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The Financial Impacts of Declining Investment Opportunities on Electric Utility Shareholders

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OVERVIEW

We consider several scenarios of declining growth in utility investments and assess the direction and magnitude of financial impacts on utility shareholders. We develop and apply a stock price formation tool using publicly available data, identify the key drivers of utility stock valuations, and estimate the degree to which those valuations may be affected by reductions in future investment growth given different utility financial situations.[3] We also assess the magnitude of regulatory and policy responses aimed at mitigating potential negative financial impacts. Importantly, we do not suggest that regulators *must* take action to restore lost investor value. We estimate the likely degree of value loss and the associated adjustments that could be made to restore value, if such action were deemed appropriate.

Our key findings are as follows:

- Growth trajectories of utility [capital expenditure] investment lower than today's expected levels results in a significant decline in electric utility stock prices – a 14% to 25% decline, on average, across scenarios;

- The magnitude of negative impacts on stock prices varies greatly depending on specific financial conditions of the electric utility, with stock price impacts ranging from -3% to -54% across all utilities and all scenarios;

- Existing regulatory policies may mitigate some or all financial impacts, depending on utility and other conditions, but doing so has consequences for ratepayers in the form of increased costs or greater allocation of risk; and

- As the electricity sector continues to evolve, utility shareholders can also diversify their portfolios and seek non-traditional and non-regulated investment opportunities, such as distributed generation and energy services.

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[3] Future investment growth changes and the reactions by investors to those changes are impossible to perfectly predict and model given the idiosyncrasies of financial markets. As such, this technical brief is not intended to serve as a forecast of stock prices. Information in this report should not be interpreted as a recommendation to buy or sell any securities.

INTRODUCTION

The electric industry is capital intensive as utilities make investments in generation, transmission, and distribution plant to provide electric service to customers. Utility shareholders see value when a utility invests in projects that earn returns on equity that exceed cost of equity (Koller et al., 2015). Today's financial and market data suggest returns on equity in excess of the cost of equity creating a strong motivation for utility investment.

Notwithstanding the motivation, the electric industry may face a decline in future growth-related investments in the coming years if growth in electricity demand and retail sales continue to decrease, with projections of less than 1 percent a year growth through 2040 (EIA, 2015). Customer-sited distributed generation (DG) continues to see substantial growth with solar photovoltaic installations 16% higher in 2015 as compared to 2014 and expected to more than double by the end of 2020 (SEIA & GTM, 2016). Some suggest that, when taken together, declining or stagnant utility load growth may eliminate utility investment in new generation, transmission and/or distribution assets, especially among regulated companies.

If such a future comes to pass, it may become increasingly difficult for utilities to create incremental value for their investors, based on the existing regulatory model, which will undoubtedly result in adverse consequences for their stock prices. In turn, utility executives will likely respond to mitigate the effects on their shareholders in ways that may not align with or promote public policy goals and regulatory objectives. Regulators and policymakers should be aware of the consequences of a potential change in investment growth and what may drive the magnitude of changes to utility stock prices. This awareness will allow them to anticipate how utility executives might react and how to better align incentives for utility investment with public policy goals.

We first explore the issue of changes in future investment growth through observation of the degree to which new equity investment may create value for shareholders. To provide further insight, we developed a tool, the Utility Stock Analysis Tool, to estimate a utility's stock price using inputs for that utility's estimated earnings per share, dividends per share, book value per share and cost of equity. After understanding impacts for the electric utility industry on average, we examine the distribution of changes in electric utility stock prices given different underlying financial conditions. In addition, we show what potential changes to a utility's achieved returns as well as their observed cost of equity would be necessary to maintain current stock prices that suggests the likely magnitude of regulatory and policy responses if regulators wish to preserve investor value. It is important to note that, while regulators must consider multiple objectives in rate design and in regulatory decisions, the primary objective is balancing customer and investor interests (*FPC v . Hope Nat. Gas Co.,* 1944). The results illustrate the fundamental relationship between anticipated future investment and utility stock price formation, and help regulators and policymakers anticipate potential utility responses as well as what they can do to mitigate the impact, should they deem such action appropriate.

TYPES OF UTILITY GROWTH

When discussing growth in the context of the utility industry, it is important to be clear as to the different types of growth and how they may impact investor value. The generic term "growth" most often refers to the rate of expansion in retail sales (kWh) or peak demand (kW). Load growth, however, does not directly drive investor value. While growth in sales can create short-term value gains for investors between rate cases[4] under traditional rate-of-return regulation, shareholders may also obtain long-term benefit from capital additions (e.g., investment in plant) if conditions are right. Growth in capital is not always linked to sales growth, and in fact the evidence suggests that the two will not be closely linked in the coming decade.

If sales continue to grow, the utility is likely to add facilities, but if excess system capacity exists, the need for such investment may not arise for many years—in that case growth in capital may lag growth in sales by many years. The scenario that appears to be more likely, however, is that even though annual utility sales growth is likely to be 1 percent or less going forward, utilities will still make substantial capital investment to replace or refurbish existing plant, or to make technological improvements particularly in the distribution system (e.g., grid modernization). Our analysis shows that the typical electric utility will expand its equity capital base[5] in the aggregate at a rate of about 4.6% per year in the future, and at 4.1% on a per-share basis.

Utilities can grow their equity investment in their plant in two ways: (1) retain some of their earnings, rather than paying them out as dividends (internal financing); and (2) issue new shares of stock (external financing).[6] We use Alliant Energy as an illustrative example. It has an aggregate book equity balance of $4,151,500,000 and is expected to earn a 10.1% return on that investment, producing annual earnings of about $420 million.

$$\$4{,}151{,}500{,}000 \times 10.1\% = \$419{,}301{,}500$$

Alliant pays out 64% of its earnings as dividends. That means it retains 36% of those earnings for reinvestment.

$$\$419{,}301{,}500 \times 36\% = \$150{,}948{,}540$$

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[4] Increased returns on equity related solely to sales growth are typically eliminated by regulators when setting rates in the next proceeding. If the regulator has implemented a decoupling mechanism, those gains are eliminated in between rate cases, as well.

