

# Interstate Natural Gas Pipeline Industry

# 2017 Cost of Capital Study

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## 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	<i>Mergers and Acquisitions</i>
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	<i>Stocks, Bonds, Bills &amp; Inflation</i>
SFV	Straight Fixed Variable
S&P	Standard & Poor's
STEO	Short-Term Energy Outlook
VL	<i>The Value Line Investment Survey</i>
WACC	Weighted Average Cost of Capital
WSJ	<i>Wall Street Journal</i>
YTM	Yield to Maturity

# **2017 Cost of Capital Study of the Interstate Natural Gas Pipeline Industry for the Interstate Natural Gas Pipeline Property Tax Forum January 1, 2017**

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## **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, 2017. 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, 2017, 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 (INGPPTF), 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, 2017.

## **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, 2017. The cost of capital

developed in this study is also known as the discount rate<sup>1</sup> and is appropriate to use in discounting the after-tax operating cash flows projected as of January 1, 2017, 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 18.

## **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 2017 membership roster of the INGPPTF is listed below:

Boardwalk Pipeline	TransColorado Gas Pipeline
Texas Gas Transmission, LLC	Louisiana Pipeline
Dominion Transmission Corporation	Bear Creek Storage
Questar Pipeline Company	Elba Express
Kern River Gas Transmission	Gulf LNG
Kinder Morgan, Inc.	Ruby Pipeline, LLC
Tennessee Gas Pipeline	Southern LNG
Southern Natural Gas	Young Gas Storage
El Paso Natural Gas	MDU Resources Group, Inc.
Mojave Pipeline	National Fuel Gas Supply Corporation
Colorado Interstate Gas	Northern Natural Gas Company
Cheyenne Plains Pipeline	Oneok Partners, LP
Wyoming Interstate Company	Guardian Pipeline Company
Natural Gas Pipeline Company of America	Midwestern Gas Transmission Company
Midcontinent Express Pipeline	OKTEX Pipeline

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<sup>1</sup> 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*, 5<sup>th</sup> ed., (Chicago: Appraisal Institute, 2010) 246.]

Viking Gas Transmission 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  
Columbia Gas/Gulf Transmission Corporation  
Williams Companies, Inc.  
Transcontinental Gas Pipeline Company LLC  
Northwest Pipeline Company LLC

## 2017 Economic Projections

Seven-and-a-half years have passed since the end of the nation's recession and investors have enjoyed a bull market for U.S. stocks. As the recovery nears its eighth anniversary in 2017, is the party over or is there still room to grow are questions being asked by economists, reported by Capital Group's American Funds?<sup>2</sup>

The seven-and-a-half year U.S. bull market continues to have new life going in 2017, thanks to a slow-moving Federal Reserve and a surprising election sweep by Republicans, which is raising hopes for regulatory-policy easing and fiscal stimulus, according to Daisy Mamey of *The Wall Street Journal*.<sup>3</sup>

The pace of the United States's recovery has been less than spectacular. In fact, the average annual growth rate of 2.1% represents the weakest expansion of any since 1949. "The economy has grown, but it hasn't grown that quickly," acknowledges Capital Group economist Darrell Spence. Nonetheless, there are reasons to feel good about the progress that has been made: The unemployment rate has dropped to 4.9% from a high of 10.2% in 2009. The S&P 500 Index, as of early November 2016, had more than doubled.

Since 1949, past expansions — on average — have lasted about five years. But recessions

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<sup>2</sup> "Does the U.S. Economic Outlook Prove that Age Is Just a Number?" American Funds, January 3, 2017.

<sup>3</sup> Mamey, Daisy. "The Outlook for the Markets and Economy in 2017," *The Wall Street Journal online*, Dec. 11, 2016.

are usually the result of excesses that build up in the economy, not of how much time has passed. The U.S. economy is only 10.6% larger than at the height of the previous cycle. “Historically, the economy has gotten 23% bigger than the prior peak before another recession has hit,” Darrell notes.<sup>4</sup>

How will the United States economy fare in 2017 is the “million dollar” question? At the beginning of each year economists make projections for the coming year. These projections generally follow a similar path. However, as of November 2017 a shock arrived in the form of Donald Trump’s election as president, and economists scrambled to react. “Nobody had it priced in, and the uncertainty is absolutely enormous,” said Ian Shepherdson, chief economist at research firm Pantheon Macroeconomics.

Mr. Trump, who will be the first president with no government or military experience and has enjoyed little support from mainstream GOP economists, represents an unknown quantity on many policy issues.<sup>5</sup>

On January 20, 2017, Donald Trump will take over the Oval Office, marking the end of the eight-year presidency of Barack Obama. While there are concerns about the future of U.S. trade policies, they may be partially offset by prospects for lower corporate taxes and other business-friendly strategies. Only time will tell.

President-elect Trump “has proposed a package of tax cuts and spending increases that should provide a boost to economic activity,” Darrell Spence adds. “Judging by what he has said, it makes a recession in 2017 less likely.”<sup>6</sup>

David Payne of *Kiplinger’s*, does not believe that Trump’s election would have much effect on GDP growth in 2017, which is projected to be around 2.1%. Kimberly Amadeo of *The Balance*, and Josh Zumbrun of *The Wall Street Journal* reported the same 2.1% GDP growth projection for 2017.

Therefore, the median Federal Reserve view for economic growth in 2017 is 2.1% and 2% in 2018, compared with 2.4% from private forecasters. A split has opened between private economic forecasters and the Federal Reserve. This divergence comes after several years in which Federal Reserve policy makers have repeatedly been too optimistic about growth and too pessimistic about unemployment.

Private forecasters are expecting faster growth, higher inflation and higher interest rates because President-elect Trump has signaled plans to cut taxes and boost government spending

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<sup>4</sup> Op. Cit., “Does the U.S. Economic Outlook Prove that Age Is Just a Number?”

<sup>5</sup> Leubsdorf, Ben. “Donald Trump’s Stunning Win Upends U.S. Economic Forecasts,” *The Wall Street Journal online*, November 9, 2016.

<sup>6</sup> Op. Cit., “Does the U.S. Economic Outlook Prove that Age Is Just a Number?”



early in his administration. Many investors clearly agree with this story, as stocks, bond yields and market-based inflation expectations have all climbed since the election in November 2016.

Zumbrun reported that the Federal Reserve officials' newest forecasts for growth and inflation, however, were almost completely unchanged since September of 2016. Their latest projections were released mid-December after the conclusion of their two-day policy meeting.<sup>7</sup>

Zumbrun also reported that the presidency of Donald Trump was poised to usher in a new era for the U.S. economy that forecasters say could boost economic growth, bring higher interest rates and inflation, and a new set of potential risks including international trade wars.

The cautious optimism revealed in *The Wall Street Journal's* latest monthly survey of economists owes to the belief that the Republican's proposals to reduce taxes and invest in infrastructure will amount to a substantial fiscal stimulus.

The change of administration could "knock the U.S. economy out of its low-altitude, low-growth orbit," said Sean Snaith, director of the Institute for Economic Competitiveness at the University of Central Florida. The question is, he said, "Will it put the economy in a higher growth orbit, or will it knock us down into the atmosphere and a fiery re-entry?"<sup>8</sup>

On average, economists marked up their growth forecasts. The economy could expand 2.2% in 2017 and 2.3% in 2018, as a fiscal stimulus kicks into gear, up from about 1.5% over the past 12 months. Inflation is seen at 2.2% next year and 2.4% in 2018. If correct, it would be the first stretch of sustained inflation above 2% since before the recession of 2007 to 2009.

The forecasts were collected from 57 academic, business and financial economists from Nov. 9 to Nov. 11 of 2016. Their average forecasts for growth, inflation and interest rates in both 2017 and 2018 all rose, at least slightly, from a survey conducted before the election in October.

President-elect Trump's administration is only beginning to take shape, and many economists cautioned their estimates are tentative. "Anyone who tells you they absolutely know what will happen under a Trump presidency is probably lying," said Megan Greene, chief economist at Manulife Asset Management.

The priorities of the incoming administration and congressional Republicans are being hashed out. Ms. Greene notes the policies Mr. Trump could enact the most quickly, such as restricting trade or immigration, could do swift harm to the economy. The source of the current optimism is tax cuts and infrastructure plans, but these would take longer to implement because

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<sup>7</sup> Zumbrun, Josh. "Fed More Pessimistic on Economic Growth Than Private Forecasters," *The Wall Street Journal online*, December 14, 2016.

<sup>8</sup> Zumbrun, Josh. "GDP, Inflation and Interest Rates Forecast to Rise Under Trump Presidency," *The Wall Street Journal online*, Nov. 13, 2016.

they would need to go through Congress.<sup>9</sup>

Trump's proposed tax cuts will have the quickest impact on the economy, but as demonstrated by the 2001 and 2003 Bush cuts, consumers tend to use the initial tax savings to pay down debts. Increased spending, which boosts GDP growth, tends to come later. Trump's proposal for extra infrastructure spending probably won't be approved by Congress until the 2018 fiscal year, which starts in October 2017. After approval, it takes months for the money to be spent, as the experience of the 2009 stimulus bill shows. Getting the necessary permits can delay infrastructure projects even more.<sup>10</sup>

Over the past year, forecasters consistently fretted that a severe slowdown in international growth was the biggest risk to the U.S. Not anymore. In the post-election survey, 65% of economists said the factors likeliest to knock the economy off course were potential White House missteps.

The potential for a trade war topped the list. It was cited as the biggest risk to the economy by 43% of economists. A move from the U.S. to impose tariffs on foreign nations could lead to a spiral of rising trade barriers, higher import prices, and shrinking markets for U.S. exporters.

"Everyone will lose if there is a global trade war," said Jim O'Sullivan, chief U.S. economist at High Frequency Economics. Other economists remain worried about the potential for business investment to deteriorate further. Business investment in equipment and structures has declined over the past year, partially attributed to uncertainty about the policy outlook after the election.

"Uncertainty on major policy issues limits hiring and investment decisions," said Robert Dietz, chief economist at the National Association of Home Builders.

Overall, respondents to the Journal's survey see about a 1 in 5 chance of a recession in the next 12 months. Those odds have declined slightly over the past three months, but are up from 14% a year ago.<sup>11</sup>

## Summary

2017 should be a prosperous year as the US economy continues to say goodbye to the effects of the financial crisis. The Trump presidency could signal irrational exuberance in the

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<sup>9</sup> *Ibid.*

<sup>10</sup> Payne, David. "Trump's Impact on the Economy, Kiplinger's latest forecast for the GDP growth rate," December 23, 2016.

<sup>11</sup> *Op. Cit.*, Zumbrun, "GDP, Inflation and Interest Rates Forecast to Rise Under Trump Presidency."

stock market. That usually signals the peak of the business cycle. That means another recession is probably two to three years out. It all depends on whether Trump's tax cuts will create the jobs he promised.

With Trump sworn in as the President in mid-January 2017, there are simply no typical predictions for the economy on which economists can agree. The unfolding of the 2017 US economy should prove to be one of the most interesting in recent memory to observe. There has been no President Elect like Trump and economists and others are hard pressed to make any meaningful projections. Only time will tell how the economy will fare in 2017.

## **Natural Gas Pipeline Industry - 2017**

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 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.<sup>12</sup>

### **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

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<sup>12</sup> Glickman, Stewart, CFA. "Natural Gas Distribution," *Standard & Poor's*, January 2015, p. 43-44.

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.<sup>13</sup>

The Pipeline Master Limited Partnership (MLP) Industry is ranked in the top third 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.<sup>14</sup> MLPs own storage, processing, and transportation assets, and charge customers fees for usage. They do not typically 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.<sup>15</sup>

### **The Pipeline MLP Industry Is In a Consolidation Phase**

Over the past few years some MLPs utilized bolt-on acquisitions and mergers to facilitate growth, both geographically and on the top and bottom lines, according to *Value Line*'s Bryan J. Fong. With the challenging economic environment over the past year or so, coupled with soft commodity prices, this trend appears to be gaining traction again. For example there are pending

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<sup>13</sup> Glickman, Stewart, CFA. "Natural Gas Distribution," *Standard & Poor's*, January 2015, p. 44.

<sup>14</sup> 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.

<sup>15</sup> Fong, Bryan J. "Pipeline MLPs", *The Value Line Investment Survey*, December 4, 2015, 611.

deals in the pipeline that include Energy Transfer Partners, Sunoco Logistics, Spectra Energy, and Enbridge Inc. just to name a few. Those transactions are anticipated to drive economies of scale and thus reduce costs through synergies.<sup>16</sup>

### **Production Volumes Have Begun to Rebound**

Oil and gas production has been trending higher for some time. This growth has come largely from the much-publicized domestic shale regions. Those formations had been gaining traction due to several years of strong price realizations, as well as the controversial drilling technique known as hydraulic fracturing, which made them economically viable. However, with the sharp downturn in commodity prices in the spring of 2016 and warmer-than-normal weather patterns, the United States' natural gas production has slowed a bit as many producers dial back wellhead volumes while awaiting the eventual return of higher prices. Overall, natural gas marketed production registered a modest downturn of 2.3% on a year-over-year basis for the month of August of 2016 (the latest period for which data was available), to 2.391 trillion cubic feet, or about 77.1 billion cubic feet per day.<sup>17</sup>

### **Are The Distributions Safe And Reliable?**

MLPs have had a good run over the past decade. However, the past two years have not been as kind, *Value Line's* Bryan Fong reported. Many in this category have utilized geographic expansion as a means to generate sufficient cash to meet future capital spending needs and distribution payments. But as this market matures, companies will need to demonstrate solid returns on their existing investments rather than relying on expansion and acquisitions as a cure-all. This potential slowdown in growth, coupled with the possibility of rising interest rates, may weigh on operations. As a result, distribution growth may slow and, in some cases, payouts will need to be cut and presumably slashed. With the recent rebound in commodity prices, according to Fong, the likelihood of such cuts may have subsided, but investors interested in this space would be wise to keep this possibility in mind.<sup>18</sup>

### **US Economy, Energy Use**

US economic growth is set to strengthen in 2017. *Oil and Gas Journal (OGJ)* forecasts that the US economy, measured by real gross domestic product, will expand at a rate of 2.2% this

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<sup>16</sup> Fong, Bryan J. "Pipeline MLPs", *The Value Line Investment Survey*, December 2, 2016, 613.

<sup>17</sup> *Ibid.*

<sup>18</sup> *Ibid.*

year. Although real GDP growth of 2016 was estimated at 1.5%, economic activity has been expanding at a moderate pace since mid-2016 reported *OGJ's* Christopher Smith.

Energy use in the US contracted 0.3% in 2016, according to EIA data, but is expected to increase in 2017, boosted by expanding economic activities. It is worth noting that EIA data on energy consumption is subject to frequent revisions, which might affect related analysis according to *OGJ's* Smith.

*OGJ* projects that oil demand in 2017 will rise 0.3%, following a growth of 0.6% in 2016. The impact of earlier sharp price falls between 2014 and early 2016 on gasoline consumption may start to fade in 2017 Smith reported. Oil will remain the dominant energy source in the US, holding 36.7% of the market.

Gas consumption is predicted to increase 0.1% in 2017 compared with a 0.8% increase in 2016. The gas market share will stand at 29.1% this year compared with 29.3% in 2016 and 29% in 2015.

Gas generated about 34% of the country's total electricity in 2016, up from 32.7% in 2015. The estimated share of coal-fired electricity generation was 30.5% in 2016. 2016 was the first year that gas-fired electricity generation exceeded that fired by coal. In 2017, coal consumption is estimated to increase due to rising gas rates.<sup>19</sup>

## **Natural Gas**

US natural gas consumption increased 0.6% in 2016 to 75.22 bcf/d, according to latest EIA data. The largest increase in consumption last year was in the electric power sector due to power plant improvements and lower gas prices. Combined consumption in the commercial and residential sectors declined 5% due to warm winter in the first quarter of 2016. Industrial consumption of the year increased 2%.

Consumption will grow 0.1% this year, *OGJ* forecasts. The growth is supported by the expectation of a colder winter in US Northeast and Midwest, partly offset by higher gas prices and slightly lower share in the power generation sector.

The temperature from December 2016 through March 2017 is projected to average 3% warmer than normal, but this forecast is 13% colder than the same period last year, according to the National Oceanic and Atmospheric Administration. Colder winter temperature will lead to an increase in commercial and residential gas consumption this year.

According to EIA, gas will generate 33% of the country's power in 2017, compared with 34% in 2016. Coal is able to regain some share from gas at higher gas prices. Gulf Coast petrochemical plants also add demand, but petrochemical plants experiencing some delays in

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<sup>19</sup> Xu, Conglin and Laura Bell. "Oil Industry Holds Recovery Prospects in 2017," *Oil & Gas Journal*, January 2, 2017, 27-28.

expected in-service dates.

US production has declined in 2016, but likely to resume growth in 2017 as producers increase drilling and oil production increases associated gas volumes. Shale gas wells continue to be the largest source of total gas production. For the fourth consecutive year, Pennsylvania saw the largest total gain in annual production, with marketed production increasing to an estimated 14.5 bcf/d in 2016, up from 13.18 bcf/d in 2015 and 11.6 bcf/d in 2014. Texas remained the largest gas producing state, but the state's production declined 9.9% last year to 19.5 bcf/d.

Gas prices at Henry Hub declined more than 40% to \$2.62/MMbtu in 2015 from an average of \$4.55/MMbtu in 2014. Gas prices in 2016 averaged even lower at \$2.5/MMbtu. However, as weather likely brings cold air, Henry Hub gas prices rebounded to an average \$3.57/MMbtu in December, the highest since Dec. 2014, compared to \$1.93/MMbtu during the same period in 2015.

Although 2016 inventories were 6% more than their 5-year average, the surplus has been shrinking. The increase in US working natural gas inventories through the 2016 injection season-the period from April through October when most gas is stored underground to help meet heating demand during the upcoming winter-was 45% less than the build last year and 37% smaller than 5-year average increase during the comparable time.

Estimated gas exports in 2016 increased tremendously by 27.9% to 2.3 tcf. LNG exports increased to 186 bcf in 2016 from 28 bcf a year ago. Pipeline exports increased 19.4% to 2 tcf. The amount of US gas moving to Mexico will continue to increase this year because of growing demand from the country electric power sector and flat gas production.<sup>20</sup>

### **Executive Summary of Natural Gas Transportation**

The Gas Pipeline Transportation industry has experienced a variety of conditions over the past five years. On the whole, natural gas consumption has increased, spurring production and demand from industry operators. Despite higher levels of natural gas production, however, consistently low prices have prevented the industry from achieving significant revenue growth. In addition, the drop in oil prices beginning in late 2014 ignited demand for competing oil transporters. In the five years to 2016, industry revenue was expected to decline at an annualized rate of 1.5% to \$22.8 billion, including a 2.2% decline in 2016.

