Interstate Natural Gas Pipeline Industry

2019 Cost of Capital Study

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March 7, 2019

Mr. Bruce Nielsen
Ad Valorem Tax Manager
The Williams Company - 1 Williams Center
Tulsa, OK 74172

Re: **Cost of Capital Study - Interstate Natural Gas Pipeline Industry as of January 1, 2019**

Dear Mr. Nielsen:

In accordance with your request we have completed a cost of capital study for the interstate natural gas pipeline industry as of January 1, 2019. The purpose of the cost of capital study is to provide the interstate natural gas pipeline industry with a cost of capital study, which can be used to capitalize the net cash flow of the operating assets of the typical interstate natural gas pipeline company for the purpose of estimating market value as of January 1, 2019. 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.

The narrative study that follows describes the processes used in reaching conclusions, sets forth the assumptions and limiting conditions, and contains relevant data amassed during our examination. This study was prepared for and our professional fee billed to you. It is intended only for use by you and your designees in performing your official duties. It may not be distributed to or relied upon by other persons or entities without our written permission. If you have questions concerning the report, please contact us at (615) 226-2300.

Sincerely,

Thomas K. Tegarden, MAI, CAE

Diane M. Ange, RM, CAE

TKT/t

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Common Terms

CAPM	Capital Asset Pricing Model
DCF	Discounted Cash Flow (aka Dividend Growth Model)
DGM	Dividend Growth Model (aka Discounted Cash Flow Model)
EIA	Energy Information Administration
FED	Federal Reserve
FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
IBES	Institutional Brokers Estimate System
INGPI	Interstate Natural Gas Pipeline Industry
INGPPTF	Interstate Natural Gas Pipeline Property Tax Forum
K	Cost of Capital or WACC
K_D	Cost of Debt
K_E	Cost of Equity
MLP	Master Limited Partnership
NUOI	Net Utility Operating Income
PT WACC	Pre-Tax Weighted Average Cost of Capital
RP	Risk Premium
SBBI	*Stocks, Bonds, Bills & Inflation*
S&P	Standard & Poor's
TCJA	Tax Cuts and Jobs Act of 2017
VL	*The Value Line Investment Survey*
WACC	Weighted Average Cost of Capital or K
WSJ	*Wall Street Journal*
YTM	Yield to Maturity

2019 Cost of Capital Study of the Interstate Natural Gas Pipeline Industry for the Interstate Natural Gas Pipeline Property Tax Forum January 1, 2019

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, 2019. 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, 2019, 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 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, 2019.

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 **10.65%** as of January 1, 2019. The cost of capital

developed in this study is also known as the discount rate[1] and is appropriate to use in discounting the after-tax operating cash flows projected as of January 1, 2019, 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 13.

Interstate Natural Gas Pipeline Property Tax Forum

The INGPPTF represents approximately 65 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 2019 membership roster of the INGPPTF is listed below:

Boardwalk Pipeline
  Texas Gas Transmission, LLC
Centerpoint Energy
  Centerpoint Energy Gas Transmission
  Centerpoint Energy Mississippi River Transmission
Dominion Transmission Corporation
Enbridge, Inc. - Canada
  West Cast Pipelines & Field Services
  West Coast Gas Services
  Maritimes and Northeast Pipeline (Canada)
  Spectra Energy Empress L.P.
  Union Gas Limited
  St. Clair Pipelines (1996)
  Market Hub Partners
  Spectra Energy Income Fund
  Sarina Airport Storage L.P.
Enbridge, Inc.
  Texas Eastern Transmission
  Algonquin Gas Transmission
  Gulf Stream Natural Gas Transmission
  Maritimes and Northeast Pipeline
  East Tennessee Natural Gas
  Sabal Trail Transmission
  Southeast Supply Header
Kern River Gas Transmission
Kinder Morgan, Inc.
  Tennessee Gas Pipeline
  Southern Natural Gas
  El Paso Natural Gas
  Mojave Pipeline
  Colorado Interstate Gas
  Cheyenne Plains Pipeline
  Wyoming Interstate Company
  Natural Gas Pipeline Company of America
  Midcontinent Express Pipeline
  TransColorado Gas Pipeline

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

Louisiana Pipeline
Elba Express
Ruby Pipeline, LLC
MDU Resources Group, Inc.
Northern Natural Gas Company
Oneok Inc.
Guardian Pipeline Company
Midwestern Gas Transmission Company
OKTEX Pipeline
Viking Gas Transmission Company
Questar Pipeline Company
TransCanada Corporation
TransCanada Pipelines Limited
TransCanada Corp – US Pipelines
ANR Pipeline
Crossroads Pipeline Company
North Baja Pipeline
Portland Natural Gas Transmission
GTN Pipeline System
Tuscarora Gas Transmission
Great Lakes Gas Transmission
Iroquois Gas Transmission
Bison Pipeline LLC
Northern Border Pipeline Company
Columbia Gas Transmission LLC
Columbia Gulf Transmission Corporation LLC
Williams Companies, Inc.
Transcontinental Gas Pipeline Company LLC
Northwest Pipeline Company LLC

2019 Economic Data

2018 was marked by strong U.S. economic growth, supported by a burst of fiscal stimulus from federal tax cuts and spending increases. That, in turn, underpinned profit growth and the Federal Reserve's decision to dial up its campaign of short-term interest-rate increases.

The good economic news for 2019 is that the odds are still against the U.S. economy entering a recession. The bad news, according to many economists, is a series of economic forecasts that calls for growth to not only be slower in the U.S., but also globally.[2]

Most private economists expect U.S. growth to slow in 2019, in part because the initial impetus of fiscal stimulus is set to wane, meaning slower profit growth and more calls for a pause in Fed interest-rate increases, according to Jon Hilsenrath writing for the *Wall Street Journal*.[3]

Kimberly Amadeo of "the Balance," agreed with Hilsenrath in her January 1, 2019 article, "US Economic Outlook for 2019 and Beyond." She reported that U.S. GDP growth would slow to 2.3% in 2019 down from 3% in 2018 then slowing further to 2% in 2020, and 1.8% in 2021. That's according to the most recent forecast released at the Federal Open Market Committee (FOMC) meeting on December 19, 2018. The projected slowdown in 2019 and

[2] Kelleher, Kevin. "U.S. Economy Will Slow in 2019, May Enter Recession in 2020, Economists Forecast. Trump Administration Disagrees," November 21, 2018, http://fortune.com/2018/11/21/us-economy-slow-2019-recession-2020-economist-forecast/.

[3] Hilsenrath, Jon. "The Economic Forecast for 2019: Less Growth and More Uncertainty," December 3, 2018, https://www.wsj.com/articles/the-economic-forecast-for-2019-less-growth-and-more-uncertainty-1543892700.

beyond is a side effect of the trade war, a key component of Trump's economic policies.[4]

While the White House has celebrated the growth rate—which hit around 3% in 2018—the Fed has had its eye on another indicator, the inflation rate, which has returned to the central bank's 2% target after running below it for most of the United States' expansion. The Fed's decisions in 2019 will hinge on what happens next for inflation, rather than the pressure coming from the White House. If the Fed believe inflation has stabilized at 2%, it will pause the rate increases. Recent soft inflation readings and comments by Jerome Powell, the Federal Reserve Chairman, suggest the probability of such a pause next year is rising, reported Hilsenrath.

As economists crunch the numbers for their 2019 forecasts, however, they are expecting a slowdown. That forecast, not exactly sunny but not dire either, prompted some pushback from Larry Kudlow, who is serving as president of the National Economic Council under President Trump. "In my personal view, our administration's view, recession is so far in the distance I can't see it," Kudlow said. "The basic economy has reawakened and it's gonna stay there… I mean, I'm reading some of the weirdest stuff, how a recession is around the corner. Nonsense."[5]

Some economists are taking a darker view than Goldman Sachs or Kudlow, which is not forecasting a recession before 2020. A survey of economists by Reuters on November 21, 2018, shows that most expect the chance of a recession in the U.S. is still low, at 35%, although the survey also showed that the median probability of a recession has inched up from 30% in October 2018.

The timing of a downturn may be in dispute, but many economists agree that the headwinds facing the U.S. economy are growing stronger and more numerous: Interest rates keep rising, making borrowing costs more expensive for consumers and companies alike; trade tariffs are increasing, thanks in good part to Trump's aggressive trade policies; and Wall Street analysts are growing concerned that earnings growth has peaked as the bull market enters its tenth year, especially in the overpriced tech sector.[6]

Financial markets entered 2019 facing increased volatility. The Conference Board[7] suggests that businesses should prepare for a more challenging profit environment, but should

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[4] Amadeo, Kimberly. "US Economic Outlook for 2019 and Beyond - "Experts Forecast Steady Growth," January 1, 2019, https://www.thebalance.com/us-economic-outlook-3305669.

[5] *Op. Cit.*, Kelleher.

[6] *Ibid.*

[7] Founded in 1916, The Conference Board is the member-driven think tank that delivers trusted insights to help leaders navigate the biggest issues facing business and better serve society.

also recognize that this slowdown does not imply that a recession is on the horizon. The economy is still likely to enjoy above trend growth, with strength coming from consumer spending and labor markets.

The labor market continues to support consumer spending growth. Unemployment rates remain below 4%. Key measures of wage growth improved during 2018 and accelerated more rapidly in the last half of 2018. Consumer confidence measures remain high even though shoppers are less certain that conditions can keep improving. Higher interest rates may lead to a slowdown in consumption growth later in the year, especially for big ticket items. For businesses, robust demand growth should bolster confidence in an increasingly challenging environment, though faster wage growth and more difficulty attracting talent can impair profitability.

During the final quarter of 2018, stock prices fell by 14 percent. Volatility throughout 2018 was greater than in 2017 which had featured steady and steep increases in market valuations. This, together with concerns about slower global growth, has dragged business confidence measures down. Federal Reserve rate hikes are a concern as higher interest rates mean a rise in firm operating costs. The Fed though may provide relief by raising rates only twice during 2019, so long as inflation stays near target levels reported The Conference Board.

Continued trade tensions with China and the ongoing partial government shutdown are also contributing to increased business uncertainty entering 2019. While higher costs and more uncertainty will reduce business profitability, 2019 can still be a good, though not spectacular, year for firm performance. Even with less favorable economic conditions, businesses should continue making investments that will help boost firm productivity and earnings, helping them to weather future headwinds.[8]

Natural Gas Pipeline Industry - 2019

Interstate pipelines have both utility and merchant energy characteristics and are considered the midstream segment of natural gas industry. The midstream segment comprises interstate pipeline, or "transmission," companies, which build and operate pipelines to transport gas from producing regions to demand centers. The FERC, which has jurisdiction over interstate commerce in natural gas, regulates transmission companies.

Pipelines Move Natural Gas From Production Fields to Markets

Natural gas transmission pipelines are wide-diameter pipelines and are often the

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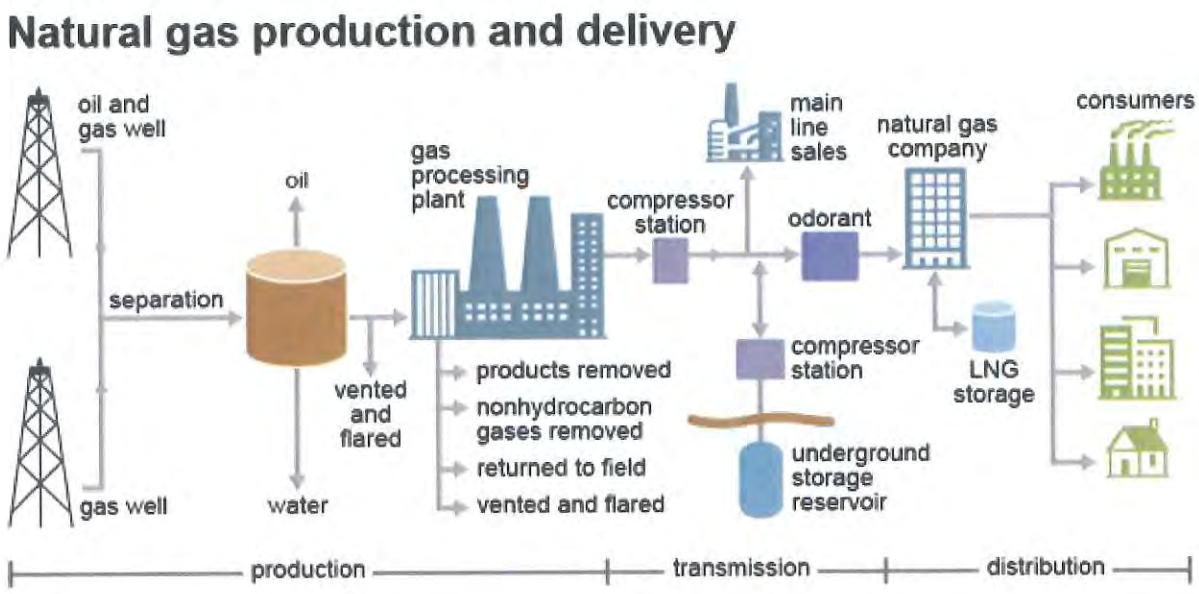
[8] "Stock Market Turbulence Reflects Weaker Environment for Profits," The Conference Board Economic Forecast for the U.S. Economy, updated January 9, 2019, https://www.conference-board.org/data/usforecast.cfm.

long-distance portion of natural gas pipeline systems that connect gathering systems in producing areas, natural gas processing plants, other receipt points, and the main consumer service areas. The three types of transmission pipelines are: (1) Interstate natural gas pipelines operate and transport natural gas across state borders; (2) Intrastate natural gas pipelines operate and transport natural gas within a state border; and (3) Hinshaw natural gas pipelines receive natural gas from interstate pipelines and deliver it to consumers for consumption within a state border. When natural gas arrives at the locations where it will be used (usually through large pipelines), it flows into smaller diameter pipelines called mains and then into smaller service lines that go directly to homes or buildings. See illustration of natural gas production and delivery produced by the U.S. Energy Information Administration (EIA) below.[9]



Pipeline MLPs (Master Limited Partnerships)

The MLP Industry consists of tax-advantaged oil and gas transporting, processing, and distribution companies. They do not pay state or federal corporate income taxes. Instead, the general partnerships (GP) typically pay out all of their distributable income to unitholders (usually, earnings plus depreciation and other noncash expenses, minus maintenance capital spending and payouts to the general partner) less a small portion retained to fund growth. 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

[9] "Delivery and Storage of Natural Gas, EIA, January 16, 2019, https://www.eia.gov/energyexplained/print.php?page=natural_gas_delivery,

prices. MLPs are operated by a GP, which often trades separately. Investors, according to Value Line's Bryan Fong, should carefully study each investor's analysis of MLPs to determine if an issue is attractive from a risk/reward standpoint and if the tax implications of an MLP are not a deterrent.[10]

A Policy Change is Shaking Up the Industry

A recent shift in regulations by the Federal Energy Regulatory Commission (FERC) has applied downward pressure on some companies in the Pipeline MLP Industry. That revision disallows income tax recovery on cost of service rate contracts for interstate pipelines. The old policy had been around since 2005. Previously, the commission allowed regulated pipelines to recoup a ''just and reasonable'' return on equity.

This meant that MLPs that utilize a cost-of-service fee structure would calculate their costs to run a specific pipeline and then charge a certain premium above that rate to allow it to run profitably and foster capital growth projects. The old policy allowed MLPs to include an income tax allowance in that fee structure. However, since most MLPs pay little to no income taxes, some market participants have argued that the old policy effectively allowed them to recover taxes twice. At this point, this policy change is only expected to impact those with regulated cost-of-service pipelines, while other fee structures are not expected to be affected.

A couple of companies hurt by the shift are Enbridge Energy Ptrs. (EEP) and Spectra Energy (SEP). Both are in the process of being absorbed, or bought-in, by the parent corporation (GP), as the new fee structure would make them less economically viable. In July, the FERC softened its stance on its original policy, stating that the MLPs could recoup those taxes paid by a corporate parent if one exists. This may provide the necessary loophole needed to keep MLPs as attractive business vehicles reported Fong. Otherwise, *Value Line* might continue to see a dwindling number of investable companies in this space.[11]

Production Volumes Are On The Rise

Oil and gas production had been trending higher for many years reported Fong. This growth has come largely from the much publicized domestic shale regions. Those formations have 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 downturn in commodity prices in the spring of 2018 and warmer-than

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[10] Fong, Bryan J. "Pipeline MLPs", *The Value Line Investment Survey*, November 30, 2018, 618.

[11] *Ibid.*

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. And it appears that may be coming down the pike again. Natural gas production volumes began logging year-over-year gains back in June of 2018 and have continued to do so. However, natural gas marketed production registered a healthy advance of almost 15% on a year-to-year basis for the month of August of 2018 (the latest period for which data were available), to 2.844 trillion cubic feet, or about 91.7 billion cubic feet per day.[12]

Summary of Natural Gas Transportation

The Gas Pipeline Transportation industry has experienced a variety of conditions over the past five years. As a whole, natural gas consumption has increased, spurring greater production volumes and demand for industry services. Despite higher levels of natural gas production, 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 as a substitute for natural gas.

Industry operators generally do not own the natural gas they transport, instead generating revenue from the fees paid by distributors and set by the Federal Energy Regulatory Committee reported Viraj D'Costa of *IBISWorld*. Advances in hydraulic fracturing technology have enabled previously untapped reserves to be used. Higher volumes of natural gas production have encouraged industry operators to extend their pipeline capacity throughout the country. 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 resulting in higher capital spending between 2013 and 2018.

Industry growth is forecast to continue from 2018 to 2023. Electricity generation operators will continue to demand natural gas as prices remain near historic lows as a result of expanding production in shale basins during the outlook 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 rebound.[13]

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[12] *Ibid.*.

[13] D'Costa, Viraj. "Gas Pipeline Transportation in the U.S.," *IBISWorld* Industry Report 48621, September 2018, 4.

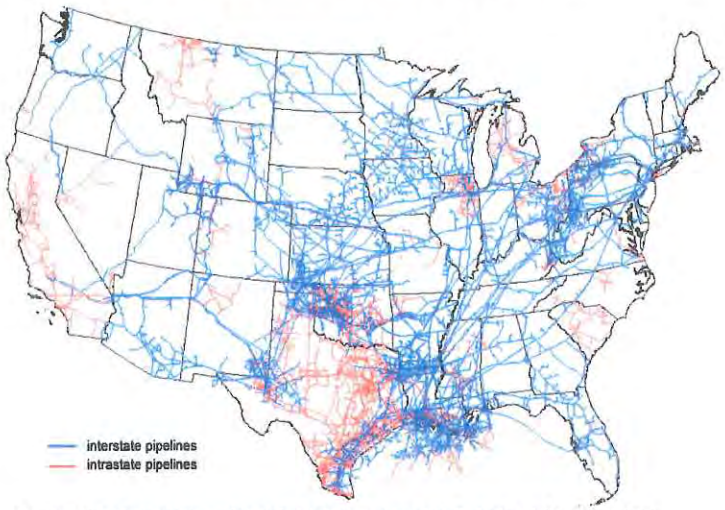
Gas Pipeline Transportation Business Locations

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 32.0% of interstate natural gas shipments), closely followed by the Southeast 29.6%). The most significant states are Texas, which account for 23.9% of establishments, and Louisiana, which account for 9.2% of establishments. The Southeast and Southwest are key locations for shale gas wells and drilling operations, which necessitate significant numbers of pipelines to distribute products across the country, according to D'Costa.