[5] This report analyzes the impact of changing capital investment on shareholders, which are the equity holders. Examining utility cash flows from operations reveals that they generate substantial cash flow from internal funds, which includes returns of capital (i.e., depreciation). It is important to note that cash from depreciation alone restores base capital but does not, by itself, create incremental capital. Utilities also can and do raise substantial amounts of capital by issuing debt, but that by definition is not equity investment. Such debt-related investment could affect equity holders if the utility's capital structure (mix of debt and equity) changes. To control for that potential effect, we assume that the utilities recover capital and finance future capital additions at the same mix of debt and equity as they have in their current capital structures so we can ignore any debt-related equity impacts.

[6] Our analysis takes place at the holding company level where direct share issuances can occur. The concepts discussed herein also apply to utilities that are subsidiaries, but the analytics of modeling the effects are a bit more complicated because "outside" equity infusions in that case lump sum investments by the parent company.

Alliant currently has 115 million shares of common stock outstanding. Our analysis suggests that it will issue 378,087 new shares of stock in the coming year.[7] We assume for purposes of this demonstration[8] that the shares will be issued at the current stock price of $73.47 per share.

$$378,087 \times \$73.47 = \$27,778,052$$

Alliant's total new equity investment in the coming year will then be:

$$\$150,948,540 + \$27,778,052 = \$178,726,592$$

Combining this figure with any net debt issuances, which are not addressed in this paper, would yield total net capital growth.

In the aggregate then Alliant's equity capital will then grow by:

$$\frac{\$178,726,592}{\$4,151,500,000} = 4.3\%$$

Since some of that growth came from share issuances, the per-share growth rate will be lower. Before the issuance the book value per share was:

$$\frac{\$4,151,500,000}{115,000,000} = \$36.10$$

At the end of the year, after retaining 36% of its earnings and issuing 378,087 shares of stock, its book value per share will be:

$$\frac{\$4,151,500,000 + \$150,948,540 + \$27,778,052}{115,000,000 + 378,087} = \$37.53$$

That amounts to an annual per-share increase of about 4.0% per year.

$$\frac{\$37.53}{\$36.10} - 1 = 4.0\%$$

The aggregate growth rate of 4.3% describes the overall expansion of the equity base; the 4.0% figure describes how that growth feeds into the per-share valuation of Alliant Energy's stock.

GROWTH AND SHAREHOLDER VALUE

Firms create value for their shareholders if new equity investment yields returns on equity (r) in excess of the associated costs of equity (k) (Koller et al., 2011). If that condition holds, the more equity capital the firm invests, the greater the shareholder gain. The same is true that, if r exceeds k, reducing utility equity investment will harm shareholders, holding other factors constant. Finance theory further suggests a relationship between the return on equity, the cost of equity, the stock price and the book value. When r is close to k, the stock price should be close to book value; in contrast, when r exceeds k the stock price should

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[7] Based on the utility's projected share issuances and industry average share issuances over the 2015-2019 period.
[8] The actual calculation of the share price is more complicated and depends on the accretion ratio. The results presented here are close to those derived under the more complicated equation.

lie above book value (Damodaran, 2012). Thus, incremental investments are a key driver of shareholder value and result in a strong financial motivation for companies.

In order to illustrate the concept, we use a version of the constant-growth dividend discount model, an approach widely used in utility stock valuations (Brealey et al., 2006). We employ a version of the dividend discount model that allows for equity investment growth through both internal financing (retained earnings) and external financing (new stock issuances).[9]

Using publicly available data[10] for the 43 electric utilities followed by the Value Line Investment Survey[11] as inputs to our tool, we derive long-term estimates of each utility's cost of equity as well as their earned return on equity, and then use those estimates to illustrate the relationship between return on equity, cost of equity, and price-to-book ratios (see Figure 1). Our analysis shows that electric utilities will likely continue to earn returns on equity (r) over the long-run in excess of the returns their equity investors require (k), which has also been the case for decades (Myers and Borucki, 1994).[12] The median expected long-run earned return on equity (r) is estimated to be 10.3%, which is slightly above the average authorized return on equity among electric utilities of 9.9% in 2015 (RRA, 2016). We estimate that those same companies have a median investor required equity return (i.e., cost of equity) of 7.7%.[13] This latter figure is close to the 7.5% median electric utility cost of equity estimate reported by the Morningstar investment advisory service (Bischof, 2016). In addition, our analysis indicates that electric utilities with larger positive gaps between r and k generally have a higher ratio of their stock price to their underlying book value (price-to-book ratio), which is consistent with finance principles.   A simple linear trend line through the data suggests for every 1 percentage point change in the value gap, the price-to-book ratio will increase by 0.9 showing that the bigger the value gap, the larger a premium a utility's stock will command over its book value.

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[9] See Appendix A for a description of the specific dividend discount model form we employ.

[10] All data was downloaded on April 26, 2016 from Value Line Investment Survey and Yahoo! Finance.

[11] Many of the electric utilities in the Value Line Investment Survey have a mix of regulated and non-regulated operation and increasing or decreasing growth opportunities may be reflected in an assortment of investment types (e.g., transmission projects, independent power generation projects). We do not segment utilities in the paper given the heterogeneity at the holding company level.

[12] Opportunities to earn above-average returns will not go unnoticed by investors. If there is a gap between r and the opportunity cost of equity k, investors will bid up the stock price above book value. That will drive the return investors can expect to earn below r with the process continuing until the expected return on the stock equals the return (k) that investors can earn on stocks with similar risk. Whether regulators will adjust r in the face of this information is a policy matter. The evidence suggests that they generally have not closed that gap.

