

10 Things Utility Consumer Advocates Should Know About Rate of Return

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NATIONAL ASSOCIATION
OF STATE UTILITY
CONSUMER ADVOCATES

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10 Things Utility Consumer Advocates Should Know About Rate of Return (1 / 2)

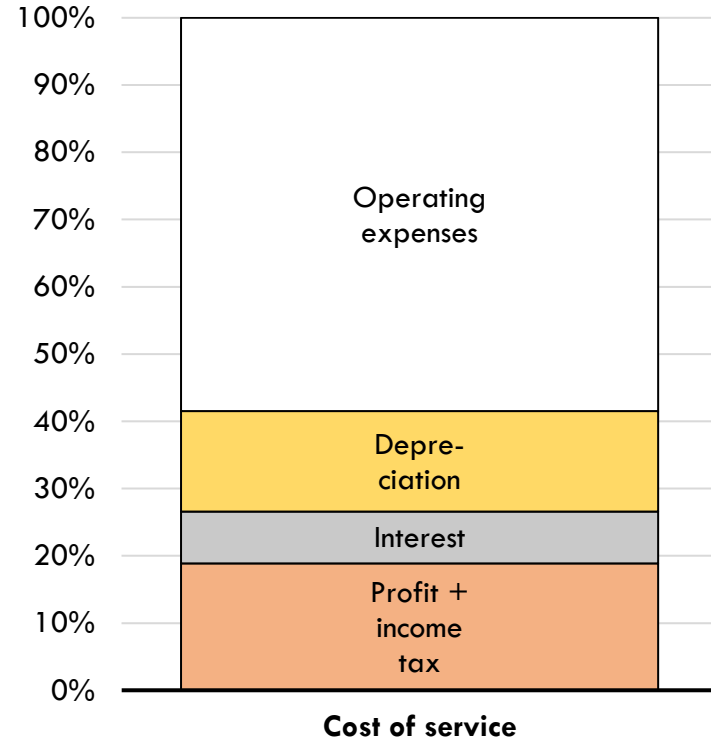
1. Rate of return is investors' compensation for taking on the risk of investing in utilities
2. Return on equity (ROE) is not the same thing as cost of equity (COE)
3. Objective is to balance consumer and investor interests
4. Capital structure and ROE cannot be determined independently
5. ROE is the financial lifeblood of utilities

10 Things Utility Consumer Advocates Should Know About Rate of Return (2/2)

6. Authorized returns have exceeded the cost of equity for decades
7. Analytically, utility rate of return is a world unto itself
8. The devil truly is in the details
9. Rate of return is a big deal for consumers and the environment
10. Change is hard

1. Rate of return is the compensation to investors for taking on the risk of investing in utilities

Cost-of-service regulation



- All **operating expenses** – salaries, fuel, maintenance, etc. – are passed through as incurred
- Investments in long-lived infrastructure are spread out over time, as **depreciation**
- A cost of capital charge – compensation for *time-value-of-money* and *risk* – is applied to the outstanding investment balance
 - Debt: **interest**
 - Equity: **profit (net income) + income tax**

2. Return on equity is not the same thing as cost of equity

From McKinsey *Valuation* guidebook, 5th ed. (2010):

Price of Risk

The cost of capital is the price charged by investors for bearing the risk that the company's future cash flows may differ from what they anticipate when they make the investment. The cost of capital to a company equals the minimum return that investors expect to earn from investing in the company. **That is why the terms *expected return to investors* and *cost of capital* are essentially the same.** The cost of capital is also called the discount rate, because you discount future cash flows at this rate when calculating the present value of an investment, to reflect what you will have to pay investors.

Cost of equity (COE): what it costs

- Opportunity cost of capital
- *Expected* return on equity

Return on equity (ROE): what is earned

- Authorized
- Realized

Difference is “economic profit” or “value added”

- Profit, in and of itself, does not mean the utility is earning its cost of capital, e.g., $ROE < COE$
- $Value > investment$ indicates $ROE > COE$

COE must be estimated

**No ex ante market data
(like interest rates)**

Ex post is not definitive

- Actual returns may or not be what investors expected at the time of investment (surprise)

Nonetheless, long-term historical trends can inform expectations, after adjusting for:

- Inflation expectations
- Interest rates
- Changes in risk perception
- Changes in economy/demand

3. Objective is to balance consumer and investor interests

Key Federal court decisions

- *Bluefield Waterworks v. Public Services Commission* (1923): “earn a return on the value of the property it employs for the convenience of the public equal to that generally being made at the same time and in the same region of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties” and “sufficient to assure confidence in the financial soundness of the utility, and ... 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”
- *Federal Power Commission v. Hope Natural Gas* (1944): “commensurate with returns on investments in other enterprises having corresponding risks” and “sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital”
- *Municipal Light Boards v. Federal Power Commission* (1971): “protection of consumers from excessive rates and charges”

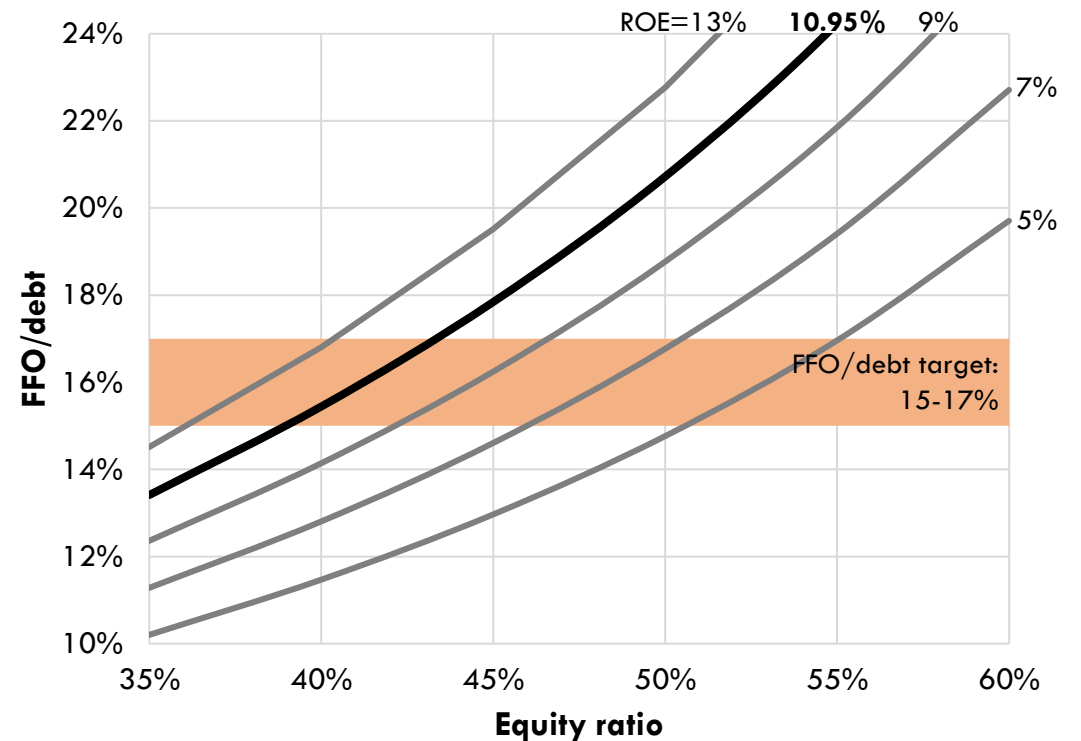
Combined, these decisions require ROE=COE