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 determined by electric power generation or industrial use. In these regions, storage is needed to support short-term demand fluctuations and system balancing.[14] Below is a map of the interstate and intrastate natural gas pipelines produced by the EIA January 16, 2019.

Map of U.S. interstate and intrastate natural gas pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*

[14] *Ibid,* 16.

Gas Pipeline Transportation Risk Rating

IBISWorld Inc. annually produces an *IBISWorld* Industry Risk Rating Report. In December 2018, the "Gas Pipeline Transportation in the U.S.: 48621" Risk Rating Report was released. This industry group transports natural gas from processing plants to local distribution systems using pipelines. This industry does not include the recovery of natural gas from wells or the processing of natural gas.

The forecast period encompasses all of 2019. Three types of risk are recognized in their analysis. These are: risk pertaining to industry structure (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.[15]

> **Structural Risk Analysis** — is forecast to be LOW over the outlook period. A modest concern is the medium level of competition, which exacerbates risk by pressuring prices and profits downward. This industry is currently in the mature phase of its life cycle which exhibits limited growth in demand opportunities and forces operators to compete for the remaining sales in order to survive. Existing operators will benefit from steady, low levels of assistance from outside organizations as this assistance mitigates some risk experienced elsewhere. Operators in the industry benefit from high and steady barriers to entry which buffer against long-run competition by hindering the entry of new players to the marketplace.[16]
>
> **Growth Risk Analysis** — is expected to be LOW over the outlook period. *IBISWorld* forecasts that annual industry revenue will grow 3.9% to $29.7 billion. In comparison, revenue shrank 3.7% per year between 2016 and 2018.[17]
>
> **Sensitivity Risk Analysis** — is forecast to be LOW over the outlook period, down from MEDIUM-LOW in 2018. The two factors with the most significant impacts on the industry are electric power consumption and industrial production index. A rise in either of these factors will lower industry risk.[18]

Barriers to Entry

Barriers to entry into the Gas Pipeline Transportation industry are high and tend to be

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[15] "IBISWorld Industry Risk Rating Report 48621, Gas Pipeline Transportation in the U.S.," *IBISWorld*, December 2018, 2.

[16] *Ibid.*, 3.

[17] *Ibid.*

[18] *Ibid.*

surmountable only by large industry enterprises with access to significant levels of funding. 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 to make the pipeline viable. Large contracts are typically awarded to existing operators with extensive infrastructure and a history of regulation compliance. Potential entrants could find it difficult to compete with established enterprises in securing these contracts.

Lastly, state and federal regulation on safety and energy act as strong barriers to entry. Compliance with various state laws that regulate energy transport and Federal Energy Regulatory Commission standards must be achieved before commencing operations. Since most pipeline infrastructure cross state boundaries, compliance with many governing authorities at the federal level is often required.[19]

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 operators 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.[20]

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[19] *Ibid.*, 5.

[20] *Ibid.*, 6.

Natural Gas Pipeline Transportation Outlook

The Gas Pipeline Transportation industry is projected to expand in the five years to 2023. The industry is highly regulated and charges customers based on rates established by the Federal Energy Regulatory Commission. Over the next five years to 2023, 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.[21]

Value Line's Michael Napoli reported that the stocks of many companies in the Natural Gas (Diversified) Industry[22] have not fared particularly well during the later months of 2018. Lower equity prices for many in this group have occurred in conjunction with weakness in the broader markets. That said, a number of natural gas companies have performed quite well in recent quarters. Greater production volumes have driven revenues and earnings higher for these participants. Investment in production capacity should continue to benefit the performance of these companies going forward. Looking further out, long-term prospects appear to be relatively favorable for this group.[23]

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 2019 appraisal year.

All of the political and economic factors discussed in this section and the "2019 Economic 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.

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[21] *Op. Cit.*, D'Costa, 8.

[22] 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.

[23] Napoli, Michael F. "Natural Gas (Diversified) Industry," *Value Line Investment Survey*, November 30, 2018, 524.

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***.[24] 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.[25]] This rate of return is often referred to as the discount rate or the opportunity cost of capital.[26] 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.[27]

The estimated cost of capital in this report for the Interstate Natural Gas Pipeline Industry as of January 1, 2019, is based on the generally accepted appraisal methodology known as the

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

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

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

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

band of investment technique. The band of investment technique consists of the following steps:

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

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

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

where

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

Figure 1

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

> The cost of capital is always an expectational or forward-looking concept. While the past performance of an investment and other historical information can be good guides and are often used to estimate the required rate of return on capital, the expectations of future events are the only factors that actually determine the cost of capital. An investor contributes capital to a firm with the expectation that the business' future performance will provide a fair return on the investment. If past performance were the criterion most important to investors, no one would invest in start-up ventures. It should also be noted that the cost of capital is a function of the investment, not the investor.[28]

Cost of Capital Study Results

The cost of capital for the Interstate Natural Gas Pipeline Industry as of January 1, 2019 is estimated to be10.66% (rounded to **10.65%**) as 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.

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

Capital	Portion	Cost	Product
Debt	37.00%	6.15%	2.28%
Equity	63.00%	13.30%	8.38%
Totals	100.00%		10.66%

Capital Structure

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

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

> We are absolutely convinced that the procedures we recommend are correct — namely, firms should focus on market value capital structures and base their cost of capital calculations on market value weights. Because market values do change, it would be impossible to keep the actual capital structure on target at all times, but this fact in no way detracts from the validity of market value targets.[29]
>
> 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.[30]
>
> Ideally, a firm's target or optimal capital structure should be used in weighting the cost of equity and cost of debt. Unfortunately, many companies are either not able

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

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

> to obtain their target capital structure, or information to support the target capital structure is not available (as may be the case for a minority-interest shareholder). In the absence of a reliable target capital structure, the capital structure weights should be market value weighted. While it is typically a straightforward process to measure the market value of equity capital for a public company, it usually is not so simple for debt capital because so little debt is publicly traded. Therefore, in most cases the market value of debt in the capital structure is assumed to be the book value of debt.[31]
>
> In theory, the relative weightings of debt and equity or other capital structure components are based on the market values of each of those components, not on their book values. In practice, most valuation analysts tend to assume that the carrying value of debt capital on the balance sheet is a reasonable proxy for its market value.[32]

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.[33]

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

[32] Duff & Phelps, *2017 Valuation Handbook U.S. Guide to Cost of Capital,* (Hoboken, NJ: John Wiley & Sons, Inc., 2017), 1-15.

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

> **FINANCIAL STRUCTURE** makeup of the right-hand side of a company's BALANCE SHEET, which includes all the ways its assets are financed, such as trade accounts payable and short-term borrowings as well as long-term debt and ownership equity. Financial structure is distinguished from CAPITAL STRUCTURE, which includes only long-term debt and equity.[34]

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...[35]

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.

In order to estimate the capital structure and ultimately the cost of capital it is important to find investments of comparable risk from which to derive market data. First, it is important to know that there is no perfect set of comparables for the typical interstate natural gas pipeline property. For example, the typical interstate natural gas pipeline is only in the business of transporting natural gas for its customers. Virtually, none of the comparables used in this cost of capital study are in just that business. To be able to be included and analyzed in the estimate of the cost of capital, a company has to have traded equity. Most of these interstate natural gas pipeline companies do not have traded equity, but rather are subsidiaries of parent companies

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[34] *Ibid.*, 132.

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

which are involved in several ventures including gathering, processing, storing, transporting, local distribution of natural gas, managing energy infrastructure, liquids processing, fractionation, crude oil pipelines, petrochemicals, natural gas liquids pipelines, offshore pipelines, transporting of petroleum products, carbon dioxide pipelines, crude oil marketing, crude oil transport trucks, and motor carrier unloading facilities in addition to other operations.

Second, there is nothing wrong with using comparables that are not exactly like the interstate natural gas pipeline companies. The primary comparison is risk. The guideline comparables should be as similar as possible in riskiness of investment. The U.S. Supreme Court in ***Bluefield*** and ***Hope*** consistently ruled relative risk is the important criteria in evaluating the cost of capital for a utility, not the particular line of business activity or degree of regulation. The cost of capital is an opportunity cost based on the returns that investors could realize by putting their money in other alternatives of comparable risk.

> "A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties." [*Bluefield Water Works & Imp. Co. v. Public Service Comm'n,* 262 U.S. 679, 692-3 (1923).]

> "From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock .... By that standard the return to equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital." [*Federal Power Comm'n v. Hope Natural Gas Co.,* 320 U.S. 591, 603 (1944) (Douglas, J.).]

As a member of the Tennessee Public Service Commission staff, I was aware of many rate cases during my 15+ years of service. It was not uncommon for expert testimony to be provided by various cost of capital experts on the cost of common equity for a particular utility company in which many diverse companies were utilized to provide comparable risk estimates. One continues to see testimony from cost of capital experts today around the country in various regulatory commission cost of capital hearings for setting the authorized rates of return for its

regulated companies. This is because the investor is not relegated to investing only in natural gas pipelines, but can invest in any comparable risk investment opportunity.

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 2019. The capital structure study involved the following companies we believe to be representative of the interstate natural gas transmission pipeline industry: 14 large (sales over $1 billion) pipeline MLPs with natural gas operations taken from the *Value Line* full data base of 5,924 companies); 8 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*; 6 comparable risk companies screened from the *Standard and Poor's* database of 9,092 companies. We also considered the 24 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 **37% debt**, essentially no preferred stock, and **63% equity**. For each of the above mentioned groups of companies, we calculated simple 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. Further, some of this group are classified by *Value Line* as electric utilities. Thus, we are inclined to give a little less consideration to the data from the Forum group.

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."[36] Only a few companies in this industry have issued preferred stock and, like debt, we used book value as a surrogate for

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

the market value of preferred stock. Our recent analysis indicates that book values for long-term debt and preferred stock are fairly reasonable approximations for market value at the present time, thus book value can be substituted as a reasonable proxy for the market value of debt and preferred stock capital.

A summary of the capital structure analysis follows. Supporting calculations for each of the company groups begins in the Addendum Section on page 41.

Summary of Capital Structure Data

Value Line Data - Medians	Debt	Pref Stk	Com Stk
VL Pipeline MLPs w/Nat. Gas Operations (Large)	37.49%	0.00%	62.51%
Interstate Natural Gas Pipeline Forum	38.85%	0.00%	61.16%
Natural Gas Pipeline Screened Comparables	33.79%	0.00%	66.21%
S&P 500 companies with "BBB-" Rated Debt	20.91%	0.00%	79.09%
Averages	**32.76%**	**0.00%**	67.24%

S&P Data - Medians	Debt	Pref Stk	Com Stk
VL Pipeline MLPs w/Nat. Gas Operations (Large)	39.69%	0.00%	60.31%
Interstate Natural Gas Pipeline Forum	41.57%	0.04%	57.35%
Natural Gas Pipeline Screened Comparables	34.57%	0.00%	62.03%
S&P 500 companies with "BBB-" Rated Debt	21.88%	0.00%	78.12%
Averages	**34.43%**	**0.01%**	**64.45%**

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.[37] 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.[38]

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 **B3** to **A1,** respectively. The predominant ratings for the typical interstate natural gas pipeline were **BBB-** and **Baa3**, respectively, from S&P and Moody's. This information is presented in the following table with supporting data in the Addendum Section.

Summary of Pipeline Long-Term Debt Ratings - January 1, 2019

Averages	**S&P Ratings**		**Moody's Ratings**	
VL Pipeline MLPs w/Nat. Gas Operations (Large)	BBB-	12	Ba1	13
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB+	10	Baa2	11
Screened Comparables Group	BBB-	12	Baa3	12
Average	**BBB**	**11**	**Baa3**	**12**

Medians				
VL Pipeline MLPs w/Nat. Gas Operations (Large)	BBB-	12	Ba1	13
Interstate Natural Gas Pipeline Forum (Pipelines)	BBB+	10	Baa2	11
Screened Comparables Group	BBB-	12	Baa3	12
Average	**BBB**	**11**	**Baa3**	**12**

The S&P and Moody's bond ratings for the individual companies within the above groups are shown beginning on page 46.

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

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

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, 2019.

Standard &Poor's and Moody's Long Term Bond Yields (%) *					
S&P	Avg YTM	Med YTM	Moody's	Avg YTM	Med YTM
AAA	4.04	4.00	Aaa	4.06	4.03
AA+	4.18	4.21	Aa1	4.21	4.23
AA	4.19	4.18	Aa2	4.23	4.21
AA-	4.36	4.29	Aa3	4.25	4.25
A+	4.37	4.30	A1	4.39	4.31
A	4.46	4.41	A2	4.39	4.34
A-	4.74	4.66	A3	4.77	4.70
BBB+	5.15	5.08	Baa1	5.03	4.98
BBB	5.60	5.57	Baa2	5.40	5.38
BBB-	6.53	6.49	Baa3	6.04	5.90
BB+	6.74	6.73	Ba1	6.30	6.31

Source: S%P and Mergent Bond Databases, Jan. 2019.
* At least 20 years to maturity.

Bloomberg 2018 Year-end Bond Yields

Rating	December 2018			All Years Average
	20Y	25Y	30Y	
AA	4.19	4.16	4.13	4.16
AA-	4.33	4.28	4.24	4.28
A+	4.31	4.40	4.47	4.39
A	4.40	4.57	4.55	4.51
A-	4.72	4.73	4.75	4.73
BBB+	5.03	5.05	4.96	5.01
BBB	5.00	5.53	5.65	5.39
BBB-	6.15	6.16	6.19	6.17
BB+	6.82	6.91	N/A	6.87
BB	6.65	6.65	6.65	6.65
BB-	8.37	9.78	9.87	9.34
B+	9.24	10.04	10.04	9.77
B	9.61	11.50	N/A	10.56
B-	15.27	N/A	N/A	15.27

Source: Bloomberg Database - Dec. 31, 2018.

The average and median yields for all corporate bonds rated **BBB-** by Standard & Poor's were **6.53%** and **6.49%**, respectively, at January 1, 2019. The average and median yields for all corporate bonds rated **Baa3** by Moody's were **6.04%** and **5.90%**, respectively, at January 1, 2019. The average yield for Bloomberg **BBB-** corporate bonds ranging from 20 to 30 years to maturity was **6.17%** at December 31, 2018. From the information discussed and displayed above we estimated the appropriate cost of debt capital rated **BBB-** to be **6.10%** at January 1, 2019 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 2019. Supporting data are found above and in the Addendum Section.

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 dividend growth model (DGM) or discounted cash flow method (DCF), 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 DGM method is a ratio of return to investment.

As discussed beginning on page 17, we analyzed data from several guideline groups of companies which considered as a whole should provide a reasonable estimate of the cost of equity capital for the typical interstate natural gas pipeline company.

After computing the cost of equity by the DGM, RP, and CAPM methods, the data was analyzed and reconciled to obtain the cost of equity capital before flotation costs of **12.75%**. 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

DGM Indicators - January 1, 2019

Company Groups	*Value Line* Data		S&P (IBES) Data	
	Average	Median	Average	Median
VL Pipeline MLPs with Natural Gas Operations (Large)	17.48	17.95	39.18	29.23
Interstate Natural Gas Pipeline Forum	22.17	17.79	17.35	13.34
Natural Gas Pipeline Screened Comparables	18.77	18.98	31.25	21.38
S&P 500 Companies with "BBB-" Rated Debt	13.40	11.68	15.23	13.75
Averages	17.96	16.60	25.75	19.43

The dividend growth 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 using FERC DGM methodology.

Risk Premium Indicators - January 1, 2019

General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
Long-Term Treasury Bonds (ex post)	2.97	6.95	9.92
Long-Term Treasury Bonds (ex ante)	2.97	9.39	12.36

Risk Premium Indicators by Groups

Indicators	Median S&P Rating		Bloomberg Yields	Risk Prem. Indicator
	Rating	Number		
VL PL MLPs w/ Nat. Gas Operations (Large)	BBB-	12	6.19	11.89
Interstate Natural Gas Pipeline Forum	BBB+	10	5.05	10.75
Natural Gas Pipeline Screened Comparables	BBB-	12	6.19	11.89
S&P Companies with "BBB-" Rated Debt	BBB-	12	6.19	11.89
Average	BBB	12	5.91	11.61

* Base Rate: Average YTM Bloomberg (BBB- Rated debt).

Risk Premium: Simulated *SBBI* Methodology (see p. 79).

Capital Asset Pricing Model (CAPM) - January 1, 2019

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
CAPM Indicator *				
Long-Term Gov't Bonds (ex post)	2.97	6.95	1.25	11.66
Long-Term Gov't Bonds (ex ante)	2.97	9.39	1.25	14.71

CAPM Formula: Ke = Rf + B(Rp)

* CAPM Indicator is based upon a *Value Line* beta of 1.25 & Federal Reserve data 1/2/19.

Company Groups	S&P CAPM * (Medians)
VL Pipeline MLPs with Natural Gas Operations (Large)	14.78
Interstate Natural Gas Pipeline Forum	10.96
Natural Gas Pipeline Screened Comparables	13.71
S&P 500 Companies with "BBB-" Rated Debt	13.64
Average	**13.27**

* S&P CAPM indicator computed independently by S&P as a part of their Research Insight subscription.

DGM Method

The dividend growth model or discounted cash flow method of estimating the cost of equity is based on the formula shown in Figure 2. Our computations using the DGM 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 containing approximately 5,924 companies. We began our analysis by screening the *Standard and Poor's* database of approximately 9,092 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**-. (Some of these companies have double-B rated debt.) Our first screening process was to find all companies having a *S&P* senior debt rating of BBB+ to BBB- (the highest-rated triple-B debt to the lowest rated triple-B debt). This screening will give us a list of companies that have long-term debt which is believed to be equal (or safer) in risk to the typical interstate natural gas pipeline. This measure is indicative of financial risk for the companies.

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

where

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

Figure 2

Next we screened the surviving group of companies by the return on net plant investment (before taxes). This is a measure of business risk and measures the ability of a company to compete in the market and maintain its rate of return before income taxes. From this calculation we screened out all companies varying more than fifty percent from the 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 1.07 presently, while the average of the *Value Line* median betas of all the pipeline groups was 1.21, as shown on page 31. Thus we excluded all companies with *S&P* adjusted betas less than 1.10 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.

