & CO	MRK	3.62	4.00	7.62	147,554.94
METLIFE INC	MET	3.32	6.57	9.89	53,591.49
MICROCHIP TECHNOLOGY INC	MCHP	3.30	7.00	10.30	9,453.30
MICROSOFT CORP	MSFT	2.85	9.65	12.50	443,169.41
MONDELEZ INTERNATIONAL INC	MDLZ	1.65	9.00	10.65	71,258.25
MONSANTO CO	MON	2.40	9.45	11.85	43,375.11
MOODY'S CORP	MCO	1.53	13.10	14.63	19,837.22
MORGAN STANLEY	MS	2.19	16.00	18.19	61,591.29
MOSAIC CO	MOS	4.23	6.20	10.43	9,252.00
MOTOROLA SOLUTIONS INC	MSI	2.64	10.00	12.64	12,085.67
NASDAQ INC	NDAQ	1.89	9.70	11.59	9,553.67
NAVIENT CORP	NAVI	5.80	3.85	9.65	4,148.44
NETAPP INC	NTAP	3.04	12.00	15.04	7,755.89
NEWELL RUBBERMAID INC	NWL	1.89	9.55	11.44	11,778.26
NEWS CORP	NWSA	1.68	12.51	14.19	7,884.28
NEXTERA ENERGY INC	NEE	3.18	7.10	10.28	47,845.09
NIELSEN HOLDINGS PLC	NLSN	2.69	12.00	14.69	16,965.10
NIKE INC -CL B	NKE	1.16	12.90	14.06	84,750.00
NORDSTROM INC	JWN	3.12	5.00	8.12	9,158.46
NORFOLK SOUTHERN CORP	NSC	2.81	0.80	3.61	25,256.04
NORTHERN TRUST CORP	NTRS	2.24	12.30	14.54	16,668.65
NORTHROP GRUMMAN CORP	NOC	1.81	6.66	8.47	34,435.73
NRG ENERGY INC	NRG	5.40	9.65	15.05	3,697.85
NUCOR CORP	NUE	4.10	10.25	14.35	12,880.48
NVIDIA CORP	NVDA	1.51	8.00	9.51	17,732.48
OMNICOM GROUP	OMC	2.79	5.70	8.49	18,329.01
ONEOK INC	OKE	10.37	4.00	14.37	5,160.80
ORACLE CORP	ORCL	1.75	6.50	8.25	153,470.56
PACCAR INC	PCAR	5.13	2.97	8.10	16,753.81
PARKER-HANNIFIN CORP	PH	2.75	6.00	8.75	13,187.34

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
PATTERSON COMPANIES INC	PDCO	2.14	10.00	12.14	4,495.23
PAYCHEX INC	PAYX	3.49	10.00	13.49	19,090.43
PENTAIR PLC	PNR	2.84	10.00	12.84	8,927.98
PEOPLE'S UNITED FINL INC	PBCT	4.43	6.75	11.18	5,010.26
PEPCO HOLDINGS INC	POM	4.33	4.33	8.66	6,596.58
PEPSICO INC	PEP	2.98	6.00	8.98	145,568.55
PERKINELMER INC	PKI	0.57	8.30	8.87	5,996.30
PFIZER INC	PFE	3.64	4.90	8.54	199,280.67
PG&E CORP	PCG	3.64	6.45	10.09	26,087.25
PHILIP MORRIS INTERNATIONAL	PM	4.68	0.90	5.58	136,198.61
PHILLIPS 66	PSX	2.95	7.64	10.59	43,635.39
PINNACLE WEST CAPITAL CORP	PNW	4.07	5.05	9.12	7,147.61
PLUM CREEK TIMBER CO INC	PCL	4.11	11.50	15.61	8,307.86
PNC FINANCIAL SVCS GROUP INC	PNC	2.24	4.50	6.74	48,398.99
PPG INDUSTRIES INC	PPG	1.64	12.81	14.45	26,609.16
PPL CORP	PPL	4.64	4.90	9.54	22,928.26
PRAXAIR INC	PX	2.87	2.69	5.56	29,168.23
PRECISION CASTPARTS CORP	PCP	0.06	15.00	15.06	31,921.79
PRICE (T. ROWE) GROUP	TROW	3.14	7.90	11.04	17,950.78
PRINCIPAL FINANCIAL GRP INC	PFG	3.65	8.10	11.75	13,167.94
PROCTER & GAMBLE CO	PG	3.62	8.30	11.92	216,040.70
PROGRESSIVE CORP-OHIO	PGR	2.34	8.40	10.74	18,577.56
PRUDENTIAL FINANCIAL INC	PRU	3.75	9.00	12.75	36,553.09
PUBLIC SERVICE ENTRP GRP INC	PEG	4.10	1.80	5.90	19,575.67
PULTEGROUP INC	PHM	2.20	8.80	11.00	6,221.62
PVH CORP	PVH	0.22	6.80	7.02	6,035.32
QUALCOMM INC	QCOM	4.28	11.50	15.78	75,132.16
QUEST DIAGNOSTICS INC	DGX	2.31	8.00	10.31	10,197.92
RALPH LAUREN CORP	RL	1.87	3.97	5.84	6,556.47
RAYTHEON CO	RTN	2.27	5.39	7.66	37,495.73
REGIONS FINANCIAL CORP	RF	2.65	5.87	8.52	12,532.50
REPUBLIC SERVICES INC	RSG	2.87	5.27	8.14	15,275.00
REYNOLDS AMERICAN INC	RAI	3.54	13.35	16.89	65,953.01
ROBERT HALF INTL INC	RHI	1.94	14.40	16.34	6,254.82
ROCKWELL AUTOMATION	ROK	3.02	6.81	9.82	13,522.87
ROCKWELL COLLINS INC	COL	1.56	8.84	10.40	12,119.54
ROPER TECHNOLOGIES INC	ROP	0.58	10.00	10.58	19,131.78
ROSS STORES INC	ROST	0.97	10.75	11.72	21,793.32
ROYAL CARIBBEAN CRUISES LTD	RCL	1.85	24.85	26.70	22,265.69
RYDER SYSTEM INC	R	3.09	7.10	10.19	3,036.14
SCANA CORP	SCG	3.76	4.45	8.21	8,645.05
SCHWAB (CHARLES) CORP	SCHW	0.89	22.29	23.18	43,353.10
SCRIPPS NETWORKS INTERACTIVE	SNI	1.85	10.90	12.75	5,223.75
SEAGATE TECHNOLOGY PLC	STX	7.22	5.00	12.22	10,962.51
SEALED AIR CORP	SEE	1.36	16.96	18.33	8,805.11
SEMPRA ENERGY	SRE	3.26	9.35	12.61	23,334.22
SHERWIN-WILLIAMS CO	SHW	1.22	18.30	19.52	24,169.02
SIGNET JEWELERS LTD	SIG	0.84	18.75	19.59	9,837.31

