# Discount Rates and the Regulated Equity Return Puzzle

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# Discount Rates and Regulated Equity Returns

## Regulated Return Foundations

• In regulatory rate-making, three cases are commonly thought to provide the foundations for determination of a “fair return”:

- Bluefield Water Works & Improvement Co. *v*. Public Service Commission of West Virginia, 262 U.S. 679 (1923)

*“The return should be reasonable, sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economic management, to maintain and support its credit and enable it to raise money necessary for the proper discharge of its public duties.”*

- Federal Power Commission *v*. Hope Natural Gas Company, 320 U.S. 391 (1944)

*“…return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.”*

-Duquesne Light Company *et al*. *v*. David M. Barasch *et al*., 488 U.S. 299 (1989)

*“The risks a utility faces are in large part defined by the rate methodology, because utilities are virtually always public monopolies dealing in an essential service, and so relatively immune to the usual market risks.”*

## Regulated Return Foundations

• In other words, regulated rates of return, or discount rates, should be set based on:

- Attracting sufficient capital
- Being reasonably comparable to investments of similar risk
- Maintaining the financial integrity of the utility
- Recognizing of the costs of regulatory risk

• In *Hope*, the court asserted the "end result" doctrine (which is essentially a legal version of economic positivism): regulatory methods are immaterial so long as the end result is reasonable to the consumer and investor. In other words, there is no single formula for determining rates.

• In practice, however, discount rates are generally thought of as:

Required Return = Riskless Rate + Risk Premium

where the Risk Premium should be sufficient to attract capital and comparable to other assets with similar risk levels.

• This formulation is not accidental; it's at the heart of modern financial theory. The Capital Asset Pricing Model ("CAPM"), Arbitrage Pricing Theory ("APT"), Fama-French Three-Factor Model, and others are also based on that framework. The disagreement emerges in the risk premium part.

• DAI uses the CAPM for discount rate determination:

$$r = r_f + \beta(r_m - r_f)$$

where $r_f$ is the riskless rate of return (U.S. Treasury rates for a comparable maturity), $\beta$ is the beta of the asset, and $r_m - r_f$ is the market risk premium.

## DAI's Approach: Key Discount Rate Parameters

- In this formulation (*i.e.*, the CAPM), there are three free parameters:

Riskless Rate

- <u>The riskless rate</u>. This is the rate on U.S. Treasury securities of comparable maturity to the duration of the cash flows of the project. A project with a 10-year life would use the 10-year Treasury rate; a project with a 30-year life would use the 30-year Treasury rate. This rate is directly observable and generally not subject to disagreement.

Risk Premium

- <u>Beta</u>. Beta measures the risk of the underlying cash flows relative to the risk of the broader universe of possible investments. It is common practice to measure beta relative to a market index such as the S&P 500, but methodology here varies. Although there is general agreement on what beta *should* represent, there is considerable disagreement over how to measure it.
    * Should it be the levered or unlevered beta?
    * Should it be the asset beta or equity beta?
    * Should it be a historical estimate or a forward-looking estimate?

- <u>The market risk premium</u>. The MRP represents the premium required by investors for bearing the risk of a broadly diversified portfolio of capital assets (*i.e.*, the "market"). Typically, this is measured by subtracting Treasury rates from the average returns on an index like the S&P 500 over some long period of time. This is another area of broad disagreement, with estimates ranging from 5% to 10%, all based on different time windows, different indexes, and different historical averaging methods (*e.g.*, arithmetic vs geometric). DAI generally uses 7.5% as a middle-of-the-road figure. Empirically, the market risk premium was **negative** for much of the last decade, which illustrates the time window sensitivity.

## Practical Results and Commentary on Alternative Approaches

• In practice, even this simple model can produce widely divergent results based on how one determines the beta and the market risk premium.

• Are there better (in the sense of more easily estimated or more consistent) alternatives?

• Not really. All the approaches have their subjective failings (or tendency toward "art," rather than science):

- The **risk premium** or **"build-up" approach** is entirely *ad hoc* and without a solid equilibrium based foundation (*e.g.*, premiums for size, for "liquidity," for earnings volatility, for industry risk, for "other factors"). Virtually no attempt is made to disentangle the relationships between these factors, or to evaluate their applicability in context. It's like a discount rate buffet: a little bit of this, a little bit of that…
- The **APT** is great, but the factors aren't specified in advance and are therefore subjective. As a result, it's merely a more formal version of the build-up approach in practice.
- The **Fama-French approach** is commonly thought of as the latest-and-greatest model and empirically has tended to outperform the CAPM, but has a relatively thin theoretical basis (*e.g.*, there is no generally-accepted consumption-investment equilibrium model that incorporates the size and book-to-market factors). Fama-French is a particular 3-factor version of the APT, where the three factors represent an empirical fit, but generally little theoretical support.

• And, to be fair, as theoretically wonderful as **CAPM** is, its empirical support is poor. We like it because a model with fewer subjectively-determined variables that are difficult to measure is better (less *ad hoc* or able to be manipulated) than a model with many of such variables.