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 Federal Energy Regulatory Committee reported Darryle Ulama of *IBISWorld*. Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity throughout the country. Advances in hydraulic fracturing technology have enabled previously untapped reserves to be

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<sup>20</sup> *Ibid.*, 31-32.

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 resulted in higher capital spending between 2011 and 2016. On the positive side, infrastructure upgrades and additional capital costs have allowed for rate increases, which have translated into revenue growth. Industry growth is forecast to resume in the five years to 2021. 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, according to Ulama. Due to these positive trends, revenue is projected to grow at an annualized rate of 2.8% to \$26.3 billion in the five years to 2021.<sup>21</sup>

### **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 30.7% of interstate natural gas shipments), closely followed by the Southeast (30.5%) and the Plains (10.2%). The most significant states are Texas, which account for 21.3% of establishments, and Louisiana, which account for 8.9% 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 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 facilities. In markets where seasonality is not a main issue, natural gas demand is mainly

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<sup>21</sup> Ulama, Darryle. "Gas Pipeline Transportation in the US," *IBISWorld* Industry Report 48621, June 2016, 4.



determined by electric power generation or industrial use. In these regions, storage is needed to support short-term demand fluctuations and system balancing.<sup>22</sup>

### **Gas Pipeline Transportation Risk Rating**

*IBISWorld Inc.* annually produces an *IBISWorld* Industry Risk Rating Report. In December 2016, 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 2017. 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.<sup>23</sup>

**Structural Risk Analysis** — is forecast to be MEDIUM-LOW over the outlook period. 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.<sup>24</sup>

**Growth Risk Analysis** — is expected to be MEDIUM-HIGH over the outlook period. *IBISWorld* forecasts that annual industry revenue will grow 1.8% to \$23.3 billion. In comparison, revenue shrank 5.6% per year between 2014 and 2016.

The Gas Pipeline Transportation industry has experienced a variety of conditions over the past five years. On the whole, natural gas consumption has increased, spurring production and demand from industry operators. Despite higher levels of natural gas production, however, consistently low prices have prevented the industry from achieving significant revenue growth. In addition, the drop in oil prices beginning in late 2014 ignited demand for competing oil transporters. In the five years through 2016, industry revenue was expected to decline at an annualized rate of 1.5% to \$22.8 billion, including

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<sup>22</sup> *Ibid*, 16.

<sup>23</sup> “IBISWorld Industry Risk Rating Report 48621, Gas Pipeline Transportation in the US,” *IBISWorld*, December 2016, 2.

<sup>24</sup> *Ibid.*, 2-3.

a 2.2% decline in 2016.

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 Federal Energy Regulatory Committee. Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity throughout the country. 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 were investing heavily in expanding their infrastructure to maintain capacity, resulting in higher capital spending between 2011 and 2016. On the positive side, infrastructure upgrades and additional capital costs have allowed for rate increases, which have translated into revenue growth.

Industry growth is forecast to resume in the five years to 2021. 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 2.8% to \$26.3 billion in the five years to 2021.<sup>25</sup>

**Sensitivity Risk Analysis** — is forecast to be MEDIUM-LOW over the outlook period, up marginally from 2016. 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, more natural gas will need to be transported. The

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<sup>25</sup> *Ibid.*, 3, 8.

industrial production index is expected to decrease in 2016. This factor's contribution to risk is expected to decrease in 2017.

**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 2016. This factor's contribution to risk is expected to increase in 2017.

**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. This factor's contribution to risk is expected to increase in 2017.

**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 was expected to decline in 2016. This factor's contribution to risk is expected to decrease in 2017.<sup>26</sup>

### **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 market 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. Large contracts are typically awarded to existing operators with extensive infrastructure and a

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<sup>26</sup> *Ibid*, 3.

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 many governing authorities at the federal level is often required.<sup>27</sup>

### **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.<sup>28</sup>

### **Natural Gas Pipeline Transportation Outlook**

The Gas Pipeline Transportation industry is projected to expand in the five years to 2021, with revenue forecast to grow at an annualized rate of 2.8% to \$26.3 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.<sup>29</sup>

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

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<sup>27</sup> *Ibid.*, 5.

<sup>28</sup> *Ibid.*, 6.

<sup>29</sup> *Op. Cit.*, Ulama, 8.

According to Napoli, the Natural Gas (Diversified) Industry,<sup>30</sup> the short-term direction of energy markets can be quite difficult to predict. Still, a number of the companies in the Natural Gas (Diversified) Industry ought to benefit from healthy production levels in 2017. *Value Line* envisions a more favorable pricing environment by the end of the decade, projected that the weakness in energy prices was the result of concerns of oversupply and that the upcoming winter might be warmer than usual.

As of December 2, 2016, natural gas prices had again risen above \$2.50 per mmbtu (benchmark Henry Hub). “It remains to be seen whether prices will increase further in the coming months,” said Napoli. This will largely depend on the weather. Over the long haul, *Value Line* believes that reduced investment in projects will probably support greater natural gas quotations, as industrial demand picks up.<sup>31</sup>

### **Natural Gas Economics**

Natural gas touches everyone’s lives. It heats 76 million homes, generates 30 percent of the nation’s electricity, is a key component of the fertilizer that helps grow our crops and is used by manufacturers to make a wide range of products from trash bags to lipstick to toys. Pipelines make the use of natural gas possible by delivering the gas safely and reliably across the country.

Consumers and producers alike have benefitted from the recent boom in domestic natural gas at the end of 2016. Gas now provides a full quarter of the energy used in the United States, as power plants, factories and homeowners enjoy the savings offered by the abundance of natural gas.

Natural gas is the cleanest burning fossil fuel, so its increased use is helping to reduce pollution. At the same time, the growth in domestic production is fueling America’s economy. Abundant natural gas is creating thousands of jobs in the production and pipeline sector, and it’s driving a resurgence in the U.S. manufacturing sector.

As gas production and use increases nationwide, more pipelines will be constructed to deliver the natural gas to market. This should provide over 350,000 Americans with well-paying jobs throughout the next 20 years reported the Interstate Natural Gas Association of America

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<sup>30</sup> 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.

<sup>31</sup> Napoli, Michael F. “Natural Gas (Diversified) Industry,” *Value Line Investment Survey*, December 2, 2016, 523.

(NGAA) website.<sup>32</sup>

## Summary

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 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 2017 appraisal year.

All of the political and economic factors discussed in this section and the "2017 Economy 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*.<sup>33</sup> 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.<sup>34</sup>] This rate of return is often referred to

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<sup>32</sup> "Economics," INGAA online, January 26, 2017, <http://www.ingaa.org/Pipelines/101/Economics.aspx>. The INGAA is a trade organization dedicated to advocating for the legislative and regulatory position of gas pipeline operators in the US and Canada.

<sup>33</sup> 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*, 14<sup>th</sup> ed., (Chicago: Appraisal Institute, 2013), 58.

<sup>34</sup> William N. Kinnard, Jr., *Income Property Valuation*, (Lexington: Heath Lexington Books, 1982), 70.

as the discount rate or the opportunity cost of capital.<sup>35</sup> 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 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.*<sup>36</sup>

The estimated cost of capital in this report for the Interstate Natural Gas Pipeline Industry as of January 1, 2017, 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.

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

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

*where*

*K = Weighted Average Cost of Capital*  
*D = Proportion of Debt in Capital Structure*  
*K<sub>d</sub> = Cost of Debt*  
*E = Proportion of Equity in Capital Structure*  
*K<sub>e</sub> = Cost of Equity*

Figure 1

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

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<sup>35</sup> Richard A. Brealey and Stewart C. Meyers, *Principles of Corporate Finance*, 4<sup>th</sup> ed., (New York: McGraw-Hill, 1991), 13.

<sup>36</sup>*The Appraisal of Real Estate*, 11<sup>th</sup> ed. (Chicago: Appraisal Institute, 1996) 44. See also *The Dictionary of Real Estate Appraisal*, 5<sup>th</sup> ed., (Chicago: Appraisal Institute, 2010) 139.

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.<sup>37</sup>

## Cost of Capital Study Results

The cost of capital for the Interstate Natural Gas Pipeline Industry as of January 1, 2017 is estimated to be 10.72% (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	30.00%	5.63%	1.69%
Equity	70.00%	12.90%	9.03%
Totals	100.00%		10.72%

## 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

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<sup>37</sup> *SBBI (Stocks, Bonds, Bills and Inflation)*, 2013 Yearbook: Valuation Edition, (Chicago: Morningstar, Inc., 2013), 21.



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.<sup>38</sup>

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 well as bonds, to finance projects, and that these securities are issued at market value, not at book value.<sup>39</sup>

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.<sup>40</sup>

**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

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<sup>38</sup> Eugene F. Brigham and Louis C. Gapenski, *Financial Management*, 7<sup>th</sup> ed. (New York: The Dryden Press, 1994), 599.

<sup>39</sup> Aswath Damodaran, *Investment Valuation*, (New York, NY: John Wiley & Sons, Inc., 1996), 64.

<sup>40</sup> John Downes and Jordan Elliot Goodman, *Dictionary of Finance and Investment Terms*, (New York: Barron's, 1985), 54.

ownership equity. Financial structure is distinguished from CAPITAL STRUCTURE, which includes only long-term debt and equity.<sup>41</sup>

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 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...<sup>42</sup>

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 2017. The capital structure study involved the following companies we believe to be representative of the interstate natural gas transmission pipeline industry: 16 large (sales over \$1 billion) companies classified by *Value Line* as the Natural Gas (Diversified) Industry (from the *Value Line* full data base of 6,049 companies), using both *Value Line* and S&P data; a combination of 26 large companies from both the *Value Line* natural gas (diversified) group and the large *Value Line* Natural Gas Utility distribution group; 14 large (sales over \$1 billion) natural gas Pipeline MLPs; and 11 companies heavily involved with natural gas pipelines from the Interstate Natural Gas Pipeline Property Tax Forum group, which

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<sup>41</sup> *Ibid.*, 132.

<sup>42</sup> Eugene F. Brigham and Louis C. Gapenski, *Financial Management*, 7<sup>th</sup> ed. (New York: The Dryden Press, 1994), 368-369.

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 30% debt, essentially no preferred stock, and 70% 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."<sup>43</sup> 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.

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<sup>43</sup> *SBBI (Stocks, Bonds, Bills and Inflation), 2013 Yearbook: Valuation Edition*, (Chicago: Morningstar, Inc., 2013) 14-15.

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

### Summary of Capital Structure Data - 2017

<b>Value Line Data - Medians</b>	<b>Debt</b>	<b>Pref. Stk.</b>	<b>Com. Stk.</b>
Natural Gas Diversified Industry (Large)	30.00%	0.00%	70.00%
Natural Gas Div. & Nat. Gas Utility (Large)	30.00%	0.00%	70.00%
Natural Gas Pipeline MLPs (Large)	42.16%	0.00%	57.85%
Interstate Natural Gas Pipeline Forum (Pipelines)	36.01%	0.00%	64.00%
S&P 500 Companies with "BBB-" Rated Debt	20.56%	0.00%	79.44%

<b>S&amp;P Data - Mkt. Medians</b>	<b>Debt</b>	<b>Pref. Stk.</b>	<b>Com. Stk.</b>
Natural Gas Diversified Industry (Large)	30.81%	0.00%	69.20%
Natural Gas Div. & Nat. Gas Utility (Large)	30.33%	0.00%	69.68%
Natural Gas Pipeline MLPs (Large)	37.82%	0.00%	59.68%
Interstate Natural Gas Pipeline Forum (Pipelines)	36.33%	0.00%	63.67%
S&P 500 Companies with "BBB-" Rated Debt	19.69%	0.00%	80.28%

<b>Value Line Data - Mkt. Wtd. Avg.</b>	<b>Debt</b>	<b>Pref. Stk.</b>	<b>Com. Stk.</b>
Natural Gas Diversified Industry (Large)	21.52%	0.00%	78.48%
Natural Gas Div. & Nat. Gas Utility (Large)	23.25%	0.00%	76.75%
Natural Gas Pipeline MLPs (Large)	40.16%	0.00%	59.84%
Interstate Natural Gas Pipeline Forum (Pipelines)	38.84%	0.41%	60.75%
S&P 500 Companies with "BBB-" Rated Debt	20.69%	0.00%	79.31%

<b>S&amp;P Data - Mkt. Wtd. Avg.</b>	<b>Debt</b>	<b>Pref. Stk.</b>	<b>Com. Stk.</b>
Natural Gas Diversified Industry (Large)	21.59%	0.70%	77.71%
Natural Gas Div. & Nat. Gas Utility (Large)	23.64%	0.56%	75.80%
Natural Gas Pipeline MLPs (Large)	39.05%	0.33%	60.62%
Interstate Natural Gas Pipeline Forum (Pipelines)	40.51%	0.71%	58.78%
S&P 500 Companies with "BBB-" Rated Debt	21.16%	0.21%	78.63%

**Natural Gas Diversified Industry (Large)  
Capital Structure (VL Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
Antero Resources Corp.	AR	38.37%	0.00%	61.63%
Cabot Oil & Gas 'A'	COG	12.61%	0.00%	87.39%
Chesapeake Energy	CHK	61.83%	0.00%	38.17%
Cimarex Energy	XEC	10.05%	0.00%	89.95%
Concho Resources	CXO	12.49%	0.00%	87.51%
Devon Energy	DVN	30.00%	0.00%	70.00%
EOG Resources	EOG	10.84%	0.00%	89.16%
EP Energy Corp	EPE	69.65%	0.00%	30.35%
EQT Corp.	EQT	19.73%	0.00%	80.27%
MDU Resources	MDU	23.99%	0.00%	76.01%
National Fuel Gas	NFG	30.00%	0.00%	70.00%
Newfield Exploration	NFX	22.14%	0.00%	77.86%
QEP Resources	QEP	31.37%	0.00%	68.63%
Southwestern Energy	SWN	47.74%	0.00%	52.26%
Targa Resources	TRGP	31.63%	0.00%	68.37%
WPX Energy	WPX	33.32%	0.00%	66.68%
	Average	30.36%	0.00%	69.64%
	Median	30.00%	0.00%	70.00%
	Wtd. Avg.	21.52%	0.00%	78.48%

Source: *Value Line*, January 2017.

**Natural Gas Diversified Industry (Large)  
Capital Structure (S&P Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
ANTERO RESOURCES CORP	AR	39.58%	0.00%	60.42%
CABOT OIL & GAS CORP	COG	12.27%	0.00%	87.73%
CHESAPEAKE ENERGY CORP	CHK	51.54%	17.34%	31.11%
CIMAREX ENERGY CO	XEC	10.33%	0.00%	89.67%
CONCHO RESOURCES INC	CXO	12.70%	0.00%	87.30%
DEVON ENERGY CORP	DVN	31.50%	0.00%	68.50%
EOG RESOURCES INC	EOG	11.13%	0.00%	88.87%
EP ENERGY CORP	EPE	69.66%	0.00%	30.34%
EQT CORP	EQT	19.84%	0.00%	80.16%
MDU RESOURCES GROUP INC	MDU	24.30%	0.20%	75.50%
NATIONAL FUEL GAS CO	NFG	30.20%	0.00%	69.80%
NEWFIELD EXPLORATION CO	NFX	23.18%	0.00%	76.82%
QEP RESOURCES INC	QEP	31.41%	0.00%	68.59%
SOUTHWESTERN ENERGY CO	SWN	46.56%	0.00%	53.44%
TARGA RESOURCES CORP	TRGP	32.32%	1.27%	66.41%
WPX ENERGY INC	WPX	32.89%	2.96%	64.14%
	Average	29.96%	1.36%	68.68%
	Median	30.81%	0.00%	69.20%
	Wtd. Avg.	21.59%	0.70%	77.71%

Source: S&P Compustat, January 2017.

**Natural Gas Div. Ind. & Natural Gas Utility  
Capital Structure (VL Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
AmeriGas Partners	APU	34.23%	0.00%	65.77%
Antero Resources Corp.	AR	38.37%	0.00%	61.63%
Atmos Energy	ATO	22.16%	0.00%	77.84%
Cabot Oil & Gas 'A'	COG	12.61%	0.00%	87.39%
Chesapeake Energy	CHK	61.83%	0.00%	38.17%
Cimarex Energy	XEC	10.05%	0.00%	89.95%
Concho Resources	CXO	12.49%	0.00%	87.51%
Devon Energy	DVN	30.00%	0.00%	70.00%
Encana Corp.	ECA			
EOG Resources	EOG	10.84%	0.00%	89.16%
EP Energy Corp	EPE	69.65%	0.00%	30.35%
EQT Corp.	EQT	19.73%	0.00%	80.27%
MDU Resources	MDU	23.99%	0.00%	76.01%
National Fuel Gas	NFG	30.00%	0.00%	70.00%
New Jersey Resources	NJR	24.24%	0.00%	75.76%
Newfield Exploration	NFX	22.14%	0.00%	77.86%
NiSource Inc.	NI	45.45%	0.00%	54.55%
QEP Resources	QEP	31.37%	0.00%	68.63%
Southwest Gas	SWX	30.12%	0.00%	69.88%
Southwestern Energy	SWN	47.74%	0.00%	52.26%
Spire Inc.	SR	38.09%	0.00%	61.91%
Star Gas Partners L.P.	SGU	10.99%	0.00%	89.01%
Targa Resources	TRGP	31.63%	0.00%	68.37%
UGI Corp.	UGI	31.92%	0.00%	68.08%
WGL Holdings Inc.	WGL	23.48%	0.00%	76.52%
WPX Energy	WPX	33.32%	0.00%	66.68%
	Average	29.86%	0.00%	70.14%
	Median	30.00%	0.00%	70.00%
	Wtd. Avg.	23.25%	0.00%	76.75%

Source: *Value Line*, January 2017.