Pipeline Risk Screening Data - January 1, 2019

VL Pipeline MLPs with Natural Gas Operations (Large) & Interstate Natural Gas Pipeline Forum

Company Name	Ticker	S&P Debt Rating Letter	S&P Debt Rating Number	S&P Adj. Beta	Return on Net Invest.
BP MIDSTREAM PARTNERS	BPMP				110.03
CENTERPOINT ENERGY INC	CNP	A-	9	0.59	8.21
CNX MIDSTREAM PARTNERS LP	CNXM	BB-	15	1.31	15.85
DCP MIDSTREAM LP	DCP	BB	14	1.85	3.19
DOMINION ENERGY INC	D	BBB+	10	0.49	7.67
DOMINION ENRG MIDSTRM PRT LP	DM			1.27	2.39
ENABLE MIDSTREAM PARTNERS LP	ENBL	BBB-	12	1.24	5.12
ENBRIDGE INC	ENB	BBB+	10	0.70	6.96
ENERGY TRANSFER LP	ET	BBB-	12	1.48	6.14
ENLINK MIDSTREAM PARTNERS LP	ENLK	BB+	13	1.69	4.41
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	0.91	9.79
EQT MIDSTREAM PARTNERS LP	EQM	BBB-	12	1.06	20.71
KINDER MORGAN INC	KMI	BBB	11	0.83	8.86
MDU RESOURCES GROUP INC	MDU	BBB+	10	0.77	10.51
MPLX LP	MPLX	BBB	11	1.13	9.22
OASIS MIDSTREAM PARTNR	OMP				16.52
ONEOK INC	OKE	BBB	11	0.93	11.39
TALLGRASS ENERGY GROUP LP	TGE			1.07	11.35
TC PIPELINES LP	TCP	BBB-	12	0.88	10.46
TRANSCANADA CORP	TRP	BBB+	10	0.85	8.18
WESTERN GAS PARTNERS LP	WES	BBB-	12	1.13	8.02
WILLIAMS COS INC	WMB	BBB	11	1.37	6.54
	Median	BBB	11	1.07	8.54

Source: S&P Compustat, January 2019.

Surviving the screening process are six (6) 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
Hyatt Hotels
Kirby Corp.
MPLX LP
Plains All American Pipeline LP
Western Gas Partners

In addition to performing a DGM analysis for the companies listed above, we performed additional DGM analyses on three (3) other groups of companies as described on page 19.

We used financial data from two independent sources, *Standard and Poor's Compustat* database of approximately 9,092 companies, and the *Value Line Investment Survey* full database of approximately 5,924 companies. The two independent sources of data gave us two sets of

growth estimates for the four 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 DGM 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.[39] For this year's study we also computed a DGM based upon a multi-stage calculation for growth as does the FERC in setting the cost of equity for pipeline companies. The FERC places 67% weight on the IBES 5-year earnings growth rate and 33% weight on the long-term gross domestic product growth rate (4.0%) for corporations and 33% weight on one-half of the long-term gross domestic product growth rate for MLPs. We gave this methodology considerable weight and the results are included in the table below. The multi-stage FERC formula for the growth (G) component of the DGM is shown in Figure 3.

$$Corp \quad G = IBES \times 0.67 + LT\ GDP \times 0.33$$

$$MLP \quad G = IBES \times 0.67 + LT\ GDP \times 0.33 \times 0.50$$

Figure 3

It is our opinion, based on this documented data, that the appropriate cost of equity for the interstate natural gas pipeline industry by the DGM method is **16.00%** as of January 1, 2019. The result of the DGM analysis is shown below and begins on page 51 in the Addendum Section.

DGM Indicators - January 1, 2019

Company Groups	*Value Line* Data		S&P (IBES) Data	
	Average	Median	Average	Median
VL Pipeline MLPs with Natural Gas Operations (Large)	17.48	17.95	39.18	29.23
Interstate Natural Gas Pipeline Forum	22.17	17.79	17.35	13.34
Natural Gas Pipeline Screened Comparables	18.77	18.98	31.25	21.38
S&P 500 Companies with "BBB-" Rated Debt	13.40	11.68	15.23	13.75
Averages	17.96	16.60	25.75	19.43

The dividend growth method for above industry groups were calculated using Value Line data and Value Line earnings estimates and S&P's Compustat data with IBES earnings growth using FERC DGM methodology.

[39] 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.

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

$$K_e = R_f + R_p$$

where

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

Figure 4

Our risk premium calculations included computations for two categories of risk premium indicators — general indicators and indicators for specific groups. The specific groups are the groups described on page 19. Our ex post risk premiums were derived from a simulated *SBBI* methodology as shown on Addendum pages 78 and 79. This risk premium was cross-checked for reasonableness by information from *Value Line*.[40] Our *ex ante* risk premium indicator was derived from the expected cost of equity for the companies making up the *S&P 500* (which are expected to pay dividends). We developed the weighted average cost of capital (weighted by market value) for the *S&P 500*, which was 12.36% (page 34). (*The ex ante risk premium of 9.39%, 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

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[40] In an effort to check the long-term risk premium of 6.95%, 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 12.36% and that the 5-year beta is 1.05 for this database (see statistics for database, *Value Line*, January 2019). Further, we know the long-term treasury bond rate was 2.97% at January 1, 2019. Therefore, we can substitute all the known elements into the CAPM formula and solve for RP as shown in Figure B. The result of this calculation is a risk premium indicator of 8.94%, which well supports the long-term government bond risk premium of 6.95%.

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

Figure A

Solve for R_p

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

$$R_p = \frac{0.1236 - 0.0297}{1.05}$$

$$R_p = 0.0894$$

Figure B

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 2, 2019. 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, 2019). The rounded average yield to maturity for each company's bond rating was added to the corporate bond risk premium of 5.70% (as calculated on page 79) 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 9.92% (ex post) and 12.36% (ex ante). The range for all calculations of risk premium indicators using the indicators by specific company groups are between 10.75% and 11.89%. A reasonable view of these results would indicate a correlated risk premium indicator for the specific company groups to be approximately 11.60%.

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, 2019, was **11.50%**. 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 is in the Addendum Section beginning on page 56.

Summary of Risk Premium Indicators - January 1, 2019

General Risk Premium Indicators

Indicators	Rates		Indicator
	Rf	Rp	
Long-term Treasury Bonds (ex post)	2.97	6.95	9.92
Long-term Treasury Bonds (ex ante)	2.97	9.39	12.36

Risk Premium Indicators by Groups

Indicators	Median S&P Rating		Bloomberg Yields	Risk Prem Indicator
	Rating	Number		
VL Pipeline MLPs with Natural Gas Operations (Large)	BBB-	12	6.19	11.89
Interstate Natural Gas Pipeline Forum	BBB+	10	5.05	10.75
Natural Gas Pipeline Screened Comparables	BBB-	12	6.19	11.89
S&P 500 Companies with "BBB-" Rated Debt	BBB-	12	6.19	11.89
Average	BBB-	12	5.91	11.61

* Base Rate: Average YTM Bloomberg database, Dec. 31, 2018.
Risk Premium Simulated *SBBI* Methodology (see p.79).

Capital Asset Pricing Model

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

$$K_e = R_f + \beta R_p$$

where

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

Figure 4

Our *ex post* CAPM calculations were based upon the long-term risk premium using the data provided by Morningstar and Duff & Phelps, and simulated for 2019 on page 78. The indicated cost of equity by this method was 11.66% at January 1, 2019. Our *ex ante* CAPM calculations were based upon the expected risk premium of 9.39% 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 14.71% at January 1, 2019 (page 34).

Our 'safe rates' for the CAPM calculations were derived as described in the risk premium method discussed earlier. Our beta estimate of 1.25 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 with supporting data on page 58. 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 forward looking. All prospective investment in interstate natural gas pipeline companies is based on an expectation of future benefits. This is consistent with the

Group of Companies	Avg.	Med.
Value Line Betas VL PL MLPs w/NG Oper. (large)	1.45	1.35
Interstate NG PL Forum	1.19	1.05
NG Pipeline Screened Comps.	1.31	1.33
S&P 500 with BBB- rated debt	1.08	1.10
Averages	1.26	1.21

Figure 5 - *Value Line* Betas

fundamental principle underlying the income approach, which is the principle of anticipation. Further, this *ex ante* method is discussed in the *Cost of Capital* as follows:

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

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

Where:	DY	=	dividend yield
	G	=	long-term growth
	K_{e500}	=	cost of equity for the S&P 500

> The second step is to calculate the risk premium of the S&P 500 (RP_{500}). For the CAPM, the ex ante risk premium is calculated by subtracting the risk-free rate (R_f), from the cost of equity for the S&P 500. For the build up method, the ex ante risk premium is calculated by subtracting the weighted average bond yield for the S&P 500 from the cost of equity for the S&P 500.[41]

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

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

In order to perform the *ex ante* CAPM indicator we derived the expected cost of equity for the companies making up the *S&P 500* (which are expected to pay dividends). We developed the weighted average cost of capital (weighted by market value) for the *S&P 500*, which was 12.36%. We then subtracted the current long-term Treasury bond rate of 2.97% to obtain the expected equity risk premium of 9.39% (page 34). 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.

Finally, we considered the Standard & Poor's own capital asset pricing model computed independently by Standard & Poor's as part of their Research Insight (Compustat) subscription service. Standard and Poor's describes their CAPM as, "*a method of determining the expected rate of return for an asset at a given level of risk. Essentially, the Cost of Capital is based on: Risk Free Rate + Beta (Market Risk Premium).*" [Compustat North America Data and Reference, Capital Asset Pricing Model] Supporting data for the S&P CAPM indicators begins on page 61.

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 **12.50%** at January 1, 2019. This conclusion gives weight and consideration to both indicators. A summary of the CAPM indicators and the supporting data begins below and on page 61 in the addendum section.

Summary of CAPM Indicators - January 1, 2019

Item	Rates			CAPM Indicator
	Rf	Rp	Beta	
CAPM Indicator *				
Long-Term Gov't Bonds (ex post)	2.97	6.95	1.25	11.66
Long-Term Gov't Bonds (ex ante)	2.97	9.39	1.25	14.71

CAPM Formula: Ke = Rf + B(Rp)
* CAPM Indicator is based upon a *Value Line* beta of 1.25 & Federal Reserve data 1-2-19.

S&P CAPM indicator computed independently by S&P

Company Groups	S&P CAPM (Medians)
VL Pipeline MLPs with Natural Gas Operations (Large)	14.78
Interstate Natural Gas Pipeline Forum	10.96
Natural Gas Pipeline Screened Comparables	13.71
S&P 500 Companies with "BBB-" Rated Debt	13.64
Average	13.27

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

CAPM Calculations:

S&P 500 Expected Equity Cost (Wt. Avg)	12.36		**LT Gov't.**		**Cost of Equity by**	
Current Yield on L-T Gov't. Bonds	2.97		**Bond Yield**		**CAPM**	
Expected Equity Risk Premium	9.39					
Beta	1.25					
Adjusted Risk Premium	11.74	+	2.97	=	14.71	*Ex Ante*

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

(Calculations for expected market return for S&P 500 can be found beginning on page 64.)

Source: *Value Line* (January 2019).

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.[42]

> 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.[43]

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)*.[44]

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

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

[44] 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.[45]

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.[46]

> 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.[47] [This identical quote is also found in *Fundamentals of Financial Management*, 9th ed. (Dryden Press) by Eugene F. Brigham and Joel F.

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

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

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

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).[48]

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.[49]

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

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

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

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

of Assessing Officers.[50]

Flotation Cost Measurement

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

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

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

As one can see from the above mathematical example the same $950 value results in either case. Actually, it is wrong to presuppose that one knows how much flotation cost to deduct in a valuation problem because in order to know exactly how much flotation cost will be, one has to

[50] 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.

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 1.00% and the average issuance cost of common equity to be 4.15%. We selected 1.00% and 4.15% to be representative of the typical flotation cost associated with the issuance of long-term debt and common stock securities, respectively.

Beginning on page 72 in the Addendum Section are the schedules detailing the long-term debt and common stock flotation costs. Incorporating the flotation costs into our cost of capital study is computed and the result is shown in the table below.

Cost of Capital Including Flotation Costs			
Capital	**Portion**	**Cost**	**Product**
Debt	37.00%	6.15%	2.28%
Equity	63.00%	13.30%	8.38%
Totals	100.00%		10.66%

Including flotation cost in the cost of capital requires an adjustment to compensate for the expense is issuing of debt and equity. This is in accordance with virtually all finance texts, as well as the practices of state and federal regulatory commissions, and the adjustment is necessary to properly match income and rate in the capitalization process for property tax appraisals. Including flotation cost adds approximately 0.35% (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 was10.66% (rounded to **10.65%**) at January 1, 2019.

Addendum Section

VL Pipeline MLPs with Natural Gas Operations (Large)
Capital Structure (VL Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
BP Midstream Partners LP	BPMP	0.41%	0.00%	99.59%
CNX Midstream Partners LP	CNXM	27.79%	0.00%	72.21%
DCP Midstream LP	DCP	50.17%	0.00%	49.83%
Dominion Energy Midstream	DM	54.76%	0.00%	45.24%
Enable Midstream Part.	ENBL	30.34%	0.00%	69.66%
Energy Transfer LP	ET	51.59%	0.00%	48.41%
EnLink Midstream Part.	ENLK	45.24%	0.00%	54.76%
Enterprise Products	EPD	27.57%	0.00%	72.43%
EQT Midstream Part.	EQM	38.92%	0.00%	61.08%
MPLX LP	MPLX	32.57%	0.00%	67.43%
Oasis Midstream Partners LP	OMP	23.70%	0.00%	76.30%
Tallgrass Energy LP	TGE	45.29%	0.00%	54.71%
TC PipeLines LP	TCP	48.45%	0.00%	51.55%
Western Gas Part.	WES	36.06%	0.00%	63.94%
	Average	36.63%	0.00%	63.37%
	Median	37.49%	0.00%	62.51%

Source: Value Line, January 2019.

VL Pipeline MLPs with Natural Gas Operations (Large)
Capital Structure (S&P Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
BP MIDSTREAM PARTNERS	BPMP	0.00%	0.00%	100.00%
CNX MIDSTREAM PARTNERS LP	CNXM	29.67%	0.00%	70.33%
DCP MIDSTREAM LP	DCP	50.69%	7.25%	42.06%
DOMINION ENRG MIDSTRM PRT LP	DM	51.68%	14.85%	33.47%
ENABLE MIDSTREAM PARTNERS LP	ENBL	31.64%	3.98%	64.39%
ENERGY TRANSFER LP	ET	73.35%	0.00%	26.65%
ENLINK MIDSTREAM PARTNERS LP	ENLK	42.58%	14.27%	43.15%
ENTERPRISE PRODS PRTNRS -LP	EPD	29.55%	0.00%	70.45%
EQT MIDSTREAM PARTNERS LP	EQM	40.03%	0.00%	59.97%
MPLX LP	MPLX	33.96%	2.64%	63.40%
OASIS MIDSTREAM PARTNR	OMP	27.38%	0.00%	72.62%
TALLGRASS ENERGY GROUP LP	TGE	44.43%	0.00%	55.57%
TC PIPELINES LP	TCP	48.46%	0.00%	51.54%
WESTERN GAS PARTNERS LP	WES	39.35%	0.00%	60.65%
	Average	38.77%	3.07%	58.16%
	Median	39.69%	0.00%	60.31%

Source: S&P Compustat, January 2019.

Interstate Natural Gas Pipeline Forum
Capital Structure (VL Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
CenterPoint Energy	CNP	36.39%	0.00%	63.61%
Dominion Energy	D	41.30%	0.00%	58.70%
Enbridge Inc.	ENB.TO			
Kinder Morgan Inc.	KMI	48.31%	0.00%	51.69%
MDU Resources	MDU	28.65%	0.00%	71.35%
ONEOK Inc.	OKE	25.29%	0.00%	74.71%
TransCanada Corp.	TRP			
Williams Cos.	WMB	41.39%	0.00%	58.61%
	Average	36.89%	0.00%	63.11%
	Median	38.85%	0.00%	61.16%

Source: Value Line, January 2019.

Interstate Natural Gas Pipeline Forum
Capital Structure (S&P Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
CENTERPOINT ENERGY INC	CNP	35.86%	3.91%	60.24%
DOMINION ENERGY INC	D	40.75%	0.00%	59.25%
ENBRIDGE INC	ENB	42.38%	5.59%	52.03%
KINDER MORGAN INC	KMI	50.97%	0.00%	49.03%
MDU RESOURCES GROUP INC	MDU	29.03%	0.00%	70.97%
ONEOK INC	OKE	27.28%	0.00%	72.72%
TRANSCANADA CORP	TRP	47.77%	4.50%	47.73%
WILLIAMS COS INC	WMB	44.49%	0.07%	55.44%
	Average	39.82%	1.76%	58.43%
	Median	41.57%	0.04%	57.35%

Source: S&P Compustat, January 2019.

Natural Gas Pipeline Screened Comparables
Capital Structure (VL Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
Buckeye Partners L.P.	BPL	51.25%	0.00%	48.75%
Hyatt Hotels	H	17.81%	0.00%	82.19%
Kirby Corp.	KEX	25.38%	0.00%	74.62%
MPLX LP	MPLX	32.30%	0.00%	67.70%
Plains All Amer. Pipe.	PAA	35.28%	0.00%	64.72%
Western Gas Part.	WES	35.98%	0.00%	64.02%
	Average	33.00%	0.00%	67.00%
	Median	33.79%	0.00%	66.21%

Source: Value Line, January 2019.

Natural Gas Pipeline Screened Comparables
Capital Structure (S&P Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
BUCKEYE PARTNERS LP	BPL	52.81%	0.00%	47.19%
HYATT HOTELS CORP	H	17.81%	0.00%	82.19%
KIRBY CORP	KEX	25.76%	0.00%	74.24%
MPLX LP	MPLX	33.96%	2.64%	63.40%
PLAINS ALL AMER PIPELNE -LP	PAA	35.18%	8.82%	56.00%
WESTERN GAS PARTNERS LP	WES	39.35%	0.00%	60.65%
	Average	34.15%	1.91%	63.95%
	Median	34.57%	0.00%	62.03%

Source: S&P Compustat, January 2019.

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

Capital Structure (VL Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
Advance Auto Parts	AAP	7.99%	0.00%	92.01%
Amer. Tower 'A'	AMT	20.52%	0.00%	79.48%
Apartment Investment	AIV			
Broadcom Inc.	AVGO	14.51%	0.00%	85.49%
Cimarex Energy	XEC	18.09%	0.00%	81.91%
Conagra Brands	CAG	52.55%	0.00%	47.45%
Crown Castle Int'l	CCI	26.89%	0.00%	73.11%
Delta Air Lines	DAL	19.54%	0.00%	80.46%
Discover Fin'l Svcs.	DFS	55.46%	1.16%	43.38%
Flowserve Corp.	FLS	20.91%	0.00%	79.09%
FMC Corp.	FMC	19.27%	0.00%	80.73%
Harris Corp.	HRS	17.69%	0.00%	82.31%
HollyFrontier Corp.	HFC	20.57%	0.00%	79.43%
Huntington Ingalls	HII	13.41%	0.00%	86.59%
Kohl's Corp.	KSS	25.71%	0.00%	74.29%
Molson Coors Brewing	TAP	39.81%	0.00%	60.19%
Mosaic Company	MOS	27.10%	0.00%	72.90%
Motorola Solutions	MSI	20.95%	0.00%	79.05%
Newell Brands	NWL	48.00%	0.00%	52.00%
PVH Corp.	PVH	27.71%	0.00%	72.29%
Synchrony Financial	SYF	56.19%	0.00%	43.81%
Tapestry Inc.	TPR	13.27%	0.00%	86.73%
Total System Svcs.	TSS	20.03%	0.00%	79.97%
Viacom Inc. 'B'	VIAB	45.98%	0.00%	54.02%
	Average	27.48%	0.05%	72.46%
	Median	20.91%	0.00%	79.09%

Source: Value Line, January 2019.

