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The Effects of Rising Interest Rates on Electric Utility Stock Prices: Regulatory Considerations and Approaches

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OVERVIEW

This technical brief identifies conditions under which utility regulators should consider implementing policy approaches that seek to mitigate negative outcomes due to an increase in interest rates. Interest rates are a key factor in determining a utility's cost of equity and investors find value when returns exceed the cost of equity. Through historical observations of periods of rising and falling interest rates and application of a pro forma financial tool, we identify the key drivers of utility stock valuations and estimate the degree to which those valuations might be affected by increasing interest rates.[3] We also analyze the efficacy of responses by utility regulators to mitigate potential negative financial impacts.

We find that regulators have several possible approaches to mitigate a decline in value in an environment of increasing interest rates, though regulators must weigh the tradeoffs of improving investor value with potential increases in customer costs. Furthermore, the range of approaches reflects today's many different electric utility regulatory models and regulatory responses to a decline in investor value will fit within state-specific models.

INTRODUCTION

Investor-owned utility (IOU) management is driven to create value for investors and responds to firm-specific risks and systematic risks. Discussions of regulatory models and utility motivation are often focused on the utility's rate of return—both the return authorized by regulators and the achieved return—but this is only part of the value proposition. Utilities create economic value for investors by investing only in projects that can earn returns on equity that exceed the cost of equity not simply by investing in any project that can make a profit (Koller et al. 2010).

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[3] Future interest rate 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.

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Interest rates are a key factor in determining a utility's cost of equity, as stock investors demand a premium return over those offered by lower-risk, interest-bearing securities, such as U.S. Treasury bonds. An increase in interest rates therefore will increase a utility's cost of equity, all else being equal. While interest rates are generally unpredictable, interest rates have been generally declining for the past 30 years. The nominal interest rate on the 10-year U.S. Treasury Note, a widely accepted risk-free interest rate proxy for long-term investments, reached a high of nearly 14 percent in 1982 compared to a little more than 2 percent in the first-half of 2015.[4]

Many economists and managers expect an inevitable increase in interest rates from historically low levels (Leubsdorf 2015 and EIA 2015[5]) and key decision makers need to be aware of the implications associated with an increasing interest rate environment. In this paper we will identify conditions under which utility regulators should be concerned with an increase in interest rates and policy approaches to address potential negative outcomes.

We first explore the issue of changing interest rates through observation of the degree to which such changes affected utility stock prices in the past. To provide further insight, we developed the "Basic Utility Stock Analysis Tool" (described later) to estimate the cost of equity, and to estimate the degree to which utility stock price valuations might be affected by changes to two key variables—the utility's return on equity and its cost of equity. The results illustrate the fundamental relationship between interest rates and utility stock price formation, and help regulators understand how their decisions and financial market actions affect utility investor value, though regulators must ultimately balance consumer interests with those of investors.[6]

THE CASE OF RISING AND FALLING INTEREST RATES

A key driver of changes in interest rates is inflation in which high interest rates tend to be accompanied by high inflation rates. Figure 1 shows yields on the 10-year U.S. Treasury bond and inflation rates (represented as GDP deflator) from 1970 to the present. The period of 1970 to 1982 was marked by significant increases in both interest rates and inflation rates.

[4] See historical monthly data available at http://www.federalreserve.gov/releases/h15/data.htm

[5] The Energy Information Administration (EIA) predicts that over the long-term interest rates will be "slightly higher" than those observed in the past three years. This technical brief does not make any predictions as to future interest rate levels or changes.

[6] 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).