**Natural Gas Div. Ind. & Natural Gas Utility  
Capital Structure (S&P Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
AMERIGAS PARTNERS -LP	APU	34.31%	0.00%	65.69%
ANTERO RESOURCES CORP	AR	39.58%	0.00%	60.42%
ATMOS ENERGY CORP	ATO	22.12%	0.00%	77.88%
CABOT OIL & GAS CORP	COG	12.27%	0.00%	87.73%
CHESAPEAKE ENERGY CORP	CHK	51.54%	17.34%	31.11%
CIMAREX ENERGY CO	XEC	10.33%	0.00%	89.67%
CONCHO RESOURCES INC	CXO	12.70%	0.00%	87.30%
DEVON ENERGY CORP	DVN	31.50%	0.00%	68.50%
ENCANA CORP	ECA	28.70%	0.00%	71.30%
EOG RESOURCES INC	EOG	11.13%	0.00%	88.87%
EP ENERGY CORP	EPE	69.66%	0.00%	30.34%
EQT CORP	EQT	19.84%	0.00%	80.16%
MDU RESOURCES GROUP INC	MDU	24.30%	0.20%	75.50%
NATIONAL FUEL GAS CO	NFG	30.20%	0.00%	69.80%
NEW JERSEY RESOURCES CORP	NJR	25.82%	0.00%	74.18%
NEWFIELD EXPLORATION CO	NFX	23.18%	0.00%	76.82%
NISOURCE INC	NI	46.05%	0.00%	53.95%
QEP RESOURCES INC	QEP	31.41%	0.00%	68.59%
SOUTHWEST GAS HOLDINGS INC	SWX	30.45%	0.00%	69.55%
SOUTHWESTERN ENERGY CO	SWN	46.56%	0.00%	53.44%
SPIRE INC	SR	38.36%	0.00%	61.64%
STAR GAS PARTNERS -LP	SGU	11.26%	0.00%	88.74%
TARGA RESOURCES CORP	TRGP	32.32%	1.27%	66.41%
UGI CORP	UGI	32.09%	0.00%	67.91%
WGL HOLDINGS INC	WGL	26.90%	0.52%	72.57%
WPX ENERGY INC	WPX	32.89%	2.96%	64.14%
	Average	29.83%	0.86%	69.32%
	Median	30.33%	0.00%	69.68%
	Wtd. Avg.	23.64%	0.56%	75.80%

Source: S&P Compustat, January 2017.



**Natural Gas Pipeline MLPs - Large  
Capital Structure (VL Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
Boardwalk Pipeline	BWP	44.31%	0.00%	55.69%
DCP Midstream Partners	DPM	34.52%	0.00%	65.48%
Energy Transfer Equity	ETE	66.17%	0.00%	33.83%
Energy Transfer Part.	ETP	60.11%	0.00%	39.89%
EnLink Midstream Part.	ENLK	33.63%	0.00%	66.37%
Enterprise Products	EPD	26.82%	0.00%	73.18%
Ferrellgas Partners L.P.	FGP	71.00%	0.00%	29.00%
Midcoast Energy Partners LP	MEP	71.17%	0.00%	28.83%
ONEOK Partners L.P.	OKS	34.50%	0.00%	65.50%
Plains GP Holdings LP	PAGP	74.59%	0.00%	25.41%
Spectra Energy Part.	SEP	27.10%	0.00%	72.90%
Suburban Propane	SPH	40.00%	0.00%	60.00%
Western Gas Part.	WES	26.73%	0.00%	73.27%
Williams Partners L.P.	WPZ	44.89%	0.00%	55.11%
	Average	46.82%	0.00%	53.18%
	Median	42.16%	0.00%	57.85%
	Wtd. Avg.	40.16%	0.00%	59.84%

Source: *Value Line*, January 2017.

**Natural Gas Pipeline MLPs - Large  
Capital Structure (S&P Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
BOARDWALK PIPELINE PRTNRS-LP	BWP	45.49%	0.00%	54.51%
DCP MIDSTREAM PARTNERS LP	DPM	33.62%	0.00%	66.38%
ENERGY TRANSFER EQUITY LP	ETE	66.48%	0.00%	33.52%
ENERGY TRANSFER PARTNERS -LP	ETP	60.63%	0.07%	39.30%
ENLINK MIDSTREAM PARTNERS LP	ENLK	32.86%	7.39%	59.75%
ENTERPRISE PRODS PRTNRS -LP	EPD	27.09%	0.00%	72.91%
FERRELLGAS PARTNERS -LP	FGP	74.92%	0.00%	25.08%
MIDCOAST ENERGY PARTNERS LP	MEP	72.69%	0.00%	27.31%
ONEOK PARTNERS -LP	OKS	35.25%	0.00%	64.75%
PLAINS GP HOLDINGS LP	PAGP			
SPECTRA ENERGY PARTNERS LP	SEP	28.00%	0.00%	72.00%
SUBURBAN PROPANE PRTNRS -LP	SPH	40.39%	0.00%	59.61%
WESTERN GAS PARTNERS LP	WES	25.84%	0.00%	74.16%
WILLIAMS PARTNERS LP	WPZ			
	Average	45.27%	0.62%	54.11%
	Median	37.82%	0.00%	59.68%
	Wtd. Avg.	39.05%	0.33%	60.62%

Source: *S&P Compustat*, January 2017.

**Interstate Natural Gas Pipeline Forum (Pipelines)  
Capital Structure (VL Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
Boardwalk Pipeline	BWP	44.31%	0.00%	55.69%
Dominion Resources	D	37.51%	0.00%	62.49%
Kinder Morgan Inc.	KMI	43.53%	1.81%	54.66%
MDU Resources	MDU	23.99%	0.00%	76.01%
National Fuel Gas	NFG	30.00%	0.00%	70.00%
ONEOK Partners L.P.	OKS	34.50%	0.00%	65.50%
Spectra Energy Corp.	SE	30.65%	0.00%	69.35%
Spectra Energy Part.	SEP	27.10%	0.00%	72.90%
TransCanada Corp.	TRP			
Williams Cos.	WMB	50.17%	0.00%	49.83%
Williams Partners L.P.	WPZ	44.89%	0.00%	55.11%
	Average	36.67%	0.18%	63.15%
	Median	36.01%	0.00%	64.00%
	Wtd. Avg.	38.84%	0.41%	60.75%

Source: *Value Line*, January 2017.

**Interstate Natural Gas Pipeline Forum (Pipelines)  
Capital Structure (S&P Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
BOARDWALK PIPELINE PRTRNS-LP	BWP	45.49%	0.00%	54.51%
DOMINION RESOURCES INC	D	37.41%	0.00%	62.59%
KINDER MORGAN INC	KMI	45.47%	0.00%	54.53%
MDU RESOURCES GROUP INC	MDU	24.30%	0.20%	75.50%
NATIONAL FUEL GAS CO	NFG	30.20%	0.00%	69.80%
ONEOK PARTNERS -LP	OKS	35.25%	0.00%	64.75%
SPECTRA ENERGY CORP	SE	30.82%	1.32%	67.85%
SPECTRA ENERGY PARTNERS LP	SEP	28.00%	0.00%	72.00%
TRANSCANADA CORP	TRP	48.33%	3.07%	48.60%
WILLIAMS COS INC	WMB	50.61%	0.00%	49.39%
WILLIAMS PARTNERS LP	WPZ			
	Average	37.59%	0.46%	61.95%
	Median	36.33%	0.00%	63.67%
	Wtd. Avg.	40.51%	0.71%	58.78%

Source: *S&P Compustat*, January 2017.

## All Companies in S&P 500 with "BBB-" Rated Debt Capital Structure (VL Data) - January 1, 2017

Company Name	Ticker	LTD %	PS %	CS %
Activision Blizzard	ATVI	14.76%	0.00%	85.24%
Advance Auto Parts	AAP	7.46%	0.00%	92.54%
Albemarle Corp.	ALB	23.07%	0.00%	76.93%
Amer. Tower 'A'	AMT	29.02%	0.00%	70.98%
Best Buy Co.	BBY	9.03%	0.00%	90.97%
Cimarex Energy	XEC	10.05%	0.00%	89.95%
Coach Inc.	COH	5.64%	0.00%	94.36%
Constellation Brands	STZ	18.47%	0.00%	81.53%
Discover Fin'l Svcs.	DFS	48.14%	0.00%	51.86%
Dun & Bradstreet	DNB	26.08%	0.00%	73.92%
Expedia Inc.	EXPE	15.71%	0.00%	84.29%
Harman Int'l	HAR	14.16%	0.00%	85.84%
Harris Corp.	HRS	24.16%	0.00%	75.84%
Horton D.R.	DHI	20.93%	0.00%	79.07%
Interpublic Group	IPG	14.31%	0.00%	85.69%
Kansas City South'n	KSU	20.56%	0.00%	79.44%
Kraft Heinz Co.	KHC	22.15%	0.00%	77.85%
Molson Coors Brewing	TAP	30.86%	0.00%	69.14%
Motorola Solutions	MSI	26.88%	0.00%	73.12%
Newell Brands	NWL	34.85%	0.00%	65.15%
NVIDIA Corp.	NVDA	0.01%	0.00%	99.99%
Pioneer Natural Res.	PXD	7.96%	0.00%	92.04%
SL Green Realty	SLG			
Synchrony Financial	SYF	39.83%	0.00%	60.17%
Total System Svcs.	TSS	26.20%	0.00%	73.80%
Weyerhaeuser Co.	WY	22.81%	0.00%	77.19%
Whole Foods Market	WFM	9.75%	0.00%	90.25%
Zions Bancorp.	ZION	16.10%	0.00%	83.90%
	Average	19.96%	0.00%	80.04%
	Median	20.56%	0.00%	79.44%
	Wtd. Avg.	20.69%	0.00%	79.31%

Source: *Value Line*, January 2017.

**S&P 500 Companies with "BBB-" Rated Debt**  
**Capital Structure (S&P Data) - January 1, 2017**

Company Name	Ticker	LTD %	PS %	CS %
ACTIVISION BLIZZARD INC	ATVI	15.39%	0.00%	84.61%
ADVANCE AUTO PARTS INC	AAP	7.72%	0.00%	92.28%
ALBEMARLE CORP	ALB	23.95%	0.00%	76.05%
AMERICAN TOWER CORP	AMT	29.07%	0.00%	70.93%
BEST BUY CO INC	BBY	9.02%	0.00%	90.98%
CIMAREX ENERGY CO	XEC	10.33%	0.00%	89.67%
COACH INC	COH	5.68%	0.00%	94.32%
CONSTELLATION BRANDS -CL A	STZ	19.44%	0.00%	80.56%
D R HORTON INC	DHI	19.31%	0.00%	80.69%
DISCOVER FINANCIAL SVCS INC	DFS	47.94%	1.00%	51.06%
DUN & BRADSTREET CORP	DNB	26.23%	0.00%	73.77%
EXPEDIA INC	EXPE	15.87%	0.00%	84.13%
HARMAN INTERNATIONAL INDS	HAR	14.09%	0.00%	85.91%
HARRIS CORP	HRS	24.32%	0.00%	75.68%
INTERPUBLIC GROUP OF COS	IPG	14.56%	0.00%	85.44%
KANSAS CITY SOUTHERN	KSU	19.94%	0.05%	80.00%
KRAFT HEINZ CO	KHC	22.00%	0.00%	78.00%
MOLSON COORS BREWING CO	TAP	31.37%	0.00%	68.63%
MOTOROLA SOLUTIONS INC	MSI	26.83%	0.00%	73.17%
NEWELL BRANDS INC	NWL	35.86%	0.00%	64.14%
NVIDIA CORP	NVDA	3.34%	0.08%	96.59%
PIONEER NATURAL RESOURCES CO	PXD	8.19%	0.00%	91.81%
SL GREEN REALTY CORP	SLG	36.12%	2.96%	60.92%
SYNCHRONY FINANCIAL	SYF	40.25%	0.00%	59.75%
TOTAL SYSTEM SERVICES INC	TSS	27.54%	0.00%	72.46%
WEYERHAEUSER CO	WY	23.31%	0.00%	76.69%
WHOLE FOODS MARKET INC	WFM	9.67%	0.00%	90.33%
ZIONS BANCORPORATION	ZION	5.67%	7.06%	87.27%
	Average	20.46%	0.40%	79.14%
	Median	19.69%	0.00%	80.28%
	Wtd. Avg.	21.16%	0.21%	78.63%

Source: S&P Compustat, January 2017.

## 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.<sup>44</sup> 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.<sup>45</sup>

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, 2017**

Averages	S&P Ratings		Moody's Ratings	
Natural Gas Diversified Industry (Large)	BB+	13	Ba3	15
Natural Gas Div. & Nat. Gas Utility (Large)	BBB-	12	Ba1	13
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	Baa3	12
Natural Gas Pipeline MLPs (Large)	BB+	13	Ba1	13
<b>Average</b>	<b>BBB-</b>	<b>12</b>	<b>Baa3</b>	<b>13</b>

Medians	S&P Ratings		Moody's Ratings	
Natural Gas Diversified Industry (Large)	BB+	13	Ba2	14
Natural Gas Div. & Nat. Gas Utility (Large)	BBB	11	Ba2	14
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	Baa3	12
Natural Gas Pipeline MLPs (Large)	BBB-	12	Ba1	13
<b>Average</b>	<b>BBB-</b>	<b>12</b>	<b>Baa3</b>	<b>13</b>

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

<sup>44</sup> Brigham, Eugene F. & Michael C. Ehrhardt, *Financial Management: Theory and Practice*, 10<sup>th</sup> ed. (Thomson Learning, Inc.: Stamford, CT, 2002), 423.

<sup>45</sup> *Stocks, Bonds, Bills and Inflation: 2013 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2013), 24

**Natural Gas Diversified Industry (Large)**  
**Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
ANTERO RESOURCES CORP	AR	BB	14	Ba3	15	8.88
CABOT OIL & GAS CORP	COG					
CHESAPEAKE ENERGY CORP	CHK	CCC+	19	Caa3	21	16.15
CIMAREX ENERGY CO	XEC	BBB-	12	Baa3	12	5.50
CONCHO RESOURCES INC	CXO	BB+	13	Ba2	14	6.54
DEVON ENERGY CORP	DVN	BBB	11	Ba2	14	5.08
EOG RESOURCES INC	EOG	BBB+	10	Baa1	10	4.72
EP ENERGY CORP	EPE			Caa2	20	10.19
EQT CORP	EQT	BBB	11	Baa3	12	5.08
MDU RESOURCES GROUP INC	MDU	BBB+	10			4.72
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa3	12	5.08
NEWFIELD EXPLORATION CO	NFX	BB+	13	Ba2	14	6.54
QEP RESOURCES INC	QEP	BB+	13	Ba3	15	6.54
SOUTHWESTERN ENERGY CO	SWN	BB-	15			9.91
TARGA RESOURCES CORP	TRGP	BB-	15	Ba3	15	9.91
WPX ENERGY INC	WPX	B+	16	B3	18	8.48
	Average	BB+	13	Ba3	15	6.54
	Median	BB+	13	Ba2	14	6.54

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

**Natural Gas Div. Ind. & Natural Gas Utility**  
**Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
AMERIGAS PARTNERS -LP	APU			Ba2	14	
ANTERO RESOURCES CORP	AR	BB	14	Ba3	15	8.88
ATMOS ENERGY CORP	ATO	A	8	A2	8	4.09
CABOT OIL & GAS CORP	COG					
CHESAPEAKE ENERGY CORP	CHK	CCC+	19	Caa3	21	16.15
CIMAREX ENERGY CO	XEC	BBB-	12	Baa3	12	5.50
CONCHO RESOURCES INC	CXO	BB+	13	Ba2	14	6.54
DEVON ENERGY CORP	DVN	BBB	11	Ba2	14	5.08
ENCANA CORP	ECA	BBB	11	Ba2	14	5.08
EOG RESOURCES INC	EOG	BBB+	10	Baa1	10	4.72
EP ENERGY CORP	EPE			Caa2	20	10.19
EQT CORP	EQT	BBB	11	Baa3	12	5.08
MDU RESOURCES GROUP INC	MDU	BBB+	10			4.72
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa3	12	5.08
NEW JERSEY RESOURCES CORP	NJR					
NEWFIELD EXPLORATION CO	NFX	BB+	13	Ba2	14	6.54
NISOURCE INC	NI	BBB+	10	Baa2	11	4.72
QEP RESOURCES INC	QEP	BB+	13	Ba3	15	6.54
SOUTHWEST GAS HOLDINGS INC	SWX	BBB+	10	A3	9	4.72
SOUTHWESTERN ENERGY CO	SWN	BB-	15			9.91
SPIRE INC	SR	A-	9			4.62
STAR GAS PARTNERS -LP	SGU					
TARGA RESOURCES CORP	TRGP	BB-	15	Ba3	15	9.91
UGI CORP	UGI			A2	8	
WGL HOLDINGS INC	WGL	A+	7	A2	8	4.66
WPX ENERGY INC	WPX	B+	16	B3	18	8.48
	Average	BBB-	12	Ba1	13	5.50
	Median	BBB	11	Ba2	14	5.08

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

**Interstate Natural Gas Pipeline Forum (Pipelines)  
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
BOARDWALK PIPELINE PRT-LP	BWP	BBB-	12	Baa3	12	5.50
DOMINION RESOURCES INC	D	BBB+	10	Baa2	11	4.72
KINDER MORGAN INC	KMI	BBB-	12	Baa3	12	5.50
MDU RESOURCES GROUP INC	MDU	BBB+	10			4.72
NATIONAL FUEL GAS CO	NFG	BBB	11	Baa3	12	5.08
ONEOK PARTNERS -LP	OKS	BBB	11	Baa2	11	5.08
SPECTRA ENERGY CORP	SE	BBB	11	Baa2	11	5.08
SPECTRA ENERGY PRT LP	SEP	BBB	11	Baa2	11	5.08
TRANSCANADA CORP	TRP	A-	9	Baa2	11	4.62
WILLIAMS COS INC	WMB	BB	14	Ba2	14	8.88
WILLIAMS PARTNERS LP	WPZ	BBB-	12	Baa3	12	5.50
Average		BBB	11	Baa3	12	5.08
Median		BBB	11	Baa3	12	5.08

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

**Natural Gas Pipeline MLPs - Large  
Long-Term Debt Ratings & Corporate Bond Yields - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
BOARDWALK PIPELINE PRT-LP	BWP	BBB-	12	Baa3	12	5.50
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	Ba2	14	8.88
ENERGY TRANSFER EQUITY LP	ETE	BB	14	Ba2	14	8.88
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12			5.50
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB-	12	Ba2	14	5.50
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	Baa1	10	4.72
FERRELLGAS PARTNERS -LP	FGP	B	17	B3	18	9.13
MIDCOAST ENERGY PARTNERS LP	MEP			Caa1	19	
ONEOK PARTNERS -LP	OKS	BBB	11	Baa2	11	5.08
PLAINS GP HOLDINGS LP	PAGP			Baa3	12	
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	Baa2	11	5.08
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	Ba3	15	9.91
WESTERN GAS PARTNERS LP	WES	BBB-	12	Ba1	13	5.50
WILLIAMS PARTNERS LP	WPZ	BBB-	12	Baa3	12	5.50
Average		BB+	13	Ba1	13	6.54
Median		BBB-	12	Ba1	13	5.50

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

The following tables indicates the long-term debt ratings and yields to maturity for the Standard & Poor's, Mergent (Moody's ratings), and Bloomberg bond databases at January 1, 2017.