S&P 500 Companies with "BBB-" Rated Debt
Capital Structure (S&P Data) - January 1, 2019

Company Name	Ticker	LTD %	PS %	CS %
ADVANCE AUTO PARTS INC	AAP	8.35%	0.00%	91.65%
AMERICAN TOWER CORP	AMT	20.90%	0.00%	79.10%
APARTMENT INVST & MGMT CO	AIV	34.16%	1.17%	64.67%
BROADCOM INC	AVGO	14.43%	0.00%	85.57%
CIMAREX ENERGY CO	XEC	20.16%	0.00%	79.84%
CONAGRA BRANDS INC	CAG	52.67%	0.00%	47.33%
CROWN CASTLE INTL CORP	CCI	26.57%	0.00%	73.43%
DELTA AIR LINES INC	DAL	19.17%	0.00%	80.83%
DISCOVER FINANCIAL SVCS	DFS	56.85%	1.19%	41.97%
FLOWSERVE CORP	FLS	22.45%	0.00%	77.55%
FMC CORP	FMC	20.66%	0.00%	79.34%
HARRIS CORP	HRS	17.72%	0.00%	82.28%
HOLLYFRONTIER CORP	HFC	21.27%	0.00%	78.73%
HUNTINGTON INGALLS IND INC	HII	13.54%	0.00%	86.46%
KOHL'S CORP	KSS	25.77%	0.00%	74.23%
MOLSON COORS BREWING CO	TAP	42.53%	0.00%	57.47%
MOSAIC CO	MOS	28.66%	0.00%	71.34%
MOTOROLA SOLUTIONS INC	MSI	21.31%	0.00%	78.69%
NEWELL BRANDS INC	NWL	51.72%	0.00%	48.28%
PVH CORP	PVH	28.97%	0.00%	71.03%
SYNCHRONY FINANCIAL	SYF	51.62%	0.00%	48.38%
TAPESTRY INC	TPR	14.06%	0.00%	85.94%
TOTAL SYSTEM SERVICES INC	TSS	20.71%	0.00%	79.29%
VIACOM INC	VIAB	47.88%	0.00%	52.12%
	Average	28.42%	0.10%	71.48%
	Median	21.88%	0.00%	78.12%

Source: S&P Compustat, January 2019.

Long-Term Debt Ratings at January 1, 2019
VL Pipeline MLPs with Natural Gas Operations (Large)

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
BP MIDSTREAM PARTNERS	BPMP					
CNX MIDSTREAM PARTNERS LP	CNXM	BB-	15	B3	18	9.87
DCP MIDSTREAM LP	DCP	BB	14	Ba2	14	6.65
DOMINION ENRG MIDSTRM PRT LP	DM					
ENABLE MIDSTREAM PARTNERS LP	ENBL	BBB-	12	Baa3	12	6.19
ENERGY TRANSFER LP	ET	BBB-	12	Baa3	12	6.19
ENLINK MIDSTREAM PARTNERS LP	ENLK	BB+	13	Ba1	13	6.91
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	Baa1	10	5.05
EQT MIDSTREAM PARTNERS LP	EQM	BBB-	12	Ba1	13	6.19
MPLX LP	MPLX	BBB	11	Baa2	11	5.65
OASIS MIDSTREAM PARTNR	OMP					
TALLGRASS ENERGY GROUP LP	TGE			Ba3	15	
TC PIPELINES LP	TCP	BBB-	12	Baa2	11	6.19
WESTERN GAS PARTNERS LP	WES	BBB-	12	Ba1	13	6.19
	Average	BBB-	12	Ba1	13	6.19
	Median	BBB-	12	Ba1	13	6.19

Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

Long-Term Debt Ratings at January 1, 2019
Interstate Natural Gas Pipeline Forum (Pipelines)

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
CENTERPOINT ENERGY INC	CNP	A-	9	A1	7	4.75
DOMINION ENERGY INC	D	BBB+	10			5.05
ENBRIDGE INC	ENB	BBB+	10	Baa2	11	5.05
KINDER MORGAN INC	KMI	BBB	11	Baa2	11	5.65
MDU RESOURCES GROUP INC	MDU	BBB+	10			5.05
ONEOK INC	OKE	BBB	11	Baa3	12	5.65
TRANSCANADA CORP	TRP	BBB+	10	Baa2	11	5.05
WILLIAMS COS INC	WMB	BBB	11	Baa3	12	5.65
	Average	BBB+	10	Baa2	11	5.05
	Median	BBB+	10	Baa2	11	5.05

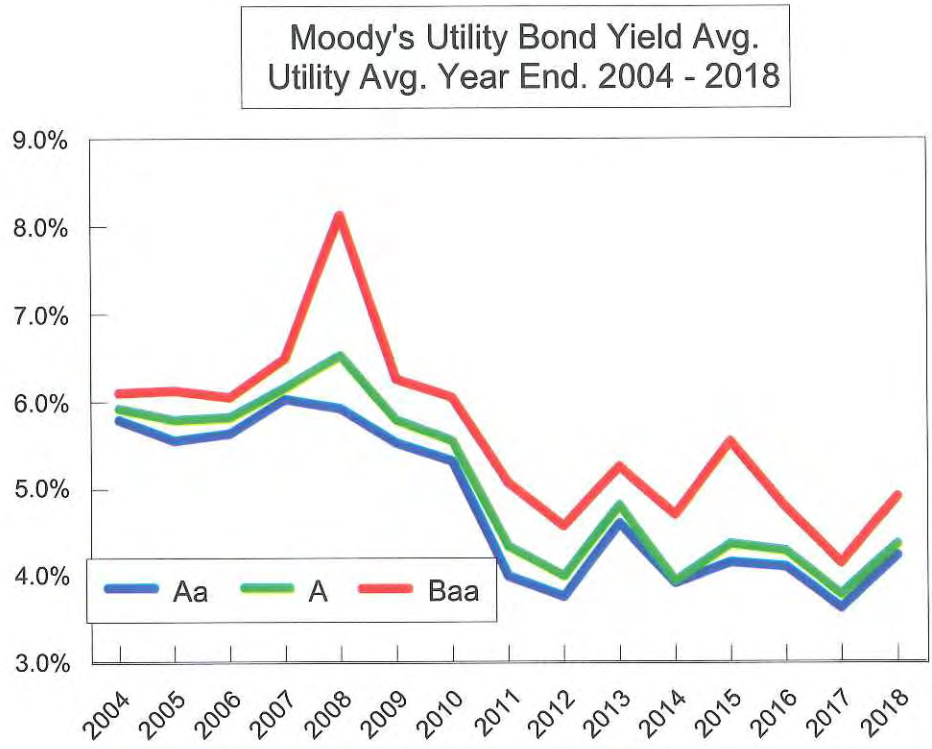
Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

Long-Term Debt Ratings at January 1, 2019
Natural Gas Pipeline Screened Comparables

Company Name	Ticker	S&P Rating	Numerical Rating	Mergent Rating	Numerical Rating	Bloomberg Yields
BUCKEYE PARTNERS LP	BPL	BBB-	12	Baa3	12	6.19
HYATT HOTELS CORP	H	BBB	11	Baa2	11	5.65
KIRBY CORP	KEX	BBB	11	Baa2	11	5.65
MPLX LP	MPLX	BBB	11	Baa2	11	5.65
PLAINS ALL AMER PIPELNE -LP	PAA	BBB-	12	Ba1	13	6.19
WESTERN GAS PARTNERS LP	WES	BBB-	12	Ba1	13	6.19
	Average	BBB-	12	Baa3	12	6.19
	Median	BBB-	12	Baa3	12	6.19

Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

Mergent Utility Bond Yields

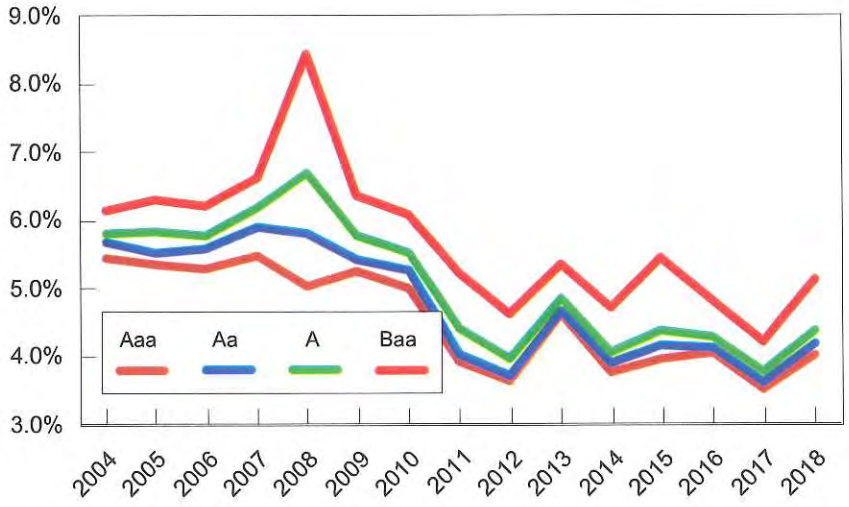


Public Utility Bond Yields - Year End Data (2004 - 2018)			
Date	**Aa**	**A**	**Baa**
2004	5.78%	5.92%	6.10%
2005	5.55%	5.80%	6.14%
2006	5.62%	5.81%	6.05%
2007	6.03%	6.16%	6.51%
2008	5.93%	6.54%	8.13%
2009	5.52%	5.79%	6.26%
2010	5.32%	5.56%	6.04%
2011	4.00%	4.33%	5.07%
2012	3.75%	4.00%	4.56%
2013	4.59%	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%
2017	3.62%	3.79%	4.14%
2018	4.24%	4.37%	4.92%

Source: Mergent's Bond Record, January 2005 - 2019

Mergent Corporate Bond Yields

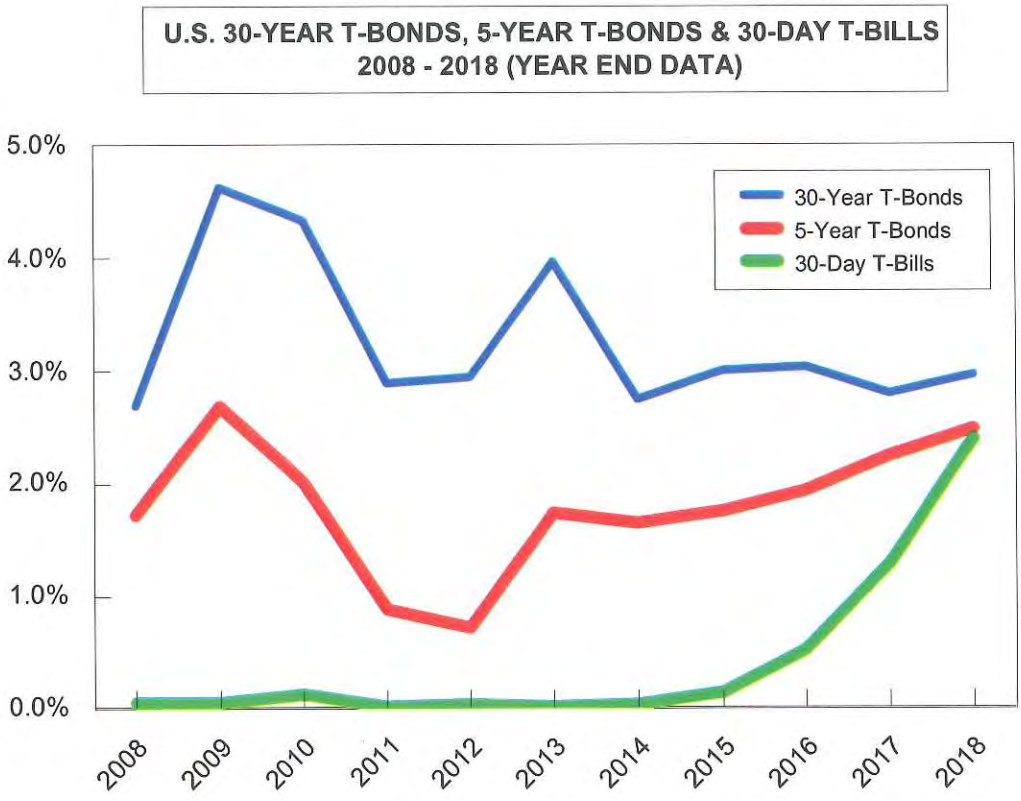
Moody's Corporate Bond Yield Avg.
Corp. Avg. Year End. 2004 - 2018



Corp. Bond Yields - Year End Data (2004 - 2018)				
Year End	Aaa	Aa	A	Baa
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%
2017	3.51%	3.61%	3.79%	4.22%
2018	4.02%	4.20%	4.37%	5.13%

Source: Mergent's Bond Record, January 2005 - 2019

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



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

Year End Date	30-Year T-Bonds	5 -Year T-Bonds	30-DAY T-Bills
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%
2017	2.81%	2.25%	1.29%
2018	2.97%	2.49%	2.40%

Source: Federal Reserve, Jan.2, 2019.

VL Pipeline MLPs with Natural Gas Operations (Large)
DGM Indicators (VL Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
BP Midstream Partners LP	BPMP		10.00		8.02
CNX Midstream Partners LP	CNXM		14.00		10.70
DCP Midstream LP	DCP	11.62	13.50	25.12	21.99
Dominion Energy Midstream	DM				
Enable Midstream Part.	ENBL	9.32	18.00	27.32	22.70
Energy Transfer LP	ET	9.29	17.50	26.79	22.34
EnLink Midstream Part.	ENLK	13.50			
Enterprise Products	EPD	6.91	12.00	18.91	16.27
EQT Midstream Part.	EQM	11.50	4.50	16.00	15.84
MPLX LP	MPLX	8.23	26.50	34.73	27.31
Oasis Midstream Partners LP	OMP		13.00		10.03
Tallgrass Energy LP	TGE				
TC PipeLines LP	TCP				
Western Gas Part.	WES	9.27	13.50	22.77	19.64
	Average	9.96	14.25	24.52	17.48
	Median	9.31	13.50	25.12	17.95

Source: Value Line, January 2019.

VL Pipeline MLPs with Natural Gas Operations (Large)
DGM Indicator (S&P Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
BP MIDSTREAM PARTNERS	BPMP	14.85	97.86	112.70	81.07
CNX MIDSTREAM PARTNERS LP	CNXM				
DCP MIDSTREAM LP	DCP	19.80	68.11	87.91	66.09
DOMINION ENRG MIDSTRM PRT LP	DM				
ENABLE MIDSTREAM PARTNERS LP	ENBL	10.16	8.10	18.26	16.25
ENERGY TRANSFER LP	ET	10.75	16.39	27.14	22.39
ENLINK MIDSTREAM PARTNERS LP	ENLK				
ENTERPRISE PRODS PRTNRS -LP	EPD	7.50	6.60	14.10	12.58
EQT MIDSTREAM PARTNERS LP	EQM				
MPLX LP	MPLX	11.43	35.80	47.23	36.07
OASIS MIDSTREAM PARTNR	OMP	16.77	55.91	72.68	54.89
TALLGRASS ENERGY GROUP LP	TGE	8.61	2.70	11.31	11.08
TC PIPELINES LP	TCP	8.85	9.30	18.15	15.74
WESTERN GAS PARTNERS LP	WES	17.05	86.51	103.56	75.67
	Average	12.58	38.73	51.30	39.18
	Median	11.09	26.10	37.19	29.23

Source: S&P Compustat, January 2019.

Interstate Natural Gas Pipeline Forum
DGM Indicator (VL Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
CenterPoint Energy	CNP	4.08	3.50	7.58	7.75
Dominion Energy	D	5.19	6.50	11.69	10.87
Enbridge Inc.	ENB.TO	6.87	4.50	11.37	11.21
Kinder Morgan Inc.	KMI	5.09	57.00	62.09	44.60
MDU Resources	MDU	3.38	14.00	17.38	14.09
ONEOK Inc.	OKE	6.44	20.50	26.94	21.50
TransCanada Corp.	TRP	5.82	56.50	62.32	44.99
Williams Cos.	WMB	6.01	22.50	28.51	22.41
	Average	5.36	23.13	28.49	22.17
	Median	5.51	17.25	22.16	17.79

Source: Value Line, January 2019.

Interstate Natural Gas Pipeline Forum
DGM Indicator (S&P Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
CENTERPOINT ENERGY INC	CNP	4.33	10.05	14.38	12.38
DOMINION ENERGY INC	D	5.02	7.37	12.39	11.28
ENBRIDGE INC	ENB	7.54	15.53	23.07	19.26
KINDER MORGAN INC	KMI	5.83	12.00	17.83	15.19
MDU RESOURCES GROUP INC	MDU				
ONEOK INC	OKE	8.92	40.64	49.55	37.46
TRANSCANADA CORP	TRP	6.10	7.60	13.70	12.51
WILLIAMS COS INC	WMB	6.66	8.00	14.66	13.34
	Average	6.34	14.46	20.80	17.35
	Median	6.10	10.05	14.66	13.34

Source: S&P Compustat, January 2019.

Natural Gas Pipeline Screened Comparables
DGM Indicator (VL Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
Buckeye Partners L.P.	BPL	10.02	2.00	12.02	12.02
Hyatt Hotels	H	0.92	18.00	18.92	14.30
Kirby Corp.	KEX		12.00		
MPLX LP	MPLX	8.23	26.50	34.73	26.64
Plains All Amer. Pipe.	PAA	5.86	23.00	28.86	21.93
Western Gas Part.	WES	9.27	13.50	22.77	18.98
	Average	6.86	15.83	23.46	18.77
	Median	8.23	15.75	22.77	18.98

Source: Value Line, January 2019.

Natural Gas Pipeline Screened Comparables
DGM Indicator (S&P Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
BUCKEYE PARTNERS LP	BPL	10.41	0.58	10.99	11.46
HYATT HOTELS CORP	H	1.01	13.90	14.92	11.65
KIRBY CORP	KEX		23.90		
MPLX LP	MPLX	11.43	35.80	47.23	36.07
PLAINS ALL AMER PIPELNE -LP	PAA	7.20	20.18	27.38	21.38
WESTERN GAS PARTNERS LP	WES	17.05	86.51	103.56	75.67
	Average	9.42	30.15	40.82	31.25
	Median	10.41	22.04	27.38	21.38

Source: S&P Compustat, January 2019.