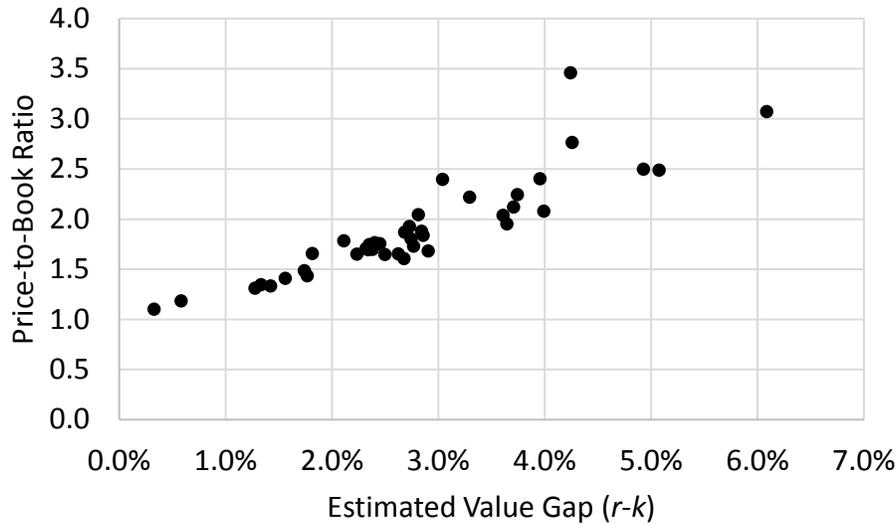[13] See Appendix B for a discussion of our cost of equity estimation method

Figure 1: Estimated Value Gap (r-k) and Price-to-Book Ratio

BASE CASE GROWTH

We next estimate the degree to which anticipated reductions in utility equity investment over time can impact a utility's stock price. Using data for the 43 utilities in the Value Line Investment Survey, we estimate future aggregate annual investment.[14] The typical electric utility today will produce aggregate equity investment growth of 4.6% per year, but ranges between 2.9% to 7.2% across the 43 utilities in our dataset.[15] We segmented these utilities to those ten utilities that are expected to see the lowest investment growth (Low Growth) ranging from 2.9% to 4.0% growth per year, those ten utilities with the fastest anticipated growth (High Growth) ranging from 5.2% to 7.2% growth per year, and the remainder who lie between (Moderate Growth) ranging from 4.1% to 5.2% growth per year.

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[14] This analysis could have looked retrospectively as well, as the data is readily available to feed into our tool to do so. However, for our purposes here, we are more interested in understanding what the future holds as changes in investment scale are anticipated for many utilities in the electric industry.

[15] We also estimate the median per-share equity investment growth between 2015 and 2019 to be 4.1%.
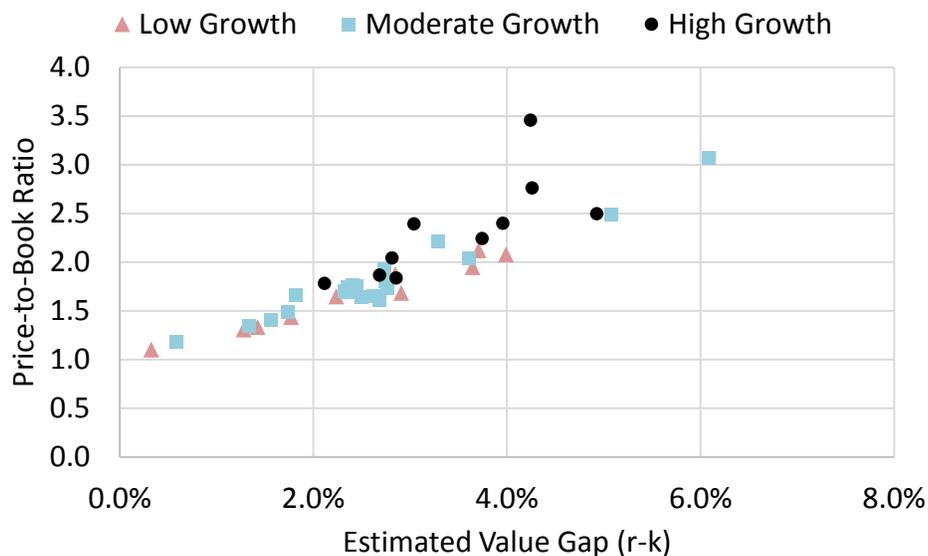
Figure 2: Estimated Value Gap (r-k) and Price-to-Book Ratio Segmented by Growth in Aggregate Investment Portfolios

By segmenting the utilities into our three categories as shown in Figure 2, we observe several relationships. First, we see that the value gap is generally smaller (median of 2.5%) for the low growth portfolio and larger (median of 3.4%) for the high growth portfolio. This suggests that every dollar of equity investment creates more value in terms of stock price appreciation for the companies in the High Growth portfolio than does a dollar of equity invested in the companies in the Low Growth portfolio. Second, the High Growth companies are not only investing more capital than their lower growth counterparts, they create more value from each dollar invested. This suggests that investors should be willing to pay relatively more for the companies in the High Growth portfolio than they do for those in the Low Growth portfolio. Figure 2 shows that such is the case as our High Growth portfolio generally has higher price to book ratios (median of 2.3) than the portfolio of Low Growth utilities (median of 1.7). Put differently, investors are willing to pay 39% more for the typical utility in the High Growth portfolio than they are for the typical utility in the Low Growth portfolio.

SCENARIO ANALYSIS

We develop two scenarios in order to assess stock price impacts at investment growth lower than current growth rates (i.e., "Base Case aggregate growth rate").

1. **Slower Growth**: Assumes that a reduction in investment growth spreads evenly across all utilities from 2015-2019 such that the growth rate in equity aggregate book value declines by 2.0 percentage points relative to each utility's Base Case aggregate growth rate.[16] We also assume there are no new stock issuances and that the utility adjusts its earnings retention rate to reflect these lower capital investment requirements.

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[16] For example, a utility with an aggregate growth rate of 4.3% in the Base Case will have an aggregate growth rate of 2.3%, and a utility with an aggregate growth rate of 3.1% in the Base Case will now have a 1.1% aggregate growth.

2. **No Growth**: Assumes equity investment growth drops to zero for all utilities by setting the earnings retention rate to zero.[17] We similarly assume elimination of all new stock issuances.