**Standard & Poor's and Moody's Long Term Bond Yields (%)**

<b>S&amp;P</b>	<b>YTM</b>	<b>Moody's</b>	<b>YTM</b>	<b>Avg YTM</b>
<b>AAA</b>	4.00	<b>Aaa</b>	3.99	<b>3.99</b>
<b>AA+</b>	4.07	<b>Aa1</b>	4.10	<b>4.08</b>
<b>AA</b>	4.03	<b>Aa2</b>	4.12	<b>4.08</b>
<b>AA-</b>	4.28	<b>Aa3</b>	4.17	<b>4.22</b>
<b>A+</b>	4.24	<b>A1</b>	4.16	<b>4.20</b>
<b>A</b>	4.22	<b>A2</b>	4.23	<b>4.22</b>
<b>A-</b>	4.44	<b>A3</b>	4.42	<b>4.43</b>
<b>BBB+</b>	4.71	<b>Baa1</b>	4.71	<b>4.71</b>
<b>BBB</b>	5.14	<b>Baa2</b>	4.99	<b>5.06</b>
<b>BBB-</b>	5.75	<b>Baa3</b>	5.52	<b>5.64</b>
<b>BB+</b>	6.02	<b>Ba1</b>	5.86	<b>5.94</b>
<b>BB</b>	6.66	<b>Ba2</b>	6.43	<b>6.55</b>
<b>BB-</b>	7.85	<b>Ba3</b>	7.13	<b>7.49</b>
<b>B+</b>	8.82	<b>B1</b>	7.64	<b>8.23</b>
<b>B</b>	8.82	<b>B2</b>	6.91	<b>7.87</b>
<b>B-</b>	9.70	<b>B3</b>	9.00	<b>9.35</b>

Source: Mergent & S&P Bond Databases, January 1, 2017.

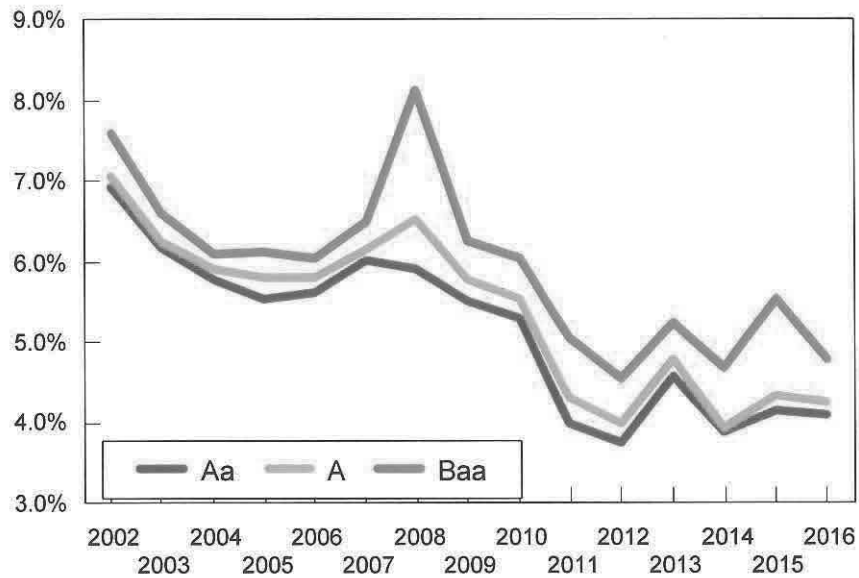
**Bloomberg Long-Term Bond Yields by Rating**

<b>Rating</b>	<b>20Y</b>	<b>25Y</b>	<b>30Y</b>	<b>Average</b>
<b>AA</b>	4.08	4.09	4.05	4.07
<b>AA-</b>	4.07	4.18	4.28	4.18
<b>A+</b>	4.24	4.42	4.66	4.44
<b>A</b>	4.32	4.27	4.09	4.23
<b>A-</b>	4.42	4.47	4.62	4.50
<b>BBB+</b>	4.73	4.74	4.72	4.73
<b>BBB</b>	5.32	5.43	5.08	5.27
<b>BBB-</b>	5.54	5.61	5.35	5.50
<b>BB+</b>	6.45	6.64		6.54
<b>BB</b>	7.08	8.86	8.88	8.27
<b>BB-</b>	7.55	7.39	9.91	8.28

Source: Bloomberg Database - Dec. 31, 2016.

## Mergent Utility Bond Yields

Moody's Utility Bond Yield Avg.  
Utility Avg. Year End. 2002 - 2016

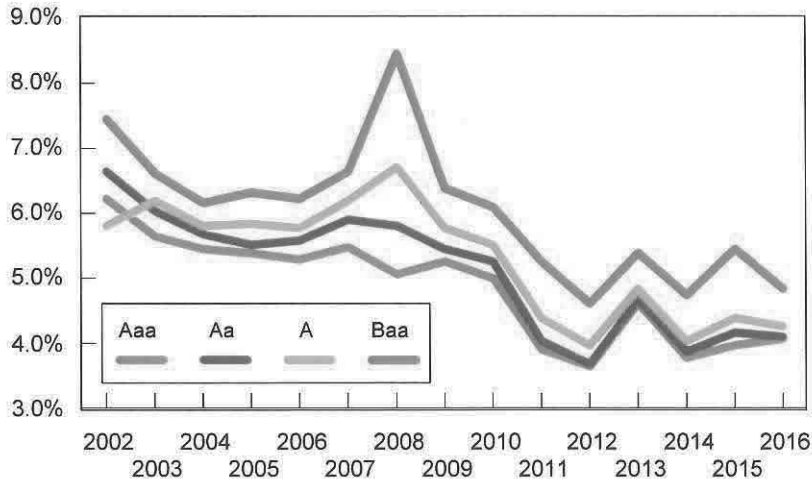


Public Utility Bond Yields - Year End Data (2002 - 2016)			
Year End Date	Aa	A	Baa
2002	6.94%	7.07%	7.61%
2003	6.18%	6.27%	6.61%
2004	5.78%	5.92%	6.10%
2005	5.55%	5.80%	6.14%
2006	5.62%	5.81%	6.05%
2007	6.03%	6.16%	6.51%
2008	5.93%	6.54%	8.13%
2009	5.52%	5.79%	6.26%
2010	5.32%	5.56%	6.04%
2011	4.00%	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%
2016	4.11%	4.27%	4.79%

Source: Mergent's Bond Record, January 2002 - 2017

## Mergent Corporate Bond Yields

**Moody's Corporate Bond Yield Avg.  
Corp. Avg. Year End. 2002 - 2016**



Corp. Bond Yields - Year End Data (2002 - 2016)				
Year End Date	Aaa	Aa	A	Baa
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%
2016	4.06%	4.12%	4.28%	4.83%

Source: Mergent's Bond Record, January 2002 - 2017

The average yields for all corporate bonds rated **BBB-/Baa3** by Standard & Poor's and Moody's, respectively, was **5.75%** and **5.52%**, respectively, as of January 1, 2017. The average yields for Bloomberg corporate bonds ranging from 20 to 30 years to maturity was **5.50%** at December 31, 2016. From the information discussed and displayed above we estimated the appropriate cost of debt capital rated **BBB-** to be **5.60%** at January 1, 2017 for the typical interstate natural gas pipeline company. This estimate recognizes that the typical interstate natural gas pipeline's typical bond rating is approximately **BBB-**, one rating above junk bond status, at the beginning of January 2017.

## 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, 2017

Company Groups	Value Line Data		S&P (IBES) Data	
	Average	Median	Average	Median
Natural Gas Diversified Industry (Large)	13.79	11.18	17.29	10.22
Natural Gas Div. & Nat. Gas Utility (Large)	10.53	9.04	13.88	10.07
Natural Gas Pipeline MLPs (Large)	17.95	16.52	22.79	16.83
Interstate Natural Gas Pipeline Forum (Pipelines)	15.93	15.40	14.30	12.83
S&P Screened Comparables Group	14.87	16.65	26.83	17.06
S&P 500 Companies with "BBB-" Rated Debt	13.43	12.31	16.70	12.71
<b>Averages</b>	14.42	13.52	18.63	13.29

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, 2017

### General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
30-Year Treasury Bonds (ex post)	2.78	6.90	9.68
30-Year Treasury Bonds (ex ante)	2.78	8.68	11.46

### Risk Premium Indicators by Groups

Indicators	Median S&P Rating	Bloomberg	Risk Prem.
	Rating	Number	Yields
Natural Gas Diversified Industry (Large)	BB+	13	6.54
Natural Gas Div. & Nat. Gas Utility (Large)	BBB	11	5.08
Natural Gas Pipeline MLPs (Large)	BBB-	12	5.50
Interstate Natural Gas Pipeline Forum (Pipes)	BBB	11	5.08
S&P Screened Comparables Group	BBB-	12	5.50
S&P 500 Companies with BBB- Rated Debt	BBB-	12	5.50
<b>Average</b>	BBB	12	5.54

\* Base Rate: Average YTM Bloomberg.

Risk Premium: Simulated *SBB* Methodology (see p. 105).

Capital Asset Pricing Model (CAPM) - January 1, 2017

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
<b>CAPM Indicator *</b>				
Long-Term Gov't Bonds (ex post)	2.78	6.90	1.20	11.06
Long-Term Gov't Bonds (ex ante)	2.78	8.68	1.20	13.20

CAPM Formula:  $K_e = R_f + B(R_p)$

\* CAPM Indicator is based upon a *Value Line* beta of 1.20 & Federal Reserve data 1/3/17.

## 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 8,840 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 **BB+** (the mid-rated triple-B debt to the highest level double-B debt). This screening will give us a list of companies that have long-term debt which is believed to be equal in risk to the typical interstate natural gas pipeline. This measure is indicative of financial risk for the companies.

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 median 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 median *S&P* adjusted beta of the interstate natural gas pipeline shown on the following page was approximately 1.11 presently, while the average of the *Value Line* median betas of all the pipeline groups was 1.21, as shown on page 68. Thus we excluded all companies with *S&P* adjusted betas less than 1.00 and greater than 1.30. 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.

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

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

**Pipeline Risk Screening Data - January 1, 2017**  
**Natural Gas Diversified & Oil/Gas Distribution/MLP - Large**

Company Name	Ticker	S&P Debt	S&P Debt	S&P Adj. Beta	Return on Net Invest.
		Rating Letter	Rating Number		
ANTERO RESOURCES CORP	AR	BB	14	0.97	17.04
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	0.86	5.17
CABOT OIL & GAS CORP	COG			0.71	
CHESAPEAKE ENERGY CORP	CHK	CCC+	19	1.77	
CIMAREX ENERGY CO	XEC	BBB-	12	1.46	
CONCHO RESOURCES INC	CXO	BB+	13	1.17	
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	1.69	4.26
DEVON ENERGY CORP	DVN	BBB	11	1.79	
ENBRIDGE INC	ENB	BBB+	10	0.76	3.57
ENCANA CORP	ECA	BBB	11	1.62	
ENERGY TRANSFER EQUITY LP	ETE	BB	14	1.61	5.62
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	1.16	5.86
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB-	12	1.63	4.68
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	0.96	10.09
EOG RESOURCES INC	EOG	BBB+	10	1.00	
EP ENERGY CORP	EPE			3.72	
EQT CORP	EQT	BBB	11	0.88	5.98
FERRELLGAS PARTNERS -LP	FGP	B	17	0.60	19.97
KINDER MORGAN INC	KMI	BBB-	12	0.81	11.18
MDU RESOURCES GROUP INC	MDU	BBB+	10	0.92	5.89
MIDCOAST ENERGY PARTNERS LP	MEP			1.98	
NATIONAL FUEL GAS CO	NFG	BBB	11	0.94	12.11
NEWFIELD EXPLORATION CO	NFX	BB+	13	1.33	
NGL ENERGY PARTNERS LP	NGL	BB-	15	0.58	8.21
ONEOK INC	OKE	BB+	13	1.07	8.68
ONEOK PARTNERS -LP	OKS	BBB	11	0.80	8.78
PEMBINA PIPELINE CORP	PBA	BBB	11	0.80	7.19
PLAINS GP HOLDINGS LP	PAGP			1.35	9.32
QEP RESOURCES INC	QEP	BB+	13	1.62	
SOUTHWESTERN ENERGY CO	SWN	BB-	15	1.26	1.92
SPECTRA ENERGY CORP	SE	BBB	11	0.72	7.82
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	0.77	9.27
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	0.91	12.43
TARGA RESOURCES CORP	TRGP	BB-	15	1.71	4.63
TRANSCANADA CORP	TRP	A-	9	0.81	8.18
WESTERN GAS PARTNERS LP	WES	BBB-	12	1.11	
WILLIAMS COS INC	WMB	BB	14	1.18	5.26
WILLIAMS PARTNERS LP	WPZ	BBB-	12	1.12	5.55
WORLD FUEL SERVICES CORP	INT			1.10	113.08
WPX ENERGY INC	WPX	B+	16	1.91	
<b>Median</b>		<b>BBB-</b>	<b>12</b>	<b>1.11</b>	<b>7.82</b>



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.

Buckeye Partners LP	NuStar Energy L.P.
Energy Transfer Partners LP	ONEOK Inc.
GATX Corp.	Sunoco Logistics Partners
Glatfelter	Tallgrass Energy Partners
Hyatt Hotels	Weyerhaeuser Co.

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 – 16 large (sales over \$1 billion) companies classified by *Value Line* as the Natural Gas (Diversified) Industry (from the *Value Line* full data base of 6,049 companies); a combination of 26 large companies from both the *Value Line* natural gas (diversified) group and the large *Value Line* Natural Gas Utility distribution group; 14 large (sales over \$1 billion) natural gas Pipeline MLPs; 11 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 8,840 companies, and the *Value Line Investment Survey* full database of approximately 6,049 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.<sup>46</sup> 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

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<sup>46</sup> 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.

is **14.00%** as of January 1, 2017. 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, 2017

Company Groups	Value Line Data		S&P (IBES) Data	
	Average	Median	Average	Median
Natural Gas Diversified Industry (Large)	13.79	11.18	17.29	10.22
Nat. Gas Diversified & Natural Gas Utility (Large)	10.53	9.04	13.88	10.07
Natural Gas Pipeline MLPs (Large)	17.95	16.52	22.79	16.83
Interstate Natural Gas Pipeline Forum (Pipelines)	15.93	15.40	14.30	12.83
S&P Screened Comparables Group	14.87	16.65	26.83	17.06
All Companies in S&P 500 with "BBB-" Rated Debt	13.43	12.31	16.70	12.71
<b>Averages</b>	14.42	13.52	18.63	13.29

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.

## Natural Gas Diversified Industry (Large)

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Antero Resources Corp.	AR		10.00	
Cabot Oil & Gas 'A'	COG	0.35	39.00	39.35
Chesapeake Energy	CHK			
Cimarex Energy	XEC	0.23	16.50	16.73
Concho Resources	CXO		16.50	
Devon Energy	DVN	0.52	1.00	1.52
EOG Resources	EOG	0.70	4.00	4.70
EP Energy Corp	EPE		10.00	
EQT Corp.	EQT	0.18	11.00	11.18
MDU Resources	MDU	2.65	8.00	10.65
National Fuel Gas	NFG	2.83		
Newfield Exploration	NFX		12.00	
QEP Resources	QEP		10.00	
Southwestern Energy	SWN		(6.50)	
Targa Resources	TRGP	6.42	6.00	12.42
WPX Energy	WPX			
	Average	1.74	10.58	13.79
	Median	0.61	10.00	11.18

Source: *Value Line*, January 2017.

## Natural Gas Diversified Industry (Large)

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
ANTERO RESOURCES CORP	AR		29.63	
CABOT OIL & GAS CORP	COG	0.55	59.80	60.35
CHESAPEAKE ENERGY CORP	CHK		5.00	
CIMAREX ENERGY CO	XEC	0.24	1.50	1.74
CONCHO RESOURCES INC	CXO		13.46	
DEVON ENERGY CORP	DVN	0.54	2.57	3.11
EOG RESOURCES INC	EOG	2.45		
EP ENERGY CORP	EPE		(56.27)	
EQT CORP	EQT	0.17	(5.93)	
MDU RESOURCES GROUP INC	MDU	2.84	6.00	8.84
NATIONAL FUEL GAS CO	NFG	3.10	8.50	11.60
NEWFIELD EXPLORATION CO	NFX		34.80	
QEP RESOURCES INC	QEP			
SOUTHWESTERN ENERGY CO	SWN		64.14	
TARGA RESOURCES CORP	TRGP	7.20	10.90	18.10
WPX ENERGY INC	WPX		(29.57)	
	Average	2.14	10.32	17.29
	Median	1.50	7.25	10.22

Source: S&P Compustat, January 2017.

## Natural Gas Div. Ind. & Natural Gas Utility

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
AmeriGas Partners	APU		10.34	
Antero Resources Corp.	AR		10.00	
Atmos Energy	ATO	2.45	6.50	8.95
Cabot Oil & Gas 'A'	COG	0.35	39.00	39.35
Chesapeake Energy	CHK			
Cimarex Energy	XEC	0.23	16.50	16.73
Concho Resources	CXO		16.50	
Devon Energy	DVN	0.52	1.00	1.52
Encana Corp.	ECA	0.50	6.50	7.00
EOG Resources	EOG	0.70	4.00	4.70
EP Energy Corp	EPE		10.00	
EQT Corp.	EQT	0.18	11.00	11.18
MDU Resources	MDU	2.65	8.00	10.65
National Fuel Gas	NFG	2.83		
New Jersey Resources	NJR	2.83	3.00	5.83
Newfield Exploration	NFX		12.00	
NiSource Inc.	NI	2.96	1.50	4.46
QEP Resources	QEP		10.00	
Southwest Gas	SWX	2.42	7.00	9.42
Southwestern Energy	SWN		(6.50)	
Spire Inc.	SR	3.22	7.50	10.72
Star Gas Partners L.P.	SGU			
Targa Resources	TRGP	6.42	6.00	12.42
UGI Corp.	UGI	2.04	7.00	9.04
WGL Holdings Inc.	WGL	2.54	3.50	6.04
WPX Energy	WPX			
	Average	2.05	8.65	10.53
	Median	2.44	7.25	9.04

Source: *Value Line*, January 2017.