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

DGM Indicator (VL Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
Advance Auto Parts	AAP	0.14	13.00	13.14	10.17
Amer. Tower 'A'	AMT	2.18	11.50	13.68	11.21
Apartment Investment	AIV	3.55	5.50	9.05	8.56
Broadcom Inc.	AVGO	4.59	47.50	52.09	37.74
Cimarex Energy	XEC	1.16	39.00	40.16	28.61
Conagra Brands	CAG	4.08	5.50	9.58	9.09
Crown Castle Int'l	CCI	4.32	12.00	16.32	13.68
Delta Air Lines	DAL	3.07	10.50	13.57	11.43
Discover Fin'l Svcs.	DFS	2.73	8.00	10.73	9.41
Flowserve Corp.	FLS	2.08	7.50	9.58	8.43
FMC Corp.	FMC	2.19	22.50	24.69	18.59
Harris Corp.	HRS	2.10	13.50	15.60	12.47
HollyFrontier Corp.	HFC	2.75	25.00	27.75	20.82
Huntington Ingalls	HII	1.82	12.50	14.32	11.52
Kohl's Corp.	KSS	3.94	10.50	14.44	12.30
Molson Coors Brewing	TAP	3.19	11.00	14.19	11.88
Mosaic Company	MOS	0.70	12.00	12.70	10.06
Motorola Solutions	MSI	2.05	13.00	15.05	12.08
Newell Brands	NWL	5.03	9.50	14.53	12.72
PVH Corp.	PVH	0.16	11.00	11.16	8.85
Synchrony Financial	SYF	3.48	10.50	13.98	11.84
Tapestry Inc.	TPR	4.08	13.00	17.08	14.11
Total System Svcs.	TSS	0.66	10.50	11.16	9.02
Viacom Inc. 'B'	VIAB	3.03	4.00	7.03	7.03
	Average	2.63	14.10	16.73	13.40
	Median	2.74	11.25	14.09	11.68

Source: Value Line, January 2019.

S&P 500 Companies with "BBB-" Rated Debt
DGM Indicator (S&P Data) - January 1, 2019

Company Name	Ticker	% Cur Yld	EPS Gth	SS DGM	MS DGM
ADVANCE AUTO PARTS INC	AAP	0.18	17.15	17.33	12.99
AMERICAN TOWER CORP	AMT	2.28	7.13	9.41	8.37
APARTMENT INVST & MGMT CO	AIV	3.71	7.10	10.81	9.79
BROADCOM INC	AVGO	4.83	15.77	20.59	16.71
CIMAREX ENERGY CO	XEC	1.41	20.66	22.07	16.57
CONAGRA BRANDS INC	CAG	4.23	6.30	10.53	9.77
CROWN CASTLE INTL CORP	CCI	5.04	21.75	26.79	20.94
DELTA AIR LINES INC	DAL	3.29	17.18	20.47	16.12
DISCOVER FINANCIAL SVCS	DFS	3.22	18.60	21.82	17.00
FLOWSERVE CORP	FLS	2.50	24.91	27.41	20.51
FMC CORP	FMC	2.76	27.50	30.26	22.50
HARRIS CORP	HRS	2.38	16.92	19.30	15.04
HOLLYFRONTIER CORP	HFC	3.76	45.56	49.32	35.60
HUNTINGTON INGALLS IND INC	HII	2.02	11.61	13.63	11.12
KOHL'S CORP	KSS	4.06	10.52	14.58	12.43
MOLSON COORS BREWING CO	TAP	3.07	5.24	8.31	7.90
MOSAIC CO	MOS	0.45	31.00	31.45	22.54
MOTOROLA SOLUTIONS INC	MSI	2.28	15.03	17.31	13.67
NEWELL BRANDS INC	NWL	5.28	6.70	11.98	11.09
PVH CORP	PVH	0.18	12.90	13.08	10.15
SYNCHRONY FINANCIAL	SYF	4.38	22.20	26.58	20.57
TAPESTRY INC	TPR	4.39	9.68	14.07	12.19
TOTAL SYSTEM SERVICES INC	TSS	0.75	17.54	18.29	13.82
VIACOM INC	VIAB	3.27	5.10	8.37	8.01
	Average	2.91	16.42	19.32	15.23
	Median	3.15	16.35	17.81	13.75

Source: S&P Compustat, January 2019.

Risk Premium Indicators - January 1, 2019
VL Pipeline MLPs with Natural Gas Operations (Large)

Company Name	Ticker	S&P Rating	Numerical Rating	Bloomberg Yields	Risk Prem Indicator
BP MIDSTREAM PARTNERS	BPMP				
CNX MIDSTREAM PARTNERS LP	CNXM	BB-	15	9.87	15.57
DCP MIDSTREAM LP	DCP	BB	14	6.65	12.35
DOMINION ENRG MIDSTRM PRT LP	DM				
ENABLE MIDSTREAM PARTNERS LP	ENBL	BBB-	12	6.19	11.89
ENERGY TRANSFER LP	ET	BBB-	12	6.19	11.89
ENLINK MIDSTREAM PARTNERS LP	ENLK	BB+	13	6.91	12.61
ENTERPRISE PRODS PRTNRS -LP	EPD	BBB+	10	5.05	10.75
EQT MIDSTREAM PARTNERS LP	EQM	BBB-	12	6.19	11.89
MPLX LP	MPLX	BBB	11	5.65	11.35
OASIS MIDSTREAM PARTNR	OMP				
TALLGRASS ENERGY GROUP LP	TGE				
TC PIPELINES LP	TCP	BBB-	12	6.19	11.89
WESTERN GAS PARTNERS LP	WES	BBB-	12	6.19	11.89
	Average	BBB-	12	6.19	11.89
	Median	BBB-	12	6.19	11.89

Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

Risk Premium Indicator - January 1, 2019
Interstate Natural Gas Pipeline Forum (Pipelines)

Company Name	Ticker	S&P Rating	Numerical Rating	Bloomberg Yields	Risk Prem Indicator
CENTERPOINT ENERGY INC	CNP	A-	9	4.75	10.45
DOMINION ENERGY INC	D	BBB+	10	5.05	10.75
ENBRIDGE INC	ENB	BBB+	10	5.05	10.75
KINDER MORGAN INC	KMI	BBB	11	5.65	11.35
MDU RESOURCES GROUP INC	MDU	BBB+	10	5.05	10.75
ONEOK INC	OKE	BBB	11	5.65	11.35
TRANSCANADA CORP	TRP	BBB+	10	5.05	10.75
WILLIAMS COS INC	WMB	BBB	11	5.65	11.35
	Average	BBB+	10	5.05	10.75
	Median	BBB+	10	5.05	10.75

Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

Risk Premium Indicator - January 1, 2019
Natural Gas Pipeline Screened Comparables

Company Name	Ticker	S&P Rating	Numerical Rating	Bloomberg Yields	Risk Prem Indicator
BUCKEYE PARTNERS LP	BPL	BBB-	12	6.19	11.89
HYATT HOTELS CORP	H	BBB	11	5.65	11.35
KIRBY CORP	KEX	BBB	11	5.65	11.35
MPLX LP	MPLX	BBB	11	5.65	11.35
PLAINS ALL AMER PIPELNE -LP	PAA	BBB-	12	6.19	11.89
WESTERN GAS PARTNERS LP	WES	BBB-	12	6.19	11.89
	Average	BBB-	12	6.19	11.89
	Median	BBB-	12	6.19	11.89

Source: S&P Compustat, Mergent, & Bloomberg, January 2019.

VL Pipeline MLPs with Natural Gas Operations (Large)
Beta (Value Line) - January 1, 2019

Company Name	Ticker	Beta
BP Midstream Partners LP	BPMP	
CNX Midstream Partners LP	CNXM	1.30
DCP Midstream LP	DCP	1.60
Dominion Energy Midstream	DM	1.20
Enable Midstream Part.	ENBL	1.25
Energy Transfer LP	ET	2.20
EnLink Midstream Part.	ENLK	1.70
Enterprise Products	EPD	1.30
EQT Midstream Part.	EQM	1.25
MPLX LP	MPLX	1.40
Oasis Midstream Partners LP	OMP	
Tallgrass Energy LP	TGE	1.65
TC PipeLines LP	TCP	1.20
Western Gas Part.	WES	1.40
	Average	1.45
	Median	1.35

Source: Value Line, January 2019.

Interstate Natural Gas Pipeline Forum
Beta (Value Line) - January 1, 2019

Company Name	Ticker	Beta
CenterPoint Energy	CNP	0.85
Dominion Energy	D	0.60
Enbridge Inc.	ENB.TO	1.00
Kinder Morgan Inc.	KMI	1.45
MDU Resources	MDU	1.00
ONEOK Inc.	OKE	1.55
TransCanada Corp.	TRP	1.10
Williams Cos.	WMB	1.95
	Average	1.19
	Median	1.05

Source: Value Line, January 2019.

Natural Gas Pipeline Screened Comparables
Beta (Value Line) - January 1, 2019

Company Name	Ticker	Beta
Buckeye Partners L.P.	BPL	1.25
Hyatt Hotels	H	1.15
Kirby Corp.	KEX	1.15
MPLX LP	MPLX	1.40
Plains All Amer. Pipe.	PAA	1.50
Western Gas Part.	WES	1.40
	Average	1.31
	Median	1.33

Source: Value Line, January 2019.

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

Beta (Value Line) - January 1, 2019

Company Name	Ticker	Beta
Advance Auto Parts	AAP	0.95
Amer. Tower 'A'	AMT	0.90
Apartment Investment	AIV	0.80
Broadcom Inc.	AVGO	1.10
Cimarex Energy	XEC	1.45
Conagra Brands	CAG	
Crown Castle Int'l	CCI	0.80
Delta Air Lines	DAL	1.20
Discover Fin'l Svcs.	DFS	1.10
Flowserve Corp.	FLS	1.40
FMC Corp.	FMC	1.30
Harris Corp.	HRS	1.00
HollyFrontier Corp.	HFC	1.15
Huntington Ingalls	HII	1.05
Kohl's Corp.	KSS	1.05
Molson Coors Brewing	TAP	0.90
Mosaic Company	MOS	1.35
Motorola Solutions	MSI	0.95
Newell Brands	NWL	1.10
PVH Corp.	PVH	1.10
Synchrony Financial	SYF	1.10
Tapestry Inc.	TPR	1.00
Total System Svcs.	TSS	1.00
Viacom Inc. 'B'	VIAB	1.15
	Average	1.08
	Median	1.10

Source: Value Line, January 2019.

VL Pipeline MLPs with Natural Gas Operations (Large)
S&P CAPM Indicators - January 1, 2019

Company Name	Ticker	S&P CAPM
BP MIDSTREAM PARTNERS	BPMP	
CNX MIDSTREAM PARTNERS LP	CNXM	16.05
DCP MIDSTREAM LP	DCP	21.38
DOMINION ENRG MIDSTRM PRT LP	DM	15.62
ENABLE MIDSTREAM PARTNERS LP	ENBL	15.32
ENERGY TRANSFER LP	ET	17.71
ENLINK MIDSTREAM PARTNERS LP	ENLK	19.81
ENTERPRISE PRODS PRTNRS -LP	EPD	12.00
EQT MIDSTREAM PARTNERS LP	EQM	13.51
MPLX LP	MPLX	14.20
OASIS MIDSTREAM PARTNR	OMP	
TALLGRASS ENERGY GROUP LP	TGE	13.61
TC PIPELINES LP	TCP	11.70
WESTERN GAS PARTNERS LP	WES	14.23
	Average	15.43
	Median	14.78

Source: S&P Compustat, January 2019.

Interstate Natural Gas Pipeline Forum
S&P CAPM Indicators - January 1, 2019

Company Name	Ticker	S&P CAPM
CENTERPOINT ENERGY INC	CNP	8.88
DOMINION ENERGY INC	D	7.86
ENBRIDGE INC	ENB	9.92
KINDER MORGAN INC	KMI	11.26
MDU RESOURCES GROUP INC	MDU	10.65
ONEOK INC	OKE	12.20
TRANSCANADA CORP	TRP	11.44
WILLIAMS COS INC	WMB	16.63
	Average	11.11
	Median	10.96

Source: S&P Compustat, January 2019.

Natural Gas Pipeline Screened Comparables
S&P CAPM Indicators - January 1, 2019

Company Name	Ticker	S&P CAPM
BUCKEYE PARTNERS LP	BPL	13.04
HYATT HOTELS CORP	H	14.28
KIRBY CORP	KEX	13.21
MPLX LP	MPLX	14.20
PLAINS ALL AMER PIPELNE -LP	PAA	13.03
WESTERN GAS PARTNERS LP	WES	14.23
	Average	13.67
	Median	13.71

Source: S&P Compustat, January 2019.

S&P 500 Companies with "BBB-" Rated Debt
S&P CAPM Indicators - January 1, 2019

Company Name	Ticker	S&P CAPM
ADVANCE AUTO PARTS INC	AAP	13.65
AMERICAN TOWER CORP	AMT	10.57
APARTMENT INVST & MGMT CO	AIV	10.05
BROADCOM INC	AVGO	11.37
CIMAREX ENERGY CO	XEC	15.18
CONAGRA BRANDS INC	CAG	10.36
CROWN CASTLE INTL CORP	CCI	9.39
DELTA AIR LINES INC	DAL	13.88
DISCOVER FINANCIAL SVCS	DFS	16.73
FLOWSERVE CORP	FLS	17.37
FMC CORP	FMC	16.80
HARRIS CORP	HRS	14.24
HOLLYFRONTIER CORP	HFC	14.29
HUNTINGTON INGALLS IND INC	HII	13.82
KOHL'S CORP	KSS	12.86
MOLSON COORS BREWING CO	TAP	11.09
MOSAIC CO	MOS	16.66
MOTOROLA SOLUTIONS INC	MSI	10.54
NEWELL BRANDS INC	NWL	13.63
PVH CORP	PVH	13.10
SYNCHRONY FINANCIAL	SYF	13.19
TAPESTRY INC	TPR	11.56
TOTAL SYSTEM SERVICES INC	TSS	14.13
VIACOM INC	VIAB	16.11
	Average	13.36
	Median	13.64

Source: S&P Compustat, January 2019.

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
3M Company	MMM	2.96	9.00	11.96	10.31
Abbott Labs.	ABT	1.93	10.00	11.93	9.95
AbbVie Inc.	ABBV	4.96	14.50	19.46	16.00
Accenture Plc	ACN	2.25	9.50	11.75	9.94
Activision Blizzard	ATVI	0.83	13.50	14.33	11.20
Advance Auto Parts	AAP	0.14	13.00	13.14	10.17
Affiliated Managers	AMG	1.65	6.50	8.15	7.33
Aflac Inc.	AFL	2.52	8.50	11.02	9.54
Agilent Technologies	A	1.04	12.00	13.04	10.40
Air Products & Chem.	APD	2.83	8.00	10.83	9.51
Alaska Air Group	ALK	2.20	1.50	3.70	4.53
Albemarle Corp.	ALB	1.84	10.00	11.84	9.86
Allegion plc	ALLE	1.05	10.50	11.55	9.41
Allergan plc	AGN	2.11	4.50	6.61	6.45
Alliance Data Sys.	ADS	1.50	14.50	16.00	12.54
Alliant Energy	LNT	3.25	6.50	9.75	8.93
Allstate Corp.	ALL	2.29	12.00	14.29	11.65
Altria Group	MO	6.52	10.50	17.02	14.88
Amer. Elec. Power	AEP	3.73	4.50	8.23	8.07
Amer. Express	AXP	1.76	9.00	10.76	9.11
Amer. Int'l Group	AIG	3.30	52.00	55.30	39.46
Amer. Tower 'A'	AMT	2.18	11.50	13.68	11.21
Amer. Water Works	AWK	2.17	10.00	12.17	10.19
Ameren Corp.	AEE	3.03	7.50	10.53	9.38
Ameriprise Fin'l	AMP	3.42	16.00	19.42	15.46
AmerisourceBergen	ABC	2.18	8.50	10.68	9.20
AMETEK Inc.	AME	0.85	10.50	11.35	9.21
Amgen	AMGN	3.06	8.50	11.56	10.08
Amphenol Corp.	APH	1.22	10.00	11.22	9.24
Analog Devices	ADI	2.37	10.50	12.87	10.73
Anthem Inc.	ANTM	1.20	18.00	19.20	14.58
Aon plc	AON	1.12	9.50	10.62	8.81
Apple Inc.	AAPL	2.26	17.50	19.76	15.31
Applied Materials	AMAT	2.53	19.00	21.53	16.58
Aptiv PLC	APTV	1.45	10.00	11.45	9.47
Archer Daniels Midl'd	ADM	3.28	9.00	12.28	10.63
Assurant Inc.	AIZ	2.70	7.50	10.20	9.05
AT&T Inc.	T	6.89	7.00	13.89	12.90
Automatic Data Proc.	ADP	2.50	15.00	17.50	13.87
Avery Dennison	AVY	2.52	11.50	14.02	11.55
Ball Corp.	BLL	0.90	22.00	22.90	16.96
Bank of America	BAC	2.44	13.00	15.44	12.47
Bank of New York Mellon	BK	2.40	9.00	11.40	9.75
Baxter Int'l Inc.	BAX	1.17	13.50	14.67	11.54
BB&T Corp.	BBT	3.72	10.00	13.72	11.74
Becton Dickinson	BDX	1.47	10.00	11.47	9.49
Best Buy Co.	BBY	3.81	12.00	15.81	13.17

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
BlackRock Inc.	BLK	3.31	11.00	14.31	12.00
Block (H&R)	HRB	4.21	8.50	12.71	11.23
Boeing	BA	2.64	18.00	20.64	16.02
BorgWarner	BWA	1.99	8.50	10.49	9.01
Bristol-Myers Squibb	BMY	3.63	13.50	17.13	14.00
Broadcom Inc.	AVGO	4.59	47.50	52.09	37.74
Broadridge Fin'l	BR	2.07	12.00	14.07	11.43
Brown-Forman 'B'	BF/B	1.46	15.50	16.96	13.17
C.H. Robinson	CHRW	2.50	10.00	12.50	10.52
Campbell Soup	CPB	4.28	1.00	5.28	6.27
Capital One Fin'l	COF	2.10	10.00	12.10	10.12
Cardinal Health	CAH	4.34	11.00	15.34	13.03
Carnival Corp.	CCL	4.22	12.50	16.72	13.92
Caterpillar Inc.	CAT	2.83	19.00	21.83	16.88
Cboe Global Markets	CBOE	1.29	17.00	18.29	14.00
CBS Corp. 'B'	CBS	1.56	10.50	12.06	9.92
CenterPoint Energy	CNP	4.08	3.50	7.58	7.75
CenturyLink Inc.	CTL	13.92	2.50	16.42	16.92
CF Industries	CF	3.20	48.50	51.70	37.02
Chevron Corp.	CVX	4.20	31.00	35.20	26.29
Chubb Ltd.	CB	2.34	9.50	11.84	10.03
Church & Dwight	CHD	1.35	10.00	11.35	9.37
Cigna Corp.	CI	0.02	13.00	13.02	10.05
Cimarex Energy	XEC	1.16	39.00	40.16	28.61
Cincinnati Financial	CINF	2.84	7.00	9.84	8.85
Cintas Corp.	CTAS	1.24	15.00	16.24	12.61
Cisco Systems	CSCO	3.43	8.00	11.43	10.11
Citigroup Inc.	C	3.65	8.50	12.15	10.67
Citizens Fin'l Group	CFG	4.21	12.50	16.71	13.91
Citrix Sys.	CTXS	1.39	7.50	8.89	7.74
Clorox Co.	CLX	2.52	7.50	10.02	8.87
CME Group	CME	1.54	4.50	6.04	5.88
CMS Energy Corp.	CMS	3.16	7.00	10.16	9.17
Coca-Cola	KO	3.51	6.50	10.01	9.19
Cognizant Technology	CTSH	1.30	11.50	12.80	10.33
Colgate-Palmolive	CL	2.84	10.50	13.34	11.20
Comcast Corp.	CMCSA	2.19	13.00	15.19	12.22
Comerica Inc.	CMA	3.46	18.00	21.46	16.84
Conagra Brands	CAG	4.08	5.50	9.58	9.09
Consol. Edison	ED	3.92	3.00	6.92	7.25
Constellation Brands	STZ	1.94	11.50	13.44	10.97
Cooper Cos.	COO	0.02	16.50	16.52	12.40
Corning Inc.	GLW	2.56	15.50	18.06	14.27
Costco Wholesale	COST	1.21	9.00	10.21	8.56
Coty Inc.	COTY	7.36	11.00	18.36	16.05
Crown Castle Int'l	CCI	4.32	12.00	16.32	13.68
CSX Corp.	CSX	1.44	18.50	19.94	15.16