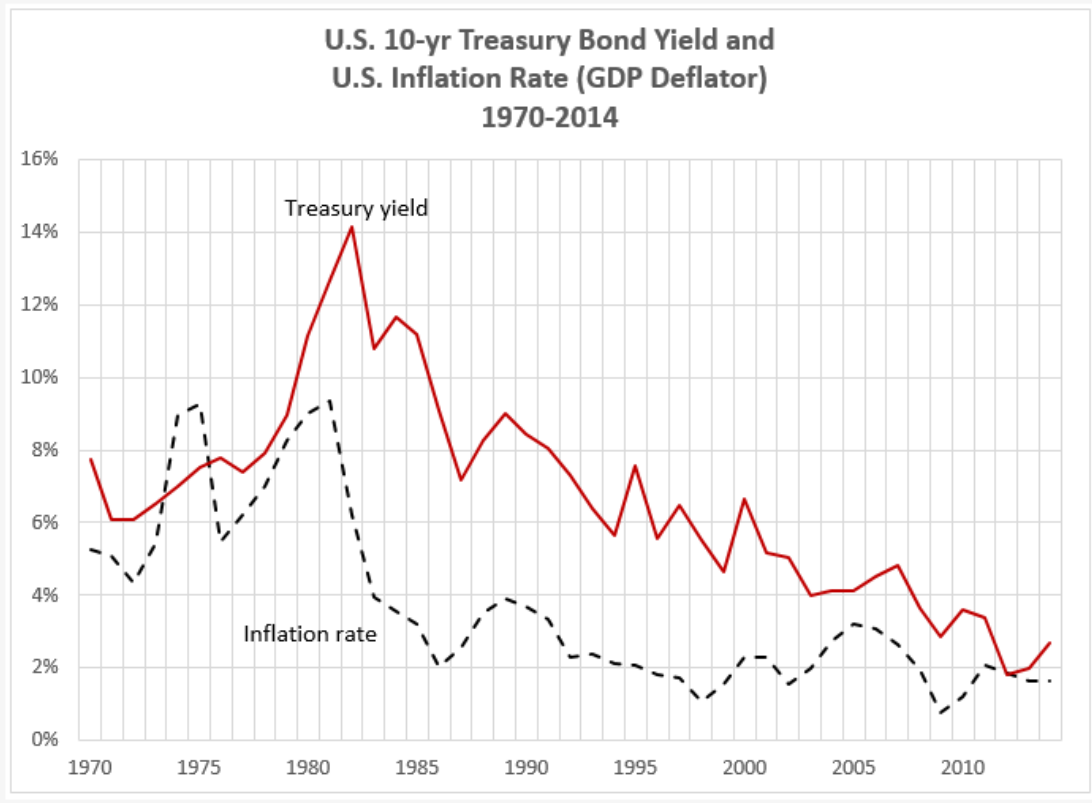

Figure 1: Interest Rates and Inflation

As interest rates rose, utility investors saw essentially no stock price appreciation for more than a decade.[7] Figure 2 shows the 54 percent decline in the real value of the Dow Jones Utility Index during the period of rising interest rates.[8] While some of this loss to investors was offset by utility dividend payments,[9] that did not eliminate concerns about this substantial loss in utility stock value.

Investors expect stock prices to rise and fall over time, so a decline in value is not necessarily evidence of a significant problem. If the decline is due to the inability of the firm to earn returns that meet minimum investor requirements (i.e., the cost of equity), however, that may result in a utility unable to raise sufficient capital to finance existing and expanded operations.[10]

[7] Other firms saw stock value decline in real terms during this periods, as well. The S&P 500 declined by 37 percent in real terms over this period. Utility stocks are considered less risky, however, and under normal conditions we would expect the reduction in utility stocks to be noticeably less than the reduction in the market, not greater.

[8] Current components of the index are American Electric Power, AES Corp., American Water Works, CenterPoint Energy, Consolidated Edison, Dominion Resources, Duke Energy, Edison International, Exelon Corp., FirstEnergy, NextEra Energy, NiSource, PG&E Corp, Public Service Enterprise Group, and Southern Company.

[9] The investors' total return is the sum of dividends and changes in stock prices.

[10] A firm can raise capital without difficulty even after a substantial price decline if investors expect that over the long run it will earn returns on equity that at least equal the returns available from investing in stocks of firms with similar risk.

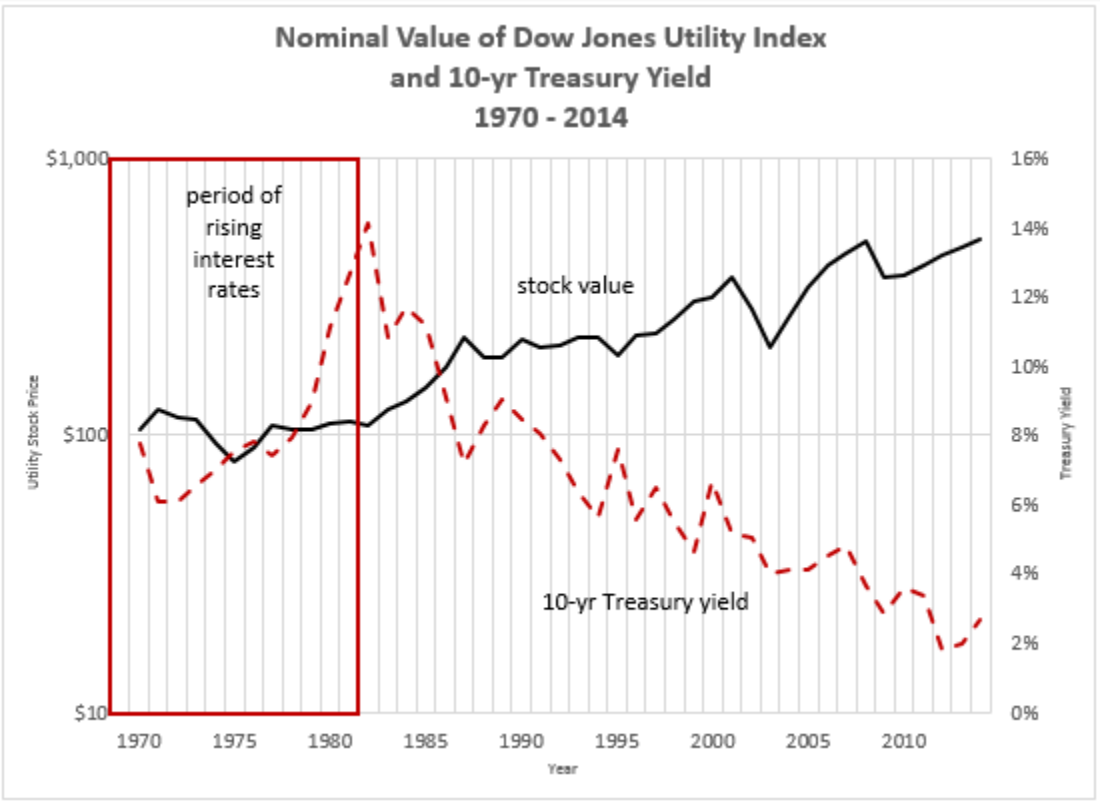

Figure 2: Interest Rates and Utility Stock Prices

During the period of rising interest rates (i.e., 1970 to 1982) the price-to-book ratio[11] for the typical utility declined from about 1.50 to 0.75, indicating the return on equity at the end of the period was less than the cost of equity (Kolbe et al. 1984).[12] This means that during the increasing interest rate environment utilities evolved from a position of financial strength, where their returns on equity exceeded the cost of equity by a noticeable amount, to one of weakness where they were not able to meet the evolving minimum return requirements. Authorized returns were actually increasing, but investor required returns (cost of equity) were increasing at a faster rate and in tandem with rising interest rates.