## Natural Gas Div. Ind. & Natural Gas Utility

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
AMERIGAS PARTNERS -LP	APU	9.05	15.30	24.35
ANTERO RESOURCES CORP	AR		29.63	
ATMOS ENERGY CORP	ATO	2.60	7.30	9.90
CABOT OIL & GAS CORP	COG	0.55	59.80	60.35
CHESAPEAKE ENERGY CORP	CHK		5.00	
CIMAREX ENERGY CO	XEC	0.24	1.50	1.74
CONCHO RESOURCES INC	CXO		13.46	
DEVON ENERGY CORP	DVN	0.54	2.57	3.11
ENCANA CORP	ECA			
EOG RESOURCES INC	EOG	2.45		
EP ENERGY CORP	EPE		(56.27)	
EQT CORP	EQT	0.17	(5.93)	
MDU RESOURCES GROUP INC	MDU	2.84	6.00	8.84
NATIONAL FUEL GAS CO	NFG	3.10	8.50	11.60
NEW JERSEY RESOURCES CORP	NJR	3.05	6.00	9.05
NEWFIELD EXPLORATION CO	NFX		34.80	
NISOURCE INC	NI	3.26	9.20	12.46
QEP RESOURCES INC	QEP			
SOUTHWEST GAS HOLDINGS INC	SWX	2.44	4.00	6.44
SOUTHWESTERN ENERGY CO	SWN		64.14	
SPIRE INC	SR	3.38	4.00	7.38
STAR GAS PARTNERS -LP	SGU			
TARGA RESOURCES CORP	TRGP	7.20	10.90	18.10
UGI CORP	UGI	2.23	8.00	10.23
WGL HOLDINGS INC	WGL	2.76	8.00	10.76
WPX ENERGY INC	WPX		(29.57)	
	Average	2.87	9.38	13.88
	Median	2.68	7.65	10.07

Source: S&P Compustat, January 2017.

## Natural Gas Pipeline MLPs - Large

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Boardwalk Pipeline	BWP	2.27	13.50	15.77
DCP Midstream Partners	DPM	8.13	8.00	16.13
Energy Transfer Equity	ETE	6.29	21.50	27.79
Energy Transfer Part.	ETP	11.81	10.00	21.81
EnLink Midstream Part.	ENLK	8.38		
Enterprise Products	EPD	6.02	10.50	16.52
Ferrellgas Partners L.P.	FGP			
Midcoast Energy Partners LP	MEP			
ONEOK Partners L.P.	OKS	7.22	5.50	12.72
Plains GP Holdings LP	PAGP			
Spectra Energy Part.	SEP	5.95	2.50	8.45
Suburban Propane	SPH	11.96	10.00	21.96
Western Gas Part.	WES	5.87	14.50	20.37
Williams Partners L.P.	WPZ	8.92		
Average		7.53	10.67	17.95
Median		7.22	10.00	16.52

Source: *Value Line*, January 2017.

## Natural Gas Pipeline MLPs - Large

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
BOARDWALK PIPELINE PRTNRS-LP	BWP	2.66	15.30	17.96
DCP MIDSTREAM PARTNERS LP	DPM	8.29	2.00	10.29
ENERGY TRANSFER EQUITY LP	ETE	6.51	10.32	16.83
ENERGY TRANSFER PARTNERS -LP	ETP	17.34	47.13	64.46
ENLINK MIDSTREAM PARTNERS LP	ENLK			
ENTERPRISE PRODS PRTNRS -LP	EPD	6.32	5.43	11.75
FERRELLGAS PARTNERS -LP	FGP			
MIDCOAST ENERGY PARTNERS LP	MEP			
ONEOK PARTNERS -LP	OKS	8.68	18.20	26.88
PLAINS GP HOLDINGS LP	PAGP			
SPECTRA ENERGY PARTNERS LP	SEP	6.20	5.15	11.35
SUBURBAN PROPANE PRTNRS -LP	SPH	11.81		
WESTERN GAS PARTNERS LP	WES			
WILLIAMS PARTNERS LP	WPZ			
Average		8.48	14.79	22.79
Median		7.40	10.32	16.83

Source: *S&P Compustat*, January 2017.

## Interstate Natural Gas Pipeline Forum (Pipelines)

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Boardwalk Pipeline	BWP	2.27	13.50	15.77
Dominion Resources	D	3.92	10.00	13.92
Kinder Morgan Inc.	KMI	2.40	13.00	15.40
MDU Resources	MDU	2.65	8.00	10.65
National Fuel Gas	NFG	2.83		
ONEOK Partners L.P.	OKS	7.22	5.50	12.72
Spectra Energy Corp.	SE	3.93	12.00	15.93
Spectra Energy Part.	SEP	5.95	2.50	8.45
TransCanada Corp.	TRP	4.99	26.50	31.49
Williams Cos.	WMB	2.58	16.50	19.08
Williams Partners L.P.	WPZ	8.92		
	Average	4.33	11.94	15.93
	Median	3.92	12.00	15.40

Source: *Value Line*, January 2017.

## Interstate Natural Gas Pipeline Forum (Pipelines)

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
BOARDWALK PIPELINE PRTRNS-LP	BWP	2.66	15.30	17.96
DOMINION RESOURCES INC	D	3.88	6.00	9.88
KINDER MORGAN INC	KMI			
MDU RESOURCES GROUP INC	MDU	2.84	6.00	8.84
NATIONAL FUEL GAS CO	NFG	3.10	8.50	11.60
ONEOK PARTNERS -LP	OKS	8.68	18.20	26.88
SPECTRA ENERGY CORP	SE	4.39	11.25	15.64
SPECTRA ENERGY PARTNERS LP	SEP	6.20	5.15	11.35
TRANSCANADA CORP	TRP	4.05	9.70	13.75
WILLIAMS COS INC	WMB	2.83	10.00	12.83
WILLIAMS PARTNERS LP	WPZ			
	Average	4.29	10.01	14.30
	Median	3.88	9.70	12.83

Source: *S&P Compustat*, January 2017.



## Pipeline Screened Comparables Group

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Buckeye Partners L.P.	BPL	7.65	9.00	16.65
Energy Transfer Part.	ETP	11.81	10.00	21.81
GATX Corp.	GATX	2.55	2.50	5.05
Glatfelter	GLT	2.07	7.00	9.07
Hyatt Hotels	H		16.00	
NuStar Energy L.P.	NS			
ONEOK Inc.	OKE	4.43	12.50	16.93
Sunoco Logistics Part.	SXL	8.50	13.50	22.00
Tallgrass Energy Partners LP	TEP		13.00	
Weyerhaeuser Co.	WY	4.08	8.50	12.58
	Average	5.87	10.22	14.87
	Median	4.43	10.00	16.65

Source: *Value Line*, January 2017.

## Pipeline Screened Comparables Group

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
BUCKEYE PARTNERS LP	BPL	8.01	8.11	16.12
ENERGY TRANSFER PARTNERS -LP	ETP	17.34	47.13	64.46
GATX CORP	GATX	2.99	15.00	17.99
GLATFELTER	GLT	2.29	9.28	11.57
HYATT HOTELS CORP	H		6.65	
NUSTAR ENERGY LP	NS	8.13	(7.60)	
ONEOK INC	OKE	4.50	5.00	9.50
SUNOCO LOGISTICS PARTNERS LP	SXL	12.78	50.52	63.30
TALLGRASS ENERGY PRT LP	TEP	7.69	14.68	22.37
WEYERHAEUSER CO	WY	4.33	5.00	9.33
	Average	7.56	15.38	26.83
	Median	7.69	8.70	17.06

Source: *S&P Compustat*, January 2017.

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

DCF Indicator (VL Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
Activision Blizzard	ATVI	0.76	8.00	8.76
Advance Auto Parts	AAP	0.14	11.50	11.64
Albemarle Corp.	ALB	1.40	7.50	8.90
Amer. Tower 'A'	AMT	2.33	15.50	17.83
Best Buy Co.	BBY	2.78	8.00	10.78
Cimarex Energy	XEC	0.23	16.50	16.73
Coach Inc.	COH	3.85	4.00	7.85
Constellation Brands	STZ	1.06	15.50	16.56
Discover Fin'l Svcs.	DFS	1.67	5.00	6.67
Dun & Bradstreet	DNB	1.58	4.50	6.08
Expedia Inc.	EXPE	0.91	21.50	22.41
Harman Int'l	HAR	1.26	16.50	17.76
Harris Corp.	HRS	2.09	7.50	9.59
Horton D.R.	DHI	1.45	11.50	12.95
Interpublic Group	IPG	2.91	13.00	15.91
Kansas City South'n	KSU	1.56	9.00	10.56
Kraft Heinz Co.	KHC	2.76		
Molson Coors Brewing	TAP	1.67	17.00	18.67
Motorola Solutions	MSI	2.26	9.00	11.26
Newell Brands	NWL	1.67	16.00	17.67
NVIDIA Corp.	NVDA	0.50	21.50	22.00
Pioneer Natural Res.	PXD	0.04	20.00	20.04
SL Green Realty	SLG	2.95		
Synchrony Financial	SYF	1.44		
Total System Svcs.	TSS	0.81	11.50	12.31
Weyerhaeuser Co.	WY	4.08	8.50	12.58
Whole Foods Market	WFM	1.87	6.50	8.37
Zions Bancorp.	ZION	0.79	11.00	11.79
	Average	1.67	11.84	13.43
	Median	1.57	11.50	12.31

Source: *Value Line*, January 2017.

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

DCF Indicator (S&P Data) - January 1, 2017

Company Name	Ticker	% Cur Yld	EPS Gth	DCF
ACTIVISION BLIZZARD INC	ATVI	0.87	20.95	21.82
ADVANCE AUTO PARTS INC	AAP	0.16	10.00	10.16
ALBEMARLE CORP	ALB	1.55	9.25	10.80
AMERICAN TOWER CORP	AMT	2.93	33.27	36.20
BEST BUY CO INC	BBY	4.11	11.60	15.71
CIMAREX ENERGY CO	XEC	0.24	1.50	1.74
COACH INC	COH	4.26	10.39	14.65
CONSTELLATION BRANDS -CL A	STZ	1.22	17.05	18.27
D R HORTON INC	DHI	1.62	10.85	12.47
DISCOVER FINANCIAL SVCS INC	DFS	1.80	8.14	9.94
DUN & BRADSTREET CORP	DNB	1.68	5.30	6.98
EXPEDIA INC	EXPE	1.19	29.80	30.99
HARMAN INTERNATIONAL INDS	HAR	1.45	15.05	16.50
HARRIS CORP	HRS	2.93	41.80	44.73
INTERPUBLIC GROUP OF COS	IPG	2.80	9.16	11.96
KANSAS CITY SOUTHERN	KSU	1.68	8.11	9.80
KRAFT HEINZ CO	KHC	3.44	25.06	28.49
MOLSON COORS BREWING CO	TAP	1.81	7.50	9.31
MOTOROLA SOLUTIONS INC	MSI	2.64	16.45	19.09
NEWELL BRANDS INC	NWL	1.93	13.15	15.08
NVIDIA CORP	NVDA	0.60	15.00	15.60
PIONEER NATURAL RESOURCES CO	PXD	0.05	8.40	8.45
SL GREEN REALTY CORP	SLG	4.21	46.06	50.27
SYNCHRONY FINANCIAL	SYF	1.55	7.88	9.42
TOTAL SYSTEM SERVICES INC	TSS	0.91	12.04	12.95
WEYERHAEUSER CO	WY	4.33	5.00	9.33
WHOLE FOODS MARKET INC	WFM	1.83	4.16	5.98
ZIONS BANCORPORATION	ZION	0.82	10.00	10.82
	Average	1.95	14.75	16.70
	Median	1.68	10.62	12.71

Source: S&P Compustat, January 2017.

## 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.

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 Industry 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 43. Our ex post risk premiums were derived from a simulated *SBI* methodology as shown on page 105. This risk premium was cross-checked for reasonableness by information from *Value Line*.<sup>47</sup> Our *ex ante* risk premium indicator was derived from the expected cost of equity for the

$$K_e = R_f + R_p$$

where

$K_e$  = Cost of equity

$R_f$  = Risk free rate

$R_p$  = Risk premium

Figure 3

<sup>47</sup> 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 expected median return on their S&P 500 database is 10.93% and that the 5-year beta is 1.05 for this database (see statistics for database, *Value Line*, January 2017). Further, we know the long-term treasury bond rate was 2.78% at January 1, 2017. 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 7.76%, which well supports the long-term government bond risk premium of 6.90%.

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

Figure A

Solve for  $R_p$

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

$$R_p = \frac{0.1093 - 0.0278}{1.05}$$

$$R_p = 0.0776$$

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 11.46%. (*The ex ante risk premium of 8.68%, 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 January 3, 2017. The 'safe rates' (or base rates) used for each company within the company groupings were the Bloomberg long-term yields for the bond rating for each company in *Standard & Poor's Compustat* database (January, 2017). 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 106) 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 9.68% (ex post) and 11.46% (ex ante). The range for all calculations of risk premium indicators using the indicators by specific company groups are between 10.88% and 12.34%. A reasonable view of these results would indicate a correlated risk premium indicator for the specific company groups to be approximately 11.25%.

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, 2017, was **10.90%**. 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, 2017

### General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
30-year Treasury Bonds (ex post)	2.78	6.90	9.68
30-year Treasury Bonds (ex ante)	2.78	8.68	11.46

### Risk Premium Indicators by Groups

Indicators	Median S&P Rating		Bloomberg Yields	Risk Prem Indicator
	Rating	Number		
Natural Gas Diversified Industry (Large)	BB+	13	6.54	12.34
Natural Gas Diversified & Natural Gas Utility (Large)	BBB	11	5.08	10.88
Natural Gas Pipeline MLPs (Large)	BBB-	12	5.50	11.30
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB	11	5.08	10.88
Pipeline Screened Comparables Group	BBB-	12	5.50	11.30
<b>Average</b>	BBB-	12	5.54	11.34

\* Base Rate: Average YTM Bloomberg database, Dec. 31, 2016.

Risk Premium Simulated *SBB* Methodology (see p.105).

**Natural Gas Diversified Industry (Large)**  
**Risk Premium Indicator - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Bloomberg Yields	Risk Prem Indicator
ANTERO RESOURCES CORP	AR	BB	14	8.88	14.68
CABOT OIL & GAS CORP	COG				
CHESAPEAKE ENERGY CORP	CHK	CCC+	19		
CIMAREX ENERGY CO	XEC	BBB-	12	5.50	11.30
CONCHO RESOURCES INC	CXO	BB+	13	6.54	12.34
DEVON ENERGY CORP	DVN	BBB	11	5.08	10.88
EOG RESOURCES INC	EOG	BBB+	10	4.72	10.52
EP ENERGY CORP	EPE				
EQT CORP	EQT	BBB	11	5.08	10.88
MDU RESOURCES GROUP INC	MDU	BBB+	10	4.72	10.52
NATIONAL FUEL GAS CO	NFG	BBB	11	5.08	10.88
NEWFIELD EXPLORATION CO	NFX	BB+	13	6.54	12.34
QEP RESOURCES INC	QEP	BB+	13	6.54	12.34
SOUTHWESTERN ENERGY CO	SWN	BB-	15	9.91	15.71
TARGA RESOURCES CORP	TRGP	BB-	15	9.91	15.71
WPX ENERGY INC	WPX	B+	16	8.48	14.28
	Average	BB+	13	6.54	12.34
	Median	BB+	13	6.54	12.34

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

**Natural Gas Div. Ind. & Natural Gas Utility  
Risk Premium Indicator - January 1, 2017**

Company Name	Ticker	S&P Rating	Numerical Rating	Bloomberg Yields	Risk Prem Indicator
AMERIGAS PARTNERS -LP	APU				
ANTERO RESOURCES CORP	AR	BB	14	8.88	14.68
ATMOS ENERGY CORP	ATO	A	8	4.09	9.89
CABOT OIL & GAS CORP	COG				
CHESAPEAKE ENERGY CORP	CHK	CCC+	19		
CIMAREX ENERGY CO	XEC	BBB-	12	5.50	11.30
CONCHO RESOURCES INC	CXO	BB+	13	6.54	12.34
DEVON ENERGY CORP	DVN	BBB	11	5.08	10.88
ENCANA CORP	ECA	BBB	11	5.08	10.88
EOG RESOURCES INC	EOG	BBB+	10	4.72	10.52
EP ENERGY CORP	EPE				
EQT CORP	EQT	BBB	11	5.08	10.88
MDU RESOURCES GROUP INC	MDU	BBB+	10	4.72	10.52
NATIONAL FUEL GAS CO	NFG	BBB	11	5.08	10.88
NEW JERSEY RESOURCES CORP	NJR				
NEWFIELD EXPLORATION CO	NFX	BB+	13	6.54	12.34
NISOURCE INC	NI	BBB+	10	4.72	10.52
QEP RESOURCES INC	QEP	BB+	13	6.54	12.34
SOUTHWEST GAS HOLDINGS INC	SWX	BBB+	10	4.72	10.52
SOUTHWESTERN ENERGY CO	SWN	BB-	15	9.91	15.71
SPIRE INC	SR	A-	9	4.62	10.42
STAR GAS PARTNERS -LP	SGU				
TARGA RESOURCES CORP	TRGP	BB-	15	9.91	15.71
UGI CORP	UGI				
WGL HOLDINGS INC	WGL	A+	7	4.66	10.46
WPX ENERGY INC	WPX	B+	16	8.48	14.28
	Average	BBB-	12	5.50	11.30
	Median	BBB	11	5.08	10.88

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.