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
Cummins Inc.	CMI	3.48	9.50	12.98	11.17
CVS Health	CVS	3.06	8.50	11.56	10.08
Danaher Corp.	DHR	0.65	10.50	11.15	9.01
Darden Restaurants	DRI	3.15	12.50	15.65	12.85
Deere & Co.	DE	2.11	16.50	18.61	14.49
Delta Air Lines	DAL	3.07	10.50	13.57	11.43
Dentsply Sirona	XRAY	0.92	2.50	3.42	3.92
Devon Energy	DVN	1.36	23.50	24.86	18.43
Discover Fin'l Svcs.	DFS	2.73	8.00	10.73	9.41
Disney (Walt)	DIS	1.65	9.00	10.65	9.00
Dollar General	DG	1.07	13.00	14.07	11.10
Dominion Energy	D	5.19	6.50	11.69	10.87
Dover Corp.	DOV	2.75	13.00	15.75	12.78
DTE Energy	DTE	3.54	7.50	11.04	9.89
Duke Energy	DUK	4.47	5.50	9.97	9.48
DXC Technology	DXC	1.38	14.00	15.38	12.08
E*Trade Fin'l	ETFC	1.29	26.00	27.29	20.03
Eastman Chemical	EMN	3.47	9.50	12.97	11.16
Eaton Corp. plc	ETN	3.96	10.00	13.96	11.98
Ecolab Inc.	ECL	1.30	9.50	10.80	8.99
Edison Int'l	EIX	4.46	4.50	8.96	8.80
Emerson Electric	EMR	3.37	14.00	17.37	14.07
Entergy Corp.	ETR	4.34	1.00	5.34	6.33
Equifax Inc.	EFX	1.70	7.50	9.20	8.05
Equinix Inc.	EQIX	3.00	25.50	28.50	21.41
Everest Re Group Ltd.	RE	2.68	10.00	12.68	10.70
Eversource Energy	ES	3.32	5.00	8.32	7.99
Exelon Corp.	EXC	3.28	8.00	11.28	9.96
Expedia Group	EXPE	1.18	20.50	21.68	16.24
Expeditors Int'l	EXPD	1.38	9.50	10.88	9.07
Exxon Mobil Corp.	XOM	4.86	18.00	22.86	18.24
Fastenal Co.	FAST	3.20	11.50	14.70	12.23
FedEx Corp.	FDX	1.65	9.50	11.15	9.34
Fidelity Nat'l Info.	FIS	1.30	15.50	16.80	13.01
Fifth Third Bancorp	FITB	3.63	7.00	10.63	9.64
FirstEnergy Corp.	FE	4.14	3.00	7.14	7.47
FLIR Systems	FLIR	1.62	13.50	15.12	11.99
Flowserve Corp.	FLS	2.08	7.50	9.58	8.43
Fluor Corp.	FLR	2.59	8.50	11.09	9.61
FMC Corp.	FMC	2.19	22.50	24.69	18.59
Foot Locker	FL	2.58	6.50	9.08	8.26
Ford Motor	F	7.71	1.50	9.21	10.04
Fortune Brands Home	FBHS	2.33	13.50	15.83	12.70
Franklin Resources	BEN	3.54	7.50	11.04	9.89
Gallagher (Arthur J.)	AJG	2.32	17.00	19.32	15.03
Gap (The) Inc.	GPS	3.76	7.00	10.76	9.77
Garmin Ltd.	GRMN	3.45	10.50	13.95	11.81

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
Gen'l Dynamics	GD	2.42	9.00	11.42	9.77
Gen'l Mills	GIS	5.07	3.50	8.57	8.74
Gen'l Motors	GM	4.83	3.00	7.83	8.16
Genuine Parts	GPC	3.08	9.00	12.08	10.43
Global Payments	GPN	0.04	20.00	20.04	14.76
Goldman Sachs	GS	1.88	9.50	11.38	9.57
Goodyear Tire	GT	3.25	12.50	15.75	12.95
Grainger (W.W.)	GWW	2.02	9.50	11.52	9.71
Hanesbrands Inc.	HBI	4.79	5.50	10.29	9.80
Harley-Davidson	HOG	4.46	9.00	13.46	11.81
Harris Corp.	HRS	2.10	13.50	15.60	12.47
Hartford Fin'l Svcs.	HIG	2.80	13.00	15.80	12.83
Hasbro Inc.	HAS	3.23	8.50	11.73	10.25
HCA Healthcare	HCA	1.17	15.00	16.17	12.54
Helmerich & Payne	HP	5.90	56.50	62.40	45.08
Henry (Jack) & Assoc.	JKHY	1.22	11.50	12.72	10.25
Hershey Co.	HSY	2.72	7.00	9.72	8.73
Hewlett Packard Ent.	HPE	3.41	7.50	10.91	9.76
Hilton Worldwide Hldgs.	HLT	0.89	9.00	9.89	8.24
HollyFrontier Corp.	HFC	2.75	25.00	27.75	20.82
Home Depot	HD	2.72	12.50	15.22	12.42
Honeywell Int'l	HON	2.52	9.00	11.52	9.87
Hormel Foods	HRL	2.01	9.50	11.51	9.70
Horton D.R.	DHI	1.70	8.00	9.70	8.38
HP Inc.	HPQ	3.21	9.50	12.71	10.90
Humana Inc.	HUM	0.76	14.00	14.76	11.46
Hunt (J.B.)	JBHT	1.08	13.50	14.58	11.45
Huntington Bancshs.	HBAN	4.65	13.00	17.65	14.68
Huntington Ingalls	HII	1.82	12.50	14.32	11.52
Illinois Tool Works	ITW	3.24	11.00	14.24	11.93
Ingersoll-Rand	IR	2.35	13.50	15.85	12.72
Int'l Flavors & Frag.	IFF	2.27	9.50	11.77	9.96
Int'l Paper	IP	4.95	15.50	20.45	16.66
Intel Corp.	INTC	2.69	12.50	15.19	12.39
Intercontinental Exch.	ICE	1.29	12.50	13.79	10.99
Interpublic Group	IPG	4.11	11.50	15.61	13.14
Intuit Inc.	INTU	0.99	14.50	15.49	12.03
Invesco Ltd.	IVZ	7.30	7.00	14.30	13.31
Iron Mountain	IRM	7.48	8.50	15.98	14.50
Jacobs Engineering	JEC	1.04	13.00	14.04	11.07
Jefferies Fin'l Group	JEF	2.88	20.50	23.38	17.94
Johnson & Johnson	JNJ	2.95	11.00	13.95	11.64
Johnson Ctrls. Int'l plc	JCI	3.46	6.00	9.46	8.80
JPMorgan Chase	JPM	3.31	9.50	12.81	11.00
Juniper Networks	JNPR	2.92	4.50	7.42	7.26
Kansas City South'n	KSU	1.55	12.50	14.05	11.25
Kellogg	K	3.94	7.00	10.94	9.95

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
KeyCorp	KEY	4.51	13.00	17.51	14.54
Kimberly-Clark	KMB	3.61	10.50	14.11	11.97
Kinder Morgan Inc.	KMI	5.09	57.00	62.09	44.60
KLA-Tencor	KLAC	3.49	15.50	18.99	15.20
Kohl's Corp.	KSS	3.94	10.50	14.44	12.30
Kraft Heinz Co.	KHC	5.84	9.50	15.34	13.53
Kroger Co.	KR	2.12	5.00	7.12	6.79
L3 Technologies	LLL	1.90	11.00	12.90	10.59
Lam Research	LRCX	3.34	13.00	16.34	13.37
Lauder (Estee)	EL	1.36	12.50	13.86	11.06
Leggett & Platt	LEG	4.28	9.00	13.28	11.63
Lennar Corp.	LEN	0.40	12.00	12.40	9.76
Lilly (Eli)	LLY	2.31	12.00	14.31	11.67
Lincoln Nat'l Corp.	LNC	2.99	10.50	13.49	11.35
Lockheed Martin	LMT	3.56	13.50	17.06	13.93
Loews Corp.	L	0.56	16.50	17.06	12.94
Lowe's Cos.	LOW	2.30	13.00	15.30	12.33
LyondellBasell Inds.	LYB	4.86	6.50	11.36	10.54
M&T Bank Corp.	MTB	2.78	12.00	14.78	12.14
Macy's Inc.	M	5.07	5.50	10.57	10.08
Marathon Petroleum	MPC	3.57	14.50	18.07	14.61
Marriott Int'l	MAR	1.61	12.50	14.11	11.31
Marsh & McLennan	MMC	2.12	9.00	11.12	9.47
Martin Marietta	MLM	1.13	13.00	14.13	11.16
Masco Corp.	MAS	1.65	14.50	16.15	12.69
MasterCard Inc.	MA	0.72	16.00	16.72	12.76
Maxim Integrated	MXIM	3.83	11.50	15.33	12.86
McCormick & Co.	MKC	1.67	10.50	12.17	10.03
McDonald's Corp.	MCD	2.65	10.00	12.65	10.67
McKesson Corp.	MCK	1.38	10.50	11.88	9.74
Medtronic plc	MDT	2.34	8.00	10.34	9.02
Merck & Co.	MRK	2.97	5.50	8.47	7.98
MetLife Inc.	MET	4.25	7.00	11.25	10.26
MGM Resorts Int'l	MGM	1.94	32.00	33.94	24.70
Microchip Technology	MCHP	2.26	15.00	17.26	13.63
Microsoft Corp.	MSFT	1.88	15.00	16.88	13.25
Molson Coors Brewing	TAP	3.19	11.00	14.19	11.88
Mondelez Int'l	MDLZ	2.69	9.50	12.19	10.38
Moody's Corp.	MCO	1.29	13.00	14.29	11.32
Morgan Stanley	MS	3.02	11.00	14.02	11.71
Mosaic Company	MOS	0.70	12.00	12.70	10.06
Motorola Solutions	MSI	2.05	13.00	15.05	12.08
MSCI Inc.	MSCI	1.78	22.00	23.78	17.84
Nasdaq Inc.	NDAQ	2.23	9.50	11.73	9.92
National Oilwell Varco	NOV	0.77	41.50	42.27	29.90
NetApp Inc.	NTAP	2.78	20.50	23.28	17.84
Newell Brands	NWL	5.03	9.50	14.53	12.72

Value Line Data for S&P 500 - Jan. 1, 2019

Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
Newmont Mining	NEM	1.62	5.00	6.62	6.29
NextEra Energy	NEE	2.95	9.00	11.95	10.30
Nielsen Hldgs. plc	NLSN	5.99	3.00	8.99	9.32
NIKE Inc. 'B'	NKE	1.21	14.50	15.71	12.25
NiSource Inc.	NI	3.10	18.00	21.10	16.48
Nordstrom Inc.	JWN	3.14	7.00	10.14	9.15
Norfolk Southern	NSC	2.22	13.50	15.72	12.59
Northern Trust Corp.	NTRS	2.68	11.00	13.68	11.37
Northrop Grumman	NOC	2.00	13.00	15.00	12.03
Nucor Corp.	NUE	3.11	20.50	23.61	18.17
NVIDIA Corp.	NVDA	0.50	23.00	23.50	17.23
Omnicom Group	OMC	3.35	7.00	10.35	9.36
ONEOK Inc.	OKE	6.44	20.50	26.94	21.50
Oracle Corp.	ORCL	1.69	8.50	10.19	8.71
PACCAR Inc.	PCAR	5.80	7.50	13.30	12.15
Packaging Corp.	PKG	3.81	9.50	13.31	11.50
Parker-Hannifin	PH	2.09	14.00	16.09	12.79
Paychex Inc.	PAYX	3.68	11.00	14.68	12.37
Pentair plc	PNR	1.96	5.50	7.46	6.97
People's United Fin'l	PBCT	4.86	11.00	15.86	13.55
PepsiCo Inc.	PEP	3.42	7.50	10.92	9.77
PerkinElmer Inc.	PKI	0.38	12.50	12.88	10.08
Perrigo Co. plc	PRGO	2.10	0.50	2.60	3.76
Pfizer Inc.	PFE	3.42	14.00	17.42	14.12
Philip Morris Int'l	PM	6.86	8.00	14.86	13.54
Phillips 66	PSX	3.92	8.00	11.92	10.60
Pinnacle West Capital	PNW	3.52	5.00	8.52	8.19
Pioneer Natural Res.	PXD	0.37	77.00	77.37	53.28
PNC Financial Serv.	PNC	3.21	9.50	12.71	10.90
PPG Inds.	PPG	1.96	4.50	6.46	6.30
PPL Corp.	PPL	5.99	2.00	7.99	8.65
Price (T. Rowe) Group	TROW	3.25	11.50	14.75	12.28
Principal Fin'l Group	PFG	4.97	6.50	11.47	10.65
Procter & Gamble	PG	3.17	10.50	13.67	11.53
Progressive Corp.	PGR	1.97	15.50	17.47	13.68
Prudential Fin'l	PRU	4.43	6.50	10.93	10.11
Public Serv. Enterprise	PEG	3.69	4.00	7.69	7.69
PulteGroup Inc.	PHM	1.69	15.50	17.19	13.40
PVH Corp.	PVH	0.16	11.00	11.16	8.85
Qualcomm Inc.	QCOM	4.72	10.50	15.22	13.08
Quanta Services	PWR	0.54	19.50	20.04	14.93
Quest Diagnostics	DGX	2.62	9.50	12.12	10.31
Ralph Lauren	RL	2.48	7.00	9.48	8.49
Raymond James Fin'l	RJF	1.95	12.00	13.95	11.31
Raytheon Co.	RTN	2.31	11.00	13.31	11.00
Regions Financial	RF	4.24	13.50	17.74	14.61
Republic Services	RSG	2.14	13.50	15.64	12.51

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
ResMed Inc.	RMD	1.39	11.00	12.39	10.08
Robert Half Int'l	RHI	2.26	9.00	11.26	9.61
Rockwell Automation	ROK	2.70	10.50	13.20	11.06
Rollins Inc.	ROL	1.04	15.50	16.54	12.75
Roper Tech.	ROP	0.71	14.50	15.21	11.75
Ross Stores	ROST	1.14	11.50	12.64	10.17
Royal Caribbean	RCL	3.02	11.00	14.02	11.71
S&P Global	SPGI	1.30	13.50	14.80	11.67
Schlumberger Ltd.	SLB	5.31	27.50	32.81	25.06
Schwab (Charles)	SCHW	1.27	16.00	17.27	13.31
Seagate Technology	STX	6.90	9.00	15.90	14.25
Sealed Air	SEE	1.84	19.00	20.84	15.89
Sempra Energy	SRE	3.53	8.50	12.03	10.55
Sherwin-Williams	SHW	0.91	13.00	13.91	10.94
Skyworks Solutions	SWKS	2.50	11.00	13.50	11.19
Smith (A.O.)	AOS	2.07	12.50	14.57	11.77
Smucker (J.M.)	SJM	3.61	5.50	9.11	8.62
Snap-on Inc.	SNA	2.61	8.00	10.61	9.29
Southern Co.	SO	5.54	3.00	8.54	8.87
Southwest Airlines	LUV	1.40	9.50	10.90	9.09
Stanley Black & Decker	SWK	2.30	10.00	12.30	10.32
Starbucks Corp.	SBUX	2.47	15.00	17.47	13.84
State Street Corp.	STT	3.18	9.00	12.18	10.53
Stryker Corp.	SYK	1.36	13.50	14.86	11.73
SunTrust Banks	STI	4.04	13.50	17.54	14.41
Symantec Corp.	SYMC	1.61	7.50	9.11	7.96
Synchrony Financial	SYF	3.48	10.50	13.98	11.84
Sysco Corp.	SYY	2.54	13.00	15.54	12.57
Tapestry Inc.	TPR	4.08	13.00	17.08	14.11
Target Corp.	TGT	3.90	7.50	11.40	10.25
TE Connectivity	TEL	2.43	9.50	11.93	10.12
Texas Instruments	TXN	3.46	12.50	15.96	13.16
Textron Inc.	TXT	0.17	15.00	15.17	11.54
Thermo Fisher Sci.	TMO	0.32	10.00	10.32	8.34
Tiffany & Co.	TIF	2.89	12.00	14.89	12.25
TJX Companies	TJX	1.81	13.00	14.81	11.84
Torchmark Corp.	TMK	0.85	10.00	10.85	8.87
Total System Svcs.	TSS	0.66	10.50	11.16	9.02
Tractor Supply	TSCO	1.68	10.50	12.18	10.04
Travelers Cos.	TRV	2.67	5.50	8.17	7.68
Twenty-First Century Fox	FOXA	0.75	12.50	13.25	10.45
Tyson Foods 'A'	TSN	2.75	9.50	12.25	10.44
U.S. Bancorp	USB	3.37	7.50	10.87	9.72
Union Pacific	UNP	2.41	13.50	15.91	12.78
United Parcel Serv.	UPS	4.10	8.50	12.60	11.12
United Technologies	UTX	2.84	9.50	12.34	10.53
UnitedHealth Group	UNH	1.52	15.00	16.52	12.89

Value Line Data for S&P 500 - Jan. 1, 2019					
Company Name	Ticker	Yield %	Growth Rate %	Single Stage DGM	Multi Stage DGM
Universal Health `B'	UHS	0.34	11.00	11.34	9.03
Unum Group	UNM	3.48	9.50	12.98	11.17
V.F. Corp.	VFC	2.94	12.00	14.94	12.30
Valero Energy	VLO	4.58	10.00	14.58	12.60
Verizon Communic.	VZ	4.28	4.50	8.78	8.62
Viacom Inc. 'B'	VIAB	3.03	4.00	7.03	7.03
Visa Inc.	V	0.78	14.50	15.28	11.82
Vulcan Materials	VMC	1.15	18.00	19.15	14.53
Walgreens Boots	WBA	2.61	11.00	13.61	11.30
Walmart Inc.	WMT	2.27	7.00	9.27	8.28
Waste Management	WM	2.10	10.50	12.60	10.46
WEC Energy Group	WEC	3.48	7.00	10.48	9.49
Wells Fargo	WFC	3.73	6.00	9.73	9.07
Western Digital	WDC	5.61	1.50	7.11	7.94
Western Union	WU	4.50	7.00	11.50	10.51
WestRock Co.	WRK	4.76	14.50	19.26	15.80
Weyerhaeuser Co.	WY	6.11	17.50	23.61	19.16
Whirlpool Corp.	WHR	4.27	8.00	12.27	10.95
Williams Cos.	WMB	6.01	22.50	28.51	22.41
Wynn Resorts	WYNN	2.90	23.00	25.90	19.63
Xcel Energy Inc.	XEL	3.29	5.50	8.79	8.30
Xerox Corp.	XRX	5.07	2.50	7.57	8.07
Xilinx Inc.	XLNX	1.72	11.00	12.72	10.41
Xylem Inc.	XYL	1.30	15.50	16.80	13.01
Yum! Brands	YUM	1.79	10.00	11.79	9.81
Zimmer Biomet Hldgs.	ZBH	0.99	5.00	5.99	5.66
Zions Bancorp.	ZION	2.90	15.00	17.90	14.27
Zoetis Inc.	ZTS	0.80	13.50	14.30	11.17
			Market weighted average =		**12.36**

Source: Value Line, January 2019.