This inability of utilities to earn returns that covered the cost of equity raised concerns not only within the investment community but also among policy makers. The Congressional Budget Office (CBO) concluded that if regulatory policies continued to make it difficult for utilities to earn the minimum return investors required, utilities might avoid building capital-intensive plants even if such resources were the least-cost options.

[11] The price-to-book ratio is formed using the company's stock price in the numerator and its accounting book value in the denominator. If the price-to-book ratio exceeds 1.00, investors expect the firm to earn a return in excess of its cost of capital. If it is below 1.00, investors expect the firm to earn a return below that cost rate (Kolbe et al., 1984).

[12] There was general deterioration in the market as the price-to-book ratio for the Dow Jones Industrial Average declined from about 1.5 to 1.0 over the same period. This reveals that a large increase is interest rates can affect all stocks. Nevertheless, utility stocks were hit harder than stocks in general.

> While current practices probably will not result in widespread electricity shortages, the nation's electricity supply could become less cost-effective if regulatory incentives continue to bias utilities away from capital investments regardless of their technical or economic merit (CBO 1986).

This difficult situation would resolve itself by the mid-80s, not because regulators changed policies, but rather because interest rates began the longest secular decline in recorded history.

U.S. interest rates (10-year U.S. Treasury bond) peaked in 1982 at about 14 percent just as inflation began to subside. After the 1982 peak, interest rates declined on average by 36 basis points every year for the next 32 years. Utility stocks also saw an increase as interest rates declined (see Figure 3). In contrast to the past, returns on equity have fallen, but not as fast as the cost of equity. Today, the utility price-to-book ratio has returned to a relatively high level (1.60), indicating that utility returns on equity exceed the cost of equity by a noticeable margin, a result that is not surprising given today's record-low interest rates.[13]

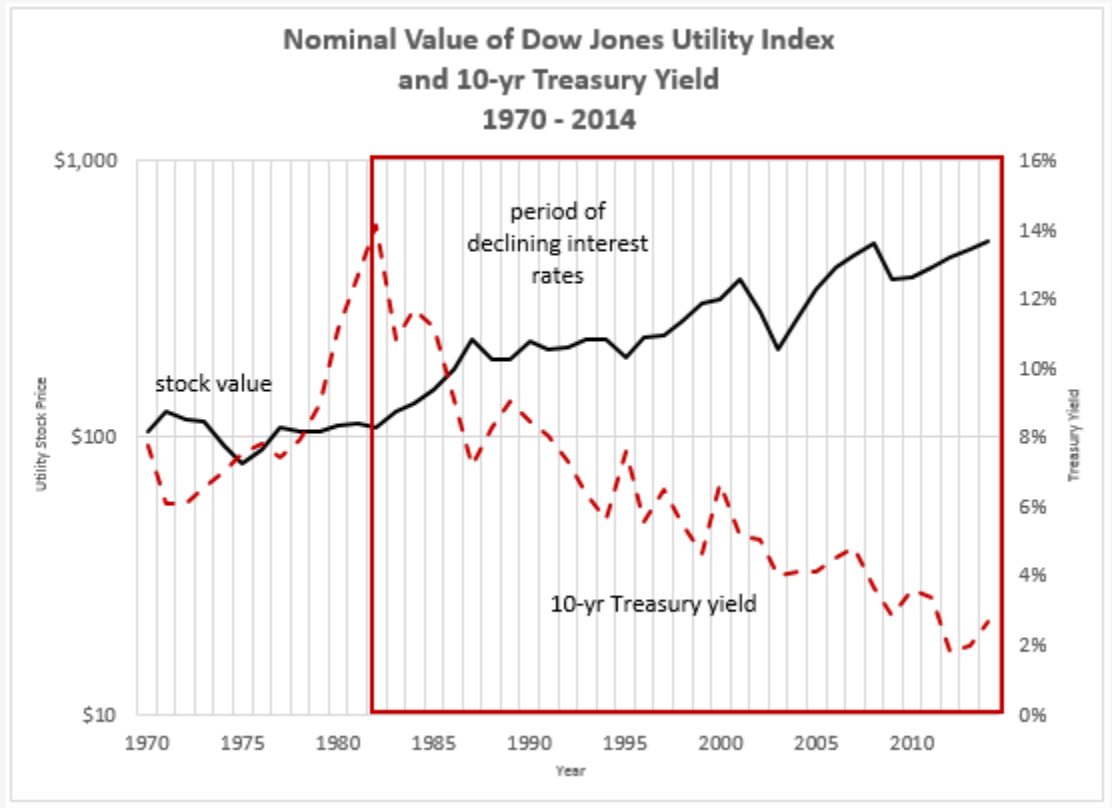

Figure 3: Interest Rates and Utility Stock Prices

BASIC UTILITY STOCK ANALYSIS TOOL

Historical analysis shows periods of rising and falling interest rates allowing us to see the effects of low or high interest rates on utility stock prices and indicating differences in the achieved return on equity and cost of equity. These two variables are of particular interest to state regulators who authorize a utility's return on equity for use in a utility's retail rate based, in part, on the cost of equity.

[13] Utility stocks did not, however, keep pace with price changes in the general stock market, which were up substantially over the 1982 to 2014 period.