- Commensurate with risk
- Sufficient to attract investment, maintain financial integrity
- Not excessive

4. Capital structure and ROE cannot be determined independently

- Typical approach – peer comparison – is too simplistic
- CFO perspective
 - Credit rating target: A-/A3, 15-17% FFO/debt
 - FFO: net income (ROE) + depreciation + deferred taxes
- Capital structure and ROE should be determined jointly

Relationship between equity ratio, ROE, and FFO/debt

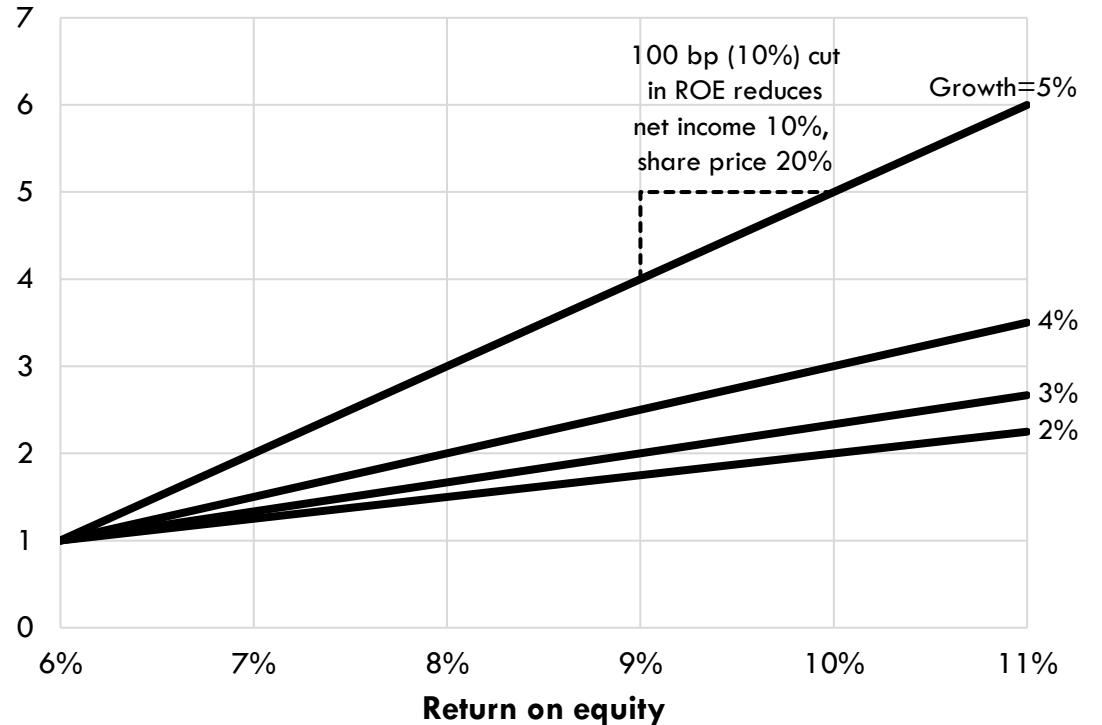


5. ROE is the financial lifeblood of utilities

- ROE determines net income (earnings per share)
- Utility stocks are valued as a multiple of earnings (currently ~20x), but this *understates* the sensitivity of stock price to ROE

Stock price sensitivity to ROE¹

ROE equal to COE = 1.0



1. Assumes a sustainable growth DCF model, $P = B \times (ROE - g) / (COE - g)$ with $COE = 6.0\%$

2020 Compensation Program Overview

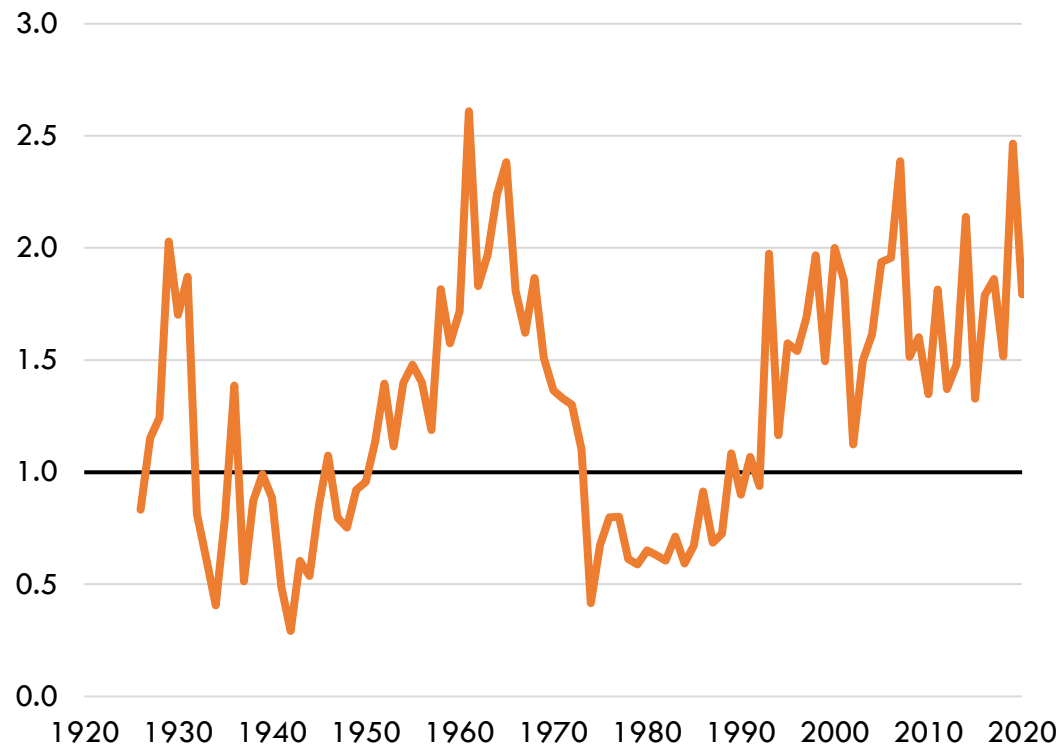
Our executive compensation program is designed to attract, motivate and retain key executive talent and promote strong, sustainable long-term performance. The three components of total direct compensation delivered in our program are 1) Base Salary; 2) Performance-Based Annual Bonus; and 3) Long-Term Equity-Based Incentives. We place an emphasis on variable performance-based pay, with each component designed to promote value creation and alignment of our management team's compensation with our long-term strategic objectives.