Figure 4 depicts changes in stock price for each of the 43 electric utilities in our dataset under the Slower Growth (horizontal-axis) and No Growth (vertical axis) scenarios. When the reduction in investment growth is similar from utility to utility (i.e., Slower Growth scenario) we see that the stock price impacts lie within a tighter range (-3 % to -24 %) than they do when the reduction in growth varies greatly from utility to utility in the no growth scenario (-5% to -54%).
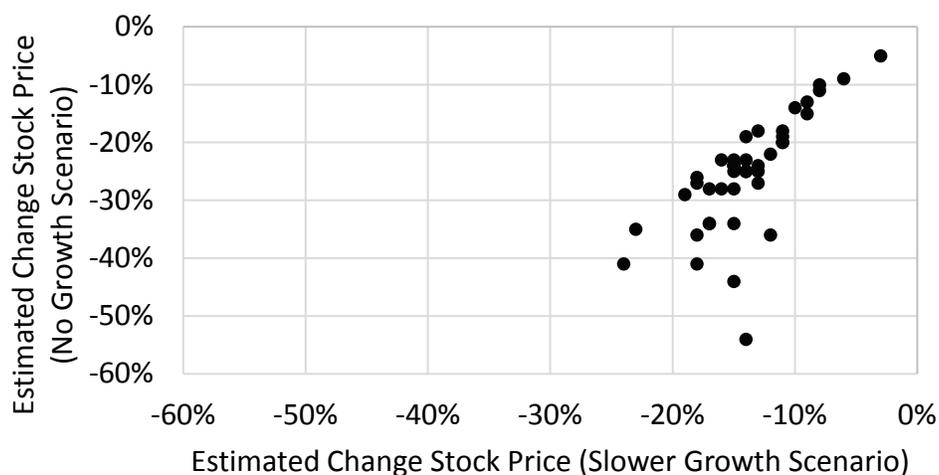

Figure 3: Estimated Changes in Stock Price for Different Investment Growth Scenarios

SCENARIOS BY GROWTH IN AGGREGATE BASE CASE INVESTMENT SEGMENT

Returning to our Low, Moderate and High Growth portfolios of utilities, we differentiate between the effects of a slowdown in future investment growth based on particular utility financial conditions. We observed greater stock price impacts on High Growth utilities in both scenarios, with a greater range of impacts among High Growth utilities in the No Growth scenario (-27.2% to -54.5%), relative to other electric utilities (see Figure 4). Focusing on the Low and High growth portfolios, when the reduction in the investment growth rate is the same across all utilities (Slower Growth scenario), the difference in the median impact on stock prices for the two portfolios is roughly only 1.5 percentage points (-13.4% and -14.8%, respectively). But when all growth is eliminated (No Growth scenario), the difference in the median reduction in the stock price balloons to almost 17 percentage points, again reflecting the more significant decrease in the growth rate for the companies in the High Growth portfolio (-18.4% and -35.1%, respectively).

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[17] This assumption results in much larger reductions in investment growth for the High Growth utilities relative to those assumed for the Low Growth utilities.
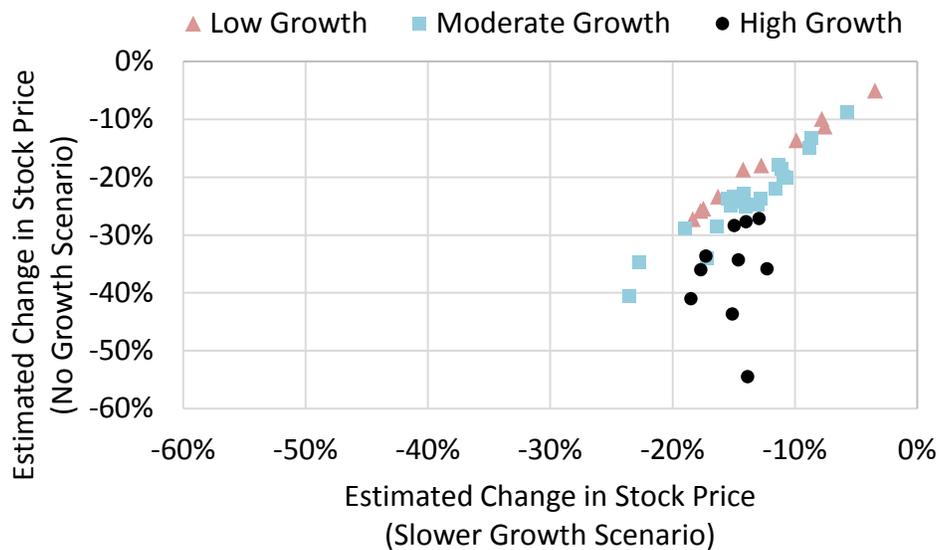
Figure 4: Estimated Changes in Stock Price for Different Investment Growth Scenarios by Growth in Aggregate Investment Portfolios

Regulators and policymakers may be concerned with the impacts of reduced investment opportunities for utilities and deem some form of intervention necessary to restore lost investor value. In order to assess the magnitude of policies to mitigate negative financial impacts we derive the necessary adjustments to both return on equity and cost of equity to restore the utilities' stock prices to current levels if utility investment growth rates slow (Slower Growth scenario) or go to zero (No Growth scenario) (see Figure 5 and Figure 6, respectively). [18] It appears that the highest growth utilities would need to boost achieved returns by over 600 basis points (median value of 6.3%) under a No Growth scenario. Whereas for the lowest growth utilities, returns would need to be increased by a little over 200 basis points (median value of 2.2%) should future investment growth be predicted to halt entirely. In contrast, if investment growth simply slowed by 2 percentage points (Slower Growth scenario), then regulators would need to increase achieved return on equity by roughly the same amount (1.3%) regardless of the Base Case growth in investment. A similar story unfolds when focusing on adjustment to the implied cost of equity, where much larger changes would be required for the High Growth utilities (median of -2.7%) under a No Growth scenario than the Low Growth utilities (-1.3%) and similar reductions in the cost of equity for both portfolios of utilities under a Slower Growth scenario (-0.8% and -0.6%).

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[18] We present these results without prejudice as to whether they should be made, or in many cases even could be made.