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
SIMON PROPERTY GROUP INC	SPG	3.73	13.21	16.93	60,163.23
SKYWORKS SOLUTIONS INC	SWKS	1.67	23.40	25.07	14,686.13
SL GREEN REALTY CORP	SLG	2.66	4.30	6.96	11,269.87
SMUCKER (JM) CO	SJM	2.36	8.40	10.76	14,760.71
SOUTHERN CO	SO	4.81	3.73	8.54	42,529.25
SOUTHWEST AIRLINES	LUV	0.92	31.70	32.62	28,004.29
SPECTRA ENERGY CORP	SE	6.49	5.00	11.49	16,073.58
ST JUDE MEDICAL INC	STJ	2.08	10.50	12.58	17,459.91
STANLEY BLACK & DECKER INC	SWK	2.29	11.00	13.29	15,980.26
STARBUCKS CORP	SBUX	1.59	19.10	20.69	89,132.55
STARWOOD HOTELS&RESORTS WRLD	HOT	2.37	9.60	11.97	11,687.47
STATE STREET CORP	STT	2.13	4.16	6.30	26,775.33
STRYKER CORP	SYK	1.79	9.15	10.94	34,945.44
SUNTRUST BANKS INC	STI	2.35	5.06	7.41	21,831.82
SYMANTEC CORP	SYMC	3.06	7.00	10.06	14,186.05
SYSCO CORP	SYY	3.18	8.50	11.67	23,145.12
TARGET CORP	TGT	3.42	11.00	14.42	44,731.54
TE CONNECTIVITY LTD	TEL	2.35	15.00	17.35	24,959.23
TECO ENERGY INC	TE	3.61	6.78	10.38	6,268.91
TEGNA INC	TGNA	2.33	6.00	8.33	5,657.61
TESORO CORP	TSO	2.09	10.00	12.09	12,685.49
TEXAS INSTRUMENTS INC	TXN	3.05	10.00	13.05	55,599.92
TEXTRON INC	TXT	0.21	12.77	12.99	11,496.88
THERMO FISHER SCIENTIFIC INC	TMO	0.46	9.10	9.56	56,612.05
TIFFANY & CO	TIF	2.34	11.70	14.04	9,781.29
TIME WARNER CABLE INC	TWC	1.68	4.20	5.88	52,558.72
TIME WARNER INC	TWX	2.50	15.40	17.90	51,702.37
TJX COMPANIES INC	TJX	1.31	10.50	11.81	47,476.30
TORCHMARK CORP	TMK	1.02	8.00	9.02	7,049.54
TOTAL SYSTEM SERVICES INC	TSS	0.90	12.27	13.17	9,162.65
TRACTOR SUPPLY CO	TSCO	1.08	15.60	16.68	11,485.56
TRAVELERS COS INC	TRV	2.30	6.55	8.85	34,334.16
TWENTY-FIRST CENTURY FOX INC	FOXA	1.30	17.41	18.70	53,541.35
TYCO INTERNATIONAL PLC	TYC	2.64	2.64	5.28	13,481.69
TYSON FOODS INC -CL A	TSN	1.26	12.36	13.62	15,681.74
U S BANCORP	USB	2.53	5.80	8.33	74,637.38
UNION PACIFIC CORP	UNP	2.98	5.95	8.93	66,792.27
UNITED PARCEL SERVICE INC	UPS	3.35	10.31	13.66	66,989.84
UNITED TECHNOLOGIES CORP	UTX	2.94	10.50	13.44	85,216.11
UNITEDHEALTH GROUP INC	UNH	1.92	12.90	14.82	112,123.63
UNIVERSAL HEALTH SVCS INC	UHS	0.37	11.10	11.47	10,899.53
UNUM GROUP	UNM	2.39	7.60	9.99	8,104.35
VALERO ENERGY CORP	VLO	3.11	10.00	13.11	34,047.08
VERIZON COMMUNICATIONS INC	VZ	5.22	6.85	12.07	188,063.31
VF CORP	VFC	2.64	10.90	13.54	26,537.73
VIACOM INC	VIAB	4.24	9.20	13.44	16,527.58
VISA INC	V	0.83	15.15	15.98	150,111.28
VORNADO REALTY TRUST	VNO	2.54	0.70	3.24	18,846.56

Standard & Poor's Compustat & I/B/E/S (S&P 500) - Jan. 1, 2016					
Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
VULCAN MATERIALS CO	VMC	0.46	9.00	9.46	12,661.31
WAL-MART STORES INC	WMT	3.23	1.00	4.23	196,276.05
WALGREENS BOOTS ALLIANCE INC	WBA	1.92	13.74	15.67	92,449.04
WASTE MANAGEMENT INC	WM	3.10	7.55	10.65	23,829.44
WEC ENERGY GROUP INC	WEC	3.79	6.41	10.20	16,197.75
WELLS FARGO & CO	WFC	3.02	9.60	12.62	277,660.72
WESTERN DIGITAL CORP	WDC	3.58	7.50	11.08	13,914.55
WESTERN UNION CO	WU	3.70	7.00	10.70	9,049.58
WEYERHAEUSER CO	WY	4.34	5.00	9.34	15,304.16
WHIRLPOOL CORP	WHR	2.86	16.70	19.56	11,484.35
WHOLE FOODS MARKET INC	WFM	1.66	6.85	8.51	11,432.48
WILLIS TOWERS WATSON PLC	WLTW	1.07	10.80	11.87	8,752.99
XCEL ENERGY INC	XEL	3.74	4.80	8.54	18,224.22
XEROX CORP	XRX	2.66	1.00	3.66	10,761.84
XILINX INC	XLNX	2.90	10.00	12.90	12,070.12
XL GROUP PLC	XL	2.07	1.40	3.47	11,666.20
XYLEM INC	XYL	1.65	7.00	8.65	6,546.86
YUM BRANDS INC	YUM	2.77	10.13	12.90	31,502.23
ZIMMER BIOMET HOLDINGS INC	ZBH	0.94	10.00	10.94	20,905.79
ZIONS BANCORPORATION	ZION	0.96	9.29	10.25	5,576.82
ZOETIS INC	ZTS	0.78	12.70	13.48	23,860.33
		Market Weighted Average =		12.58	

Source: Standard & Poor's Compustat, January 2016.

Flotation Cost Adjustment

Flotation costs are the costs associated with financing the investment – issuing debt and equity. They are made up of several types of costs including underwriter's fees, legal expenses, cost of preparing the prospectus, etc. In the appraisal process it is appropriate to include the interest rate and any other charges necessary to obtain the financing for the investment. In other words, the cost of financing an investment includes not only the interest rate but also flotation costs (the cost of issuing securities – both debt and equity). The Appraisal Institute's *The Appraisal of Real Estate* and the International Association of Assessing Officers' *Property Assessment Valuation* state the following regarding the cost of financing:

> The cost of financing includes the interest rate and any points, discounts, equity participations, or other charges that the lender requires to increase the effective yield on the loan.[57]

> The investor considers risk, return, management, liquidity, and other factors in deciding an acceptable discount rate. The discount rate is the annual percentage rate reflecting the competitive rate of return on an investment. The discount rate, also known as the *overall yield rate* $[Y_O]$, is the weighted average cost of capital for a particular investment and includes the costs associated with issuing debt and equity.[58]

Flotation costs can be accounted for either by amortizing the cost (reducing the cash flow to discount), or by including them in the cost of capital. Many studies have been made regarding the amount of flotation costs for debt and equity capital.

> In general, the adjustment for flotation costs is a refinement of the basic unadjusted cost. In other words, usually the adjusted and unadjusted costs will not be very different. However, this doesn't imply that you shouldn't make the adjustment. The information needed to make the adjustment is readily available, and the adjustment itself doesn't require much effort or computer processing time. To paraphrase the film maker, Spike Lee, you should do the right thing *(especially if the right thing is relatively easy to do)*.[59]

---

[57] *The Appraisal of Real Estate*, 14th ed., (Chicago: Appraisal Institute, 2013) 109.

[58] *Property Assessment Valuation*, 3rd ed., (Kansas City: International Association of Assessing Officers, 2010), 305.

[59] Ehrhardt, Michael C., *The Search for Value: Measuring the Company's Cost of Capital*, (Harvard Business School Press: Boston, MA, 1994), 134.

> Flotation costs occur when new issues of stock or debt are sold to the public. The firm usually incurs several kinds of flotation or transaction costs, which reduces the actual proceeds received by the firm. Some of these are direct out-of-pocket outlays, such as fees paid to underwriters, legal expenses, and prospectus preparation costs. Because of this reduction in proceeds, the firm's required returns on these proceeds equate to a higher return to compensate for the additional costs. Flotation costs can be accounted for either by amortizing the cost, thus reducing the cash flow to discount, or by incorporating the cost into the cost of capital. Because flotation costs are not typically applied to operating cash flow, one must incorporate them into the cost of capital.[60]

An adjustment for flotation cost must be made even if the issuing company has no plans to ever issue any additional securities. The following illustration is quoted by Roger A. Morin, PhD, *Regulatory Finance: Utilities' Cost of Capital*, (Arlington, VA: Public Utilities Reports, Inc., 1994), p. 170.] and fully addresses this issue.

> Brigham, Aberwald, and Gapenski (1985) performed an excellent analysis regarding the need for a flotation cost adjustment. The following illustration adapted from Brigham, Aberwald, and Gapenski (1985) shows that: (1) even if no further stock issues are contemplated, the flotation adjustment is still permanently required to keep shareholders whole, and (2) flotation costs are only recovered if the rate of return is applied to total equity, including retained earnings, in all future years, even if no future financing is contemplated....<u>It is noteworthy that the adjustment is always required each and every year, whether or not new stock issues are sold in the future, and that the allowed return on equity must be earned on total equity, including retained earnings, for investors to earn the cost of equity</u>.[61]

> Companies generally hire an investment banker to assist them when they issue common stock, preferred stock, or bonds. In return for a fee, the investment banker helps the company with the terms, price, and sale of the issue. The banker's fees are often referred to as **flotation costs**. The total cost of capital should include not only the required return paid to investors but also the flotation fees paid to the investment banker for marketing the issue.[62] [This identical quote

---

[60] Pratt, Shannon P., *Cost of Capital, Estimation and Applications*, (NY: John Wiley & Sons, Inc. 1998) 176.

[61] Roger A. Morin, PhD, *Regulatory Finance: Utilities' Cost of Capital*, (Arlington, VA: Public Utilities Reports, Inc., 1994), 170-171. (emphasis added)

[62] Brigham, Eugene F. and Michael C. Ehrhardt, *Financial Management: Theory and Practice*, 10th ed. (Thomson Learning, Inc.: Stamford, CT, 2002), 452.

is also found in *Fundamentals of Financial Management*, 9th ed. (Dryden Press) by Eugene F. Brigham and Joel F. Houston, Chapter 10.]