Type	Component	Form	Key Characteristics
Fixed	Base Salary	Cash	<ul style="list-style-type: none"> Base salary is benchmarked to the median of comparably-sized general industry peers (excluding financial services companies)
Variable	Performance-Based Annual Bonus	Cash	<ul style="list-style-type: none"> Based on ABP Earnings (weighted at 85%) and Safety and Stakeholder Measures (collectively weighted at 15%) No bonus payment unless company exceeds threshold performance level for the year and maximum payouts are capped
	Long-Term Equity-Based Incentives ⁽²⁾	Equity	<ul style="list-style-type: none"> Performance-Based Restricted Stock Units (weighted at 70% collectively) <ul style="list-style-type: none"> Relative Total Shareholder Return (TSR) Performance-Based Restricted Stock Units (50%): 3-year relative TSR <ul style="list-style-type: none"> (35%): Relative TSR measured vs. S&P 500 Utilities Index⁽¹⁾; maximum payout requires performance at 90th percentile of S&P 500 Utilities Index peers (15%): Relative TSR measured vs. S&P 500 Index; maximum payout requires performance at 90th percentile of S&P 500 Index peers EPS Growth Performance-Based Restricted Stock Units (20%): 3-year EPS CAGR, with payout scale set based on forward consensus estimates of EPS CAGR of S&P 500 Utilities Index peers⁽¹⁾; maximum payout requires performance at the 90th percentile of estimates for S&P 500 Utilities Index peers 3-year performance period for each performance measure For each measure, performance at threshold results in zero payout Stock Options⁽³⁾ and/or Service-Based Restricted Stock Units⁽³⁾ (weighted at 30% collectively): Vest ratably over three years

6. Authorized returns have exceeded the cost of equity for decades

Average utility market-to-book ratio

End of year



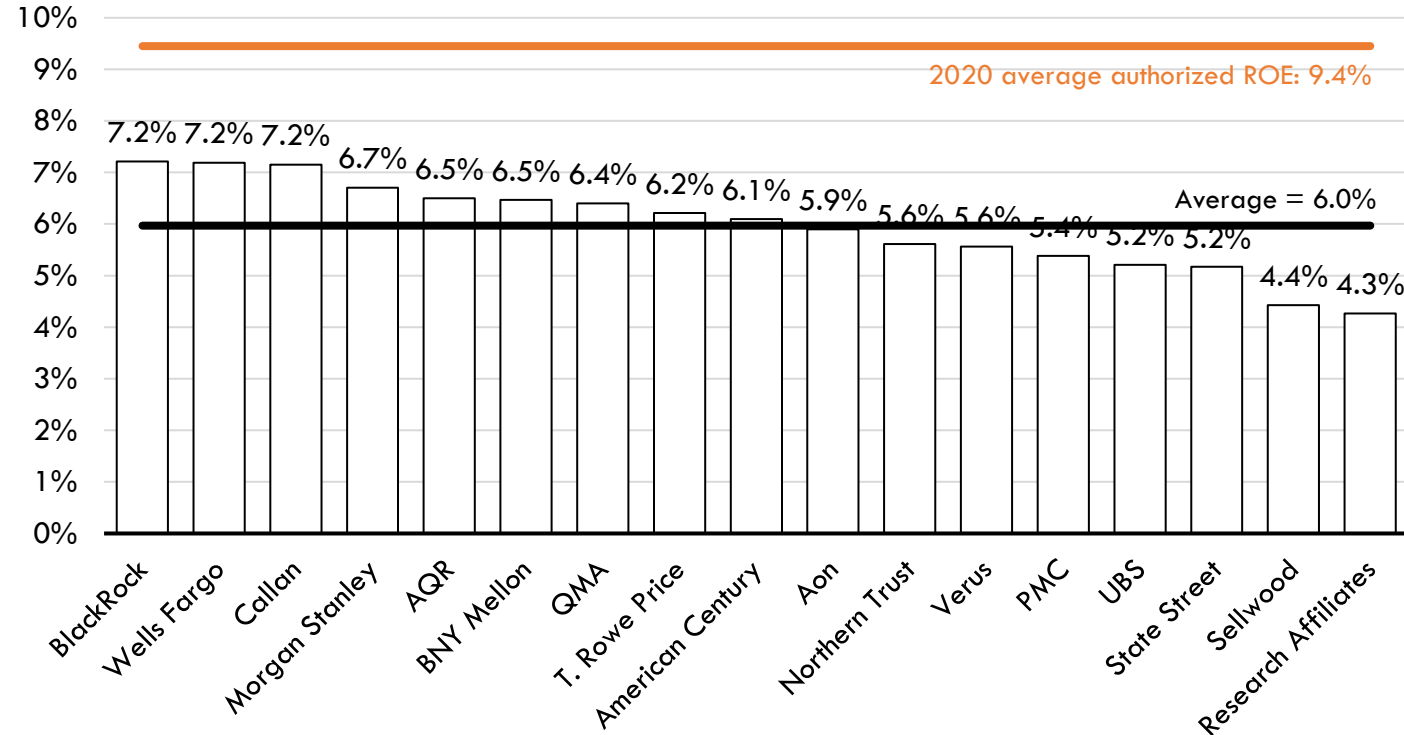
“[T]he sharp appreciation in the prices of public utility stocks, to one and half and then two times their book value during this period [1950-1970], reflected ... a growing recognition that the companies in question were in fact being permitted to earn considerably more than their cost of capital.”

“The source of the discrepancy between market and book value has been that commissions have been allowing r 's [returns on equity] in excess of k [market cost of equity]; if instead they had set r equal to k , or proceeded at some point to do so ... the discrepancy between market and book value ... would have disappeared, or would never have arisen.”

Alfred Kahn, *The Economics of Regulation* (1970)

7. Analytically, utility rate of return is a world unto itself

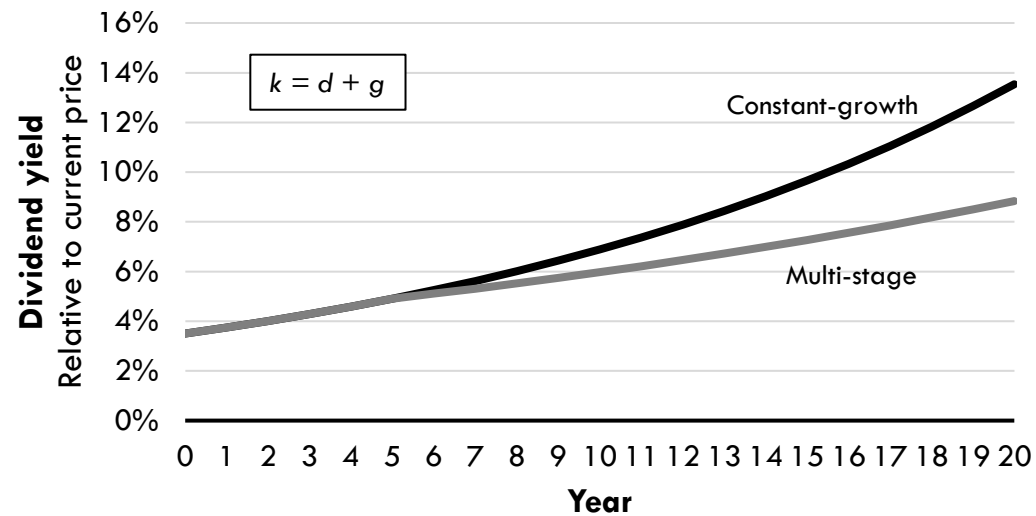
Fall 2020 30-year US equity return forecast
Nominal, geometric



- Many investment management firms publish long-term return forecasts
- They are universally much lower than utilities' ~10% cost of equity estimates
- What do utilities' experts know that every single one of these firms, collectively responsible for managing tens of trillions of dollars, is missing?