Table 1. Median Estimated Change in Return on Equity and Cost of Equity by Scenario and Investment Growth Portfolio

	Return on Equity		Cost of Equity	
	Slower Growth	No Growth	Slower Growth	No Growth
Low Growth Utilities	1.3%	2.2%	-0.8%	-1.3%
Moderate Growth Utilities	1.1%	3.1%	-0.7%	-1.8%
High Growth Utilities	1.3%	6.3%	-0.6%	-2.7%
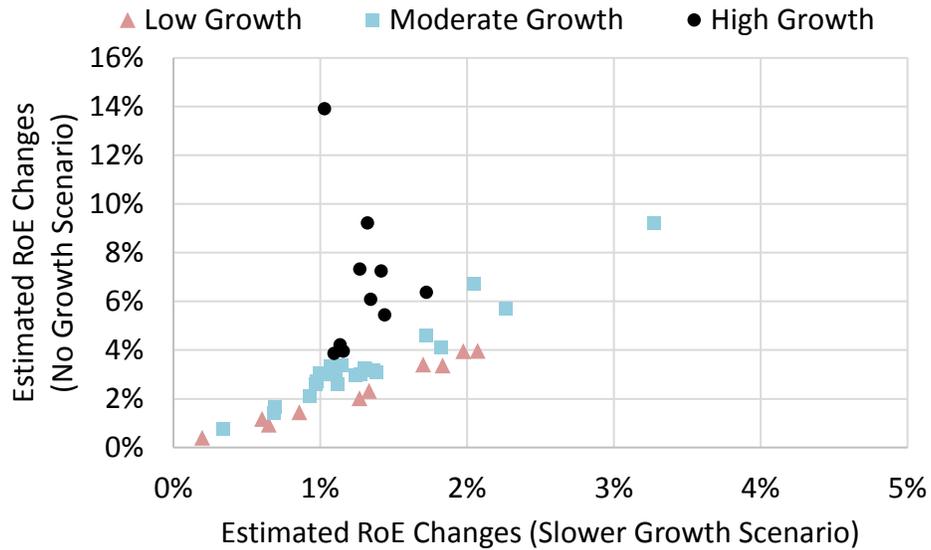
Figure 5: Estimated Changes in Return on Equity (RoE) Required to Maintain Base Case Stock Price by Scenario and Investment Growth Portfolio
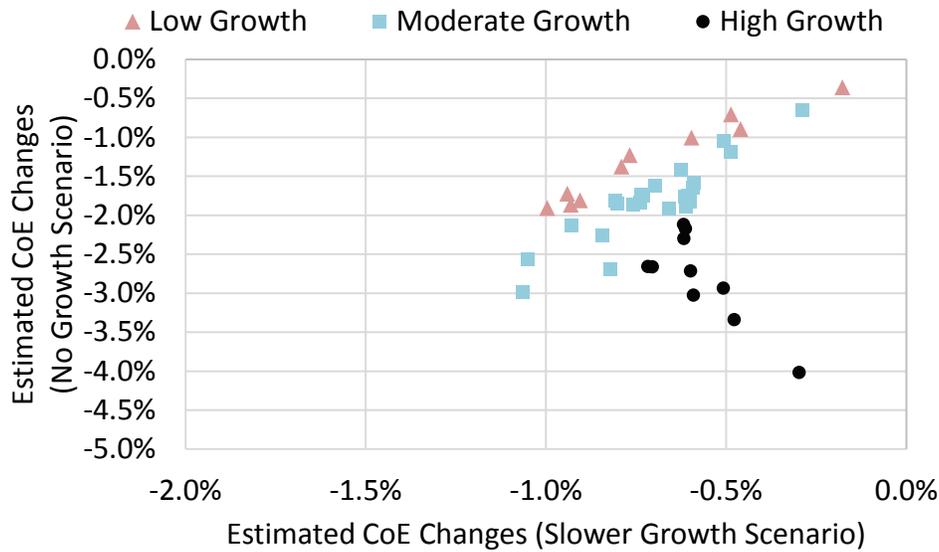
Figure 6: Estimated Changes in Cost of Equity (CoE) Required to Maintain Base Case Stock Price by Scenario and Investment Growth Portfolio

SCENARIOS BY VALUE GAP

Our observations of the gap between return on equity [r] and cost of equity [k] discussed earlier also revealed variation among electric utilities in terms of the difference between r and k, what we call the "value gap", and how that provides a better sense of the true value created for shareholders per dollar of utility investment. We observed that utility stocks with a larger value gap are purchased by investors at a premium (i.e., high price-to-book ratio). We assess whether the size of a utility's value gap suggests larger or smaller impacts from a slowdown in investment growth in order to assess the distribution of impacts given certain underlying financial conditions.

Figure 7 shows a sizeable difference in the spreads between r and k for the utilities grouped by their value gap (i.e., top ten as "High Value Gap", bottom ten as "Low Value Gap", and remainder as "Moderate Value Gap"). Specifically, there is a median value gap of 1.5% for the Low Value Gap and 4.1% for the High Value Gap portfolios. Furthermore, the groupings better delineate the differences in price-to-book ratios across the 43 utilities in our dataset.
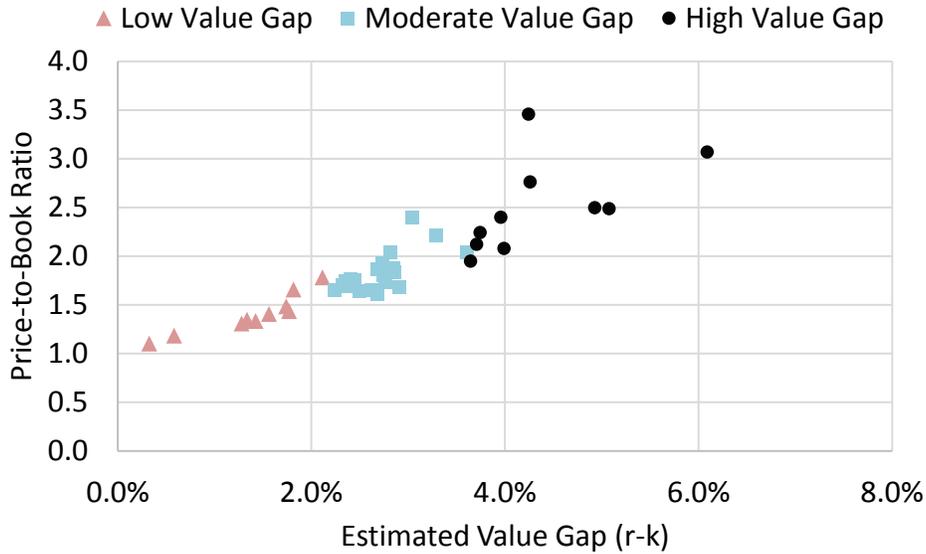
Figure 7: Estimated Value Gap (r-k) and Price-to-Book Ratio Segmented by Value Gap Portfolios