* Multi-Stage DGM based on weighted average of short-term and long-term growth rates.

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2018)

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	100.00	96.87	3.23%
Michigan Con Gas Company	Gas	15-May-97	30,000	100.00	99.25	0.76%
Michigan Con Gas Company	Gas	15-May-97	40,000	100.00	99.36	0.64%
Seagull Energy Corp.	Gas	25-Sep-97	150,000	99.54	98.54	1.02%
SONAT Inc.	Gas	25-Sep-97	100,000	99.75	99.10	0.66%
Southern Natural Gas Co.	Gas	25-Sep-97	100,000	99.89	99.24	0.66%
Laclede Gas	Gas	16-Oct-97	25,000	98.68	98.35	0.34%
Kn Energy Inc.	Gas	22-Oct-97	150,000	100.00	99.37	0.63%
Northern Illinois Gas Co.	Gas	23-Oct-97	50,000	99.50	99.00	0.51%
Enron Oil & Gas Co.	Gas	25-Nov-97	100,000	99.71	99.06	0.66%
Consolidated Natural Gas Co.	Gas	09-Dec-97	300,000	99.19	98.31	0.89%
SONAT	Gas	27-Jan-98	100,000	99.53	98.88	0.66%
SONAT	Gas	29-Jan-98	100,000	99.79	98.91	0.89%
KN Energy, Inc.	Gas	04-Mar-98	500,000	99.78	98.91	0.89%
KN Energy, Inc.	Gas	04-Mar-98	150,000	99.50	98.37	1.14%
Coastal Corp.	Gas	02-Jun-98	200,000	99.88	99.23	0.66%
Coastal Corp.	Gas	02-Jun-98	200,000	99.66	98.79	0.89%
Wisconsin Gas Co.	Gas	19-Jan-99	50,000	99.25	98.60	0.66%
No. Illinois Gas Co.	Gas	02-Feb-99	50,000	100.00	99.35	0.65%
Providence Gas Co.	Gas	04-Feb-99	15,000	100.00	96.85	3.25%
Cascade Natural Gas Corp.	Gas	15-Mar-99	15,000	100.00	99.25	0.76%
Laclede Gas Co.	Gas	28-May-99	25,000	100.00	99.50	0.50%
Mich. Consolidated Gas Co.	Gas	04-Jun-99	55,000	100.00	96.85	3.25%
Williams Co.	Gas	21-Jul-99	700,000	99.08	98.20	0.89%
Williams Communication Grp.	Gas	30-Sep-99	1,500,000	99.25	96.75	2.58%
Indiana Gas Co.	Gas	04-Oct-99	30,000	100.00	99.38	0.63%
Northwest Natural Gas	Gas	09-Dec-99	20,000	100.00	99.25	0.76%
SEMCO Energy	Gas	12-Apr-00	30,000	100.00	97.25	2.83%
New Jersey Gas Co.	Gas	29-Jun-00	10,000	100.00	99.25	0.76%
New Jersey Gas Co.	Gas	05-Jul-00	10,000	100.00	96.85	3.25%
New Jersey Gas Co.	Gas	01-Jul-00	15,000	100.00	97.60	2.46%
Northwest Natural Gas	Gas	29-Aug-00	20,000	100.00	99.25	0.76%
Northwest Natural Gas	Gas	06-Sep-00	20,000	100.00	99.25	0.76%
Northwest Natural Gas	Gas	06-Sep-00	10,000	100.00	99.25	0.76%
Northwest Natural Gas	Gas	27-Nov-00	25,000	100.00	99.38	0.63%
Agl Capital Corp	Gas	23-Feb-01	300,000	99.58	98.93	0.66%
Oneok, Inc	Gas	03-Apr-01	400,000	99.91	99.26	0.65%
Atmos Energy Corp	Gas	15-May-01	350,000	99.94	99.29	0.65%
Semco Energy	Gas	18-Jun-01	60,000	100.00	97.50	2.56%
Questar Gas Co.	Gas	03-Oct-01	60,000	100.00	99.38	0.63%
Northwest Natural Gas	Gas	26-Mar-02	40,000	100.00	99.38	0.63%
Northwest Natural Gas	Gas	24-Sep-02	30,000	100.00	99.25	0.76%
UGI Utilities Inc.	Gas	25-Sep-02	20,000	100.00	99.38	0.63%
California Gas Co.	Gas	02-Oct-02	250,000	99.90	99.25	0.65%
AGL Capital Corp.	Gas	07-Jan-03	225,000	99.93	99.28	0.65%
Atmos Energy Corp	Gas	13-Jan-03	250,000	99.92	99.25	0.67%
Sepra Energy	Gas	01-Feb-03	400,000	99.66	99.01	0.66%
Michigan Consolidated Gas Co	Gas	12-Feb-03	200,000	99.64	98.76	0.89%
Northwest Natural Gas	Gas	25-Feb-03	10,000	100.00	99.25	0.76%
Nisource Finance Corp	Gas	01-Mar-03	345,000	100.00	99.35	0.65%
Keyspan Corporation	Gas	01-Apr-03	150,000	99.76	98.89	0.88%
AGL Capital Corp.	Gas	15-Apr-03	225,000	99.93	99.28	0.65%

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2018)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
The Cincinnati Gas & Electric Co.	Gas	12-Jun-03	200,000	99.76	98.89	0.88%
The Cincinnati Gas & Electric Co.	Gas	12-Jun-03	200,000	99.40	98.52	0.89%
Baltimore Gas And Electric Company	Gas	17-Jun-03	200,000	99.30	98.42	0.89%
Nisource Finance Corp	Gas	16-Jul-03	500,000	99.86	99.21	0.66%
Vectren Coproation	Gas	24-Jul-03	100,000	99.75	99.10	0.66%
Vectren Coproation	Gas	24-Jul-03	100,000	99.18	98.48	0.71%
UGI Utilities	Gas	14-Aug-03	20,000	100.00	99.25	0.76%
UGI Utilities	Gas	14-Aug-03	25,000	100.00	99.37	0.63%
Energy East Corporation	Gas	08-Sep-03	200,000	99.83	98.95	0.89%
Madison Gas & Electric Co	Gas	09-Sep-03	20,000	100.00	99.25	0.76%
Energen Corporation	Gas	30-Oct-03	50,000	99.56	98.91	0.66%
Northwest Natural Gas	Gas	21-Nov-03	40,000	100.00	99.25	0.76%
Piedmont Natural Gas Co Inc	Gas	16-Dec-03	100,000	99.86	98.98	0.88%
Piedmont Natural Gas Co Inc	Gas	16-Dec-03	100,000	100.00	99.35	0.65%
AGL Resources	Gas	14-Dec-04	200,000	99.87	99.22	0.66%
Aquila	Gas	18-Aug-04	300,000	25.00	25.00	0.00%
Atmos Energy	Gas	18-Oct-04	500,000	99.99	99.34	0.65%
Atmos Energy	Gas	18-Oct-04	200,000	99.39	98.52	0.89%
Laclede Gas Co.	Gas	21-Apr-04	50,000	99.59	98.84	0.76%
Laclede Gas Co.	Gas	21-Apr-04	100,000	99.43	98.56	0.89%
Michigan Consolidated Gas	Gas	27-Sep-04	120,000	99.59	98.84	0.76%
Consolidated Natural Gas Co	Gas	15-Nov-04	400,000	99.69	99.04	0.66%
Alabama Gas Corp	Gas	11-Jan-05	40,000	100.00	96.86	3.24%
Alabama Gas Corp	Gas	11-Jan-05	40,000	100.00	99.35	0.65%
Alabama Gas Corp	Gas	14-Nov-05	80,000	100.00	99.40	0.60%
Cascade Natural Gas	Gas	20-Jan-05	30,000	100.00	96.85	3.25%
Cascade Natural Gas	Gas	29-Aug-05	15,000	100.00	99.30	0.70%
Northwest Natural Gas Co.	Gas	02-Jun-05	40,000	100.00	99.38	0.63%
Northwest Natural Gas Co.	Gas	21-Jun-05	10,000	100.00	99.25	0.76%
Vectren Utility Holdings, Inc	Gas	16-Nov-05	75,000	99.80	99.15	0.66%
Vectren Utility Holdings, Inc	Gas	16-Nov-05	75,000	99.78	98.90	0.88%
Laclede Gas Co.	Gas	06-Jun-06	55,000	99.85	98.98	0.88%
Piedmont Natural Gas Co., Inc	Gas	15-Jun-06	200,000	100.00	96.85	3.15%
AGI Capital Resources	Gas	27-Jun-06	175,000	99.86	99.21	0.65%
Southern Union Co.	Gas	18-Oct-06	600,000	99.64	98.34	1.30%
Northwest Natural Gas Co.	Gas	15-Dec-06	25,000	100.00	99.38	0.63%
Alabama Gas Corp	Gas	10-Jan-07	45,000	100.00	99.13	0.88%
Atmos Energy Corp	Gas	11-Jun-07	250,000	99.73	99.08	0.66%
Vectren Utility Holdings, Inc	Gas	05-Mar-08	125,000	100.00	96.85	3.25%
Vectren Utility Holdings, Inc	Gas	24-Mar-08	100,000	99.93	99.06	0.88%
Vectren Utility Holdings, Inc	Gas	24-Mar-08	50,000	99.40	99.29	0.11%
Laclede Gas Co	Gas	18-Sep-08	80,000	100.00	96.85	3.25%
Washington Gas Light	Gas	05-Dec-08	50,000	100.00	99.38	0.63%
AGI Capital Corp	Gas	05-Aug-09	300,000	99.78	99.13	0.66%
Atmos Energy	Gas	23-Mar-09	450,000	99.81	99.16	0.66%
National Fuel Gas Co	Gas	01-Apr-09	250,000	99.76	99.11	0.66%
Northwest Natural Gas Co.	Gas	20-Mar-09	75,000	100.00	99.38	0.63%
Sempra Energy	Gas	05-Oct-09	750,000	99.16	98.28	0.89%
Central Hudson Gas &Elec Corp	Gas	02-Dec-10	44,150	100.00	99.38	0.63%
Central Hudson Gas &Elec Corp	Gas	02-Dec-10	30,000	100.00	92.47	8.15%
Southwest Gas Corporation	Gas	07-Dec-10	125,000	99.82	99.17	0.66%
Washington Gas Light Co.	Gas	30-Nov-10	75,000	100.00	99.98	0.02%

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2018)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
AGL Capital Corp.	Gas	16-Mar-11	500,000	99.83	98.96	0.88%
Atmos Energy Co	Gas	07-Jun-11	400,000	99.68	98.80	0.89%
Northwest Natural Gas Co	Gas	19-Aug-11	500,000	100.00	99.38	0.63%
AGL Capital Corp.	Gas	15-Sep-11	200,000	113.43	112.56	0.78%
AGL Capital Corp.	Gas	15-Sep-11	300,000	98.48	97.83	0.66%
National Fuel Gas Co	Gas	28-Nov-11	500,000	99.87	99.22	0.66%
San Diego Gas & Elec	Gas	19-Mar-12	250,000	99.48	98.61	0.89%
Pacific Gas & Elec	Gas	11-Apr-12	400,000	99.49	98.62	0.89%
Pacific Gas & Electric Co	Gas	13-Aug-12	350,000	99.91	99.04	0.88%
Pacific Gas & Electric Co	Gas	13-Aug-12	400,000	99.71	99.06	0.66%
Baltimore Gas & Electric Co.	Gas	14-Aug-12	250,000	99.62	99.31	0.31%
Sempra Energy	Gas	19-Sep-12	500,000	99.97	99.32	0.65%
AGI Capital	Gas	13-May-13	500,000	99.62	98.74	0.89%
Atmos Energy	Gas	08-Jan-13	500,000	99.81	98.94	0.88%
Integrys Energy Group	Gas	12-Aug-13	400,000	25.00	24.21	3.25%
NiSource	Gas	09-Apr-13	750,000	99.58	98.70	0.89%
NiSource Finance	Gas	03-Oct-13	500,000	99.34	98.47	0.89%
Northwest Natural Gas Co	Gas	14-Aug-13	50,000	100.00	99.38	0.63%
Piedmont Natural Gas Co	Gas	29-Jul-13	300,000	99.95	99.08	0.88%
Sempra Energy	Gas	09-Nov-13	500,000	99.67	99.02	0.66%
Laclede Group Inc	Gas	12-Aug-14	250,000	99.91	99.03	0.88%
Piedmont Natural Gas Co	Gas	15-Sep-14	250,000	99.83	99.08	0.75%
Atmos Energy	Gas	06-Oct-14	500,000	99.81	98.94	0.88%
WGL Holdings Inc	Gas	22-Oct-14	125,000	99.23	98.35	0.88%
WGL Holdings Inc	Gas	11-Dec-14	125,000	92.61	91.74	0.88%
WGL Holdings Inc	Gas	13-Nov-15	250,000	99.91	99.26	0.65%
WGL Holdings Inc	Gas	22-Jun-15	450,000	99.69	99.04	0.65%
WGL Holdings Inc	Gas	09-Sep-15	150,000	99.94	99.29	0.65%
WGL Holdings Inc	Gas	12-Nov-15	350,000	99.73	99.08	0.65%
AGI Capital Corp	Gas	13-May-16	350,000	99.60	98.95	0.66%
Peidmont Natural Gas Co., Inc.	Gas	25-Jul-16	300,000	99.88	99.00	0.88%
Southwest Gas Corp	Gas	26-Sep-16	300,000	99.70	98.82	0.89%
Washington Gas Light Co.	Gas	16-Sep-16	250,000	100.00	99.25	0.76%
Atmos Energy Corp	Gas	05-Jun-17	500,000	99.73	99.08	0.66%
Atmos Energy Corp	Gas	05-Jun-17	250,000	103.91	103.03	0.85%
Baltimore Gas And Electric Co	Gas	21-Aug-17	300,000	99.20	98.32	0.89%
National Fuel Gas Co	Gas	18-Sep-17	300,000	99.32	98.67	0.66%
Nisource Finance Corp	Gas	05-Sep-17	750,000	99.89	99.02	0.88%
Nisource Finance Corp	Gas	11-May-17	1,000,000	99.92	99.04	0.88%
Nisource Finance Corp	Gas	11-May-17	1,000,000	99.98	99.33	0.65%
Northwest Gas Co.	Gas	06-Sep-17	15,000	100.00	99.25	0.76%
Northwest Gas Co.	Gas	06-Sep-17	25,000	100.00	99.40	0.60%
Oklahoma Gas Electric Co	Gas	08-Aug-17	300,000	99.68	98.80	0.89%
PECO Energy Co	Gas	11-Sep-17	325,000	99.62	98.75	0.89%
San Diego Gas And Electric Co	Gas	05-Jun-17	400,000	99.55	98.68	0.89%
Southern Company Gas	Gas	04-May-17	450,000	99.77	98.89	0.88%
Atmos Energy Corp.	Gas	01-Oct-18	600,000	99.50	98.62	0.89%
Baltimore Gas And Electric Co	Gas	17-Sep-18	300,000	99.92	99.04	0.88%
One Gas, Inc	Gas	01-Nov-18	400,000	99.91	99.04	0.88%
San Diego Gas And Electric Co.	Gas	14-May-18	400,000	99.56	98.68	0.89%
Sempra Energy	Gas	09-Jan-18	1,000,000	99.30	98.65	0.66%
Sempra Energy	Gas	09-Jan-18	800,000	98.65	97.78	0.89%

Debt Issuance Cost
Natural Gas/Transmission Utilities (1997 - 2018)

Company	Type of Utility	Issue Date	Amount Offered ($000)	Price to Public ($/100)	Net Proceeds	Issue Cost
Sempra Energy	Gas	09-Jan-18	1,000,000	98.92	98.04	0.89%
Southwest Gas Corp	Gas	12-Mar-18	300,000	99.82	99.17	0.66%
					Average	0.99%
					Selected	1.00%

Source: Public Utility Finance Tracker, February 1998 - 2019.

Common Stock Issuance Cost
Natural Gas/Transmission Utilities (1990 - 2018)

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

Common Stock Issuance Cost
Natural Gas/Transmission Utilities (1990 - 2018)

Company	Type of Company	Issue Date	Number of Shares (000)	Price to Public	Net Proceeds	Issue Cost
Southern Union Co.	Gas	10-Jun-03	3,000	16.15	16.15	0.00%
Southern Union Co.	Gas	05-Jun-03	9,500	16.00	15.38	4.06%
Southern Union Co.	Gas	15-Jun-03	2,500	50.00	48.17	3.80%
Vectren Corporation	Gas	07-Aug-03	6,500	22.81	22.00	3.70%
AGL Resources	Gas	19-Nov-04	9,600	31.010	30.038	3.23%
Ameren	Gas	30-Jun-04	10,000	42.000	40.700	3.19%
Aquila(M)	Gas	18-Aug-04	40,000	2.550	2.451	4.04%
Atmos Energy Co.	Gas	21-Oct-04	14,000	24.750	23.760	4.17%
Northwest Natural Gas Co.	Gas	30-Mar-04	1,200	31.000	29.844	3.87%
Piedmont Natural Gas Co. Inc	Gas	20-Jan-04	4,250	42.500	41.010	3.63%
Southern Union Co.	Gas	26-Jul-04	11,000	18.750	18.003	4.15%
The Laclede Group Inc	Gas	06-May-04	1,500	26.800	25.862	3.63%
UGI Corp.	Gas	18-Mar-04	7,500	32.100	30.696	4.58%
Semco Energy	Gas	09-Aug-05	27,176	6.320	6.067	4.17%
Southern Union Co.	Gas	07-Feb-05	342,999	23.000	22.300	3.14%
Chesapeake Utility Corp	Gas	15-Nov-06	600	30.100	28.975	3.88%
Vectron Corp	Gas	22-Feb-07	4,600	28.33	27.34	3.62%
Clean Energy	Gas	25-Jun-09	8,200	8.30	7.80	6.38%
EQT	Gas	10-Mar-11	12,500	44.00	42.24	4.17%
Gas Natural Inc	Gas	30-Nov-13	1,134.000	10.00	9.42	6.16%
Gas Natural Inc	Gas	11-Jul-13	1,500	10.00	9.42	6.16%
Laclede Group	Gas	22-May-13	8,700	4.50	4.33	3.98%
Piedmont Natural Gas Co.	Gas	29-Jan-13	4,000	32.00	30.88	3.63%
Atmos Energy	Gas	11-Feb-14	800	44.00	42.46	3.63%
The Laclede Group Inc	Gas	05-Jun-14	9,000	46.25	44.54	3.84%
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%
Spectra 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%
Atmos Energy Corporation	Gas	28-Nov-18	7,008	92.75	91.77	1.07%
RGC Resources	Gas	15-Mar-18	609.00	23.00	21.74	5.80%
Sempra Energy	Gas	04-Jan-18	23,364	107.00	105.07	1.84%
Sempra Energy	Gas	10-Jul-18	9,750	113.75	111.87	1.68%
South Jersey Industries	Gas	18-Apr-18	5,000	50.00	48.50	3.09%
South Jersey Industries	Gas	18-Apr-18	11,018	29.50	28.47	3.62%
Southwest Gas Holdings	Gas	27-Nov-18	3,100	75.50	72.95	3.50%
Spire	Gas	07-Apr-18	2,000	68.75	66.64	3.17%
					Average	4.13%
					Selected	4.15%

Source: Public Utility Finance Tracker, February 1991 - 2019.