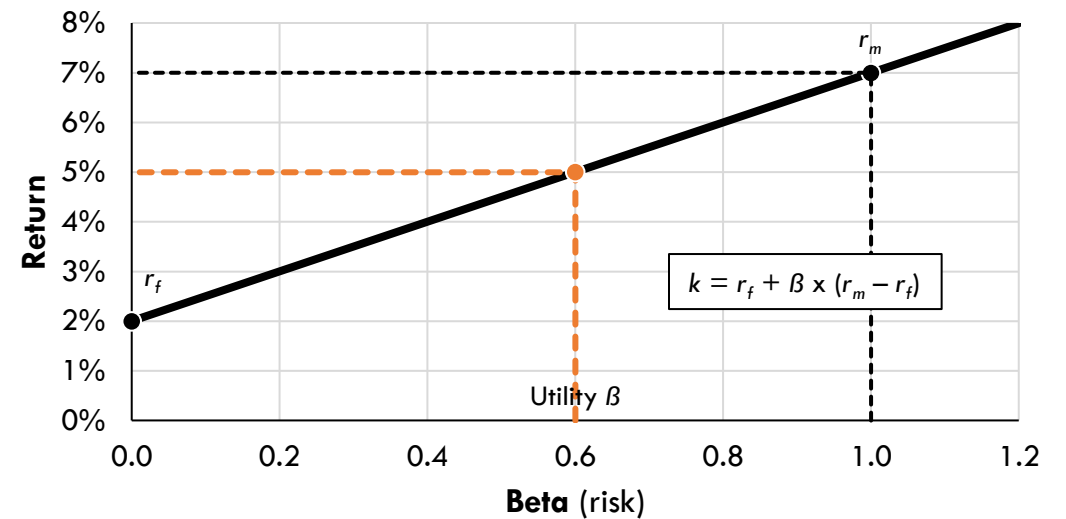
Common COE models

Discounted cash flow (DCF)



- Growth based on (biased?) equity analysts' forecasts
- Expressed as a closed-form formula, e.g., $k = d + g$
- Multi-stage used in place of/addition to
- Widely used by investment professionals

Capital asset pricing model (CAPM)



- Compensation for risk: risk-free rate + risk factor (beta) x market risk premium (MRP, $r_m - r_f$)
- Beta measures the tendency of a security to move with the market; under Modern Portfolio Theory, returns only reflect systematic (non-diversifiable) risk, not firm-specific (diversifiable) risk
- Widely used in corporate finance

8. The devil truly is in the details (1 / 2)

Model/method	Common utility expert assumption/ approach	What the evidence says
Peer groups	<ul style="list-style-type: none"> • Utility • Non-utility companies with “comparable” risk profile 	<ul style="list-style-type: none"> • Criteria tend to exclude poor performers • Conceptually flawed <ul style="list-style-type: none"> – Conflicts with <i>Bluefield</i> – Begs the question – Ignores most salient factor (regulation)
Discounted cash flow (DCF)	<ul style="list-style-type: none"> • Constant-growth (CG DCF): analyst growth estimates into perpetuity • Multi-stage: terminal growth equal to GDP 	<ul style="list-style-type: none"> • Analyst bias • Collectively unsustainable • Contradicted by analysts’ own forecasts • Long-term historical growth rates <ul style="list-style-type: none"> – Market: ~GDP/capita – Utilities: ~inflation
Capital asset pricing model (CAPM)	<ul style="list-style-type: none"> • Forecast, not current, risk-free rate • Adjusted beta • Arithmetic, not geometric, returns • CG DCF-based MRP • Empirical CAPM: adjust for observed “flatness” of relationship between beta and excess return 	<ul style="list-style-type: none"> • Systematically biased (e.g., BCFF) • Adjustment does not apply to utilities (trend toward 0.5-0.6) • (Lower) geometric returns reflect equity claim on cash flows into perpetuity • Adjust for volatility of realized ROE • Historical/implied geometric MRP: 3-5% • ECAPM based on returns relative to short-term r_f; flatness much less pronounced relative to long-term r_f • Utilities don’t exhibit flatness seen in the market as a whole

8. The devil truly is in the details (2/2)

Model/method	Common utility expert assumption/ approach	What the evidence says
Risk premium model (RPM)	<ul style="list-style-type: none"> • Regression of equity returns against bond yields • Proprietary models (e.g., GARCH) 	<ul style="list-style-type: none"> • Conceptually flawed <ul style="list-style-type: none"> – Backward-looking equity vs. forward-looking bond yields – No statistically significant relationship
	<ul style="list-style-type: none"> • Forecast bond yields • Arithmetic returns 	<ul style="list-style-type: none"> • See above
Comparable earnings	<ul style="list-style-type: none"> • Authorized ROEs in other jurisdictions, sometimes regressed against bond yields 	<ul style="list-style-type: none"> • Circular logic; assumes regulators are infallible
	<ul style="list-style-type: none"> • Non-utility company realized ROEs 	<ul style="list-style-type: none"> • Conceptually flawed; see above
Leverage adjustment	<ul style="list-style-type: none"> • Account for differences in capital structure between peers and target 	<ul style="list-style-type: none"> • Inconsistent application, e.g., CAPM, but not DCF, RPM, CE
	<ul style="list-style-type: none"> • Unlever market, relever book 	<ul style="list-style-type: none"> • Both un-/re-levering should be based on market (actual or estimated)
Ad hoc adjustments	<ul style="list-style-type: none"> • Small-size premium: based on empirical observation that small stocks earn higher returns than large stocks 	<ul style="list-style-type: none"> • Phenomenon refuted by recent research • Applies to stocks, not subsidiaries • Ad absurdum
	<ul style="list-style-type: none"> • Flotation cost: account for transaction cost of equity issuance 	<ul style="list-style-type: none"> • Legitimate cost, but assumes $M/B=1.0$; higher M/B more than compensates
	<ul style="list-style-type: none"> • Other risk 	<ul style="list-style-type: none"> • Not statistically significant • Diversifiable, firm-specific risks do not garner a risk premium (Modern Portfolio Theory)

Example 1 – Non-utility peer group: Conflicts with *Bluefield* and logically flawed

Bluefield:

“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**”
(emphasis added)

• Non-utility peer groups have included:

- | | | |
|------------------|-----------------|--------------------|
| – Adobe | – General Mills | – New York Times |
| – AT&T | – Hershey | – salesforce.com |
| – Coca-Cola | – Intuit | – Sherwin-Williams |
| – Dollar General | – J.B. Hunt | – UPS |
| – Eli Lilly | – J.M. Smucker | – Walgreens |

It is hard to see how the “risks and uncertainties” of these diverse companies’ investments correspond to those of state-regulated utilities

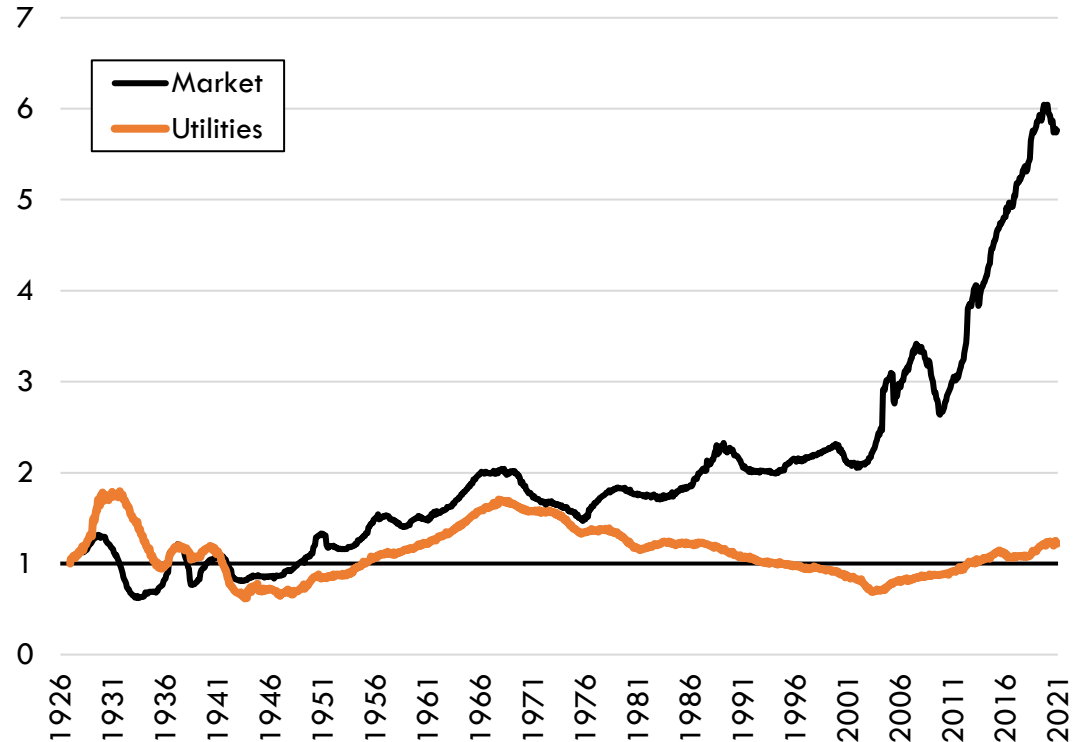
- Begs the question (assumes what needs to be proved); no evidence selected risk factors predict expected returns comparable to utilities’
 - If they do: superfluous/redundant
 - If they don’t: flawed/missing something
- Selected risk factors, by design, ignore the most salient one: whether peers are regulated utilities
 - Akin to estimating home prices by comparing square footage, lot size, number of bedrooms and bathrooms, year of construction, etc. – and ignoring location

Example 2 – DCF: Extrapolating analysts’ “long-term” growth rate into perpetuity

- Utility experts typically use equity analysts’ estimated “long-term” EPS growth rates in the constant-growth DCF (CG DCF) model, implicitly assuming these growth rates can be sustained into perpetuity
- There are two flaws with this assumption:
 - Analysts are explicit that their “long-term” forecasts are valid for only 3 to 5 years
 - Analyst estimates tend to be upwardly biased
- Projecting analysts’ estimated earnings – i.e., share count \times 2021 EPS $\times (1 + g_{\text{tr}})^{\text{years}}$ – for S&P 500 members demonstrates the unreasonableness of this assumption
 - By 2028, their combined earnings would be \$38 trillion, larger than total US GDP (vs. <10% of GDP today)
- The error is carried over to the CAPM, where the CG DCF is used to estimate the market risk premium (MRP)
- A more realistic model would assume growth trends toward the long-term historical average, which has just kept pace with inflation, significantly lagging the market overall

Real dividend per share

Trailing twelve months, 7/26-6/27=1.0

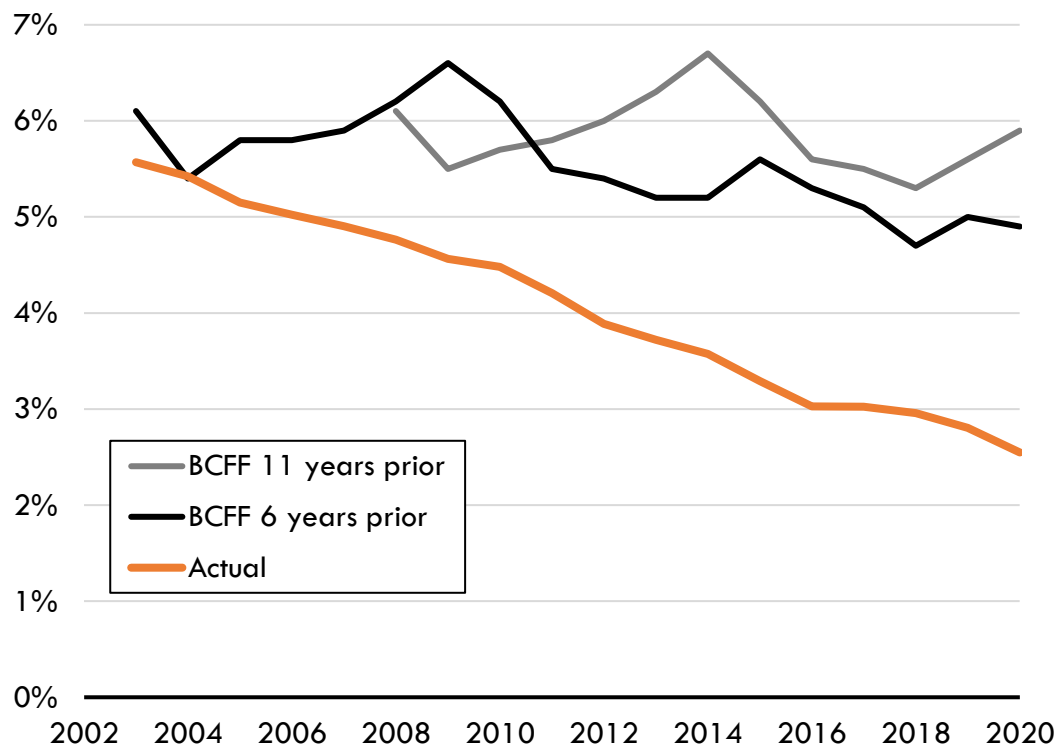


Example 3 – CAPM: Using forecast, not current, risk-free rate

- Utility experts frequently use a forecast risk-free rate (typically the 30-year Treasury), rather than the current rate
 - Most widely used forecast is Blue Chip Financial Forecasts (BCFF)
 - BCFF provides 8 different forecasts extending up to 11 years into the future
 - Experts typically use an (arbitrary) weighted average of all 8
- The use of BCFF forecasts presents two problems:
 - We are trying to estimate the cost of capital from today, not a forward rate up to 11 years in the future
 - More critically, the BCFF forecasts are systematically biased upward