We developed an analytical tool, the "Basic Utility Stock Analysis Tool," which explains the degree to which changes in key variables affect the value of utility stocks in the future. Even though we apply the tool to individual utility stocks, we focus our analysis on the portfolio result to estimate the change in value for a typical utility stock. The tool results suggest the direction and magnitude of change in utility stock prices given changes to a utility's authorized return on equity and cost of equity, either as a result of regulatory approaches or external economic factors, or both.

The tool uses the constant-growth version of the dividend discount model, which is commonly used in regulatory proceedings and in utility stock valuations. While the constant-growth assumption is a questionable one for individual non-utility companies, which tend to grow at varying rates over time, it works well for utilities overall. Figure 4 shows that utility dividends as a whole tend to grow in a fairly consistent manner from year to year, consistent with a constant growth rate assumption and utility dividend payout policies.

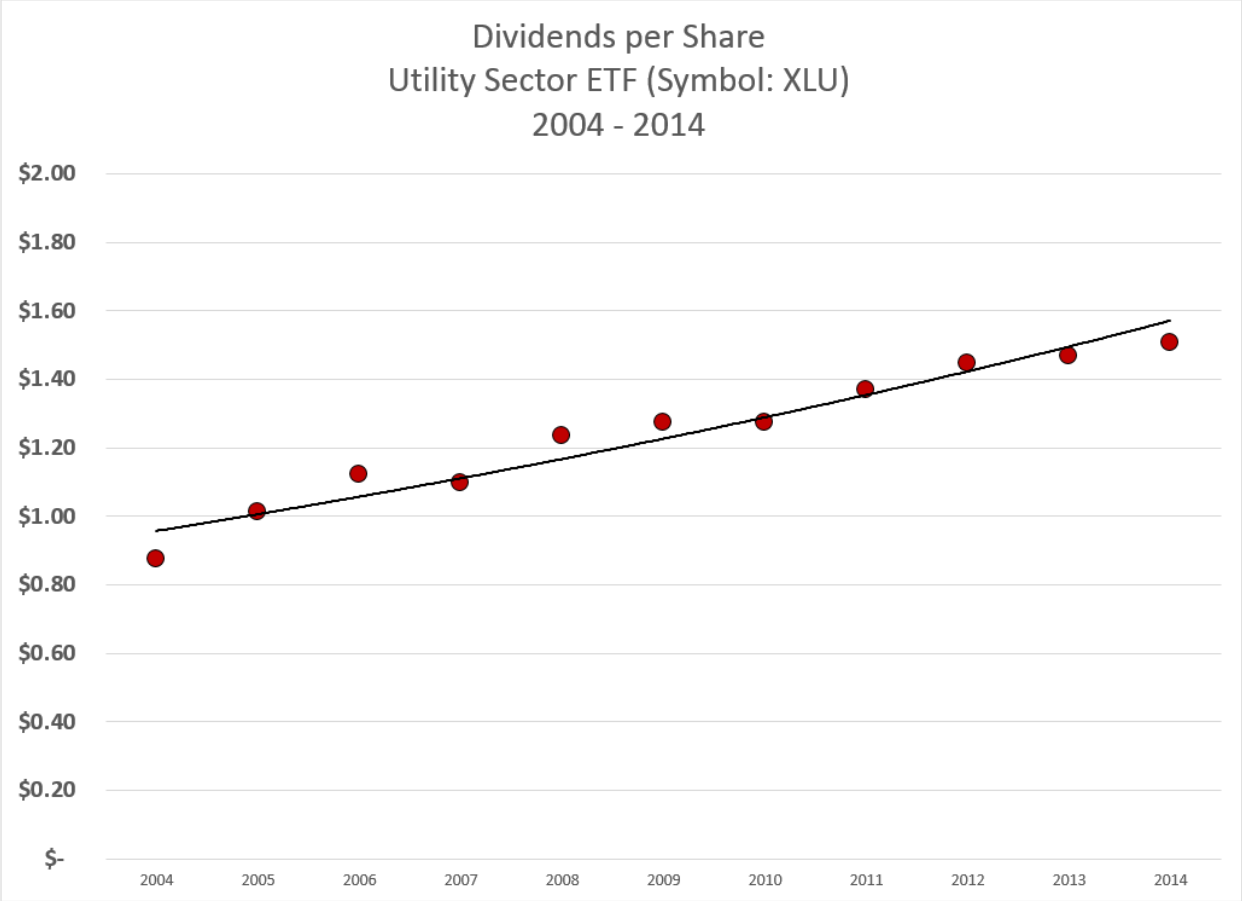

Figure 4: Utility Sector Dividends Per Share

This dividend discount equation is shown below:

$$P = \frac{DPS}{k - g}$$

In this equation P is the stock price, DPS is the dividend per share, k is the cost of equity and g is the long-run growth rate for the dividends. The return on equity is implicit in this formulation, although explicit in

the tool itself.[14] To estimate the market value (stock price), we use a dividend forecast and a cost of equity estimate allowing for internally-consistent analysis. Using the same model structure, to estimate the cost of equity, we use the current stock price as an accurate estimate of the market value (stock price) and then solve for the implied discount rate that equates the present value of the future dividend stream and that stock price.