Additionally, Dr. Roger Ibbotson refers to flotation cost in his book, Stocks, Bonds, Bills and Inflation, when he discusses the cost of capital. He states the following:

> Although the cost of capital estimation techniques set forth later in this book are applicable to rate setting, certain adjustments may be necessary. One such adjustment is for flotation costs (amounts that must be paid to underwriters by the issuer to attract and retain capital).[63]

All of these studies reach the conclusion that a flotation cost adjustment must be made when estimating the cost of capital. Alternatively, some finance textbooks suggest that it is better to adjust the net present value of the assets downward.

> ***Issue costs.*** If accepting the project forces the firm to issue securities, then the present value of issue costs should be subtracted from base-case NPV.[64]

In either case (whether the cost of capital is adjusted upward or the net present value of the assets is adjusted downward) the end result is exactly the same – the market value of the assets subject to appraisal is lower as a result of flotation costs.

Even if one accounted for flotation costs as a negative cash flow [as Brealey, Myers and Marcus suggest – see *Fundamentals of Corporate Finance* (2004) 4th ed. Pg. 335-336] rather than an adjustment to the WACC, we should get exactly the same correct valuation. The following will illustrate that it makes no difference mathematically whether we (1) account for flotation costs in the WACC or (2) account for flotation costs as a negative cash flow. Please note the example that follows where we compare the appraisal by either adjusting the WACC for flotation costs or simply deducting the flotation costs from the expected cash flow to get the net cash flow. In both cases $950 is available to purchase assets because $50 was the flotation cost from issuing $1,000 worth of securities. Note that market value in both cases is exactly the same — $950. Clearly it makes no difference whether one adjusts the WACC or does all the necessary math to find the net present value after treating flotation costs as a negative cash flow at the beginning of the first year. The following flotation cost measurement example is taken from the

---

[63] *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 25.

[64] Brealey, Richard & Stewart C. Myers, *Principles of Corporate Finance*, 7th ed. (New York: McGraw-Hill, 2002), 552.

Journal of Property Tax Assessment & Administration published by the International Association of Assessing Officers.[65]

Flotation Cost Measurement

WACC Adjustment Method	
Securities Issued	$1,000
Cost of Capital	10%
Required Return	$100
Flotation Cost =	5.00%
Flotation Cost =	50
Assets Purchased	950
Cost of Capital	10.00%
1 - FC =	0.95
Adj'd. Cost of Cap.	10.5263%
Market Value:	
Required Return	100
	-------- = $950
Adj'd Cost of Cap.	10.5263%

Cash Flow Adjustment Method			
Securities Issued			$1,000
Flotation Cost =			$50
Assets Purchased			$950
Disc. Rate = Unadjusted WACC =			10.00%
First Year's Cash Flow:			
		Pres. Value Factor	**NCF**
Beg. of Year	($50)	1.10	($55)
		First Year's Income =	100
		First Year's Net Cash Flow =	45

End of Year	NCF	Pres. Value Factor (divisor)	Pres. Value
1	45	1.10	40.91
2	100	1.21	82.64
3	100	1.33	75.13
4	100	1.46	68.30
5	100	1.61	62.09
6	100	1.77	56.45
7	100	1.95	51.32
8	100	2.14	46.65
9	100	2.36	42.41
10	100	2.59	38.55
skip to			
339	100	107,676,335,910,201.00	0.00
340	100	118,443,969,501,221.00	0.00
341	100	130,288,366,451,343.00	0.00
342	100	143,317,203,096,477.00	0.00
343	100	157,648,923,406,125.00	0.00
344	100	173,413,815,746,737.00	0.00
345	100	190,755,197,321,411.00	0.00
346	100	209,830,717,053,552.00	0.00
347	100	230,813,788,758,908.00	0.00
348	100	253,895,167,634,798.00	0.00
349	100	279,284,684,398,278.00	0.00
350	100	307,213,152,838,106.00	0.00
			$950.00

As one can see from the above mathematical example the same $950 value results in either case. Actually, it is wrong to presuppose that one knows how much flotation cost to deduct in a

[65] Tegarden, Thomas K., "The Appraisal of Public Utilities: Adjustment to the WACC for Flotation Costs," *Journal of Property Tax Management & Administration*, (Chicago: IAAO), Vol. 5, Issue 1, 2008, 71-74.

valuation problem because in order to know exactly how much flotation cost will be, one has to already know what the value in order to know how much debt and equity will have to be issued. Thus, the appraiser must be biased or clairvoyant or both. **In solving a valuation problem, the WACC adjustment method is best**. If one already knew the amount of debt and equity securities to be issued, one would have to already know the purchase price and thus, the valuation. It's a 'Catch 22.' If one already knew the value, why do an appraisal at all?

The flotation costs associated with debt for large issues conservatively are approximately 1%. For relatively large issues of equity, the flotation costs range from a low of 2% to as much as 6%.

From information derived from *Public Utility Finance Tracker* we determined the average flotation cost associated with the issuance of long-term debt and common stock of natural gas and natural gas transmission companies. We found the average issuance cost of long-term debt to be 1.02% and the average issuance cost of common equity to be 4.33%. We selected 1.00% and 4.25% to be representative of the typical flotation cost associated with the issuance of long-term debt and common stock securities, respectively.

On the following pages are the schedules detailing the long-term debt and common stock flotation costs.

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2015)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
Michigan Con Gas Company	Gas	14-May-97	15,000	100.000	96.868	3.23%
Michigan Con Gas Company	Gas	15-May-97	30,000	100.000	99.247	0.76%
Michigan Con Gas Company	Gas	15-May-97	40,000	100.000	99.361	0.64%
Seagull Energy Corp.	Gas	25-Sep-97	150,000	99.544	98.544	1.02%
SONAT Inc.	Gas	25-Sep-97	100,000	99.748	99.097	0.66%
Southern Natural Gas Co.	Gas	25-Sep-97	100,000	99.891	99.239	0.66%
Laclede Gas	Gas	16-Oct-97	25,000	98.682	98.352	0.34%
Kn Energy Inc.	Gas	22-Oct-97	150,000	100.000	99.374	0.63%
Northern Illinois Gas Co.	Gas	23-Oct-97	50,000	99.500	98.996	0.51%
Enron Oil & Gas Co.	Gas	25-Nov-97	100,000	99.709	99.058	0.66%
Consolidated Natural Gas Co.	Gas	09-Dec-97	300,000	99.190	98.314	0.89%
SONAT	Gas	27-Jan-98	100,000	99.531	98.879	0.66%
SONAT	Gas	29-Jan-98	100,000	99.787	98.912	0.89%
KN Energy, Inc.	Gas	04-Mar-98	500,000	99.784	98.908	0.89%
KN Energy, Inc.	Gas	04-Mar-98	150,000	99.496	98.370	1.14%
Coastal Corp.	Gas	02-Jun-98	200,000	99.882	99.231	0.66%
Coastal Corp.	Gas	02-Jun-98	200,000	99.661	98.785	0.89%
Wisconsin Gas Co.	Gas	19-Jan-99	50,000	99.252	98.602	0.66%
No. Illinois Gas Co.	Gas	02-Feb-99	50,000	100.000	99.350	0.65%
Providence Gas Co.	Gas	04-Feb-99	15,000	100.000	96.850	3.25%
Cascade Natural Gas Corp.	Gas	15-Mar-99	15,000	100.000	99.250	0.76%
Laclede Gas Co.	Gas	28-May-99	25,000	100.000	99.502	0.50%
Mich. Consolidated Gas Co.	Gas	04-Jun-99	55,000	100.000	96.850	3.25%
Williams Co.	Gas	21-Jul-99	700,000	99.075	98.200	0.89%
Williams Communication Grp.	Gas	30-Sep-99	1,500,000	99.249	96.749	2.58%
Indiana Gas Co.	Gas	04-Oct-99	30,000	100.000	99.375	0.63%
Northwest Natural Gas	Gas	09-Dec-99	20,000	100.000	99.250	0.76%
SEMCO Energy	Gas	12-Apr-00	30,000	100.000	97.250	2.83%
New Jersey Gas Co.	Gas	29-Jun-00	10,000	100.000	99.250	0.76%
New Jersey Gas Co.	Gas	05-Jul-00	10,000	100.000	96.850	3.25%
New Jersey Gas Co.	Gas	01-Jul-00	15,000	100.000	97.600	2.46%
Northwest Natural Gas	Gas	29-Aug-00	20,000	100.000	99.250	0.76%
Northwest Natural Gas	Gas	06-Sep-00	20,000	100.000	99.250	0.76%
Northwest Natural Gas	Gas	06-Sep-00	10,000	100.000	99.250	0.76%
Northwest Natural Gas	Gas	27-Nov-00	25,000	100.000	99.375	0.63%
Agl Capital Corp	Gas	23-Feb-01	300,000	99.578	98.928	0.66%
Oneok, Inc	Gas	03-Apr-01	400,000	99.912	99.262	0.65%
Atmos Energy Corp	Gas	15-May-01	350,000	99.940	99.290	0.65%
Semco Energy	Gas	18-Jun-01	60,000	100.000	97.500	2.56%
Questar Gas Co.	Gas	03-Oct-01	60,000	100.000	99.375	0.63%
Northwest Natural Gas	Gas	26-Mar-02	40,000	100.000	99.375	0.63%
Northwest Natural Gas	Gas	24-Sep-02	30,000	100.000	99.250	0.76%
UGI Utilities Inc.	Gas	25-Sep-02	20,000	100.000	99.375	0.63%
California Gas Co.	Gas	02-Oct-02	250,000	99.897	99.247	0.65%
AGL Capital Corp.	Gas	07-Jan-03	225,000	99.927	99.277	0.65%
Atmos Energy Corp	Gas	13-Jan-03	250,000	99.915	99.250	0.67%
Sepra Energy	Gas	01-Feb-03	400,000	99.658	99.008	0.66%