**Natural Gas Pipeline MLPs - Large  
Risk Premium Indicator - January 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>S&amp;P Rating</b>	<b>Numerical Rating</b>	<b>Bloomberg Yields</b>	<b>Risk Prem Indicator</b>
BOARDWALK PIPELINE PRTNRS-LP	BWP	BBB-	12	5.50	11.30
DCP MIDSTREAM PARTNERS LP	DPM	BB	14	8.88	14.68
ENERGY TRANSFER EQUITY LP	ETE	BB	14	8.88	14.68
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	5.50	11.30
ENLINK MIDSTREAM PARTNERS LP	ENLK	BBB-	12	5.50	11.30
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	4.72	10.52
FERRELLGAS PARTNERS -LP	FGP	B	17	9.13	14.93
MIDCOAST ENERGY PARTNERS LP	MEP				
ONEOK PARTNERS -LP	OKS	BBB	11	5.08	10.88
PLAINS GP HOLDINGS LP	PAGP				
SPECTRA ENERGY PARTNERS LP	SEP	BBB	11	5.08	10.88
SUBURBAN PROPANE PRTNRS -LP	SPH	BB-	15	9.91	15.71
WESTERN GAS PARTNERS LP	WES	BBB-	12	5.50	11.30
WILLIAMS PARTNERS LP	WPZ	BBB-	12	5.50	11.30
	Average	BB+	13	6.54	12.34
	Median	BBB-	12	5.50	11.30

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

**Interstate Natural Gas Pipeline Forum (Pipelines)  
Risk Premium Indicator - January 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>S&amp;P Rating</b>	<b>Numerical Rating</b>	<b>Bloomberg Yields</b>	<b>Risk Prem Indicator</b>
BOARDWALK PIPELINE PRT-LP	BWP	BBB-	12	5.50	11.30
DOMINION RESOURCES INC	D	BBB+	10	4.72	10.52
KINDER MORGAN INC	KMI	BBB-	12	5.50	11.30
MDU RESOURCES GROUP INC	MDU	BBB+	10	4.72	10.52
NATIONAL FUEL GAS CO	NFG	BBB	11	5.08	10.88
ONEOK PARTNERS -LP	OKS	BBB	11	5.08	10.88
SPECTRA ENERGY CORP	SE	BBB	11	5.08	10.88
SPECTRA ENERGY PRT LP	SEP	BBB	11	5.08	10.88
TRANSCANADA CORP	TRP	A-	9	4.62	10.42
WILLIAMS COS INC	WMB	BB	14	8.88	14.68
WILLIAMS PARTNERS LP	WPZ	BBB-	12	5.50	11.30
	Average	BBB	11	5.08	10.88
	Median	BBB	11	5.08	10.88

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

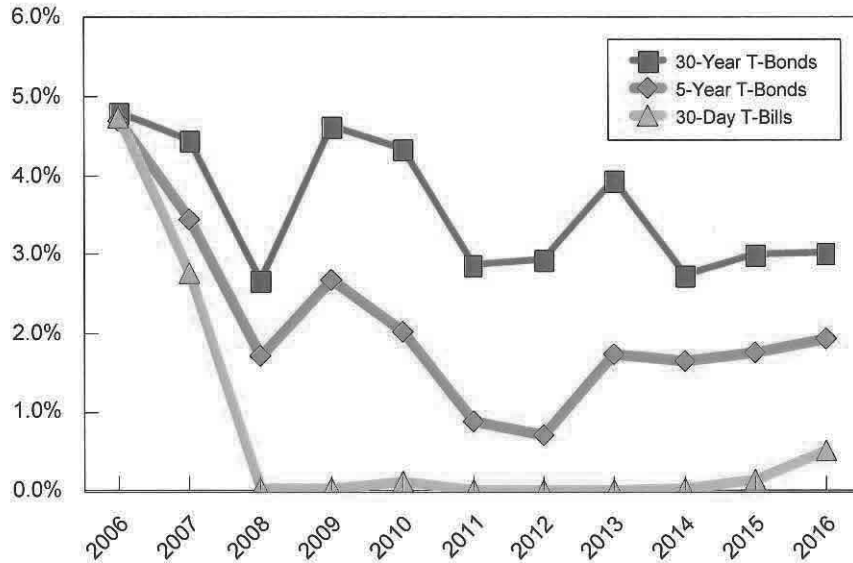
**Pipeline Screened Comparables Group  
Risk Premium Indicator - January 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>S&amp;P Rating</b>	<b>Numerical Rating</b>	<b>Bloomberg Yields</b>	<b>Risk Prem Indicator</b>
BUCKEYE PARTNERS LP	BPL	BBB-	12	5.50	11.30
ENERGY TRANSFER PARTNERS -LP	ETP	BBB-	12	5.50	11.30
GATX CORP	GATX	BBB	11	5.08	10.88
GLATFELTER	GLT	BB+	13	6.54	12.34
HYATT HOTELS CORP	H	BBB	11	5.08	10.88
NUSTAR ENERGY LP	NS	BB+	13	6.54	12.34
ONEOK INC	OKE	BB+	13	6.54	12.34
SUNOCO LOGISTICS PARTNERS LP	SXL	BBB	11	5.08	10.88
TALLGRASS ENERGY PRT LP	TEP	BB+	13	6.54	12.34
WEYERHAEUSER CO	WY	BBB-	12	5.50	11.30
	Average	BBB-	12	5.50	11.30
	Median	BBB-	12	5.50	11.30

Source: S&P Compustat, Mergent, & Bloomberg, January 2017.

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

**U.S. 30-YEAR T-BONDS, 5-YEAR T-BONDS & 30-DAY T-BILLS  
2006 - 2016 (YEAR END DATA)**



**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
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%
2016	3.04%	1.94%	0.52%

Source: Federal Reserve, Jan. 3, 2017.

## 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.

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 2017 on page 105. The indicated cost of equity by this method was 11.06% at January 1, 2017. Our *ex ante* CAPM calculations were based upon the expected risk premium of 8.68% 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 13.20% at January 1, 2017.

Our 'safe rates' for the CAPM calculations were derived as described in the risk premium method discussed earlier. Our beta estimate of 1.20 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

$$K_e = R_f + \beta R_p$$

where

$K_e$  = Cost of equity  
 $R_f$  = Risk free rate  
 $\beta$  = Beta  
 $R_p$  = Risk premium

Figure 4

Group of Companies	Avg.	Med.
<b>Value Line Betas</b>		
VL Nat Gas Divers. (Large)	1.54	1.50
VL Nat Gas Divers & Nat Gas Utility (Large)	1.28	1.30
VL NG Pipeline MLPs (Large)	1.23	1.18
Nat Gas PL Forum (pipes)	1.08	1.05
S&P Screened Comps.	1.18	1.15
S&P 500 BBB- rated debt	1.13	1.10

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  $(4\% \times 1.1) + 10\%$ , or 14.40 %. This can also be described in the following formula:

$$K_{e500} = DY \times (1 + g) + g$$

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.<sup>48</sup>

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<sup>48</sup> 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 11.46%. We then subtracted the current long-term Treasury bond rate of 2.78% to obtain the expected equity risk premium of 8.68%. 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, 2017. This conclusion gives weight and consideration to both indicators. A summary of the CAPM indicators and the supporting data begins below and on the following page.

### Summary of CAPM Indicators - January 1, 2017

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
<b>CAPM Indicator *</b>				
Long-Term Gov't Bonds (ex post)	2.78	6.90	1.20	11.06
Long-Term Gov't Bonds (ex ante)	2.78	8.68	1.20	13.20

CAPM Formula:  $K_e = R_f + B(R_p)$

\* CAPM Indicator is based upon a *Value Line* beta of 1.20 & Federal Reserve data January 3, 2017.

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, 2017.

### Summary of Industry Betas

Value Line Data - Medians	Beta
Natural Gas Diversified Industry (Large)	1.50
Natural Gas Div. Ind. & Natural Gas Utility	1.30
Natural Gas Pipeline MLPs - Large	1.18
Interstate Natural Gas Pipeline Forum (Pipelines)	1.05
S&P Screened Comparables Group	1.15
S&P 500 Companies with BBB- Rated Debt	1.10
<b>Average</b>	<b>1.21</b>

### Natural Gas Diversified Industry (Large) Beta (Value Line) - January 1, 2017

Company Name	Ticker	Beta
Antero Resources Corp.	AR	1.30
Cabot Oil & Gas 'A'	COG	1.05
Chesapeake Energy	CHK	1.95
Cimarex Energy	XEC	1.50
Concho Resources	CXO	1.50
Devon Energy	DVN	1.60
EOG Resources	EOG	1.40
EP Energy Corp	EPE	2.95
EQT Corp.	EQT	1.00
MDU Resources	MDU	1.05
National Fuel Gas	NFG	1.05
Newfield Exploration	NFX	1.70
QEP Resources	QEP	1.60
Southwestern Energy	SWN	1.30
Targa Resources	TRGP	1.75
WPX Energy	WPX	1.90
	<b>Average</b>	<b>1.54</b>
	<b>Median</b>	<b>1.50</b>

Source: *Value Line*, January 2017.



## Natural Gas Div. Ind. & Natural Gas Utility Beta (Value Line) - January 1, 2017

Company Name	Ticker	Beta
AmeriGas Partners	APU	0.70
Antero Resources Corp.	AR	1.30
Atmos Energy	ATO	0.70
Cabot Oil & Gas 'A'	COG	1.05
Chesapeake Energy	CHK	1.95
Cimarex Energy	XEC	1.50
Concho Resources	CXO	1.50
Devon Energy	DVN	1.60
Encana Corp.	ECA	1.55
EOG Resources	EOG	1.40
EP Energy Corp	EPE	2.95
EQT Corp.	EQT	1.00
MDU Resources	MDU	1.05
National Fuel Gas	NFG	1.05
New Jersey Resources	NJR	0.80
Newfield Exploration	NFX	1.70
NiSource Inc.	NI	
QEP Resources	QEP	1.60
Southwest Gas	SWX	0.75
Southwestern Energy	SWN	1.30
Spire Inc.	SR	0.70
Star Gas Partners L.P.	SGU	0.55
Targa Resources	TRGP	1.75
UGI Corp.	UGI	0.90
WGL Holdings Inc.	WGL	0.75
WPX Energy	WPX	1.90
	Average	1.28
	Median	1.30

Source: *Value Line*, January 2017.

## Natural Gas Pipeline MLPs - Large Beta (Value Line) - January 1, 2017

Company Name	Ticker	Beta
Boardwalk Pipeline	BWP	0.85
DCP Midstream Partners	DPM	1.35
Energy Transfer Equity	ETE	1.75
Energy Transfer Part.	ETP	1.15
EnLink Midstream Part.	ENLK	1.45
Enterprise Products	EPD	1.15
Ferrellgas Partners L.P.	FGP	0.75
Midcoast Energy Partners LP	MEP	1.70
ONEOK Partners L.P.	OKS	1.05
Plains GP Holdings LP	PAGP	1.70
Spectra Energy Part.	SEP	0.85
Suburban Propane	SPH	0.90
Western Gas Part.	WES	1.20
Williams Partners L.P.	WPZ	1.35
	Average	1.23
	Median	1.18

Source: *Value Line*, January 2017.

## Interstate Natural Gas Pipeline Forum (Pipelines) Beta (Value Line) - January 1, 2017

Company Name	Ticker	Beta
Boardwalk Pipeline	BWP	0.85
Dominion Resources	D	0.65
Kinder Morgan Inc.	KMI	1.25
MDU Resources	MDU	1.05
National Fuel Gas	NFG	1.05
ONEOK Partners L.P.	OKS	1.05
Spectra Energy Corp.	SE	1.05
Spectra Energy Part.	SEP	0.85
TransCanada Corp.	TRP	1.00
Williams Cos.	WMB	1.70
Williams Partners L.P.	WPZ	1.35
	Average	1.08
	Median	1.05

Source: *Value Line*, January 2017.

**Pipeline Screened Comparables Group  
Beta (Value Line) - January 1, 2017**

Company Name	Ticker	Beta
Buckeye Partners L.P.	BPL	1.05
Energy Transfer Part.	ETP	1.15
GATX Corp.	GATX	1.15
Glatfelter	GLT	1.00
Hyatt Hotels	H	1.15
NuStar Energy L.P.	NS	1.05
ONEOK Inc.	OKE	1.35
Sunoco Logistics Part.	SXL	1.45
Tallgrass Energy Partners LP	TEP	1.30
Weyerhaeuser Co.	WY	1.15
	Average	1.18
	Median	1.15

Source: *Value Line*, January 2017.

**S&P 500 Companies with "BBB-" Rated Debt  
Beta (Value Line) - January 1, 2017**

Company Name	Ticker	Beta
Activision Blizzard	ATVI	1.00
Advance Auto Parts	AAP	0.95
Albemarle Corp.	ALB	1.30
Amer. Tower 'A'	AMT	0.95
Best Buy Co.	BBY	1.10
Cimarex Energy	XEC	1.50
Coach Inc.	COH	1.05
Constellation Brands	STZ	0.95
Discover Fin'l Svcs.	DFS	1.05
Dun & Bradstreet	DNB	1.15
Expedia Inc.	EXPE	1.25
Harman Int'l	HAR	1.50
Harris Corp.	HRS	1.05
Horton D.R.	DHI	1.35
Interpublic Group	IPG	1.10
Kansas City South'n	KSU	1.15
Kraft Heinz Co.	KHC	
Molson Coors Brewing	TAP	0.95
Motorola Solutions	MSI	0.90
Newell Brands	NWL	1.15
NVIDIA Corp.	NVDA	1.10
Pioneer Natural Res.	PXD	1.45
SL Green Realty	SLG	1.10
Synchrony Financial	SYF	
Total System Svcs.	TSS	1.00
Weyerhaeuser Co.	WY	1.15
Whole Foods Market	WFM	0.90
Zions Bancorp.	ZION	1.25
	Average	1.13
	Median	1.10

Source: *Value Line*, January 2017.

## Cost of Equity Indication Using Expected Risk Premium

Weighted Average Cost of Equity for S&P 500 = Market Required Cost of Equity

**CAPM Calculations:**

		<b>LT Gov't. Bond Yield</b>		<b>Cost of Equity by CAPM</b>	
S&P 500 Expected Equity Cost (Wt. Avg)	11.46				
Current Yield on L-T Gov't. Bonds	2.78				
Expected Equity Risk Premium	8.68				
Beta	1.20				
Adjusted Risk Premium	10.42	+	2.78	=	13.20
					<i>Ex Ante</i>

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: *Value Line* (January 2017).

**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
Abbott Labs.	ABT	2.76	7.50	10.26	58,450.71
AbbVie Inc.	ABBV	4.08	13.00	17.08	103,620.38
Accenture Plc	ACN	2.13	7.50	9.63	73,842.55
Activision Blizzard	ATVI	0.76	8.00	8.76	28,193.89
Acuity Brands	AYI	0.22	19.50	19.72	10,474.51
Advance Auto Parts	AAP	0.14	11.50	11.64	12,924.52
AES Corp.	AES	4.10	8.50	12.60	7,521.20
Aetna Inc.	AET	0.80	9.50	10.30	43,690.56
Aflac Inc.	AFL	2.49	4.50	6.99	28,546.73
Agilent Technologies	A	1.16	4.50	5.66	15,078.96
Air Products & Chem.	APD	2.38	11.00	13.38	31,014.29
Alaska Air Group	ALK	1.24	10.00	11.24	10,817.82
Albemarle Corp.	ALB	1.40	7.50	8.90	10,165.80
Allegion plc	ALLE	0.74	10.50	11.24	6,364.83
Allergan plc	AGN	0.13	10.00	10.13	84,622.06
Alliance Data Sys.	ADS	0.90	11.00	11.90	13,630.40
Alliant Energy	LNT	3.09	6.50	9.59	8,670.03
Allstate Corp.	ALL	1.77	6.50	8.27	27,243.04
Altria Group	MO	3.59	9.50	13.09	132,558.80
Amer. Elec. Power	AEP	3.77	5.00	8.77	31,071.09
Amer. Express	AXP	1.81	4.50	6.31	69,068.44
Amer. Int'l Group	AIG	1.95	10.00	11.95	68,413.52
Amer. Tower 'A'	AMT	2.33	15.50	17.83	45,103.16
Amer. Water Works	AWK	2.15	8.00	10.15	12,981.39
Ameren Corp.	AEE	3.38	6.00	9.38	12,785.02
Ameriprise Fin'l	AMP	2.72	10.50	13.22	18,027.33
AmerisourceBergen	ABC	1.84	11.00	12.84	17,961.66
Ametek Inc.	AME	0.74	6.00	6.74	11,381.83
Amgen	AMGN	3.11	9.00	12.11	113,939.50
Amphenol Corp.	APH	0.94	8.00	8.94	20,858.86
Analog Devices	ADI	2.28	10.50	12.78	21,978.76
Anthem Inc.	ANTM	1.79	8.00	9.79	38,079.16
Aon plc	AON	1.18	12.00	13.18	29,901.98
Apache Corp.	APA	1.56	6.00	7.56	23,998.88
Apple Inc.	AAPL	2.08	11.50	13.58	622,250.31
Applied Materials	AMAT	1.22	23.00	24.22	34,700.10
Archer Daniels Midl'd	ADM	2.64	5.00	7.64	26,455.06
Assurant Inc.	AIZ	2.28	7.00	9.28	5,518.59
AT&T Inc.	T	4.59	6.50	11.09	261,903.56
Automatic Data Proc.	ADP	2.20	10.00	12.20	46,687.43
Avery Dennison	AVY	2.40	8.50	10.90	6,371.20
Baker Hughes	BHI	1.05	29.00	30.05	27,206.79
Ball Corp.	BLL	0.68	10.50	11.18	13,431.21
Bank of America	BAC	1.40	15.50	16.90	229,608.80
Bank of New York Mellon	BK	1.60	10.50	12.10	50,847.34
Bard (C.R.)	BCR	0.48	10.00	10.48	16,847.75
BB&T Corp.	BBT	2.61	7.50	10.11	37,917.84
Becton Dickinson	BDX	1.75	10.00	11.75	35,090.20

**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
Bed Bath & Beyond	BBBY	1.22	2.50	3.72	6,259.78
Best Buy Co.	BBY	2.78	8.00	10.78	13,346.32
BlackRock Inc.	BLK	2.41	8.00	10.41	62,075.15
Block (H&R)	HRB	3.79	10.00	13.79	5,010.27
Boeing	BA	3.64	10.50	14.14	98,235.15
BorgWarner	BWA	1.41	8.50	9.91	8,683.44
Bristol-Myers Squibb	BMY	2.64	19.50	22.14	100,491.06
Broadcom Ltd.	AVGO	2.26	23.00	25.26	69,091.74
Brown-Forman 'B'	BF/B	1.61	9.00	10.61	17,422.48
C.H. Robinson	CHRW	2.44	7.50	9.94	10,463.56
CA Inc.	CA	3.17	6.50	9.67	13,667.00
Cabot Oil & Gas 'A'	COG	0.35	39.00	39.35	10,530.97
Campbell Soup	CPB	2.29	5.50	7.79	18,705.51
Capital One Fin'l	COF	1.83	2.50	4.33	43,237.26
Cardinal Health	CAH	2.61	14.50	17.11	23,840.00
Carnival Corp.	CCL	2.69	15.50	18.19	39,208.30
Caterpillar Inc.	CAT	3.30	3.00	6.30	54,411.79
CBS Corp. 'B'	CBS	1.11	13.00	14.11	28,614.76
CenterPoint Energy	CNP	4.32	2.00	6.32	10,685.22
CenturyLink Inc.	CTL	8.98	12.00	20.98	13,940.59
Chevron Corp.	CVX	3.66	3.50	7.16	221,454.19
Chubb Ltd.	CB	2.08	8.00	10.08	60,780.31
Church & Dwight	CHD	1.58	7.00	8.58	11,597.74
Cigna Corp.	CI	0.03	12.50	12.53	36,382.34
Cimarex Energy	XEC	0.23	16.50	16.73	13,305.41
Cincinnati Financial	CINF	2.53	6.50	9.03	12,477.67
Cintas Corp.	CTAS	1.14	10.00	11.14	12,117.89
Cisco Systems	CSCO	3.67	6.50	10.17	151,724.94
Citigroup Inc.	C	1.07	11.50	12.57	171,952.70
Clorox Co.	CLX	2.68	9.50	12.18	15,792.47
CME Group	CME	2.07	9.50	11.57	39,178.75
CMS Energy Corp.	CMS	3.16	6.00	9.16	11,719.41
Coach Inc.	COH	3.85	4.00	7.85	9,891.79
Coca-Cola	KO	3.51	4.00	7.51	180,067.75
Colgate-Palmolive	CL	2.45	14.00	16.45	59,419.16
Comcast Corp.	CMCSA	1.56	10.00	11.56	167,857.17
Comerica Inc.	CMA	1.35	9.00	10.35	11,965.61
ConAgra Brands	CAG	2.01	6.00	8.01	17,051.14
ConocoPhillips	COP	1.97	7.00	8.97	63,103.64
Consol. Edison	ED	3.72	2.50	6.22	20,789.04
Constellation Brands	STZ	1.06	15.50	16.56	30,989.64
Cooper Cos.	COO	0.03	14.50	14.53	8,596.63
Corning Inc.	GLW	2.20	7.00	9.20	23,118.81
Costco Wholesale	COST	1.11	9.00	10.11	71,573.37
Coty Inc.	COTY	2.71	8.50	11.21	6,361.32
Crown Castle Int'l	CCI	4.44	8.50	12.94	29,449.61
CSX Corp.	CSX	1.98	7.00	8.98	34,647.09
Cummins Inc.	CMI	3.00	5.00	8.00	23,183.33