Our tool-based analysis shows that the return on equity for the typical investor-owned electric utility today is 9.8 percent and the typical electric utility cost of equity is 7.6 percent, suggesting that those returns currently differ not only in concept but also in numeric value.[15] If regulation is to mimic the results observed in real competitive markets, the return on equity should lie above the cost of equity, as our analysis suggests it currently does (Kahn 1988). From 2000 to 2014, the average return on equity for the companies that comprise the S&P 500 index was 14.4 percent.[16] The average estimate of the forward-looking cost of equity for that index over the same period was 8.2 percent.[17]

Our median utility cost of equity estimate is in line with those of other investment professionals reflecting the same conventional valuation principles we embodied in the Basic Utility. Morningstar's analysis of The Southern Company states:

> We anticipate Southern will increase its dividend 4% annually during the next few years, largely in line with management's projections. We use a **7.5% cost of equity** and 5.7% weighted average cost of capital in our discounted cash flow valuation (Emphasis added) (Barnett 2015).

APPLYING THE TOOL: INTEREST RATES AND ELECTRIC UTILITY STOCK VALUATIONS

We use the Basic Utility Stock Analysis Tool to illustrate the impact of possible regulatory responses to an increasing interest rate environment. Regulators in most states would take reactive approaches to adjusting the utility's authorized return on equity given increases in the cost of equity resulting from higher interest rates through a general rate case or regulatory proceeding particularly focused on the utility's authorized returns.

Our portfolio consists of 38 electric utilities followed by *The Value Line Investment Survey*. We eliminated stocks of companies currently in the process of being acquired by other companies (i.e., Integrys and Pepco Holdings) and those that do not provide retail service (i.e., ITC Holdings).[18] We then used the Basic Utility

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[14] Dividends are a function of the return on equity. We could write $P = (BVPS \times ROE \times payout) / (k - g)$. *BVPS* is book value per share and *payout* is the portion of earnings paid out as dividends.

[15] Analysis as of April 23, 2015.

[16] Authors' calculation based on data from http://www.multpl.com.

[17] See Implied Equity Risk Premium available at http://people.stern.nyu.edu/adamodar/

[18] The electric utilities we included in the portfolio are Allete, Alliant Energy, Ameren, American Electric Power, Avista, Black Hills Corp, CenterPoint Energy, CMS Energy, Consolidated Edison, Dominion Resources, DTE Energy, Duke Energy, Edison International, Empire District Electric, Entergy, Exelon, FirstEnergy, IDACORP, MGE Energy, NextEra Energy, Northwestern Corp, OGE Energy, Otter Tail Corp, PG&E Corp, Pinnacle West Capital, PNM Resources, Portland General, PPL Corp, Public Service Enterprise Group, SCANA Corp, Sempra Energy, Southern Company, TECO Energy, UIL Holdings, Vectren Corp, Westar Energy, Wisconsin Energy and Xcel Energy. Since stock price formation reflects all of the firms' operations, and most utilities have some non-regulated operations, our financial analysis includes the joint effect of both utility and non-utility activities. In utility rate proceedings, utility holding companies are used as proxies for regulated utilities in developing cost of equity estimates and our approach is consistent with that practice.

Stock Analysis Tool to determine the cost of equity that supports the current stock price and estimated the expected change in stock price by adjusting interest rate assumptions.

We assumed that interest rates increased by 200 basis points and that this increase raised the cost of equity for all utilities by that amount.[19] From 1962 to 2014, 10-year treasury bonds have averaged a 71 basis point change (plus or minus) per year and with a fair degree of volatility (standard deviation of the annual change was 63 basis points). A 200 basis point increase in one year illustrates the outer bounds of potential negative impacts on utility stocks, though it would be an unlikely annual increase in interest rates. Holding return on equity constant, rising interest rates take a heavy toll on utility stock prices, reducing their value on average by 35 percent (see Figure 5).