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2015)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
Michigan Consolidated Gas Co	Gas	12-Feb-03	200,000	99.637	98.762	0.89%
Northwest Natural Gas	Gas	25-Feb-03	10,000	100.000	99.250	0.76%
Nisource Finance Corp	Gas	01-Mar-03	345,000	100.000	99.354	0.65%
Keyspan Corporation	Gas	01-Apr-03	150,000	99.763	98.888	0.88%
AGL Capital Corp.	Gas	15-Apr-03	225,000	99.927	99.277	0.65%
The Cincinnati Gas & Electric Co.	Gas	12-Jun-03	200,000	99.764	98.889	0.88%
The Cincinnati Gas & Electric Co.	Gas	12-Jun-03	200,000	99.396	98.521	0.89%
Baltimore Gas And Electric Company	Gas	17-Jun-03	200,000	99.295	98.420	0.89%
Nisource Finance Corp	Gas	16-Jul-03	500,000	99.862	99.212	0.66%
Vectren Coproation	Gas	24-Jul-03	100,000	99.746	99.096	0.66%
Vectren Coproation	Gas	24-Jul-03	100,000	99.177	98.477	0.71%
UGI Utilities	Gas	14-Aug-03	20,000	100.000	99.250	0.76%
UGI Utilities	Gas	14-Aug-03	25,000	100.000	99.370	0.63%
Energy East Corporation	Gas	08-Sep-03	200,000	99.830	98.950	0.89%
Madison Gas & Electric Co	Gas	09-Sep-03	20,000	100.000	99.250	0.76%
Energen Corporation	Gas	30-Oct-03	50,000	99.557	98.907	0.66%
Northwest Natural Gas	Gas	21-Nov-03	40,000	100.000	99.250	0.76%
Piedmont Natural Gas Co Inc	Gas	16-Dec-03	100,000	99.859	98.984	0.88%
Piedmont Natural Gas Co Inc	Gas	16-Dec-03	100,000	100.000	99.350	0.65%
AGL Resources	Gas	14-Dec-04	200,000	99.870	99.220	0.66%
Aquila	Gas	18-Aug-04	300,000	25.000	25.000	0.00%
Atmos Energy	Gas	18-Oct-04	500,000	99.993	99.343	0.65%
Atmos Energy	Gas	18-Oct-04	200,000	99.392	98.517	0.89%
Laclede Gas Co.	Gas	21-Apr-04	50,000	99.585	98.835	0.76%
Laclede Gas Co.	Gas	21-Apr-04	100,000	99.434	98.559	0.89%
Michigan Consolidated Gas	Gas	27-Sep-04	120,000	99.594	98.844	0.76%
Consolidated Natural Gas Co	Gas	15-Nov-04	400,000	99.686	99.036	0.66%
Alabama Gas Corp	Gas	11-Jan-05	40,000	100.000	96.860	3.24%
Alabama Gas Corp	Gas	11-Jan-05	40,000	100.000	99.350	0.65%
Alabama Gas Corp	Gas	14-Nov-05	80,000	100.000	99.400	0.60%
Cascade Natural Gas	Gas	20-Jan-05	30,000	100.000	96.850	3.25%
Cascade Natural Gas	Gas	29-Aug-05	15,000	100.000	99.300	0.70%
Northwest Natural Gas Co.	Gas	02-Jun-05	40,000	100.000	99.375	0.63%
Northwest Natural Gas Co.	Gas	21-Jun-05	10,000	100.000	99.250	0.76%
Vectren Utility Holdings, Inc	Gas	16-Nov-05	75,000	99.799	99.149	0.66%
Vectren Utility Holdings, Inc	Gas	16-Nov-05	75,000	99.779	98.904	0.88%
Laclede Gas Co.	Gas	06-Jun-06	55,000	99.852	98.977	0.88%
Piedmont Natural Gas Co., Inc	Gas	15-Jun-06	200,000	100.000	96.850	3.15%
AGI Capital Resources	Gas	27-Jun-06	175,000	99.856	99.206	0.65%
Southern Union Co.	Gas	18-Oct-06	600,000	99.644	98.344	1.30%
Northwest Natural Gas Co.	Gas	15-Dec-06	25,000	100.000	99.375	0.63%
Alabama Gas Corp	Gas	10-Jan-07	45,000	100.000	99.125	0.88%
Atmos Energy Corp	Gas	11-Jun-07	250,000	99.729	99.079	0.66%
Vectren Utility Holdings, Inc	Gas	05-Mar-08	125,000	100.000	96.850	3.25%
Vectren Utility Holdings, Inc	Gas	24-Mar-08	100,000	99.930	99.062	0.88%
Vectren Utility Holdings, Inc	Gas	24-Mar-08	50,000	99.400	99.290	0.11%
Laclede Gas Co	Gas	18-Sep-08	80,000	100.000	96.850	3.25%

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2015)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
Washington Gas Light	Gas	05-Dec-08	50,000	100.000	99.375	0.63%
AGI Capital Corp	Gas	05-Aug-09	300,000	99.783	99.133	0.66%
Atmos Energy	Gas	23-Mar-09	450,000	99.813	99.163	0.66%
National Fuel Gas Co	Gas	01-Apr-09	250,000	99.762	99.112	0.66%
Northwest Natural Gas Co.	Gas	20-Mar-09	75,000	100.000	99.375	0.63%
Sempra Energy	Gas	05-Oct-09	750,000	99.159	98.284	0.89%
Central Hudson Gas &Elec Corp	Gas	02-Dec-10	44,150	100.000	99.375	0.63%
Central Hudson Gas &Elec Corp	Gas	02-Dec-10	30,000	100.000	92.467	8.15%
Southwest Gas Corporation	Gas	07-Dec-10	125,000	99.818	99.168	0.66%
Washington Gas Light Co.	Gas	30-Nov-10	75,000	100.000	99.979	0.02%
AGL Capital Corp.	Gas	16-Mar-11	500,000	99.833	98.958	0.88%
Atmos Energy Co	Gas	07-Jun-11	400,000	99.678	98.803	0.89%
Northwest Natural Gas Co	Gas	19-Aug-11	500,000	100.000	99.375	0.63%
AGL Capital Corp.	Gas	15-Sep-11	200,000	113.434	112.559	0.78%
AGL Capital Corp.	Gas	15-Sep-11	300,000	98.483	97.833	0.66%
National Fuel Gas Co	Gas	28-Nov-11	500,000	99.867	99.217	0.66%
San Diego Gas & Elec	Gas	19-Mar-12	250,000	99.481	98.606	0.89%
Pacific Gas & Elec	Gas	11-Apr-12	400,000	99.491	98.616	0.89%
Pacific Gas & Electric Co	Gas	13-Aug-12	350,000	99.911	99.035	0.88%
Pacific Gas & Electric Co	Gas	13-Aug-12	400,000	99.709	99.059	0.66%
Baltimore Gas & Electric Co.	Gas	14-Aug-12	250,000	99.620	99.314	0.31%
Sempra Energy	Gas	19-Sep-12	500,000	99.965	99.315	0.65%
AGI Capital	Gas	13-May-13	500,000	99.618	98.743	0.89%
Atmos Energy	Gas	08-Jan-13	500,000	99.812	98.937	0.88%
Integrys Energy Group	Gas	12-Aug-13	400,000	25.000	24.213	3.25%
NiSource	Gas	09-Apr-13	750,000	99.575	98.700	0.89%
NiSource Finance	Gas	03-Oct-13	500,000	99.341	98.466	0.89%
Northwest Natural Gas Co	Gas	14-Aug-13	50,000	100.000	99.375	0.63%
Piedmont Natural Gas Co	Gas	29-Jul-13	300,000	99.952	99.077	0.88%
Sempra Energy	Gas	09-Nov-13	500,000	99.665	99.015	0.66%
Laclede Group Inc	Gas	12-Aug-14	250,000	99.908	99.030	0.88%
Piedmont Natural Gas Co	Gas	15-Sep-14	250,000	99.826	99.076	0.75%
Atmos Energy	Gas	06-Oct-14	500,000	99.812	98.937	0.88%
WGL Holdings Inc	Gas	22-Oct-14	125,000	99.226	98.351	0.88%
WGL Holdings Inc	Gas	11-Dec-14	125,000	92.612	91.737	0.88%
WGL Holdings Inc	Gas	13-Nov-15	250,000	99.910	99.260	0.65%
WGL Holdings Inc	Gas	22-Jun-15	450,000	99.686	99.036	0.65%
WGL Holdings Inc	Gas	09-Sep-15	150,000	99.935	99.285	0.65%
WGL Holdings Inc	Gas	12-Nov-15	350,000	99.728	99.078	0.65%
					Average	1.02%
					Selected	1.00%

Source: *Public Utility Finance Tracker*, February 1999 - 2016.