**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
CVS Health	CVS	2.15	9.50	11.65	86,793.72
Danaher Corp.	DHR	0.63	8.00	8.63	55,334.91
Darden Restaurants	DRI	3.09	15.00	18.09	8,902.45
Delphi Automotive PLC	DLPH	1.84	14.50	16.34	18,883.66
Delta Air Lines	DAL	1.64	12.00	13.64	36,620.43
Dentsply Sirona	XRAY	0.53	8.00	8.53	13,467.23
Devon Energy	DVN	0.52	1.00	1.52	25,681.24
Discover Fin'l Svcs.	DFS	1.67	5.00	6.67	28,900.26
Disney (Walt)	DIS	1.49	10.00	11.49	182,546.00
Dollar General	DG	1.55	12.00	13.55	20,587.19
Dominion Resources	D	3.92	10.00	13.92	47,827.56
Dover Corp.	DOV	2.34	3.50	5.84	11,888.71
Dow Chemical	DOW	3.48	10.00	13.48	64,815.82
Dr Pepper Snapple	DPS	2.39	9.00	11.39	16,792.80
DTE Energy	DTE	3.39	6.00	9.39	17,692.29
Du Pont	DD	2.16	6.50	8.66	64,164.14
Duke Energy	DUK	4.46	4.50	8.96	53,569.75
Dun & Bradstreet	DNB	1.58	4.50	6.08	4,496.12
Eastman Chemical	EMN	2.70	8.00	10.70	11,366.32
Eaton Corp. plc	ETN	3.37	4.50	7.87	30,422.00
Ecolab Inc.	ECL	1.25	8.50	9.75	34,580.98
Edison Int'l	EIX	3.00	3.50	6.50	23,490.97
Emerson Electric	EMR	3.43	5.00	8.43	36,086.57
Entergy Corp.	ETR	4.76	0.50	5.26	13,076.34
EOG Resources	EOG	0.70	4.00	4.70	57,427.04
EQT Corp.	EQT	0.18	11.00	11.18	11,377.84
Equifax Inc.	EFX	1.11	11.00	12.11	14,349.61
Equinix Inc.	EQIX	1.96	19.50	21.46	26,392.38
Eversource Energy	ES	3.41	6.00	9.41	17,517.46
Exelon Corp.	EXC	3.61	6.00	9.61	32,776.09
Expedia Inc.	EXPE	0.91	21.50	22.41	17,193.75
Expeditors Int'l	EXPD	1.50	10.00	11.50	9,560.14
Exxon Mobil Corp.	XOM	3.36	5.00	8.36	367,216.88
Fastenal Co.	FAST	2.54	5.50	8.04	13,474.67
FedEx Corp.	FDX	0.85	12.00	12.85	50,212.96
Fidelity Nat'l Info.	FIS	1.35	14.50	15.85	25,600.40
Fifth Third Bancorp	FITB	2.09	3.50	5.59	20,128.70
FirstEnergy Corp.	FE	4.62	6.00	10.62	13,134.17
FLIR Systems	FLIR	1.43	8.00	9.43	4,956.38
Flowserve Corp.	FLS	1.58	2.50	4.08	6,315.55
Fluor Corp.	FLR	1.60	1.50	3.10	7,474.94
FMC Corp.	FMC	1.23	4.50	5.73	7,820.21
Foot Locker	FL	1.55	9.00	10.55	9,499.55
Ford Motor	F	4.90	5.00	9.90	49,839.56
Fortune Brands Home	FBHS	1.33	15.50	16.83	8,324.86
Franklin Resources	BEN	2.13	4.50	6.63	23,492.25
Frontier Communic.	FTR	12.50	16.00	28.50	4,375.69
Gallagher (Arthur J.)	AJG	2.93	13.50	16.43	9,432.26



**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
Garmin Ltd.	GRMN	4.24	4.00	8.24	9,326.19
Gen'l Dynamics	GD	1.75	7.00	8.75	53,638.15
Gen'l Electric	GE	3.02	12.00	15.02	278,838.22
Gen'l Mills	GIS	3.11	7.00	10.11	36,117.45
General Motors	GM	4.32	9.50	13.82	54,585.00
Genuine Parts	GPC	2.72	7.00	9.72	14,378.41
Gilead Sciences	GILD	2.60	10.00	12.60	100,485.23
Global Payments	GPN	0.05	14.50	14.55	11,283.48
Goldman Sachs	GS	1.09	7.00	8.09	96,337.60
Goodyear Tire	GT	1.28	8.50	9.78	8,218.89
Grainger (W.W.)	GWV	2.09	6.00	8.09	13,835.73
Halliburton Co.	HAL	1.33	8.00	9.33	48,565.44
Hanesbrands Inc.	HBI	2.03	13.00	15.03	8,544.95
Harley-Davidson	HOG	2.40	9.00	11.40	10,544.51
Harman Int'l	HAR	1.26	16.50	17.76	7,728.22
Harris Corp.	HRS	2.09	7.50	9.59	12,831.63
Hartford Fin'l Svcs.	HIG	1.92	11.50	13.42	18,355.98
Hasbro Inc.	HAS	2.61	12.00	14.61	10,458.98
Hershey Co.	HSY	2.37	5.50	7.87	22,096.61
Hewlett Packard Ent.	HPE	1.11	5.50	6.61	39,258.78
Home Depot	HD	2.33	12.50	14.83	163,358.00
Honeywell Int'l	HON	2.29	9.00	11.29	88,985.72
Hormel Foods	HRL	1.93	14.00	15.93	19,133.45
Horton D.R.	DHI	1.45	11.50	12.95	10,572.37
Humana Inc.	HUM	0.57	9.50	10.07	29,929.04
Hunt (J.B.)	JBHT	0.90	10.50	11.40	10,903.26
Huntington Bancshs.	HBAN	2.52	9.50	12.02	14,384.22
Illinois Tool Works	ITW	2.12	10.50	12.62	42,685.72
Ingersoll-Rand	IR	2.11	10.00	12.11	19,434.24
Int'l Flavors & Frag.	IFF	2.15	7.00	9.15	9,227.28
Int'l Paper	IP	3.46	15.00	18.46	22,043.57
Intel Corp.	INTC	2.83	9.50	12.33	172,262.64
Intercontinental Exch.	ICE	1.20	14.00	15.20	33,935.66
Interpublic Group	IPG	2.91	13.00	15.91	9,477.93
Intuit Inc.	INTU	1.18	13.50	14.68	29,831.01
Invesco Ltd.	IVZ	3.72	7.00	10.72	12,877.02
Iron Mountain	IRM	6.79	11.50	18.29	8,951.18
Johnson & Johnson	JNJ	2.85	8.50	11.35	318,161.16
Johnson Ctrls. Int'l plc	JCI	2.39	0.50	2.89	26,747.06
JPMorgan Chase	JPM	2.30	6.00	8.30	308,124.31
Juniper Networks	JNPR	1.48	10.00	11.48	10,962.08
Kansas City South'n	KSU	1.56	9.00	10.56	8,790.28
Kellogg	K	2.82	5.00	7.82	25,661.61
KeyCorp	KEY	1.98	8.00	9.98	16,467.28
Kimberly-Clark	KMB	3.19	10.00	13.19	41,549.56
Kinder Morgan Inc.	KMI	2.40	13.00	15.40	48,370.54
KLA-Tencor	KLAC	2.72	12.00	14.72	12,258.54
Kohl's Corp.	KSS	4.23	8.00	12.23	7,393.76

**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
Kroger Co.	KR	1.47	10.00	11.47	31,018.14
L Brands	LB	3.62	6.00	9.62	17,743.44
L-3 Communic.	LLL	1.83	6.50	8.33	11,783.64
Lam Research	LRCX	1.68	20.00	21.68	17,315.48
Lauder (Estee)	EL	1.76	8.50	10.26	28,792.99
Legg Mason	LM	2.95	21.50	24.45	3,145.62
Leggett & Platt	LEG	2.74	11.00	13.74	6,554.33
Lennar Corp.	LEN	0.37	12.50	12.87	10,119.01
Leucadia National	LUK	1.07	16.50	17.57	8,434.29
Lilly (Eli)	LLY	2.82	9.50	12.32	83,447.42
Lincoln Nat'l Corp.	LNC	1.80	7.00	8.80	15,270.31
Linear Technology	LLTC	2.04	5.50	7.54	14,875.57
Lockheed Martin	LMT	2.90	8.00	10.90	74,996.25
Loews Corp.	L	0.53	13.00	13.53	15,682.07
Lowe's Cos.	LOW	2.10	15.00	17.10	62,044.11
LyondellBasell Inds.	LYB	3.95	3.50	7.45	36,284.84
M&T Bank Corp.	MTB	1.79	6.50	8.29	24,076.60
Marathon Oil Corp.	MRO	1.13	14.50	15.63	15,398.46
Marathon Petroleum	MPC	3.01	4.00	7.01	26,852.30
Marriott Int'l	MAR	1.44	13.00	14.44	31,933.46
Marsh & McLennan	MMC	2.00	9.00	11.00	35,283.69
Martin Marietta	MLM	0.74	24.50	25.24	14,376.32
Masco Corp.	MAS	1.25	15.00	16.25	10,598.17
MasterCard Inc.	MA	0.84	12.00	12.84	116,833.08
Mattel Inc.	MAT	5.50	6.50	12.00	10,584.57
McCormick & Co.	MKC	2.00	7.50	9.50	11,534.42
McDonald's Corp.	MCD	3.06	6.00	9.06	99,398.88
McKesson Corp.	MCK	0.79	12.00	12.79	33,121.75
Mead Johnson Nutrition	MJN	2.32	6.00	8.32	13,595.80
Medtronic plc	MDT	2.43	6.50	8.93	97,882.53
Merck & Co.	MRK	3.18	6.00	9.18	166,003.44
MetLife Inc.	MET	3.16	6.50	9.66	59,158.42
Microchip Technology	MCHP	2.22	11.50	13.72	13,516.56
Microsoft Corp.	MSFT	2.48	8.00	10.48	484,943.19
Molson Coors Brewing	TAP	1.67	17.00	18.67	21,421.23
Mondelez Int'l	MDLZ	1.74	11.50	13.24	69,551.82
Monsanto Co.	MON	2.05	9.50	11.55	46,060.41
Moody's Corp.	MCO	1.61	7.00	8.61	18,707.99
Morgan Stanley	MS	1.89	14.50	16.39	81,100.86
Motorola Solutions	MSI	2.26	9.00	11.26	13,718.24
Nasdaq Inc.	NDAQ	1.91	10.00	11.91	11,174.06
NetApp Inc.	NTAP	2.13	7.00	9.13	9,759.36
Newell Brands	NWL	1.67	16.00	17.67	22,518.43
Newmont Mining	NEM	0.56	10.00	10.56	19,409.53
NextEra Energy	NEE	3.17	4.50	7.67	55,573.00
Nielsen Hldgs. plc	NLSN	2.94	8.00	10.94	15,197.92
NIKE Inc. 'B'	NKE	1.41	14.50	15.91	88,504.09
NiSource Inc.	NI	2.96	1.50	4.46	7,315.75

### Value Line Data for S&P 500 - Jan. 1, 2017

Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
Nordstrom Inc.	JWN	3.12	0.50	3.62	7,895.55
Norfolk Southern	NSC	2.16	6.50	8.66	32,198.28
Northern Trust Corp.	NTRS	1.71	7.50	9.21	20,401.43
Northrop Grumman	NOC	1.54	7.50	9.04	41,719.26
Nucor Corp.	NUE	2.47	24.50	26.97	19,395.74
NVIDIA Corp.	NVDA	0.50	21.50	22.00	54,430.90
Occidental Petroleum	OXY	4.24	4.00	8.24	53,966.96
Omnicom Group	OMC	2.68	9.00	11.68	20,064.04
ONEOK Inc.	OKE	4.43	12.50	16.93	12,384.77
Oracle Corp.	ORCL	1.55	6.00	7.55	158,539.92
PACCAR Inc.	PCAR	3.88	4.50	8.38	22,838.08
Parker-Hannifin	PH	1.79	6.50	8.29	18,858.47
Patterson Cos.	PDCO	2.55	11.50	14.05	4,153.30
Paychex Inc.	PAYX	3.09	9.00	12.09	21,832.98
Pentair plc	PNR	2.44	10.00	12.44	10,553.58
People's United Fin'l	PBCT	3.56	10.50	14.06	5,996.08
PepsiCo Inc.	PEP	2.89	7.00	9.89	150,363.56
PerkinElmer Inc.	PKI	0.53	8.00	8.53	5,774.52
Perrigo Co. plc	PRGO	0.75	8.50	9.25	12,391.10
Pfizer Inc.	PFE	3.94	12.00	15.94	203,957.42
PG&E Corp.	PCG	3.33	12.00	15.33	30,583.84
Philip Morris Int'l	PM	4.53	5.00	9.53	141,374.25
Phillips 66	PSX	3.08	2.50	5.58	45,178.53
Pinnacle West Capital	PNW	3.34	4.00	7.34	8,718.38
Pioneer Natural Res.	PXD	0.04	20.00	20.04	31,516.45
Pitney Bowes	PBI	4.88	4.50	9.38	2,964.62
PNC Financial Serv.	PNC	1.89	3.00	4.89	57,281.44
PPG Inds.	PPG	1.67	9.50	11.17	25,243.20
PPL Corp.	PPL	4.61	1.00	5.61	23,298.89
Praxair Inc.	PX	2.72	6.50	9.22	33,010.95
Price (T. Rowe) Group	TROW	2.97	7.50	10.47	18,697.59
Principal Fin'l Group	PFG	3.02	5.00	8.02	16,833.33
Procter & Gamble	PG	3.17	9.00	12.17	227,619.95
Progressive (Ohio)	PGR	2.50	8.50	11.00	20,815.87
Prudential Fin'l	PRU	2.69	3.50	6.19	45,134.66
Public Serv. Enterprise	PEG	3.90	2.00	5.90	22,098.80
PulteGroup Inc.	PHM	2.16	14.00	16.16	6,609.16
PVH Corp.	PVH	0.16	6.00	6.16	7,387.81
Qualcomm Inc.	QCOM	3.36	4.50	7.86	96,555.16
Quest Diagnostics	DGX	1.95	10.00	11.95	12,883.91
Ralph Lauren	RL	2.25	3.50	5.75	7,319.91
Range Resources	RRC	0.23	13.50	13.73	8,450.82
Raytheon Co.	RTN	2.04	9.00	11.04	43,559.04
Regions Financial	RF	1.97	7.00	8.97	17,840.40
Republic Services	RSG	2.27	8.50	10.77	19,497.17
Reynolds American	RAI	3.28	14.00	17.28	78,689.23
Robert Half Int'l	RHI	1.88	7.50	9.38	6,263.86
Rockwell Automation	ROK	2.25	3.50	5.75	17,699.59

**Value Line Data for S&P 500 - Jan. 1, 2017**

<b>Company Name</b>	<b>Ticker</b>	<b>Yield %</b>	<b>Growth Rate %</b>	<b>Equity Cost %</b>	<b>Market Value</b>
Rockwell Collins	COL	1.41	8.00	9.41	12,072.14
Roper Tech.	ROP	0.76	7.00	7.76	18,792.68
Ross Stores	ROST	0.88	9.00	9.88	25,889.74
Royal Caribbean	RCL	2.31	16.50	18.81	18,238.45
Ryder System	R	2.33	9.00	11.33	4,032.02
S&P Global	SPGI	1.43	11.50	12.93	29,172.07
SCANA Corp.	SCG	3.28	4.50	7.78	10,345.96
Schlumberger Ltd.	SLB	2.37	10.00	12.37	118,678.58
Schwab (Charles)	SCHW	0.70	12.00	12.70	54,245.39
Scripps Networks	SNI	1.39	9.00	10.39	9,641.79
Seagate Technology	STX	6.62	2.50	9.12	11,660.60
Sealed Air	SEE	1.40	16.00	17.40	9,158.93
Sempra Energy	SRE	3.18	8.00	11.18	25,440.00
Sherwin-Williams	SHW	1.35	11.00	12.35	25,659.33
Signet Jewelers Ltd.	SIG	1.19	13.00	14.19	6,122.71
Skyworks Solutions	SWKS	1.46	12.00	13.46	13,787.99
Smucker (J.M.)	SJM	2.32	7.50	9.82	15,041.20
Snap-on Inc.	SNA	1.65	10.00	11.65	9,962.89
Southern Co.	SO	4.65	4.00	8.65	48,157.15
Southwest Airlines	LUV	0.79	14.50	15.29	31,069.23
Spectra Energy Corp.	SE	3.93	12.00	15.93	29,631.27
St. Jude Medical	STJ	1.62	5.00	6.62	23,082.27
Stanley Black & Decker	SWK	2.01	9.00	11.01	17,834.04
Starbucks Corp.	SBUX	1.77	16.50	18.27	82,792.95
State Street Corp.	STT	2.06	5.50	7.56	31,493.36
Stryker Corp.	SYK	1.41	18.50	19.91	44,423.72
SunTrust Banks	STI	1.97	7.00	8.97	27,226.89
Symantec Corp.	SYMC	1.23	5.00	6.23	15,365.53
Sysco Corp.	SYU	2.36	11.50	13.86	30,189.07
Target Corp.	TGT	3.30	9.00	12.30	40,900.40
TE Connectivity	TEL	2.11	8.00	10.11	24,178.38
TEGNA Inc.	TGNA	2.59	1.00	3.59	4,627.12
Tesoro Corp.	TSO	2.48	8.50	10.98	9,973.78
Texas Instruments	TXN	2.69	8.50	11.19	73,001.81
Textron Inc.	TXT	0.16	15.50	15.66	13,572.55
Thermo Fisher Sci.	TMO	0.42	10.50	10.92	57,428.73
Tiffany & Co.	TIF	2.37	7.50	9.87	9,562.84
Time Warner	TWX	1.66	11.00	12.66	73,504.57
TJX Companies	TJX	1.37	10.50	11.87	49,642.26
Torchmark Corp.	TMK	0.76	7.50	8.26	8,820.82
Total System Svcs.	TSS	0.81	11.50	12.31	9,646.77
Tractor Supply	TSCO	1.38	12.00	13.38	10,015.53
Travelers Cos.	TRV	2.19	1.50	3.69	33,617.55
Twenty-First Century Fox	FOXA	1.27	12.00	13.27	53,813.47
Tyson Foods 'A'	TSN	1.09	12.50	13.59	23,031.80
U.S. Bancorp	USB	2.18	4.50	6.68	86,895.13
Union Pacific	UNP	2.31	7.00	9.31	84,277.57
United Parcel Serv.	UPS	2.88	9.50	12.38	100,543.41