Creating portfolios based on the difference between *r* and *k* may provide better insight in terms of stock price changes under different future investment growth assumptions than does sorting on aggregate investment growth. Comparing Figure 4 and Figure 8, the median stock price change under a Slower Growth scenario for the Low Growth and High Growth portfolios was only 1.5 percentage point (-14% versus -15%) but is now 8.0 percentage points when portfolios are organized around the value gap. For the No Growth scenario, the difference in stock price changes for the Low Growth and High Growth portfolios was nearly 17 percentage points while here it is almost 22 percentage points (13.4% versus 35.1%).
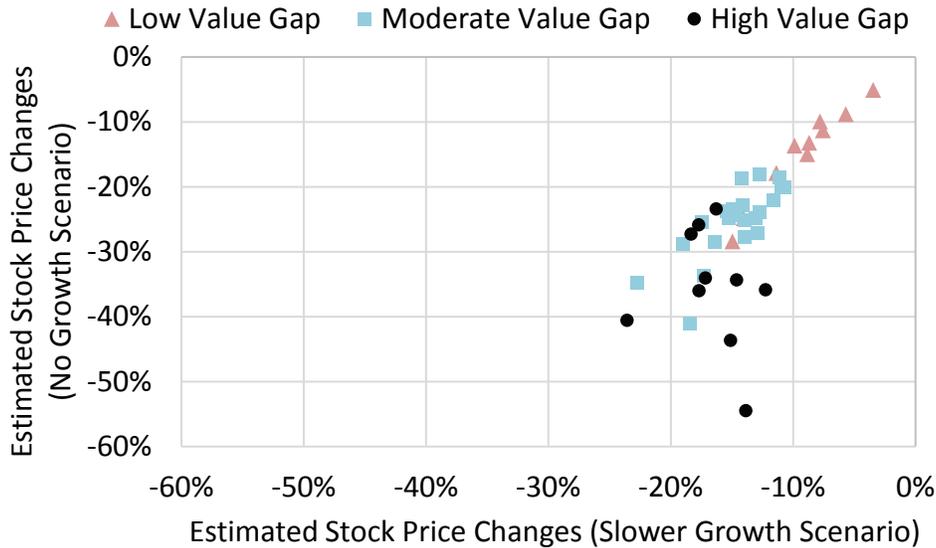

Figure 8: Estimated Changes in Stock Price for Different Investment Growth Assumptions by Value Gap Portfolios

Furthermore, organizing the required return on equity and cost of equity changes to maintain each utility's stock price by the magnitude of the value gap again creates a clearer picture of which types of utilities will be most likely to pursue mitigating the adverse effects of a slowdown in investment. Figure 9 and Figure 10 show changes in return on equity and cost of equity, respectively, for each of the different Value Gap

portfolios to keep the Base Case stock prices unchanged. In both cases, we see that should investment growth cease the utilities with the highest difference between *r* and *k* would require the largest increase in return on equity (median value of 3.2%) and the largest decrease in cost of equity (median value of -2.7%) – both exceeding the required change for the Low Value Gap utilities by over four times for return on equity and two times for cost of equity.
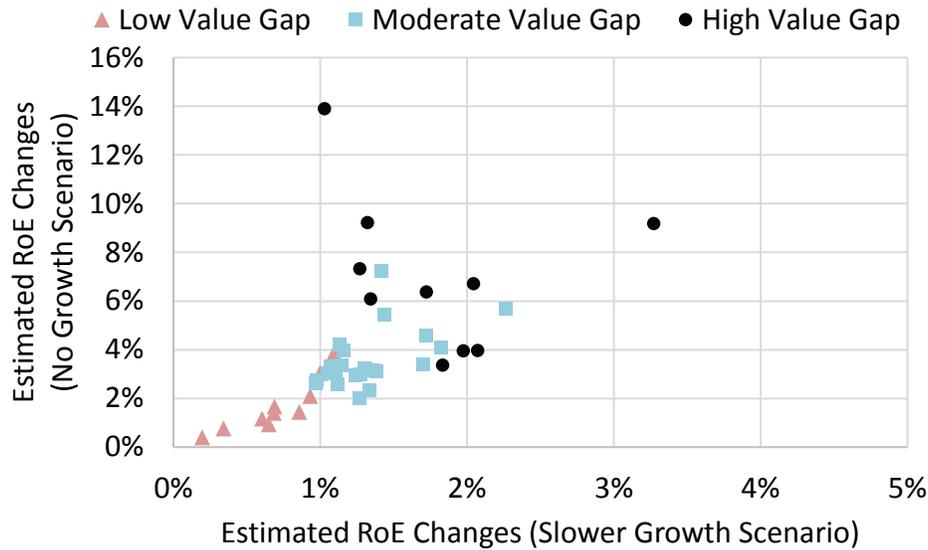