Common Stock Issuance Cost
Natural Gas/Transmission Utilities (1990 - 2014)

Company	Type of Company	Issue Date	Number of Shares (000)	Price to Public	Net Proceeds	Issue Cost
Consolidated Natural Gas	Gas	08-Jan-90	3,500	45.50	44.24	2.85%
Washington Energy	Gas	17-Jan-90	1,750	20.13	19.26	4.52%
Colonial Gas	Gas	15-May-90	600	21.50	20.27	6.07%
Atlanta Gas Light	Gas	05-Dec-90	1,000	31.38	30.00	4.60%
Washington Energy	Gas	04-Feb-91	2,650	19.00	18.21	4.34%
Piedmont Natural Gas	Gas	03-Apr-91	1,250	28.50	27.36	4.17%
Panhandle Eastern	Gas	18-Jul-91	13,800	10.75	10.27	4.67%
Bay State Gas Co.	Gas	13-Mar-92	1,550	23.25	22.28	4.35%
El Paso Natural Gas Co.	Gas	12-May-92	5,000	19.00	17.77	6.92%
New Jersey Resources Co.	Gas	15-Sep-92	1,500	22.25	21.27	4.61%
Washington Energy Co.	Gas	29-Sep-92	2,750	21.00	20.19	4.01%
Equitable Resources	Gas	22-Sep-93	2,400	38.50	37.25	3.36%
Brooklyn Union Gas	Gas	29-Sep-93	1,700	25.75	24.77	3.96%
S.E. Michigan Gas Enterprises	Gas	19-Jan-94	650	20.50	19.62	4.49%
Connecticut Energy Corp.	Gas	03-Mar-94	900	20.13	19.22	4.71%
Mobile Gas Service Corp.	Gas	14-Sep-94	400	22.00	20.30	8.37%
Northwest Natural Gas	Gas	15-Feb-95	1,000	29.75	28.59	4.06%
MCN Corp.	Gas	14-Mar-95	5,000	17.88	17.21	3.86%
Piedmont Natural Gas	Gas	20-Mar-95	1,500	20.00	19.14	4.49%
Laclede Gas	Gas	15-May-95	1,550	19.00	18.12	4.86%
United Cities	Gas	08-Jun-95	1,200	14.50	13.88	4.47%
Atlanta Gas Light	Gas	12-Jun-95	1,300	33.63	32.51	3.43%
WICOR, INC.	Gas	05-Dec-95	1,100	31.88	30.63	4.06%
Connecticut Natural Gas	Gas	05-Jun-96	640	23.25	22.19	4.78%
Delta Natural Gas	Gas	15-Jul-96	350	16.00	15.07	6.17%
Tejas Gas	Gas	22-Jul-96	3,075	35.00	33.42	4.73%
KN Energy	Gas	31-Jul-96	3,100	32.25	31.01	4.00%
Cascade Natural Gas	Gas	13-Aug-96	1,350	15.25	14.45	5.54%
Energen	Gas	17-Jan-97	1,500	29.50	28.39	3.91%
KCS Energy	Gas	29-Jan-97	3,000	39.00	36.91	5.66%
Energen	Gas	18-Sep-97	1,200	35.50	34.16	3.92%
COHO Energy, Inc.	Gas	29-Sep-97	8,585	10.50	9.87	6.38%
Fall River Gas Co.	Gas	30-Oct-97	340	13.25	12.06	9.87%
Connecticut Energy Corp.	Gas	12-Nov-97	900	24.25	23.17	4.66%
Roanoke Gas Co.	Gas	22-Feb-98	166	20.00	18.67	7.12%
KN Energy	Gas	04-Mar-98	11,000	52.00	49.90	4.21%
Enron Corp.	Gas	05-May-98	15,000	50.00	48.47	3.16%
Laclede Gas Co.	Gas	05-May-99	1,100	50.00	49.34	1.35%
SEMCO	Gas	12-Jun-00	9,000	10.00	9.60	4.17%
WGL Holdings Co.	Gas	26-Jun-01	1,790	26.73	25.80	3.47%
Utilicorp	Gas	25-Jan-02	11,000	23.00	22.28	3.25%
Calpine Corporation	Gas	24-Apr-02	66,000	11.50	11.13	3.30%
MDU Resources Group	Gas	19-Nov-02	2,100	24.00	23.30	3.00%
MDU Resources Group	Gas	29-Nov-02	2,100	24.00	23.16	3.63%
Agl Resources, Inc	Gas	11-Feb-03	5,600	22.00	21.21	3.70%
Atmos Energy Corp.	Gas	18-Jun-03	4,000	25.31	24.25	4.38%
Sempra Energy	Gas	23-Oct-03	15,000	28.00	27.15	3.12%

Common Stock Issuance Cost
Natural Gas/Transmission Utilities (1990 - 2014)

Company	Type of Company	Issue Date	Number of Shares (000)	Price to Public	Net Proceeds	Issue Cost
Southern Union Co.	Gas	10-Jun-03	3,000	16.15	16.15	0.00%
Southern Union Co.	Gas	05-Jun-03	9,500	16.00	15.38	4.06%
Southern Union Co.	Gas	15-Jun-03	2,500	50.00	48.17	3.80%
Vectren Corporation	Gas	07-Aug-03	6,500	22.81	22.00	3.70%
AGL Resources	Gas	19-Nov-04	9,600	31.010	30.038	3.23%
Ameren	Gas	30-Jun-04	10,000	42.000	40.700	3.19%
Aquila(M)	Gas	18-Aug-04	40,000	2.550	2.451	4.04%
Atmos Energy Co.	Gas	21-Oct-04	14,000	24.750	23.760	4.17%
Northwest Natural Gas Co.	Gas	30-Mar-04	1,200	31.000	29.844	3.87%
Piedmont Natural Gas Co. Inc	Gas	20-Jan-04	4,250	42.500	41.010	3.63%
Southern Union Co.	Gas	26-Jul-04	11,000	18.750	18.003	4.15%
The Laclede Group Inc	Gas	06-May-04	1,500	26.800	25.862	3.63%
UGI Corp.	Gas	18-Mar-04	7,500	32.100	30.696	4.58%
Semco Energy	Gas	09-Aug-05	27,176	6.320	6.067	4.17%
Southern Union Co.	Gas	07-Feb-05	342,999	23.000	22.300	3.14%
Chesapeake Utility Corp	Gas	15-Nov-06	600	30.100	28.975	3.88%
Vectron Corp	Gas	22-Feb-07	4,600	28.33	27.34	3.62%
Clean Energy	Gas	25-Jun-09	8,200	8.30	7.80	6.38%
EQT	Gas	10-Mar-11	12,500	44.00	42.24	4.17%
Gas Natural Inc	Gas	30-Nov-13	1,134.000	10.00	9.42	6.16%
Gas Natural Inc	Gas	11-Jul-13	1,500	10.00	9.42	6.16%
Laclede Group	Gas	22-May-13	8,700	4.50	4.33	3.98%
Piedmont Natural Gas Co.	Gas	29-Jan-13	4,000	32.00	30.88	3.63%
Atmos Energy	Gas	11-Feb-14	800	44.00	42.46	3.63%
The Laclede Group Inc	Gas	05-Jun-14	9,000	46.25	44.54	3.84%
					Average	4.33%
					Selected	4.25%

Source: *Public Utility Finance Tracker*, February 1999 - 2015.

Incorporating the flotation costs found on the previous pages into our cost of capital study is computed and the result is shown in the table below.