### Value Line Data for S&P 500 - Jan. 1, 2017

Company Name	Ticker	Yield %	Growth Rate %	Equity Cost %	Market Value
United Technologies	UTX	2.38	7.00	9.38	91,686.15
UnitedHealth Group	UNH	1.55	14.50	16.05	154,395.36
Universal Health Sv. 'B'	UHS	0.37	11.50	11.87	10,545.36
Unum Group	UNM	1.82	10.50	12.32	10,318.94
V.F. Corp.	VFC	3.13	10.00	13.13	22,024.43
Valero Energy	VLO	3.49	5.50	8.99	30,664.79
Verizon Communic.	VZ	4.31	3.00	7.31	222,747.23
Viacom Inc. 'B'	VIAB	2.26	2.50	4.76	14,872.06
Visa Inc.	V	0.84	13.50	14.34	174,586.77
Vornado R'lty Trust	VNO	2.58	22.50	25.08	20,316.86
Vulcan Materials	VMC	0.62	33.50	34.12	16,861.46
Wal-Mart Stores	WMT	2.93	2.00	4.93	213,097.59
Walgreens Boots	WBA	1.79	13.00	14.79	89,822.02
Waste Management	WM	2.38	8.50	10.88	31,200.57
WEC Energy Group	WEC	3.53	6.00	9.53	18,627.71
Wells Fargo	WFC	2.80	4.50	7.30	277,218.22
Western Digital	WDC	2.92	6.50	9.42	20,106.75
Western Union	WU	2.93	8.00	10.93	10,824.81
Weyerhaeuser Co.	WY	4.08	8.50	12.58	23,148.53
Whirlpool Corp.	WHR	2.18	10.50	12.68	13,948.50
Whole Foods Market	WFM	1.87	6.50	8.37	9,695.42
Williams Cos.	WMB	2.58	16.50	19.08	23,773.26
Wyndham Worldwide	WYN	2.60	5.50	8.10	8,234.52
Wynn Resorts	WYNN	2.29	6.50	8.79	9,303.20
Xcel Energy Inc.	XEL	3.46	5.50	8.96	20,724.48
Xerox Corp.	XRX	2.86	4.50	7.36	7,218.09
Xilinx Inc.	XLNX	2.17	6.00	8.17	14,627.96
Xylem Inc.	XYL	1.24	9.50	10.74	8,957.44
Yum! Brands	YUM	1.88	3.50	5.38	23,932.40
Zimmer Biomet Hldgs.	ZBH	1.00	15.00	16.00	21,010.99
Zions Bancorp.	ZION	0.79	11.00	11.79	8,783.90
Zoetis Inc.	ZTS	0.78	11.00	11.78	26,654.42
Zions Bancorp.	ZION	0.79	11.00	11.79	8,783.90
Zoetis Inc.	ZTS	0.78	11.00	11.78	26,654.42

Market Weighted Average = 11.46

Source: Value Line, January 2017.

## 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.<sup>49</sup>

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.<sup>50</sup>

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*).<sup>51</sup>

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<sup>49</sup> *The Appraisal of Real Estate*, 14<sup>th</sup> ed., (Chicago: Appraisal Institute, 2013) 109.

<sup>50</sup> *Property Assessment Valuation*, 3<sup>rd</sup> ed., (Kansas City: International Association of Assessing Officers, 2010), 305.

<sup>51</sup> 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.<sup>52</sup>

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....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.<sup>53</sup>

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.<sup>54</sup> [This identical quote

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<sup>52</sup> Pratt, Shannon P., *Cost of Capital, Estimation and Applications*, (NY: John Wiley & Sons, Inc. 1998) 176.

<sup>53</sup> Roger A. Morin, PhD, *Regulatory Finance: Utilities' Cost of Capital*, (Arlington, VA: Public Utilities Reports, Inc., 1994), 170-171. (emphasis added)

<sup>54</sup> Brigham, Eugene F. and Michael C. Ehrhardt, *Financial Management: Theory and Practice*, 10<sup>th</sup> ed. (Thomson Learning, Inc.: Stamford, CT, 2002), 452.

is also found in *Fundamentals of Financial Management*, 9<sup>th</sup> 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).<sup>55</sup>

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.<sup>56</sup>

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) 4<sup>th</sup> 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

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<sup>55</sup> *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 25.

<sup>56</sup> Brealey, Richard & Stewart C. Myers, *Principles of Corporate Finance*, 7<sup>th</sup> ed. (New York: McGraw-Hill, 2002), 552.



**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%
<b>Market Value:</b>	
Required Return	100
	----- = <b>\$950</b>
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%
<b>First Year's Cash Flow:</b>			
		<b>Pres. Value Factor</b>	<b>NCF</b>
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
			<b>\$950.00</b>

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

<sup>57</sup> 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 4.25%. 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 - 2016)**

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%
AgI 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%
JGI 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%
Septra Energy	Gas	01-Feb-03	400,000	99.658	99.008	0.66%

**Debt Issuance Cost  
Natural Gas/Transmission Utilities (1997 - 2016)**

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 - 2016)**

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%
Integrus 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%
AGI Capital Corp	Gas	13-May-16	350,000	99.598	98.948	0.66%
Piedmont Natural Gas Co., Inc.	Gas	25-Jul-16	300,000	99.878	99.003	0.88%
Southwest Gas Corp	Gas	28-Sept-16	300,000	99.698	98.823	0.89%
Washington Gas Light Co.	Gas	16-Sep-16	250,000	100.000	99.250	0.76%
					Average	1.02%
					Selected	1.00%

Source: *Public Utility Finance Tracker*, February 1999 - 2017.

**Common Stock Issuance Cost  
Natural Gas/Transmission Utilities (1990 - 2016)**

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%
Southern Union Co.	Gas	10-Jun-03	3,000	16.15	16.15	0.00%

**Common Stock Issuance Cost  
Natural Gas/Transmission Utilities (1990 - 2016)**

Company	Type of Company	Issue Date	Number of Shares (000)	Price to Public	Net Proceeds	Issue Cost
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%
Chesapeake Utilities Corp	Gas	22-Sep-16	835	62.26	62.24	3.74%
South Jersey Industries, Inc.	Gas	12-May-16	7,000	26.25	26.24	3.50%
Spectral Energy Corp	Gas	04-Apr-16	1,400	30.00	30.00	0.90%
Spire Inc.	Gas	12-May-16	1,900	63.05	63.03	3.25%
					Average	4.25%
					Selected	4.25%

Source: *Public Utility Finance Tracker*, February 1991 - 2017

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.

<b>Cost of Capital Including Flotation Costs</b>			
<b>Capital</b>	<b>Portion</b>	<b>Cost</b>	<b>Product</b>
Debt	30.00%	5.63%	1.69%
Equity	70.00%	12.90%	9.03%
Totals	100.00%		10.72%

Including flotation cost in the cost of capital requires an adjustment to compensate for the expense of issuing 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 0.35% (35 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 10.72% (rounded to **10.70%**) at January 1, 2017.

## **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.<sup>58</sup>

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.<sup>59</sup>

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).<sup>60</sup>

## **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

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<sup>58</sup> *Stocks, Bonds, Bills and Inflation: 2012 Valuation Edition Yearbook*, (Chicago: Morningstar, Inc., 2012), 56.

<sup>59</sup> Morin, Roger A., *New Regulatory Finance* (Vienna, VA: Public Utilities Reports, Inc., 2006), 133.

<sup>60</sup> Richard A. Brealey, Stewart C. Myers, and Paul Allen, *Principles of Corporate Finance*, 8<sup>th</sup> ed., (Irwin McGraw-Hill, 2006), 156-157.

risk premium because it represents the truly riskless portion of the return.<sup>61</sup>

### **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.<sup>62</sup>

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.<sup>63</sup>

### **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.

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<sup>61</sup> *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 55.

<sup>62</sup> *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 62.

<sup>63</sup> Copeland, Tom, Tim Koller & Jack Murrin, *Valuation: Measuring and Managing the Value of Companies*, 3<sup>rd</sup> 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.<sup>64</sup>

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.<sup>65</sup>

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, 2017, and no adjustment is necessary.

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<sup>64</sup> *Stocks, Bonds, Bills and Inflation: 2012 Yearbook, Valuation Edition* (Chicago: Morningstar, Inc., 2012), 62.

<sup>65</sup> 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.

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

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<sub>c</sub>)*. 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* ( $R_o$ ). 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* ( $Y_o$ ). 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, ( $R_o = \text{yield} - \text{change in income and value}$ ) and the Ellwood method.<sup>66</sup>

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**

<b>Securities (Debt or Equity Instruments)</b>	<b>Real Estate/Personal Property (Individually or as a Mass Assemblage)</b>
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 percentage 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	

<sup>66</sup> *The Appraisal of Real Estate*, 13<sup>th</sup> ed., (Chicago: Appraisal Institute, 2008), 501.

- |   |  |
|---|--|
| <p>9. Income typically subject to only individual tax (from investor's perspective)</p> <p>10. Portfolios can be created in limitless combinations of risky securities and risk-free securities</p> | <p>8. Investments expected to depreciate over time</p> <p>9. Income typically subject to both corporate and individual tax (from investor's perspective)</p> <p>10. Portfolio limited to the particular combination of real estate and personal property that operate the subject business</p> |
|---|--|

As the table indicates, there are fundamental investment risk and return differences between (1) 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.<sup>67</sup>

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

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<sup>67</sup> Pratt, Reilly, & Schweihs, *Valuing A Business*, 3<sup>rd</sup> edition, (Chicago: Irwin Professional Publishing, 1996), 708.

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 personal property.<sup>68</sup>

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.<sup>69</sup>

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

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<sup>68</sup> *Property Assessment Valuation*, 3<sup>rd</sup> ed., (Kansas City: International Association of Assessing Officers, 2010), 362.

<sup>69</sup> *The Appraisal of Real Estate*, 13<sup>th</sup> ed., (Chicago: Appraisal Institute, 2008), 519-520.



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 discount rate. In this model the discount rate and the overall capitalization rate are the same.<sup>70</sup>

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.<sup>71</sup> 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.

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

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,  $Value = Income \div Rate$ , 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.

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<sup>70</sup> *Ibid.*, 560.

<sup>71</sup> *Ibid.*, 560.

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.<sup>72</sup>

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.<sup>73</sup>

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 98. 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 18, 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

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<sup>72</sup> *The Appraisal of Real Estate*, 13<sup>th</sup> ed., 635; 12<sup>th</sup> ed., 119; 11<sup>th</sup> ed., 554-555; and 10<sup>th</sup> ed., 506-507.

<sup>73</sup> *The Appraisal of Real Estate*, 13<sup>th</sup> ed., 635-636; 12<sup>th</sup> ed., 119; 11<sup>th</sup> ed., 554-555; and 10<sup>th</sup> ed., 506-507.

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 *The Appraisal of Real Estate*, 14<sup>th</sup> 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.<sup>74</sup> This is further discussed by Dr. Gary C. Cornia, David Crapo, and Dr. Larry Walters as quoted below:

This approach is well suited to public utility valuation. It capitalizes a stable, level annual income by assuming that annual depreciation charges will be reinvested annually. This produces a level rate base and, thus, a level income. This net operating income (*NOI*) is then simply divided by the market capitalization rate (*r*). The same mathematical formula ( $V = NOI/r$ ) is also appropriate if the intent is to only value the assets in existence on the lien date. In such a situation, it is assumed that depreciation is equal to the amount of replacement capital expenditures necessary to maintain the existing assets into perpetuity. Thus, the cash flow (*CF*) to be capitalized is deemed to be equal to *NOI*. This formula can also be expressed as  $V = CF/r - g$  where the growth (*g*) is equal to 0 percent when it is expected that the

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<sup>74</sup> 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.

cash flows will remain constant into perpetuity.<sup>75</sup>

As discussed earlier, 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.

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<sup>75</sup> Cornia, Gary C., David J. Carpo, and Lawrence C. Walters. 2013. "The Unit Approach to the Taxation of Railroad and Public Utility Property". *Infrastructure and Land Policies*, eds. Ingram, Gregory K. and Karin L. Brandt. Cambridge, MA: Lincoln Institute of Land Policy. This paper was presented at the Lincoln Institute's annual Land Policy Conference in 2012, along with numerous other papers examining the links between infrastructure and land policy. It is included as Chapter 5 in the book "Infrastructure and Land Policies."

**Computation of 2017 Equity Risk Premium**  
**Adapted from *SBI* Information**  
 Computed By Dr. Hal Heaton, Brigham Young University

2016 ERP = 6.90% (Average of 1926 - 2015 data)<sup>76</sup>

$$0.0690 = \frac{\sum_{t=1926}^{2016} (R_{M^t} - R_{F^t})}{(2016 - 1926)} = \frac{\sum}{90}$$

$$R_M^{2016} - R_F^{2016} = 0.1196 - 0.0301 = 0.0895$$

$$2017 \text{ ERP} = \frac{\sum_{t=1926}^{2017} (R_{M^t} - R_{F^t})}{91} = \frac{(\sum + 0.0895)}{91}$$

$$\text{Since } 0.0690 = \frac{\sum}{90} \rightarrow \sum = 90 \times 0.0690 = 6.210$$

$$2017 \text{ ERP} = \frac{(6.210 + 0.0895)}{91} = 0.0692 \text{ or } 6.92\%$$

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<sup>76</sup> Based on the *SBI* study 1926 - 2013. Total annual return S&P 500.  
[https://ycharts.com/indicators/sandp\\_500\\_total\\_annual\\_return](https://ycharts.com/indicators/sandp_500_total_annual_return).

**Computation of 2017 Equity Risk Premium (for LT Corp Bonds)**  
**Adapted from *SBBI* Information**

2016 ERP = 5.8% (Average of 1926 - 2015 data)<sup>77</sup>

$$0.058 = \frac{\sum_{t=1926}^{2015} (R_{M^t} - R_{F^t})}{(2016 - 1926)} = \frac{\sum}{90}$$

$$R_M^{2016} - R_F^{2016} = 0.1196 - 0.0482 = 0.0714$$

$$2017 \text{ ERP for LT Corp Bonds} = \frac{\sum_{t=1926}^{2016} (R_{M^t} - R_{F^t})}{91} = \frac{(\sum + 0.0714)}{91}$$

$$\text{Since } 0.058 = \frac{\sum}{90} \rightarrow \sum = 90 \times 0.058 = 5.22$$

$$2017 \text{ ERP for LT Corp Bonds} = \sum_{1926}^{2016} + \left( R_f^{2016} + R_f^{2016} \right)$$

$$2017 \text{ ERP for LT Corp Bonds} = \frac{(5.22 + 0.0714)}{91} = 0.0581 \text{ or } 5.8\%$$

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<sup>77</sup> Based on the *SBBI* study 1926 - 2013 (LT Corp Bonds). Total annual return long-term Corporate Bond (BBB), Bloomberg, Jan. 2017.

## CRSP Deciles Size Premia Study: Key Variables

As of December 31, 2016

### Yield (Risk-free Rate)

Long-term (20-year) U.S. Treasury Coupon Bond Yield 2.72%

### Equity Risk Premium<sup>1</sup>

Long-horizon expected equity risk premium (historical): large company stock total returns minus long-term government bond income returns 6.94

Long-horizon expected equity risk premium (supply-side): historical equity risk premium minus price-to-earnings ratio calculated using three-year average earnings 5.97

Duff & Phelps recommended equity risk premium (conditional): The Duff & Phelps recommended ERP was developed in relation to (and should be used in conjunction with) a 3.5% "normalized" risk-free rate.<sup>2</sup> 5.50

### CRSP Deciles Size Premium<sup>3</sup>

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	\$2,392.689	-	\$10,711.194	1.02%
Low-Cap 6-8	569.279	-	2,390.899	1.75
Micro-Cap 9-10	2.516	-	567.843	3.67

#### Breakdown of CRSP Deciles 1-10

1-Largest	\$24,361.659	-	\$609,163.498	-0.35%
2	10,784.101	-	24,233.747	0.61
3	5,683.991	-	10,711.194	0.89
4	3,520.566	-	5,676.716	0.98
5	2,392.689	-	3,512.913	1.51
6	1,571.193	-	2,390.899	1.66
7	1,033.341	-	1,569.984	1.72
8	569.279	-	1,030.426	2.08
9	263.715	-	567.843	2.68
10-Smallest	2.516	-	262.891	5.59

#### Breakdown of CRSP 10th Decile

10a	\$127.296	-	\$262.891	4.09%
10w	190.553	-	262.891	3.10
10x	127.296	-	190.383	5.33
10b	\$2.516	-	\$127.279	8.64%
10y	73.561	-	127.279	7.21
10z	2.516	-	73.504	11.63

<sup>1</sup> See Chapter 3 for complete methodology.

<sup>2</sup> See Exhibit 3.19.

<sup>3</sup> See Chapter 7 for complete methodology.

**Note:** Examples on how these variables can be used are found in Chapter 8.

**Sources of underlying data:** 1.) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2017 Center for Research in Security Prices (CRSP), University of Chicago Booth School of Business. 2.) Morningstar Direct database. Used with permission. All rights reserved. Calculations performed by Duff & Phelps, LLC.