30-year Treasury rate, Blue Chip Financial Forecast vs. actual

Average for five years ending in December

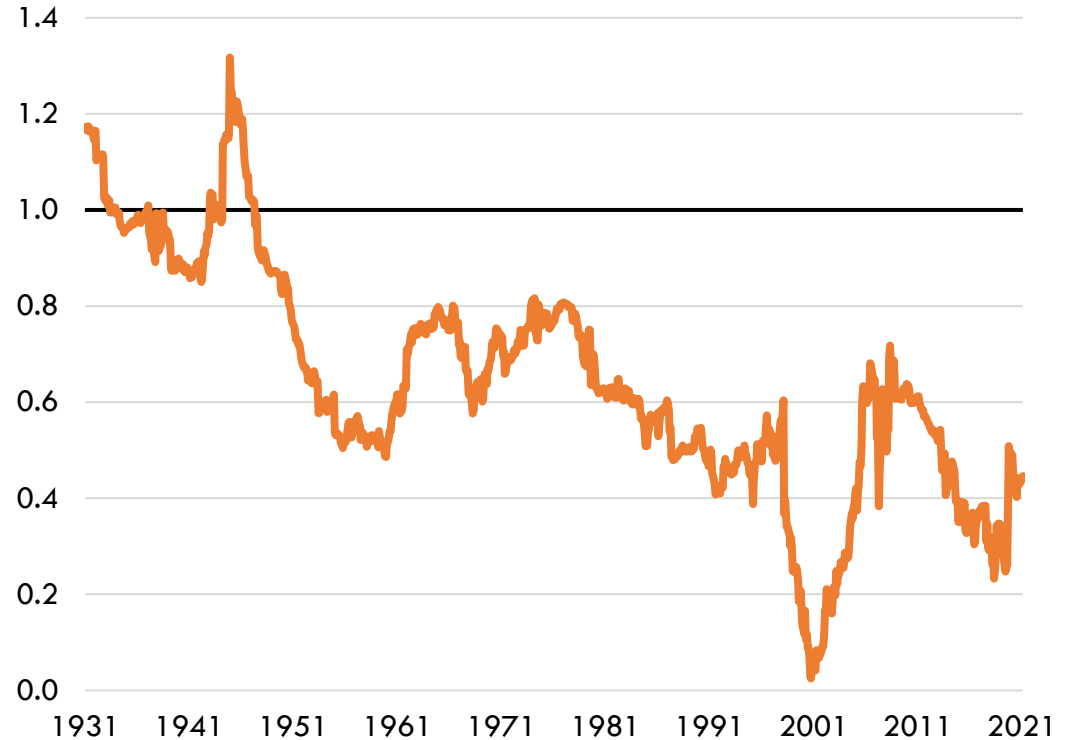


Example 4 – CAPM: Adjusted beta

- Some sources of beta estimates (e.g., Value Line, Bloomberg) report “adjusted” beta as a default
 - $\beta_{adj} = 2/3 \times \beta_{raw} + 1/3$
 - Accounts for the observed tendency for the cross-section of betas, on average, to trend closer to 1.0 over time
- Adjustment based on a 50-year-old analysis using beta-sorted portfolios of all stocks in the market
 - High-beta stocks tend to be smaller, less mature; as they mature and grow, they become less risky
 - Less clear why low-beta stocks should rise (scarcity of low-risk projects?); effect only appears for the lowest-beta stocks (~ 0.25), not for those with betas between ~ 0.5 and ~ 1.0 , like utilities
 - Analysis did not look at industry portfolios; utility betas trend toward 0.4-0.6, not 1.0
- While the adjustment increases beta by < 0.2 , applied to utility experts’ inflated MRP ($\sim 10\%$), the effect is material ($\sim 2\%$)

Utility sector beta

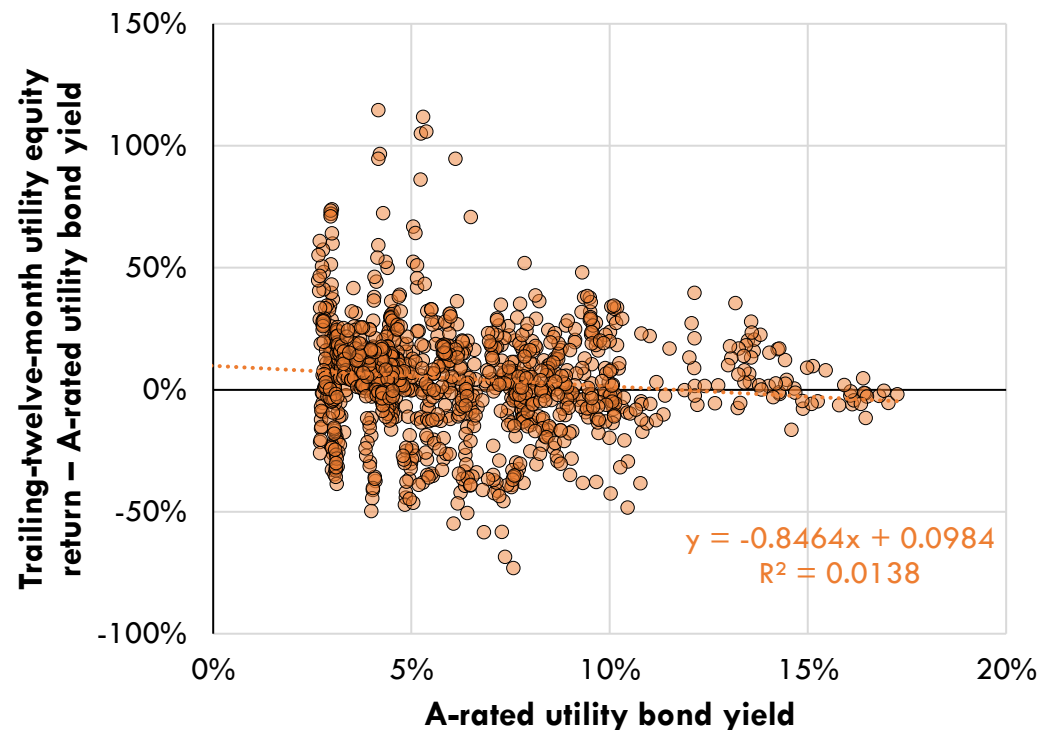
Trailing 5 years, monthly total returns



Example 5 – RPM: Regression-based risk premium model

- The risk premium model (RPM) estimates the cost of equity as a premium over a bond yield
 - The premium can be the average – in which case it is similar to the CAPM but with a beta that uses all historical data, not just the most recent
 - More commonly, it is a regression, which tends to inflate the estimated premium for low interest rates
- As commonly implemented, the regression-based RPM is fundamentally flawed, because it compares data series across two different time frames: *backward-looking* equity returns vs. *forward-looking* bond yields
 - There is no reason to expect a statistically significant relationship between them
 - The model fails all common tests of statistical significance; for example, the R^2 coefficient, a common measure of how much of the variation in one variable is caused by the other, is <0.05 , no better than that of randomly generated, uncorrelated data sets with similar distributions