Cost of Capital Including Flotation Costs			
Capital	**Portion**	**Cost**	**Product**
Debt	35.00%	6.57%	2.30%
Equity	65.00%	12.90%	8.39%
Totals	100.00%		10.69%

Including flotation cost in the cost of capital requires an adjustment to compensate for the expense is issuing of debt and equity. This is in accordance with virtually all finance texts, as well as the practices of state and federal regulatory commissions, and the adjustment is necessary to properly match income and rate in the capitalization process for property tax appraisals. Including flotation cost adds approximately 0.07% to the cost of debt, approximately 0.55% to the cost of equity, and approximately 0.40% (40 basis points) to the overall cost of capital. The cost of capital to purchase the operating assets for the typical interstate natural gas pipeline after accounting for flotation costs was 10.69% (rounded to **10.70%**) at January 1, 2016.

Other Issues Regarding the Cost of Capital

Geometric Mean vs. Arithmetic Mean

Occasionally appraisers make the mistake of using the geometric mean rather than the arithmetic mean in measuring the equity risk premium. The geometric mean is backward-looking, measuring the change in wealth over more than one period. On the other hand, the arithmetic mean better represents a typical performance over single periods and serves as the correct rate for forecasting, discounting, and estimating the cost of capital. Dr. Roger Ibbotson has written regarding this issue as follows:

> The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its

> parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return.[66]

Additionally, Dr. Roger Morin addressed the issue of the arithmetic versus geometric means in estimating the cost of capital.

> In statistical parlance, the arithmetic average is the unbiased measure of the expected value of repeated observations of a random variable, not the geometric mean. This appendix formally illustrates that only arithmetic averages can be used as estimates of cost of capital, and that the geometric mean is not an appropriate measure of cost of capital.[67]

Brealey, Myers and Allen also addressed this issue:

> If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return (geometric averages).[68]

Income Return

The income return is the appropriate return for use in calculating the equity risk premium. This issue is discussed in SBBI as follows:

> Another point to keep in mind when calculating the equity risk premium is that the income return on the appropriate-horizon Treasury security, rather than the total return, is used in the calculation. The total return is comprised of three return components: the income return, the capital appreciation return, and the reinvestment return. The income return is defined as the portion of the total return that results from a periodic cash flow or, in this case, the bond coupon payment. The capital appreciation return results from the price change of a bond over a specific period. Bond prices generally change in reaction to unexpected fluctuations in yields. Reinvestment return is the return on a given month's investment income when reinvested into the same asset class in the subsequent months of the year. The income return is thus used in the estimation of the equity

---

[66] *Stocks, Bonds, Bills and Inflation: 2012 Valuation Edition Yearbook,* (Chicago: Morningstar, Inc., 2012), 56.

[67] Morin, Roger A., *New Regulatory Finance* (Vienna, VA: Public Utilities Reports, Inc., 2006), 133.

[68] Richard A. Brealey, Stewart C. Myers, and Paul Allen, Principles of Corporate Finance, 8th ed., (Irwin McGraw-Hill, 2006), 156-157.

risk premium because it represents the truly riskless portion of the return.[69]

Equity Risk Premium Puzzle

In 1985, Mehra and Prescott published a paper that discussed the equity risk premium from a utility theory perspective. The point that Mehra and Prescott make is that under existing economic theory, economists cannot justify the magnitude of the equity risk premium. The utility theory model employed was incapable of obtaining values consistent with those observed in the market.

This is an interesting point and may be worthy of further study, but it does not do anything to prove that the equity risk premium is too high. It may, on the other hand, indicate that theoretical economic models require further refinement to adequately explain market behavior.[70]

There is no historical data to suggest a systematic decline in the market risk premium in estimating the cost of equity.

> Are there any historical data to suggest a systematic decline in the market risk premium? Exhibit 10.5 plots five-year rolling averages of the market equity risk premium from 1930 to 1995. The volatility of the market risk premium has decreased, but what about the average market risk premium? A regression of the rolling five-year market risk premium versus time indicates that there is no statistically significant change in the risk premium between 1926 and 1995. The slope of the regression is not significantly different from zero.[71]

Survivorship Bias

Some have suggested that a negative adjustment should be made to the cost of equity for survivorship bias. They argue that the United States has been the most successful stock market of the twentieth century and therefore equity costs do not consider the low returns that failing companies might indicate. If that is the case, is it possible that the equity risk premium statistics based only on U.S. data may overstate the returns of equities as a whole because they only focus on one successful market? According to Dr. Roger Ibbotson this is not the case.

---

[69] *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 55.

[70] *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 62.

[71] Copeland, Tom, Tim Koller & Jack Murrin, *Valuation: Measuring and Managing the Value of Companies*, 3rd ed. (New York: John Wiley & Sons, 2000), 217.

> While the survivorship bias evidence may be compelling on a worldwide basis, one can question its relevance to a purely U.S. analysis. If the entity being valued is a U.S. company, then the relevant data set should be the performance of equities in the U.S. market.[72]

Other studies have reached similar conclusions – that survivorship bias is of no significance in measuring the cost of equity in U. S. equity markets.

> The U.S. equity premium plays an important role in many areas of finance research and practice. Therefore, the concerns raised by Brown, Goetzmann, and Ross (BGR) that the equity premium might contain serious survival bias should be studied with great care: If proven true, this hypothesis would have widespread impact.
>
> Based on a general survival model developed in this paper, we show that the fundamental difficulty facing the survival argument is that to have high survival bias, the probability of market survival over the long run has to be extremely small, which seems to be inconsistent with existing historical evidence. Therefore, we argue that contrary to what BGR suggest, the survival bias in the U.S. equity premium is unlikely to be significant and the resultant concerns about the survival problem in the current literature are probably overstated.[73]

Thus, we believe that there is no significant survivorship bias affecting our estimate of the cost of capital for the Interstate Natural Gas Pipeline industry at January 1, 2016, and no adjustment is necessary.

---

[72] *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 62.

[73] Li, Haitao, and Yuewu Xu, "Survival Bias and the Equity Premium Puzzle," *The Journal of Finance*, Vol. LVII, Issue 5, October 2002, 1991. (emphasis added)

Supplement to the Cost of Capital Study

The income approach is based on the principle of anticipation primarily and involves converting dollars of expected future income into present value. The execution of the income approach involves the selection of the appropriate capitalization method, estimation of the expected income, and estimation of a proper capitalization rate which matches the income to be capitalized. The basic income formula is shown in the box to the right.

$$Value = \frac{Income}{Rate}$$

Income-producing property is typically purchased for investment purposes, and the projected net income stream is the critical factor affecting its market value. An investor purchasing income-producing property is in effect trading a sum of present dollars for the right to a stream of future dollars. There is a relationship between the two, and the connecting link is the process of capitalization. Because future dollars are worth less than present dollars, the anticipated future dollars are discounted to a present worth on some basis that reflects the risk and the waiting time involved.

The historical development of the income approach reflects a movement away from an initial emphasis on physical components of value toward a greater emphasis on investment components. The initial division of capitalization was between the concept of value as income divided by a rate (straight capitalization) and as income multiplied by a factor (annuity capitalization). Contemporary income appraisal theory revolves around two categories of capitalization methods — *direct* capitalization and *yield* capitalization.

Rates of Return

The typical investor's objective in any investment is to ultimately receive more than the amount invested. The investor thus wants a complete return ***of*** all capital invested and, in addition, a fair return ***on*** the capital invested. Thus, the investor expects to completely recoup his investment and be fairly compensated for the use of his capital. The return of capital is usually referred to as the recapture of the initial capital investment. The return on capital is usually referred to as the compensation an investor receives for the use of his capital until the capital is recaptured.

All rates of return can be classified as either 1) ***income rates*** or 2) ***yield rates***. An example of an income rate is the ***overall capitalization rate (R_o)***. An example of a yield rate is the property's ***overall yield rate***, which is synonymous with the ***discount rate*** and the ***cost of capital***. Under certain conditions, the income and yield rates for a property are equal even though they are not conceptually equal.

Categories of Capitalization

There are two categories (sometimes called methods) of capitalization which can be used in the income approach — ***direct*** and ***yield*** capitalization. Each category is based on sound appraisal theory and each is theoretically different in application. Direct capitalization is accomplished by the use of an *overall capitalization rate* ($\mathbf{R_o}$). The overall capitalization rate is actually the percent that a single year's income (usually the first year's income) represents as compared to market value. Yield capitalization is accomplished through the use of an *overall yield rate* ($\mathbf{Y_o}$). The overall yield rate is conceptually the weighted average of the interest rate for long-term debt and the equity yield rate and is also known as the *weighted average cost of capital (WACC)* or *discount rate*. Unlike the overall capitalization rate, the overall yield rate is not necessarily the percent of market value that the first year's income represents. However, under certain circumstances the overall capitalization rate and the overall yield rate are identical.