Figure 9: Estimated Changes in Return on Equity (RoE) Required to Maintain Base Case Stock Price by Scenario and Value Gap Portfolio
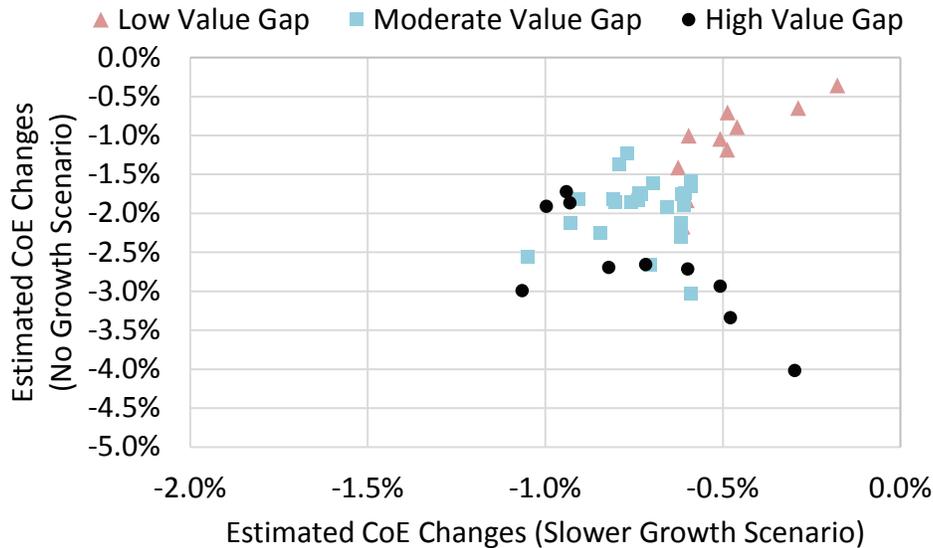

Figure 10: Estimated Changes in Cost of Equity (CoE) Required to Maintain Base Case Stock Price by Scenario and Value Gap Portfolio

DISCUSSION AND POLICY IMPLICATIONS

The analysis demonstrates that a decrease in future utility investment growth puts downward pressure on utility stock prices. Furthermore, such pressure exerts itself differently among utilities depending upon the existing level of aggregate investment growth as well as the value gap. For example, the difference in the median stock prices of ten utilities with the lowest aggregate investment growth and ten utilities with the highest aggregate investment growth would be nearly 17 percentage points if future investment growth were to suddenly halt altogether; whereas if the two utility portfolios are created based on the smallest and largest gap in each utility's return on equity [r] and cost of equity [k], that difference in the median stock price jumps to nearly 22 percentage points.

In a future where utility investment is expected to slow from its current pace, stockholders *ceteris paribus* will be adversely affected absent efforts to directly mitigate the effect. This negative impact to shareholder value should be understood by and may be of concern to regulators and policymakers because it may undermine public policy goals and regulatory objectives, such as integrating distributed resources, increased energy efficiency, and modernizing electricity delivery systems. Utility management may increasingly oppose any additional efforts to further reduce load growth and/or alter existing utility roles and responsibilities if they are concerned about further earnings erosion. Additionally, ratepayers may also be negatively impacted by declining utility finances as electricity prices may increase to restore lost utility profits.

As shown in our results, increases to a utility's achieved return on equity and/or reductions to the utility's cost of equity can alleviate the impact. If the utility has a large value gap or expected high aggregate investment growth, they will require even greater changes to return on equity (in excess of 600 basis points) and cost of equity (greater than -260 basis points) than utilities with smaller differences in r and k or aggregate investment growth (in excess of 140 basis points for return on equity and over -100 basis points for cost of equity).

State regulators have the ability to affect achieved utility returns in a number of ways. First, regulators could incrementally alter the utility's business model to increase the achieved return on equity. This could be done by increasing the rate of return used in retail rate setting. However, the modeling approach some regulators currently employ to set a utility's authorized return on equity may stymy such efforts, as the approaches drive return on equity towards industry averages. Jurisdictions that rely less on model results and more on informed judgment may be more conducive to achieve this result and authorize returns on equity for particular utilities beyond the industry average. Alternatively, state regulators could transition towards a regulatory model that provides greater opportunities for earned profits based upon the achievement of certain policy goals. In its simplest form, this represents shareholder incentive mechanisms that have long been used to align energy efficiency savings goals with utility financial interests. In addition, mechanisms that mitigate the variability in utility cash flows over time (e.g., decoupling mechanisms that allow a utility to collect a set revenue requirement regardless of sales, cost tracker mechanisms that allow the utility more contemporaneous recover of costs) could be designed and implemented to ultimately boost a utility's achieved return on equity. More comprehensively, regulators could alter the business model towards one that is more performance-based with targeted incentives, where greater customer satisfaction, increased reliability, and other desired outcomes makes the utility eligible for additional earnings opportunities.

Regulators have implemented targeted incentives to encourage the successful achievement of energy efficiency program goals for many decades. These shareholder incentive mechanisms can contribute 20-50 basis points to return on equity (Cappers et al., 2009).[19] Existing approaches, however, may be insufficient to make up for significant declines in shareholder value. Dramatically increasing one utility's return on equity by 140 to more than 600 basis points without any perceived benefit to ratepayers may be politically unsupportable as it may result in substantial customer cost increases. More fundamental changes to the utility business model (e.g., New York's Reforming the Energy Vision initiative) are a curiosity that many regulators are keeping tabs on but few seem inclined to pursue at present.

Regulators have less ability to alter the utility's cost of equity. Macroeconomic risks (e.g., recession, interest rates, inflation) represent changes in systematic economic conditions that will positively or negatively affect the value of all firms, albeit not necessarily to the same degree. Equity investors see as relevant only the risks that they cannot diversify away. If the investor diversifies broadly, firm-specific (and by extension sector-specific) risks will tend to cancel out as one firm's loss is another's gain. The only risks that are not eliminated in this fashion are those that affect all companies in the economy to one degree or another, risk impacts that portfolio diversification does not eliminate. These macroeconomic risks are the only risks investors demand compensation for in terms of a required return on a stock (i.e., the cost of equity). Some regulatory approaches can have small effects in this regard. If decoupling mechanisms insulate utilities from recessionary impacts, the cost of equity would be lowered (Kihm et al., 2016).[20] In general, however, state regulators and electric utilities alike have less opportunity to affect macroeconomic risks and hence are hindered to affect a utility's cost of equity.