Computation of 2019 Equity Risk Premium
Adapted from *SBBI* and Duff & Phelps Information

Computed By Tom Tegarden, MAI, CAE

2018 ERP = 7.10% (Average of 1926 - 2017data)[51]

$$0.0710 = \frac{\sum_{t=1926}^{2018}\left(R_{M^t} - R_{F^t}\right)}{(2018-1926)} = \frac{\sum}{92}$$

$$R_M{}^{2018} - R_F{}^{2018} = -0.0438 - 0.0283 = -0.0721$$

$$2019\ ERP = \frac{\sum_{t=1926}^{2019}\left(R_{M^t} - R_{F^t}\right)}{93} = \frac{\left(\sum + -0.0721\right)}{93}$$

$$Since - 0.071 = \frac{\sum}{92} \rightarrow \sum = 92 \times -0\ 0.071 = 6.4599$$

$$2019\ ERP = \frac{\left(6.532 + -0.0721\right)}{93} = 0.0695\ or\ 6.95\%$$

[51] Based on the *SBBI* & Duff & Phelps study 1926 - 2018. Total annual return S&P 500. ycharts.com/ indicators/ Standard & Poor's 500 total annual return. (Original study by Dr. Hal Heaton, Brigham Young Univ.)

Computation of 2019 Equity Risk Premium (for LT Corp Bonds) Adapted from *SBBI* Information

2018 ERP = 5.70% (Average of 1926 - 2017 data)[52]

$$0.057 = \frac{\sum_{t=1926}^{2017}\left(R_{M^t} - R_{F^t}\right)}{(2018-1926)} = \frac{\sum}{92}$$

$$R_M{}^{2018} - R_F{}^{2018} = -0.0438 - -0.0691 = 0.0253$$

$$2019\ ERP\ for\ LT\ Corp\ Bonds = \frac{\sum_{t=1926}^{2018}\left(R_{M^t} - R_{F^t}\right)}{93} = \frac{\left(\sum + 0.0253\right)}{93}$$

$$Since\ 0.057 = \frac{\sum}{92} \rightarrow \sum = 92 \times 0.057 = 5.244$$

$$2019\ ERP\ for\ LT\ Corp\ Bonds = \sum_{1926}^{2017} + \left(R_f^{2018} + R_f^{2018}\right)$$

$$2019\ ERP\ for\ LT\ Corp\ Bonds = \frac{(5.244 + 0.0253)}{93} = 0.0567\ or\ 5.67\%$$

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[52] Based on the *SBBI* & Duff & Phelps study 1926 - 2018 (LT Corp Bonds). Total annual return long-term Corporate Bonds BloomBarc Benchmark Vanguard ETF website.

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.[53]

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.[54]

Brealey, Myers and Allen also addressed this issue:

> If the cost of capital is estimated from historical returns or risk premiums, use

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

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

arithmetic averages, not compound annual rates of return (geometric averages).[55]

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 risk premium because it represents the truly riskless portion of the return.[56]

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.[57]

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

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

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

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

> 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.[58]

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.

> 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.[59]

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

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

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

current literature are probably overstated.[60]

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, 2019, and no adjustment is necessary.

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

Supplement to the Cost of Capital Study

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

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

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

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

Impact of New Tax Law on Valuation

The new Tax Cuts and Jobs Act (TCJA) of 2017 was signed into law on December 20, 2017 by President Donald Trump. The TCJA took effect on January 1, 2018 and provides for a number of changes in corporate taxes. The most visible and immediate impact is a reduction in corporate federal income tax rates from 35% to 21%. The impact on regulated companies should be minimal from a valuation standpoint. For example, regulated utilities are unlikely to see any long-term benefit. Any reduction in tax costs will be passed on directly to customers as savings, as the regulated model is typically based on cost of service. Any cost reductions resulting from tax reform will result in lower revenues granted from regulators. In fact, the Center for Financial Research and Analysis (CFRA) has stated, "CFRA does not expect regulated gas utilities to see any long-term benefit from U.S. Tax Reform. Any reduction in tax costs will be passed on directly to customers as savings, as the regulated model is typically based on cost of service."

Actually that statement is good for regulated companies in general because all regulatory commissions (state and federal) in their oversight capacity in setting the rates of return and net

operating income for their regulated companies do essentially the same thing. The regulatory commissions start their regulatory process at the bottom of the income statement and work their way up to the top – just the opposite of what the typical accountant or appraiser would do in estimating net operating income for a generic property.

Regulators set the allowed rate of return using a "standard **WACC**" (weighted average cost of capital). This WACC is after the correct amount of income tax is computed, taking into consideration the fact that interest expense is a tax-deductible item of expense. Most financial texts compute an after-tax WACC (**AT WACC**) as if interest expense is not a tax deductible item (or as if the total investment was financed entirely by equity). Some appraisers and financial texts will even compute a pre-tax WACC (**PT WACC**). In any event, whatever cost of capital is used (as long as it is matched with the proper level of income) should not have any impact on an appraisal. Please see the following illustration which shows all three 'WACCs' mentioned above.

Income Tax Rate = **35%**

Capital	Portion	Cost	WACC	Tax. Ben.	AT WACC	Divisor	PT WACC
Debt	50%	6.00%	3.00%	65.00%	1.95%		
Equity	50%	10.00%	5.00%		5.00%		
Total	100%		**8.00%**		**6.95%**	65.00%	**10.69%**

Now compare the information above for the company with the new 21% tax rate.

Income Tax Rate = **21%**

Capital	Portion	Cost	WACC	Tax. Ben.	AT WACC	Divisor	PT WACC
Debt	50%	6.00%	3.00%	79.00%	2.37%		
Equity	50%	10.00%	5.00%		5.00%		
Total	100%		**8.00%**		**7.37%**	79.00%	**9.33%**

Notice how the standard WACC does not change with the change in the tax law. That is because the standard WACC computed by the regulatory commissions is after the correct amount of income tax is computed and deducted (whatever the tax rate is). That illustrates the cost of service model used by all regulatory commissions. In other words, income taxes are a cost of service expense that is passed on to the consumer no matter what the tax rate or tax expense is.

For unregulated companies the theory would be similar. Regulatory commissions are set up to be a surrogate for market competition and thus the impacts should be similar. For unregulated companies competition should theoretically cause unregulated companies to pass along any tax savings to consumers (same as for regulated companies). In order for unregulated

companies to remain competitive with their peers they must offer their goods and services for the lowest prices possible to allow them to earn their cost of capital. There may be some short-term advantages that accrue to companies because of the new corporate tax rate, however over the long term these advantages will be either regulated or competed away. We must remember that we are appraising these companies (regulated and unregulated) using a perpetuity model. That model assumes that we are appraising only the operating properties that exist on the appraisal date and we are projecting a level income based on the assumption that depreciation expense will be offset with an equal amount of capital expenditures. This is well documented in the railroad public utility appraisal arena and 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 ®. 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 cash flows will remain constant into perpetuity.[61]

Ultimately, the appraiser recognizing that the appraisal procedure of capitalizing net operating income into perpetuity and that net operating income for regulated utilities (and to a large extent for unregulated companies over the long term due to competition) is not likely to be significantly impacted by a change in tax rates (or any other operating expenses). Companies must still earn their cost of capital to remain in business over the long term, regardless of whether they are regulated by a regulatory commission or simply by market competition, their net operating income and thus value are not likely to be significantly impacted by the change in federal income tax rates.

Rating agencies (Moody's, Fitch, and Standard & Poor's) have noted that regulated

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[61] Cornia, Gary C., David J. Crapo, 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."

companies may face a ratings downgrade due to accumulated deferred income taxes (ADIT) having to be paid back to customers. ADIT has been collected based on a 35% income tax rate and is to be paid based on a 21% rate. The excess ADIT will be returned to customers and may create cash flow or interest coverage problems, potentially causing debt ratings downgrades.

Rates of Return

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

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

Categories of Capitalization

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

Direct Capitalization

Direct capitalization is a method of converting one year's income into value in one direct step, usually by dividing the income estimate by the appropriate income rate. It is the present worth of the future earnings that gives a proper indication of value by the income approach.

Typically the income capitalized is the estimated net utility operating income expected in the following year. Net utility operating income for public utilities is defined as the income representing the amount available to pay the debt costs and equity costs for the property. Public utility regulatory commissions (both state and federal) recognize that net utility operating income is the level of income necessary to pay the cost of capital annually.

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

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

> When supported by appropriate market data, accepted techniques include 1) derivation from comparable sales, 2) derivation from effective gross income multipliers and net income ratios, 3) band of investment—mortgage and equity components, 4) band of investment—land and building components, 5) the debt coverage formula, and 6) yield capitalization techniques such as the general yield and change formula, (R_O = yield – change in income and value) and the Ellwood method.[62]

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

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

differences between capital market securities (whether debt or equity instruments) and real estate and tangible personal property (either individual assets or going concern assemblages of assets) as investment alternatives.

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

	Securities (Debt or Equity Instruments)		Real Estate/Personal Property (Individually or as a Mass Assemblage)
1.	Liquid, marketable investments	1.	Illiquid investments
2.	Noncontrolling interest in income production and distribution	2.	Controlling interest in income production and distribution
3.	Small, absolute dollar investment required	3.	Large, absolute dollar investment required
4.	Small 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	8.	Investments expected to depreciate over time
9.	Income typically subject to only individual tax (from investor's perspective)	9.	Income typically subject to both corporate and individual tax (from investor's perspective)
10.	Portfolios can be created in limitless combinations of risky securities and risk-free securities	10.	Portfolio limited to the particular combination of real estate and personal property that operate the subject business

As the table indicates, there are fundamental investment risk and return differences between (1) 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.[63]

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

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

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

> The equity yield rate (Y_E) is different from the equity capitalization rate (R_E). The equity capitalization rate is simply the ratio between the first year's income and the equity value or equity investment. The equity yield rate is the rate of return on equity capital. It is similar in concept to the property's overall yield rate (Y_O). The equity yield rate can be estimated by extraction from recent comparable sales (similar to derivation of the overall yield rate in the previous example), survey and opinion of market participants, and comparison with the equity yield rates (Y_E) achieved in alternative investments of comparable risk such as stocks and bonds. While the equity yield rate (Y_E) can be developed from alternative investments of comparable risks such as stocks and bonds, the equity capitalization rate (R_E) used in direct capitalization cannot be developed correctly from the earnings-to-price ratios of common stocks. Earnings-to-price ratios of common stocks can only be used in the appraisal of similar common stock, not for the appraisal of real personal property.[64]

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.

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

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.[65]

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

Upon projecting the amount, timing, and duration of the cash flows to the property being appraised, the appraiser must identify the pattern that the cash flow is expected to follow during the holding period. Those patterns are either variable, level, increasing, or decreasing annuities. For a level annuity where a property is expected to generate a level net utility operating income for a finite period of time and then be resold at the original purchase price, the property can be valued with capitalization in perpetuity by dividing the periodic income by the appropriate discount rate. In this model the discount rate and the overall capitalization rate are the same.[66]

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.[67] 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

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

[66] *Ibid.*, 560.

[67] *Ibid.*, 560.

rate for the holding period. Further, the appraiser discounts any remaining value in the investment at the end of the holding period and adds the total present worth of the variable cash flows to the present worth of the future value at the end of the holding period. The total represents the present worth of the total property.

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

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

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

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

> An investor may compare the expected equity yield on a real property investment with the yields on alternative investments with commensurate risk (e.g., stocks and bonds) and with a lender's yield on mortgages secured by similar real property.[68]

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.[69]

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, DGM or Gordon growth model,

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

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

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 89. 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 13, Dr. William Kinnard, MAI explains that all of the annual "income" figures used in appraising income-producing properties are *cash flows* rather than accrual accounting incomes. Cash flow can be defined in a number of ways, however for appraisal purposes it generally consists of income necessary to satisfy the cost of capital plus depreciation expense. Commercial and general appraisers recognize this level of income as simply ***net operating income***. Utility appraisers know that the definition of "net utility operating income" for public utilities and commercial properties is different in one important aspect. For public utilities the level of income reported as "net utility operating income" is only that income available to pay the utility's cost of capital, while for commercial properties "net operating income" includes not only the level of income available for debt and equity, but also the income to recapture a portion of the wasting asset (*otherwise known as depreciation expense*).

In general commercial appraisals cash flow is typically defined as simply net operating income (as defined for general commercial appraisal purposes), which is the income available for debt and equity and the depreciation expense. For an illustration of this type of analysis, refer to *The Appraisal of Real Estate*, 14th edition, page 546-547.

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

Another variation of this same general definition of cash flow for a public utility is called ***net cash flow***, which is the gross cash flow less capital expenditures. Some refer to this as gross revenue less all cash disbursements except interest expense. For the appraisal of public utilities where it is assumed that the amount of capital reinvestment is equal to the depreciation expense,

net cash flow can be defined simply as utility net utility operating income. For the appraisal of a public utility as a going concern, net cash flow is usually the best level of income to work with.[70] This issue was addressed and discussed by Dr. Gary C. Cornia, David Crapo, and Dr. Larry Walters as previously quoted on page 86.

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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[70] 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.

Duff & Phelps Risk Premium Calculations - 2019

Exhibit 2.3: Summary Statistics of Annual Total Returns, Income Returns, and Capital Appreciation Returns of Basic U.S. Asset Classes
1926–2018

1926–2018	Geometric Mean Returns (%)	Arithmetic Mean Returns (%)	Standard Deviation of Returns (%)
Large Company Stocks			
Total Return	10.0	11.9	19.8
Income Return	3.9	4.0	1.6
Capital Appreciation Return	5.8	7.7	19.1
Small Company Stocks			
Total Return	11.8	16.2	31.6
Mid-cap Stocks (Decile 3-5)			
Total Return	10.9	13.6	24.3
Income Return	3.7	3.7	1.8
Capital Appreciation Return	7.0	9.7	23.6
Low-cap Stocks (Decile 6-8)			
Total Return	11.3	15.0	28.5
Income Return	3.4	3.4	2.0
Capital Appreciation Return	7.8	11.4	27.9
Micro-cap Stocks (Decile 9-10)			
Total Return	11.9	17.7	38.5
Income Return	2.4	2.5	1.7
Capital Appreciation Return	9.4	15.1	37.6
Long-term Corporate Bonds			
Total Return	5.9	6.3	8.4
Long-term Government Bonds			
Total Return	5.5	5.9	9.8
Income Return	4.9	5.0	2.6
Capital Appreciation Return	0.3	0.7	8.8
Intermediate-term Government Bonds			
Total Return	5.1	5.2	5.6
Income Return	4.4	4.4	2.9
Capital Appreciation Return	0.5	0.6	4.4
US Treasury Bills			
Total Return	3.3	3.4	3.1
Inflation	2.9	3.0	4.0

Source of underlying data in both Exhibit 2.3 and 2.4: (i) Stocks, Bonds, Bills, and Inflation® (SBBI®) return series from the Morningstar *Direct* database. Series used: Large Company Stocks (IA SBBI® US Large Stock TR USD Ext). The "SBBI® US Large Stock" return series is essentially the S&P 500 index; Small Company Stocks (IA SBBI® US Small Stock TR USD); Long-term Corp. Bonds (IA SBBI® US LT Corp TR USD); Long-term Gov't Bonds (IA SBBI® US LT Govt TR USD); Intermediate-term Gov't Bonds (IA SBBI® US IT Govt TR USD); T-bills (IA SBBI® US 30 Day TBill TR USD); Inflation (IA SBBI® US Inflation). All rights reserved. Used with permission. (ii) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2019 Center for Research in Security Prices (CRSP®), University of Chicago Booth School of Business.
(continued on next page)

Certification

We certify that, to the best of our knowledge and belief, ...

- the statements of fact contained in this study are true and correct.
- the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, impartial and unbiased professional analyses, opinions, and conclusions.
- we have no present or prospective interest in any companies that may be affected by this study, and we have no personal interest with respect to the parties involved.
- we have no bias with respect to the companies in this industry or to the parties involved with this assignment.
- we have appraised some of the companies in this industry in the three years prior to accepting this assignment.
- our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined result that favors the cause of the client, the concluded cost of capital, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this study.
- our engagement in this assignment was not contingent upon developing or reporting predetermined results.
- our analyses, opinions, and conclusions were developed, and this study has been prepared, in conformity with the requirements of the Codes of Professional Ethics of the Appraisal Institute and the International Association of Assessing Officers and the *Uniform Standards of Professional Appraisal Practice* of the Appraisal Foundation.
- use of this study is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
- we are currently certified under the continuing education programs of the Appraisal Institute and the International Association of Assessing Officers.
- the study is based on an analysis of financial information and we have not made a personal inspection of any physical property related to this study.
- no one provided significant assistance to the person(s) signing this certification.

Thomas K. Tegarden, MAI, CAE

Diane M. Ange, RM, CAE

Assumptions and Limiting Conditions

1. The study is based on an economic analysis and no property was physically inspected during the course of this assignment.

2. We believe that the facts, statements, and opinions contained in this report are reliable and supportable. We have not independently validated or audited this information. No responsibility is assumed for the accuracy of information obtained from the Client, other informed sources, or from other published material which was available. The conclusions set forth in this study are dependent upon such information being complete and accurate in all material respects. If the actual facts were to be different from the facts set forth in this study, our analysis and conclusions might be different.

3. We assumed that this properties used in this analysis are under responsible ownership under competent management consistent with the regulatory requirements.

4. The various analyses used in this study may not be considered separately or independently of each other, and the final conclusion is predicated on a careful reconciliation of all indicators.

5. The authors reserve all rights to the contents and reproductions of this study, especially conclusions and computations relating to the cost of capital results. No part of this study shall be disseminated to the public through the advertising media, public relations media, news media, or any other public means of communication without the prior written consent of the authors.

6. The authors may not be required to give testimony or to appear in court by reason of this study, unless prior arrangements have been made therefor.

7. We take no responsibility for changes in market conditions and we assume no obligation to revise this study to reflect events or conditions, which occur subsequent to the date hereof. The date to which the opinion expressed in this study applies is set forth at the beginning of this study.