Direct Capitalization

Direct capitalization is a method of converting one year's income into value in one direct step, usually by dividing the income estimate by the appropriate income rate. It is the present worth of the future earnings that gives a proper indication of value by the income approach. Typically the income capitalized is the estimated net utility operating income expected in the following year. Net utility operating income for public utilities is defined as the income representing the amount available to pay the debt costs and equity costs for the property. Public utility regulatory commissions (both state and federal) recognize that net utility operating income is the level of income necessary to pay the cost of capital annually.

Regulatory commissions develop the cost of debt capital and cost of equity capital for the INGPI company in each rate case. The cost of debt capital and the cost of equity capital is weighted by the respective percentages of the amount of debt and equity in the overall capital structure for the utility. The resulting **weighted average cost of capital** is multiplied by the authorized rate base to obtain the authorized net utility operating income for regulatory purposes, which is the targeted amount that the regulatory commissions intend for the utility to earn each year to pay its cost of capital. Net utility operating income is reported on the utility's income statement and it is the amount available to pay to debt and equity holders. Thus, net utility operating income is the level of income set by regulatory commissions to fully cover the cost of capital of a public utility.

A note of caution about the use of direct capitalization is given here. There are six accepted techniques which can be used correctly to derive the overall capitalization rate used in direct capitalization. They are as stated below.

When supported by appropriate market data, accepted techniques include 1) derivation from comparable sales, 2) derivation from effective gross income multipliers and net income ratios, 3) band of investment—mortgage and equity components, 4) band of investment—land and building components, 5) the debt coverage formula, and 6) yield capitalization techniques such as the general yield and change formula, (R_O = yield – change in income and value) and the Ellwood method.[74]

Generally accepted appraisal literature indicates that it is improper under any circumstances to use sales of stock as comparable sales for deriving an overall capitalization rate or even an equity capitalization rate. In fact, there is an abundance of caution in appraisal literature about the use of sales that are not comparable to the property being appraised (such as deriving earnings-price ratios from stock transactions). For example, the following quotation addresses this issue:

Fundamental Investment Difference between Investment Securities and Real Estate/Tangible Personal Property. Table 29-2 summarizes some of the intrinsic differences between capital market securities (whether debt or equity instruments) and real estate and tangible personal property (either individual assets or going concern assemblages of assets) as investment alternatives.

Table 29-2
Investment Differences between Securities and Real Estate/Personal Property

	Securities (Debt or Equity Instruments)		Real Estate/Personal Property (Individually or as a Mass Assemblage)
1.	Liquid, marketable investments	1.	Illiquid investments
2.	Noncontrolling interest in income production and distribution	2.	Controlling interest in income production and distribution
3.	Small, absolute dollar investment required	3.	Large, absolute dollar investment required
4.	Small pereentage of overall wealth committed to this investment	4.	Large percentage of overall wealth committed to this investment
5.	Diversified portfolio of investments	5.	Nondiversified portfolio of investments
6.	Short-term investment time horizon	6.	Long-term investment time horizon
7.	Does not require re-investment to maintain investment base	7.	Requires "replenishment" investment to maintain investment base
8.	Investments expected to appreciate over time	8.	Investments expected to depreciate over time
9.	Income typieally subject to only individual tax (from investor's perspective)	9.	Income typically subjeet to both corporate and individual tax (from investor's perspective)
10.	Portfolios ean be created in limitless combinations of risky securities and risk-free securities	10.	Portfolio limited to the particular combination of real estate and personal property that operate the subject business

As the table indicates, there are fundamental investment risk and return differences between (1)

[74] *The Appraisal of Real Estate*, 13th ed., (Chicago: Appraisal Institute, 2008), 501.

marketable, minority interests in debt and equity securities and (2) nonmarketable, controlling interests in operating real estate and tangible personal property. Due to these differences, and for other reasons, it is unlikely that an economic model that correlates nondiversified risk and expected return for one type of investment will effectively serve the same function for such a different type of investment.[75]

Thus, it is clear from appraisal literature that it is absolutely wrong to use earnings-price ratios derived from stock sales as the equity capitalization rate or the equity yield rate in the appraisal of tangible assets or mass assemblages of assets as a going concern. Further, it is improper to use earnings-price ratios to match with the net utility operating income authorized by the FERC. The FERC does not utilize earnings-price ratios in the determination of the cost of equity for any company or in setting the authorized net operating amount. Finally, for the FERC to set the cost of equity capital based on earnings-price ratios would violate the mandates of the US Supreme court in their *Hope Natural Gas* and *Bluefield Water Works* decisions, which require the regulatory commissions to allow the regulated utilities to earn their cost of capital (commensurate with the return earned by companies of comparable risk).

Appraisal texts tell us explicitly that an appraiser ***may not*** derive equity capitalization rates from the stock market, however the same appraisal texts emphatically state that appraisers can derive equity yield rates from stocks and bonds of commensurate risk in the market. The use of earnings-price ratios as a substitute for the equity capitalization rate in deriving equity value, is simply not permissible. For example, IAAO's primary textbook addresses this issue as stated below.

> The equity yield rate (Y_E) is different from the equity capitalization rate (R_E). The equity capitalization rate is simply the ratio between the first year's income and the equity value or equity investment. The equity yield rate is the rate of return on equity capital. It is similar in concept to the property's overall yield rate (Y_O). The equity yield rate can be estimated by extraction from recent comparable sales (similar to derivation of the overall yield rate in the previous example), survey and opinion of market participants, and comparison with the equity yield rates (Y_E) achieved in alternative investments of comparable risk such as stocks and bonds. While the equity yield rate (Y_E) can be developed from alternative investments of comparable risks such as stocks and bonds, the equity capitalization rate (R_E) used in direct capitalization cannot be developed correctly from the earnings-to-price ratios of common stocks. Earnings-to-price ratios of common stocks can only be used in the appraisal of similar common stock, not for the appraisal of real

---

[75] Pratt, Reilly, & Schweihs, *Valuing A Business*, 3rd edition, (Chicago: Irwin Professional Publishing, 1996), 708.

personal property.[76]

Additionally, many of the interstate natural gas pipeline companies are subsidiaries of publicly traded holding companies. The use of a parent company traded stock earnings-price ratio as comparison to an untraded subsidiary company would further exacerbate an incorrect equity value.

Yield Capitalization

Yield capitalization is a method of converting a series of income flows (called cash flows) or a singular representative level cash flow into present value by discounting the expected future benefits at an appropriate discount rate (synonymous with the property's **overall yield rate** or **cost of capital)**.

> To perform yield capitalization, an appraiser 1) selects an appropriate projection period; 2) forecasts all future cash flows or cash flow patterns (including the reversion); 3) chooses an appropriate yield rate; and 4) converts future benefits into present value by discounting each annual future benefit or by developing an overall rate that reflects the income pattern, value change, and yield rate using one of the various yield capitalization formulas. The application of capitalization rates that reflect an appropriate yield rate, the use of present value factors, and discounted cash flow analysis are all yield capitalization procedures.[77]

Thus, the appraiser performs yield capitalization by either 1) discounting each individual cash flow to its present value for the duration of the income, or 2) capitalizing the appropriate income at an overall capitalization rate, which represents the income pattern, value change, and yield rate.

Upon projecting the amount, timing, and duration of the cash flows to the property being appraised, the appraiser must identify the pattern that the cash flow is expected to follow during the holding period. Those patterns are either variable, level, increasing, or decreasing annuities. For a level annuity where a property is expected to generate a level net utility operating income for a finite period of time and then be resold at the original purchase price, the property can be valued with capitalization in perpetuity by dividing the periodic income by the appropriate

---

[76] *Property Assessment Valuation*, 3rd ed., (Kansas City: International Association of Assessing Officers, 2010), 362.

[77] *The Appraisal of Real Estate*, 13th ed., (Chicago: Appraisal Institute, 2008), 519-520.

discount rate. In this model the discount rate and the overall capitalization rate are the same.[78]

When the net income consists of a fixed amount that represents the return of capital (depreciation expense) plus a declining amount representing the return on the capital remaining in the investment, classic straight-line capitalization can be used to value the property.[79] In this model, as with the level perpetuity, the discount rate and the overall capitalization rate are equal when properly applied to a utility's net cash flow.

If the cash flow pattern is expected to be in the form of a variable annuity each individual income flow will be discounted into an indication of present worth at the appropriate discount rate for the holding period. Further, the appraiser discounts any remaining value in the investment at the end of the holding period and adds the total present worth of the variable cash flows to the present worth of the future value at the end of the holding period. The total represents the present worth of the total property.

The application of the DCF model for a variable annuity can be accomplished using the following formula.

$$Value = \frac{I_1}{(1+r)^1} + \frac{I_2}{(1+r)^2} + \frac{I_3}{(1+r)^3} + \ldots + \frac{I_n}{(1+r)^n}$$

In this formula, ***I*** equals income or cash flow in periods 1 through n, and ***r*** equals the discount rate. Where income has the characteristics of a perpetuity or of a classic straight line capitalization model, the universal capitalization formula, *Value = Income ÷ Rate*, can be used. In this case the overall capitalization rate will equal the discount rate.