It's also possible that the Federal government could aid in a transition of the sector as described above. Federal regulators could authorize higher returns for transmission investments under their jurisdiction, but this would only cover a fraction of most utilities' rate base assets. The Internal Revenue Service could promulgate changes in the tax code that reduce a regulated utility's tax liability or how long lived capital assets are booked (i.e., normalization). All of these efforts solely focus on affecting the utility's return on equity. On the cost of equity side, although the Federal government is certainly responsible for managing most macroeconomic conditions, it is highly unlikely it would alter policy to specifically affect the utility sector's cost of equity. Even where Federal action could restore value some might object to policies designed to prop up one industry possibly at the expense of others.

Any intervention by regulators and policymakers, however, must be done with great care. Restoring lost value to investors is not the sole regulatory objective and such action could adversely impact ratepayers in the form of increased costs and a greater allocation of risk. Restoring investor value to prior levels also presumes maintaining a status quo utility business and regulatory model. Regulators and policymakers may implement policies that improve investor value relative to a new baseline based on new utility business models.

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[19] For example, in the fall of 2007 Duke Energy proposed a novel business model called "Save-a-Watt" to promote a more aggressive pursuit of demand side management opportunities (Duke, 2007). In a subsequent analysis of this approach, Cappers et al (2009) found that this mechanism could contribute between 200 and 650 basis points to the utility's earned ROE, whereas more traditional incentive mechanisms typically contribute no more than 50 basis points to ROE. The South Carolina Utility Commission ultimately rejected the proposal, citing in part the possibility for the utility to earn an "unreasonably high profit" (PSCSC, 2009).

[20] Insulating utilities from the impacts of energy efficiency programs alone would not lower the cost of equity because efficiency program impacts are not macroeconomic in nature and never affect the cost of equity.

All of this suggests that the policy options to mitigate the effects of lower future investment growth may be limited, leaving a utility in the position of having to take direct action to restore lost shareholder value. Initially, a utility could focus its efforts on improving its cash flows. For example, a utility could cut costs by trimming its operations and being more efficient with the work force and investments it has in order to achieve higher returns. This is unlikely to stem the tide, but could provide some contribution to return on equity. Regulators, though, typically pass cost savings on to customers, suggesting that utility cost reductions produce only short-term gains (i.e., until the next general rate case). To achieve more dramatic increases, a utility could propose new and different capital projects to maintain, if not expand, investment growth. Grid modernization initiatives that focus on advanced metering, distribution automation, and other objectives are just such examples that would create investment opportunities, despite a slowdown in load and peak demand growth. A utility could also seek to develop new services that they offer to customers, which may require additional capital investment. For example, they could chose to invest in distributed solar and/or battery storage technologies in order to offer to customers under leasing arrangements. Lastly, a utility could take the more dramatic step of restructuring its business or outright creating new entities (e.g., business units, unregulated companies) to generate additional capital investment opportunities. American Electric Power, Duke Energy, Excelon, and ComEd are recent examples of electric utilities making investments in distributed generation, microgrid, and storage technologies.

In the end, regulators and policymakers should simply be aware of the implications that a reduction in investment growth would pose to investor-owned utilities and how that may affect their decision making knowing how investors could be adversely impacted. The degree to which regulators and policymakers understand utility financial motivations under different circumstances should help them make more informed decisions.

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APPENDIX A: Stock Pricing Model

In analyzing the impact of lower capital growth on electric utility shareholders, we use the following version of the model, one that we derived based on the finance literature (Gordon, 1974):

$$P = \frac{BVPS(r(1-b) - s)}{k - br - s}$$

In this equation *P* is the estimated stock price, *BVPS* is book value per share, *r* is the expected long-run earned return on equity, *b* is the earnings retention rate (the portion of earnings not paid out as dividends), *s* is the annual increase in shares of stock outstanding and *k* is the cost of equity.

To develop a reference point for the lower-growth scenarios we wish to study, we calibrate the model to match the current stock price for each utility. We observe the current stock price from Yahoo! Finance and we gather from *Value Line* each utility stock's beta[21] as well as that organization's projections for the following variables for the current year: earnings per share (*EPS*), dividends per share (*DPS*) and book value per share. With those data in hand we can determine the current return on equity (*EPS / BVPS*) and the current earnings retention rate (1 – *DPS / EPS*). We also gather information on current and projected shares of stock outstanding over the coming three to five years, which allows us to develop an initial estimate of *s*.

The model then calculates long-run estimates of the earnings retention rate, share issuances and returns on equity that, given the cost of equity, support the current stock price. This procedure applies to regression to the mean concept for these key value drivers, which leads to more reasonable long-run estimates. This is important because under the constant-growth assumption the value of these variables hold indefinitely.

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[21] The beta coefficient is a measure of the degree to which an individual stock moves in concert with changes in general market conditions. A beta less than 1.0 suggests that the stock's price changes are muted relative to those of the typical stock. A beta in excess of 1.00 suggests that the stock's price changes are larger than those of the typical stock. See Appendix B for more information.

APPENDIX B: Cost of Equity Estimation

We estimated the cost of equity for each utility using the empirical capital asset pricing model. The empirical CAPM mutes the sensitivity of the cost of equity estimate to changes in the beta coefficient, consistent with the adjustment suggested by the empirical research (Fama & French, 2004; Morin 2006).The functional form of the model is:

$$k_i = r_f + 0.25 (k_m - r_f) + 0.75 (\beta_i) (k_m - r_f)$$

where r_f = the long-term risk-free interest rate (10-year U.S. Treasury yield), k_m = the cost of equity (expected return) for the stock market in general (S&P 500), and β_i = the beta coefficient for stock i, which measures the degree to which an individual stock moves in concert with changes in the broad market. We use Morningstar's market cost of equity of 9.0% (Barnett, 2016) and a 10-year Treasury yield of 1.8% (U.S. Federal Reserve Board, 2016). The typical utility stock beta is 0.75 (*Value Line Investment Survey*, 2016).

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