Regression-based utility risk premium model



Example 6 – Arithmetic returns

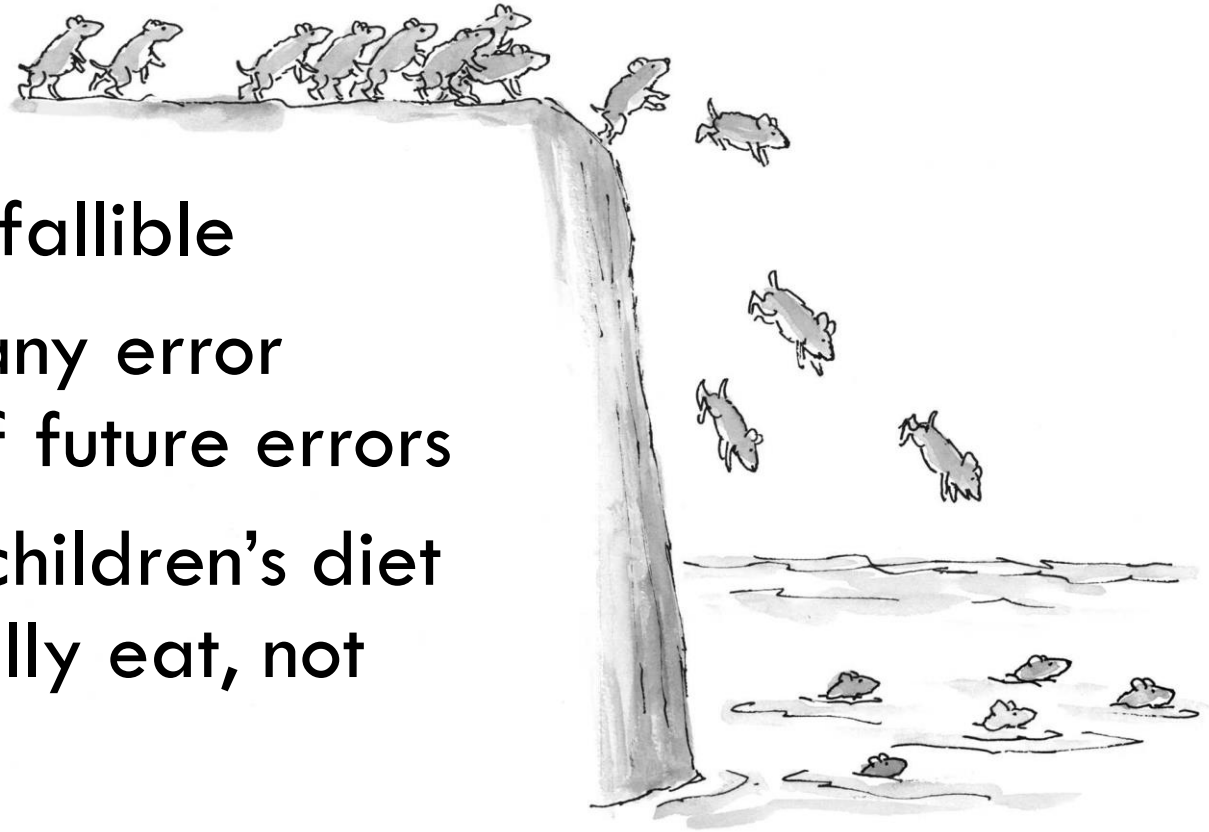
- Utility experts are inconsistent in their use of arithmetic and geometric returns
 - DCF: geometric
 - CAPM/RPM: arithmetic
- The one-year arithmetic convention is arbitrary and upwardly biases multiperiod discount rate estimates
- Geometric is appropriate for cost of equity model inputs
 - Equity is a claim on cash flows into perpetuity, not a single time period
- Geometric should be converted to arithmetic based on volatility of ROE, not of stock market returns
 - Majority of market volatility comes from price changes
 - Rate base is not marked-to-market; investors (e.g., utility parents) face only ROE volatility

Illustrative example

- Starting balance: **\$100**
- Returns
 - Period 1: **+200%**
 - Period 2: **-100%**
- Ending balance: $\$100 \times (1+200\%) = \$300 \times (1-100\%) = \mathbf{\$0}$
- Average return
 - Arithmetic: $(200\% - 100\%)/2 = \mathbf{+50\%}$
 - Geometric: $[(1+200\%) \times (1-100\%)]^{1/2} - 1 = \mathbf{-100\%}$
- Which better reflects the actual return?

Example 7 – Comparable (utility) earnings/ authorized ROE: Circular logic

- Assumes regulators are infallible
- No means of correction; any error increases the likelihood of future errors
- Akin to recommending a children's diet based on what kids actually eat, not what's good for them

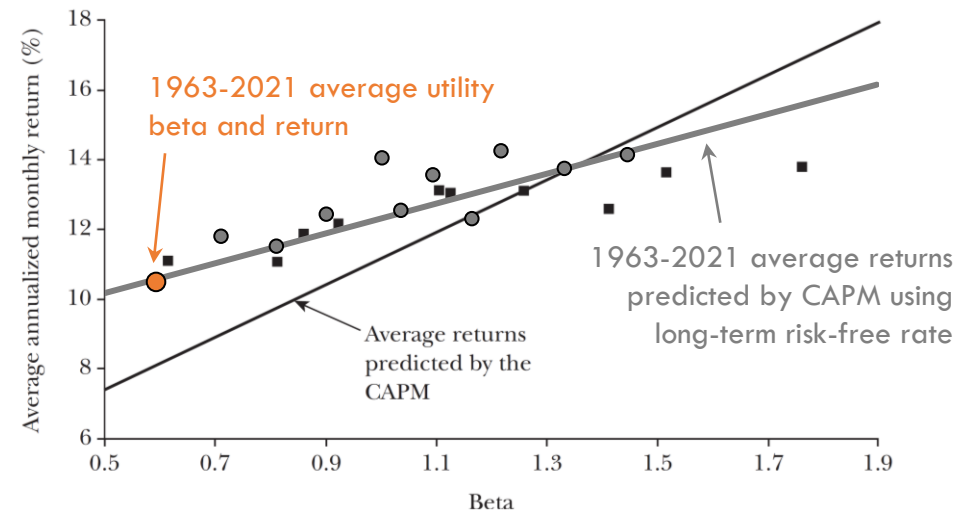


Example 8 – CAPM: Empirical adjustment

- The Empirical CAPM (ECAPM) was developed by Roger Morin, a utility ROR expert, based on the observed “flatness” of the security market line (SML; relationship between beta and excess return) – the slope is too low, and the intercept too high
- The academic studies referenced by Dr. Morin differ in two key aspects from the CAPM’s use in regulatory proceedings:
 - The studies are for the entire market, divided into portfolios sorted by beta, not just utilities
 - The studies use a short-term risk-free rate, not the 20- or 30-year Treasury
- Using a long-term risk-free rate, utilities demonstrate no flatness