To derive *equity yield rates* from market information, yield capitalization permits some things that would not be proper when using direct capitalization. For example, generally accepted appraisal texts record how it is permissible to use stocks and bonds for determination of equity yield rates in alternative investments when appraising real estate.

> An investor may compare the expected equity yield on a real property investment with the yields on alternative investments with commensurate risk (e.g., stocks and bonds) and with a lender's yield on mortgages secured by similar real property.[80]

---

[78] *Ibid.*, 560.

[79] *Ibid.*, 560.

[80] *The Appraisal of Real Estate*, 13th ed., 635; 12th ed., 119; 11th ed., 554-555; and 10th ed., 506-507.

The Appraisal Institute goes on to state:

> To estimate equity yield rates, appraisers must research the market. This research can take many forms and may include one or more of the following analyses...Comparison with the equity yield rates achieved in alternative investments of comparable risk such as stocks and bonds.[81]

An important difference between yield capitalization and direct capitalization is that in yield capitalization when deriving the equity yield rate, i.e., the cost of capital, it is entirely appropriate to use sales of stock (the capital asset pricing model, DCF or Gordon growth model, or risk premium models) to derive the equity yield rate. However, as discussed above, when using direct capitalization, it is absolutely inappropriate to use sales of stock (earnings-price ratios) to derive equity capitalization rates. The reason is simple; equity cap rates are intended to be ratios between income and value while equity yield rates are not. Thus, it is critical that the sales used in deriving those ratios be virtually identical to the property being appraised. Stocks, quite simply, are not comparable to tangible assets as discussed in the quotation on page 106. Because stock sales used to derive equity yield rates are used to indicate relative risk between investments, it is entirely appropriate to use stock sales to derive equity yield rates.

Estimation of Income to Capitalize

The income level capitalized in the income approach is usually called ***cash flow***. In fact, as mentioned previously on page 23, Dr. William Kinnard, MAI explains that all of the annual "income" figures used in appraising income-producing properties are *cash flows* rather than accrual accounting incomes. Cash flow can be defined in a number of ways, however for appraisal purposes it generally consists of income necessary to satisfy the cost of capital plus depreciation expense. Commercial and general appraisers recognize this level of income as simply ***net operating income***. Utility appraisers know that the definition of "net utility operating income" for public utilities and commercial properties is different in one important aspect. For public utilities the level of income reported as "net utility operating income" is only that income available to pay the utility's cost of capital, while for commercial properties "net operating income" includes not only the level of income available for debt and equity, but also the income to recapture a portion of the wasting asset (*otherwise known as depreciation expense*).

In general commercial appraisals cash flow is typically defined as simply net operating income (as defined for general commercial appraisal purposes), which is the income available for debt and equity and the depreciation expense. For an illustration of this type of analysis, refer to

---

[81] *The Appraisal of Real Estate*, 13th ed., 635-636; 12th ed., 119; 11th ed., 554-555; and 10th ed., 506-507.

The Appraisal of Real Estate, 14th edition, page 546-547.

For public utility appraisal, cash flow is often defined as net utility operating income (defined as the income available to pay the cost of capital) plus depreciation expense and the current portion of deferred income taxes. This definition of cash flow is sometimes referred to as ***gross cash flow*** because there is no deduction for capital expenditures to keep the utility operating, Thus this cash flow model will have a limited life duration. In other words, gross cash flows cannot continue indefinitely without significant new investment to keep the utility operations ongoing.

Another variation of this same general definition of cash flow for a public utility is called ***net cash flow***, which is the gross cash flow less capital expenditures. Some refer to this as gross revenue less all cash disbursements except interest expense. For the appraisal of public utilities where it is assumed that the amount of capital reinvestment is equal to the depreciation expense, *net cash flow* can be defined simply as utility net utility operating income. For the appraisal of a public utility as a going concern, net cash flow is usually the best level of income to work with.[82] The purpose of this cost of capital study is to provide the cost of capital, which can be used to capitalize the net cash flow for the typical interstate natural gas pipeline company for the purpose of estimating market value of the operating assets.

---

[82] Tegarden, Thomas K., "Income Approach Techniques in Central Assessment Appraisals," *Journal of Property Tax Assessment & Administration*, (Kansas City: IAAO), Vol. 10, Issue 3, 2013, 13-14.

Computation of 2016 Equity Risk Premium
Adapted from *SBBI* Information

Computed By Dr. Hal Heaton, Brigham Young University

2015 ERP = 6.99% (Average of 1926 - 2014 data)[83]

$$0.0699 = \frac{\sum_{t=1926}^{2014}\left(R_{M^t} - R_{F^t}\right)}{(2015 - 1926)} = \frac{\sum}{89}$$

$$R_M^{2015} - R_F^{2015} = 0.0119 - 0.0275 = -0.0156$$

$$2016\ ERP = \frac{\sum_{t=1926}^{2015}\left(R_{M^t} - R_{F^t}\right)}{90} = \frac{\left(\sum + -0.0156\right)}{90}$$

$$Since\ 0.0699 = \frac{\sum}{89} \rightarrow \sum = 89 \times 0.0699 = 6.2211$$

$$2016\ ERP = \frac{(6.2211 + -0.0156)}{90} = 0.0690\ or\ 6.9\%$$

[83] Based on the *SBBI* study 1926 - 2013 and Duff & Phelps 2014.

Computation of 2016 Equity Risk Premium (for LT Corp Bonds)
Adapted from *SBBI* Information

2015 ERP = 5.79% (Average of 1926 - 2014 data)[84]

$$0.0579 = \frac{\sum_{t=1926}^{2013}\left(R_{M^t} - R_{F^t}\right)}{(2015 - 1926)} = \frac{\sum}{89}$$

$$R_M{}^{2015} - R_F{}^{2015} = 0.0119 - -0.0108 = 0.0227$$

$$2016\ ERP\ for\ LT\ Corp\ Bonds = \frac{\sum_{t=1926}^{2015}\left(R_{M^t} - R_{F^t}\right)}{90} = \frac{\left(\sum + 0.0503\right)}{90}$$

$$Since\ 0.0579 = \frac{\sum}{89} \rightarrow \sum = 89 \times 0.0579 = 5.1531$$

$$2016\ ERP\ for\ LT\ Corp\ Bonds = \sum_{1926}^{2015} + \left(R_f^{2015} + R_f^{2015}\right)$$

$$2016\ ERP\ for\ LT\ Corp\ Bonds = \frac{(5.1531 + 0.0227)}{90} = 0.058\ or\ 5.8\%$$

---

[84] Based on the *SBBI* and Duff & Phelps study 1926 - 2014 (LT Corp Bonds). "iBoxx Investment Grade Corporate Bond Index" The index is composed of U.S. dollar-denominated, investment grade corporate bonds. The Index Provider Markit owns, compiles and publishes the iBoxx bond and iTraxx credit derivative indices, which are used around the world by financial market participants as benchmarks and as the basis for traded products. "Markit®" and "iBoxx®" are the registered trademarks of Markit Group Limited and Markit Indices Limited, respectively.

CRSP Deciles Size Premium[85]

Decile	Market Capitalization of Smallest Company (in millions)	Market Capitalization of Largest Company (in millions)	Size Premium (Return in Excess of CAPM)
Mid-Cap 3-5	$2,090,566 -	$9,611,187	1.00%
Low-Cap 6-8	448,502 -	2,083,642	1.70
Micro-Cap 9-10	1,963 -	448,079	3.58
Break down of CRSP Deciles 1 - 10			
1 - Largest	$22,035,313 -	$629,010,254	-0.36%
2	9,618,053 -	21,809,433	0.57
3	5,205,841 -	9,611,187	0.86
4	3,195,898 -	5,199,952	0.99
5	2,090,566 -	3,187,480	1.49
6	1,400,931 -	2,083,642	1.63
7	845,509 -	1,400,208	1.62
8	448,502 -	844,475	2.04
9	209,880 -	448,079	2.54
10 - Smallest	1,963 -	209,406	5.60
Breakdown of CRSP 10th Decile			
10a	$108,692 -	$209,406	4.04%
10w	148,934 -	209,406	3.04
10x	108,692 -	148,813	5.30
10b	$1,963 -	$108,598	8.76%
10y	64,846 -	108,598	7.32
10z	1,963 -	64,747	11.79

Sources of underlying data: 1.) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2016 Center for Research in Security Prices (CRSP ®), University of Chicago Booth School of Business, 2.) Morningstar EnCorr database. Used with permission. All rights reserved. Calculations performed by Duff & Phelps LLC.

[85]See Duff & Phelps 2016 Valuation Handbook – *Guide to Cost of Capital.*