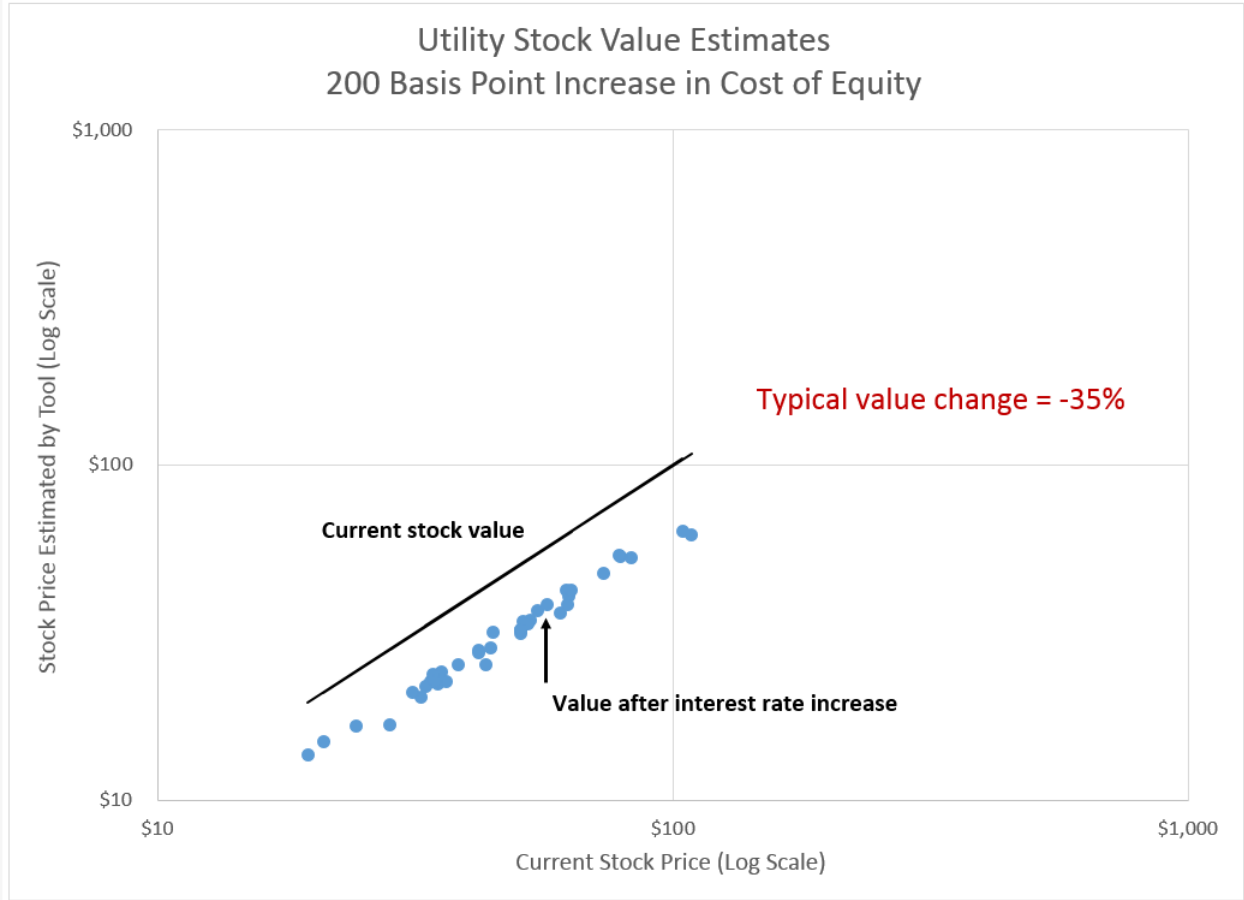

Figure 5: Effect of 200 Basis Point Increase in Cost of Equity (Log Scale)[20]

There are two reasons why this estimate likely overstates the actual impact on utility stock prices. First, the change in interest rates may not increase the cost of equity on a one-for-one basis. The cost of equity in general is a function of two key factors, the interest rate (risk-free rate) and the equity risk premium. In recent years when interest rates have declined, broad-based equity risk premiums have increased, thereby

[19] The cost of equity change could be greater or lesser than the interest rate change if the utility's equity risk premium changes, as well. As a general rule, the cost of equity changes somewhat less than the change in interest rates.

[20] Results are expressed using a logarithmic scale in order to account for non-linear impacts on stocks priced higher and lower than the average.

muting the effect of the interest change.[21] In the case of rising interest rates, the equity risk premium might decline which would, again, mute the impact of the interest rate change. Second, regulators would likely take some action to counter the negative investor impacts, passing on at least a portion of the utility's higher costs to consumers. The precise timing of this action would depend on the schedule of rate case filings and periods of regulatory lag.[22]

In the initial analysis we assumed no regulatory response to the interest rate change. Next we assumed that the regulator took actions necessary to ensure that the utility's return on equity increase would match the cost of equity increase on a one-for-one basis. That is, we assumed they set rates during a general rate case that would allow the earned return on equity to increase by 200 basis points. But Figure 6 shows that even this action would not fully compensate utilities for the loss in value associated with the increased cost of equity.[23]