Fama-French study referenced in support of ECAPM with long-term r_f SML and utility beta added

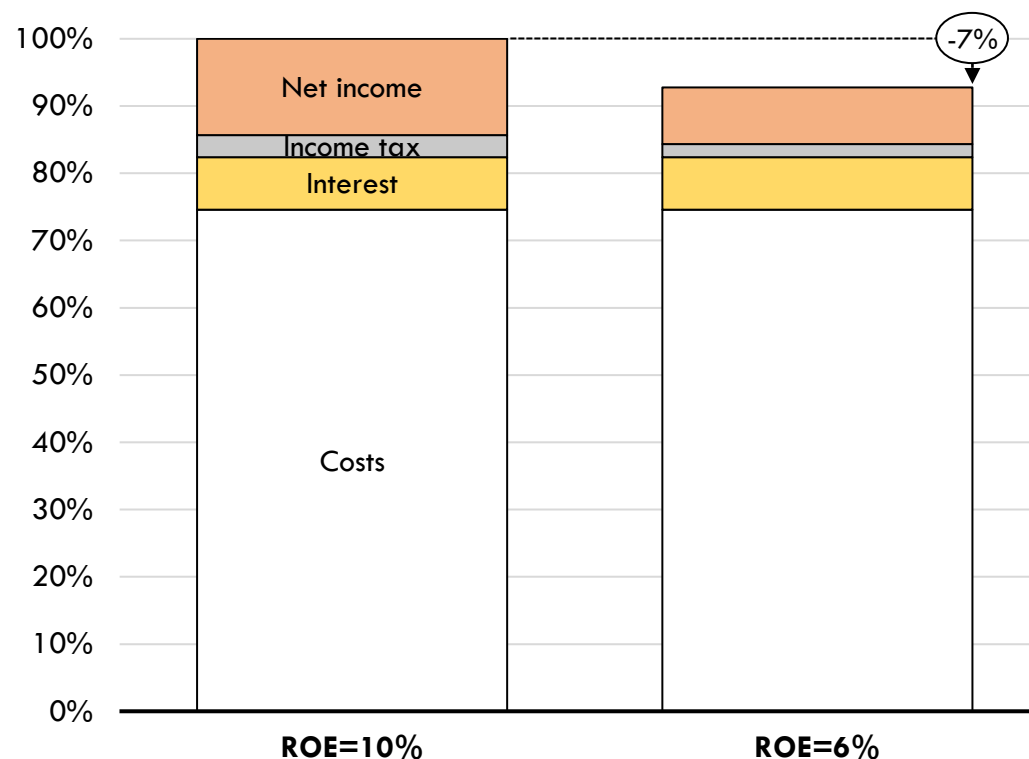
Average Annualized Monthly Return versus Beta for Value Weight Portfolios Formed on Prior Beta, 1928–2003



9. Rate of return is a big deal for consumers and the environment

- Net income + income taxes account for 15-20% of rates
- Reducing ROE closer to COE – from ~10% to ~6% – would reduce rates by 6-8%
- Potential consumer savings
 - >\$10 B/year
 - ~\$100/household
 - Does not account for reduced incentive to over-invest
- Going forward, the trillions of dollars of investment required for the energy transition would go ~20% further for the same rate impact

SDG&E illustrative example

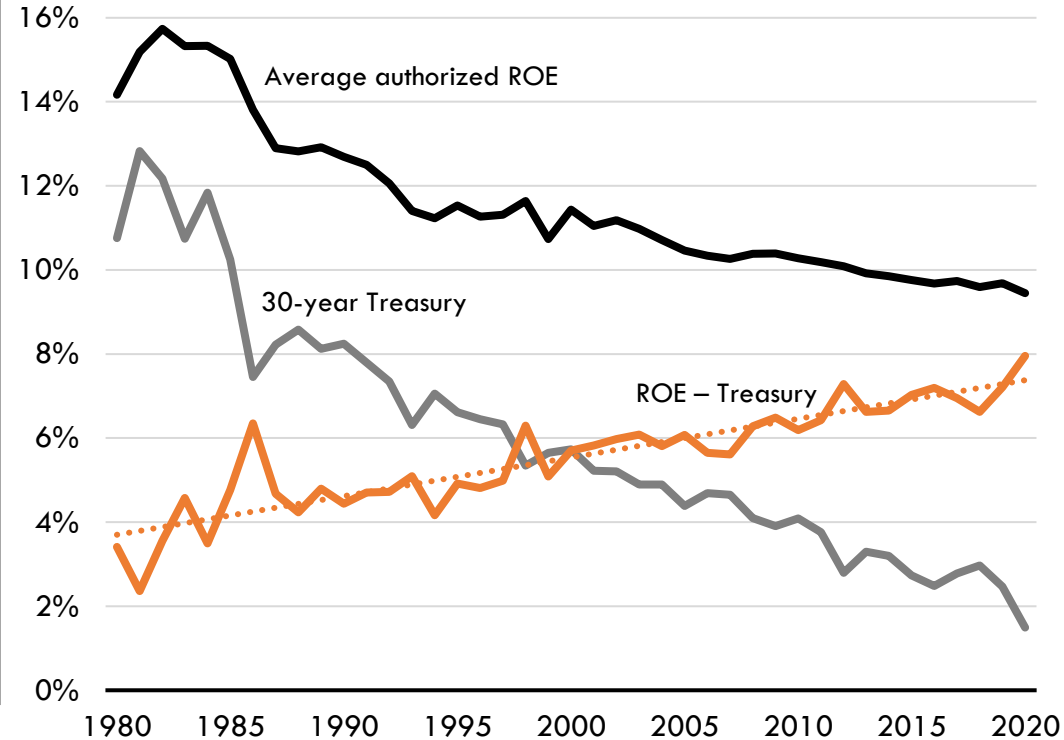


10. Change is hard

Seems so obvious...

- Not new
 - Widely known among utility executives, equity analysts, rating agencies, investors, academics, consultants, consumer advocates
- Public interest
 - Huge waste could be put to better use – clean/modernize the grid, return to consumers
- In-place institutional infrastructure
 - Consumer advocates
 - Regulators

Authorized ROE vs. 30-year Treasury



...yet it persists

- Utilities
 - “Complexify”
 - Manipulate methods
 - Unlimited resources
 - Regulatory deference
- Institutions
 - Fragmented/ uncoordinated
 - Other priorities
 - Unaware of the stakes
 - Seen as unsexy, arcane, nit-picky, down-in-the-weeds
 - Out-resourced
 - Change means admitting you were wrong/negligent

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Questions/feedback

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