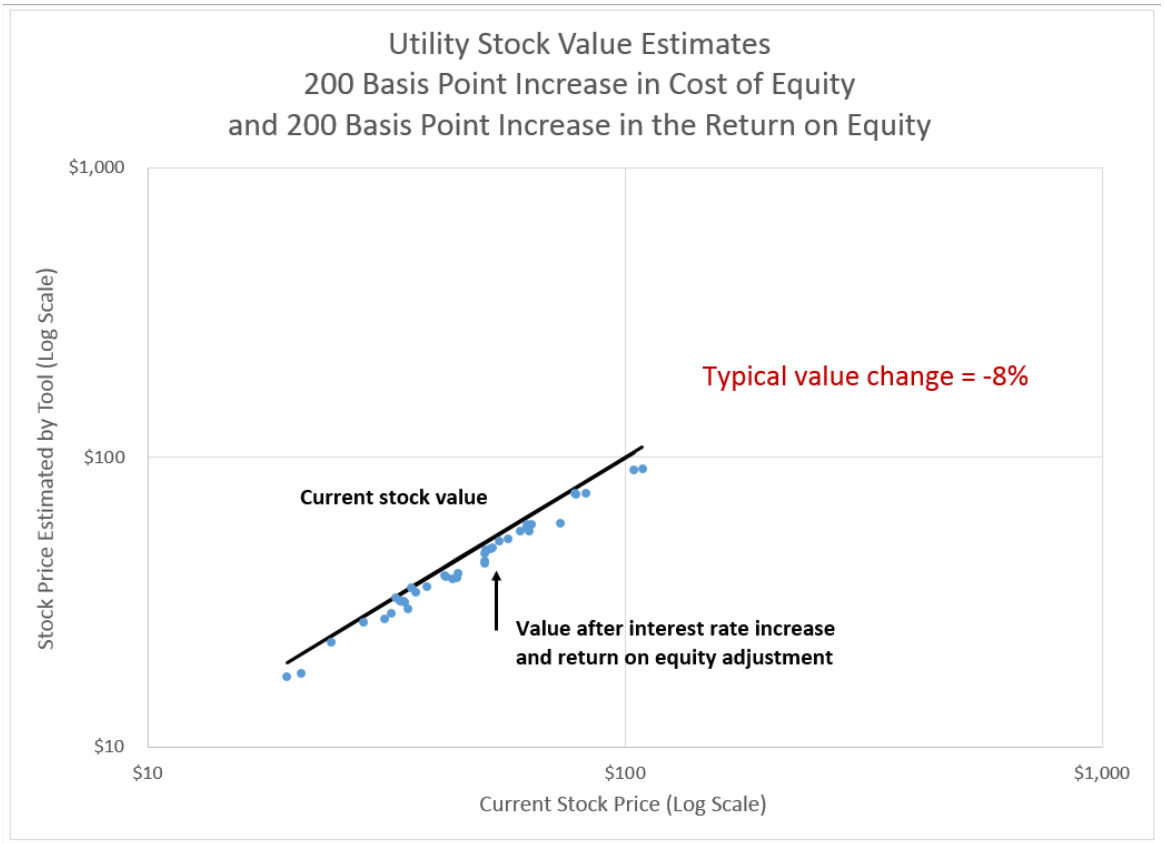

Figure 6: Effect of 200 Basis Point Increase in Cost of Equity and a 200 Basis Point Increase in the Return on Equity (Log Scale)

[21] See http://pages.stern.nyu.edu/~adamodar/

[22] Given the scope of the study, we have not projected the likely change in timing and frequency of rate case filings. Today rate cases occur infrequently, and, even when they do, may take a year or more to complete. History tells us that when interest rates rise year after year, as they did in the late 1970s and early 1980s rate case filings can often "pancake," which means the utility files a new rate case before the prior one is finished.

[23] When the return on equity (which drives the numerator of the value equation) lies above the cost of equity (which drives the denominator), a one-for-one change in both variables will lead to a lower ending quotient. Using a simple example: 3 / 2 = 1.5; (3 + 1) / (2 + 1) = 4 / 3 = 1.33

We also considered a case in which regulators would want to preserve utility valuations and found that when the cost of equity rises by 200 basis points, they will have to take actions that allow utilities to earn returns on equity that are 250 basis points higher (see Figure 7).[24] Such a case may be considered bounding for discussion purposes because regulators consider many factors when establishing the authorized return on equity, not only the cost of equity.

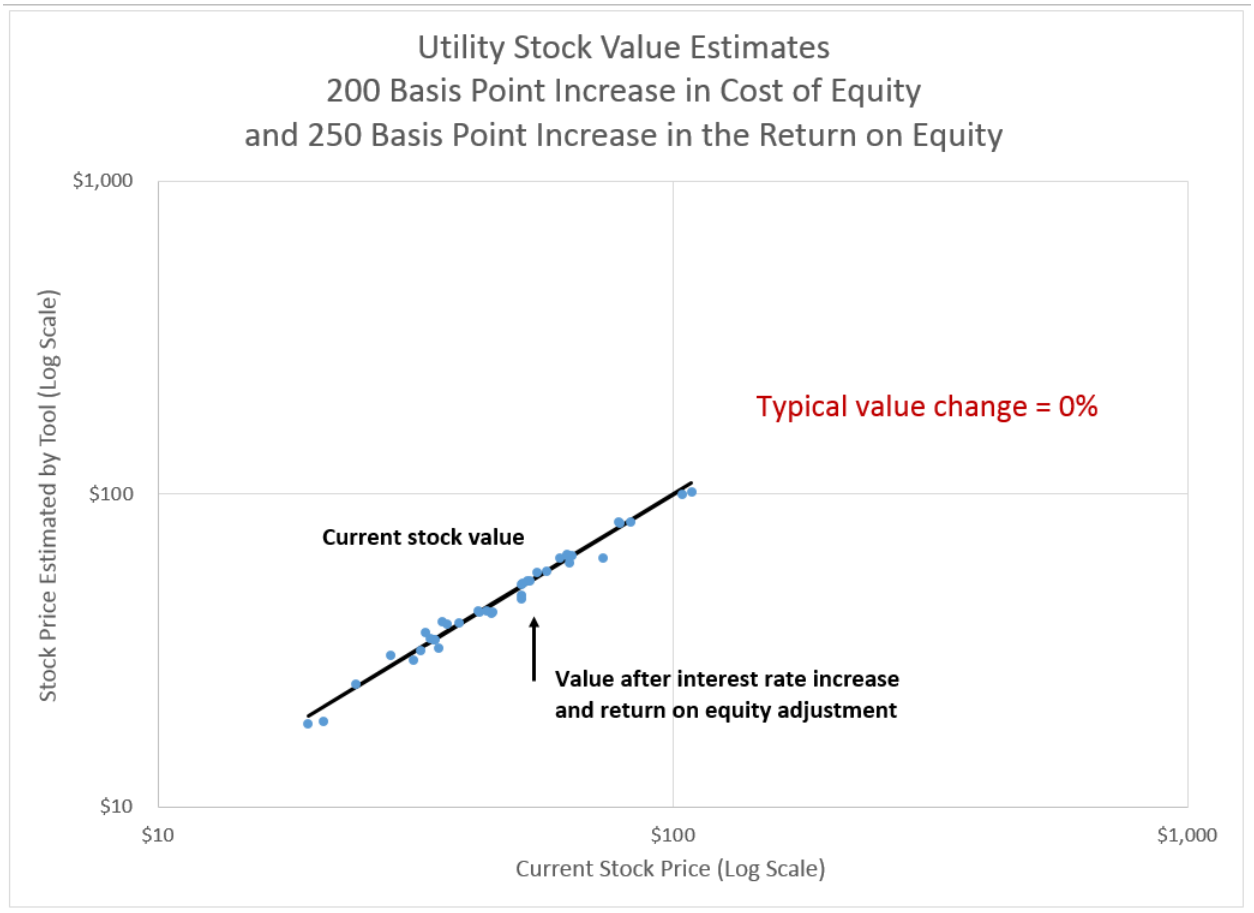

Figure 7: Effect of 200 Basis Point Increase in Cost of Equity and a 250 Basis Point Increase in the Return on Equity (Log Scale)

Our tool-based analysis suggests that, for the typical electric utility stock, the effect of a 200 basis point increase in interest rates lies between two extremes: (1) a 35 percent loss of value if regulators take no action to pass on cost increases to consumers; and (2) no loss in value if regulators pass all associated cost increases onto consumers, which means making it possible for the utility to earn a return on equity that is 250 basis points higher. The likely actual impact lies between these two outer bounds.

[24] The size of the additional ROE adjustment diminishes as the cost of equity increases. The adjustment of 250 basis points to offset a 200 basis point increase in the cost of equity applies to a starting cost of equity of 7.5 percent.

DISCUSSION AND POLICY IMPLICATIONS

The analysis demonstrates, based on historical data and the modeling of stock prices based on changes to cost of equity, that interest rate increases put downward pressure on utility stock prices. The severity of this impact is dependent on several countervailing factors. For example, interest rates tend to rise during periods of growth in the broader economy and there may be a mitigating effect on the negative impacts to utility stock prices because load growth during this time might lead to higher earned returns between rate cases.[25] However as discussed earlier, interest rates also tend to rise during a period of increasing cost inflation which may impair the utility's ability to control costs between rate cases and negatively impact achieved returns.

A rising interest rate environment may pose challenges for regulators and policymakers. Utilities will readily attract investor capital when returns meet or exceed the cost of equity. In the case of a significant increase in interest rates and absent regulatory intervention, such a value proposition may not be realized and utility management may be less likely to make capital investments in generation, transmission, and distribution systems – even when such investments are necessary to replace aging infrastructure or meet clean energy public policy goals (e.g., renewable portfolio standards). But if history is our guide interest rates would have to rise substantially from current levels before we would be likely to encounter this condition.

Nevertheless, to the extent there is a misalignment between utility management decisions to maximize investor value and attract investor capital and regulatory goals and objectives, regulators and policymakers may have options to intervene to maintain or support utility stock price valuations. States have no ability to affect market interest rates, but they can adjust utility returns on equity in response to changes in the utility's cost of equity via several policy approaches and mechanisms.

A noticeable increase in interest rates would manifest itself in regulatory proceedings in the form of higher cost of equity estimates. How this would translate into return on equity determinations depends largely on specific regulatory approaches, as regulatory rate of return policies vary from period to period and from jurisdiction to jurisdiction. Some regulators set returns on equity primarily based on the results from cost of equity models (e.g., the California Public Utilities Commission and the Federal Energy Regulatory Commission). Others set the return relying less on model results and more on informed judgment (e.g., the Wisconsin Public Service Commission). Therefore, while some regulators may not fully reflect cost of equity changes in authorized returns on equity, others might.

The U.S. Supreme Court found that regulators do not have an obligation to take actions to maintain utility market valuations but likewise cannot set the authorized return on equity at any level they wish (*FPC v. Hope Nat. Gas Co* 1944). This legal precedent has given regulators a tremendous degree of latitude to determine, through a combination of rigorous analysis and careful deliberation, the appropriate return to authorize.

[25] Over the long-run sales growth is not a significant driver of utility returns because regulators adjust rates in rate proceedings to reflect the impact of changes in sales on utility earnings.

The frequency of general rate cases, use of historic test years, and period of regulatory lag may impact the utility's ability to reflect increases in its cost of equity and seek a new authorized return on equity. The ratesetting process can have varying effects on the utility's ability to earn its authorized returns depending on the cost growth between rate cases. If a utility's costs are generally increasing between rate cases, the opportunity for the utility to earn its authorized return depends on its ability to manage the cost increases. If they are unable to earn the authorized return, the utility may be incented to file a rate case and seek updated retail rates. On the other hand, if costs are declining between rate cases, the utility is more likely to achieve its authorized returns. Regulators may require a utility to file a rate case if it is earning in excess of authorized levels.

Regulators who authorize a future test year, in which utility rates are set based on expected, not historical, costs, could mitigate some of the impacts by reflecting the inflationary aspects that typically accompany rising interest rates. However, forecasting changes to long-term interest rates themselves over a future test year lacks a solid financial basis since interest rate changes cannot be predicted with any degree of accuracy, even by financial experts (Baghestani et al. 2015).

Beyond the ratesetting process, regulators may also intervene in a changing interest rate environment through the use of bill riders or trackers reflecting the increasing or decreasing cost of equity. For example, regulators have implemented net inflation factors in conjunction with revenue decoupling mechanisms to account for increases or decreases in the utility's operational efficiencies (i.e., how well it is managing costs). Regulators may also implement mechanisms that directly track the changes in interest rates above or below a set level. For example, in Illinois, the return on equity is set by formula contained in a statute that adds a fixed premium to the Treasury bond yield (*Commonwealth Edison Co. v. Illinois Commerce Comm'n* 2014). In most cases, bill riders or trackers pass through the financial benefits and losses from the utility to its ratepayers.

The key value driver for utilities is the gap between the achieved return on equity and the cost of equity. In the context of an increasing interest rate environment, utilities should have very limited expectations about maintaining the same gap in those returns previously granted by regulators in a low-interest rate environment. Regulators must balance the interests of many parties when determining retail rate increases, having the prerogative to erode to some extent this gap for utility stockholders in order to mitigate the effects on ratepayers of increasing utility costs.

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