## So what does this mean in practice?

• Return to the *Hope* decision and the End Results Doctrine.

• Don’t get too attached to any particular model and instead focus on what the practical impact of the discount rate determined (through whatever means) is likely to be and what it is telling us.

• If you look at the results from rate cases over the last year or two, the allowed rates of return on equity have ranged from 10-11%.

• This compares to anywhere from 12-18% for non-regulated equity discount rates, depending on project leverage (more debt means a higher rate), availability of a PPA (merchant means a higher rate than contracted), technology (intermittent means a higher rate than baseload), etc.

• But in researching these rates, we came across something of a puzzle.

# The Puzzle

## Origin and Nature of the Puzzle

• DAI examined 1,349 electric utility rate cases going back to 1980.

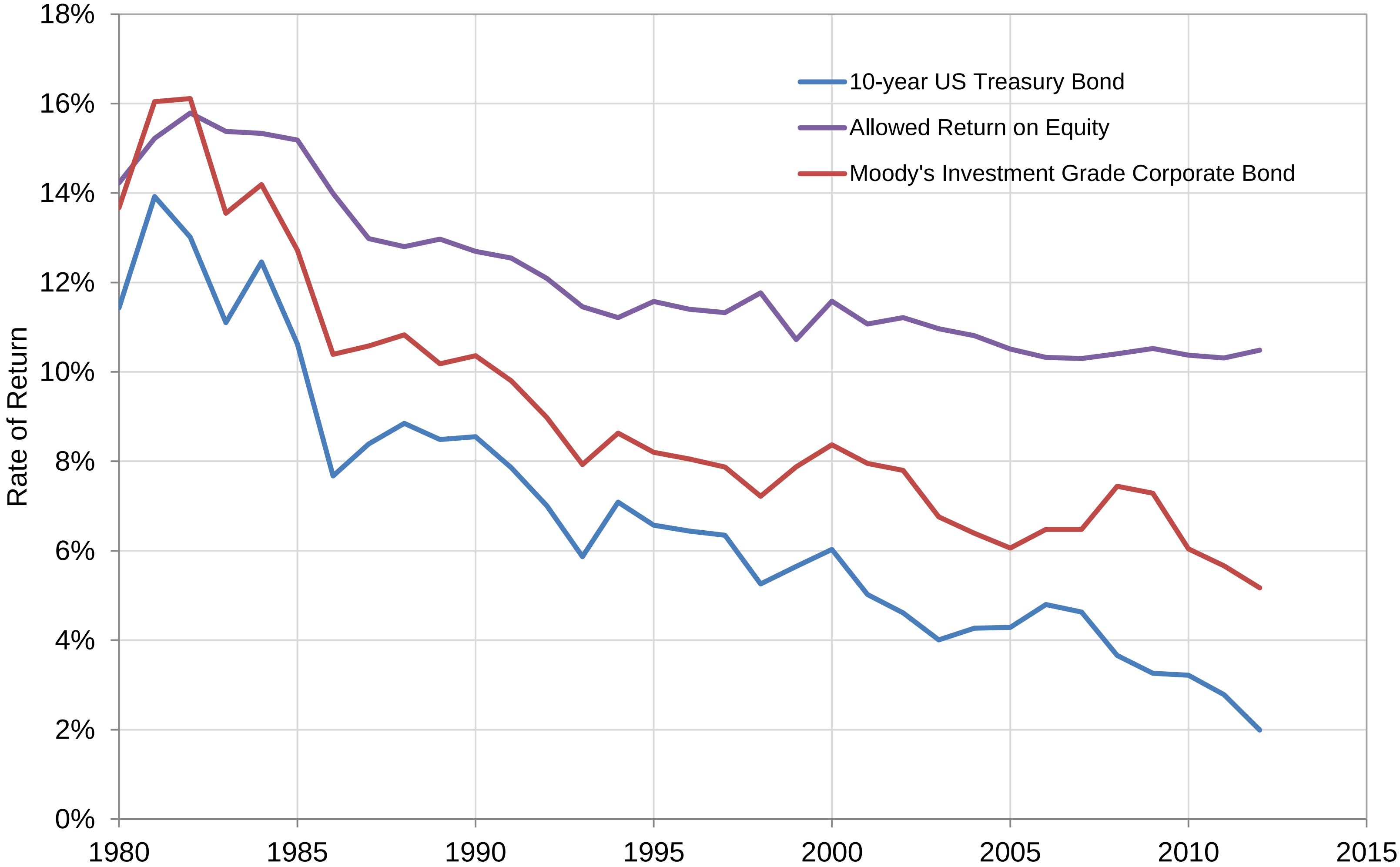
• In each case, we compared the approved (not requested) rate of return on equity against the 10-year U.S. Treasury rate and to Moody's investment-grade (Baa) corporate bond rate.

• According to our formulation of the equity rate of return as the sum of the riskless rate and the risk premium, if the risk premium does not change over time, then equity returns should rise and fall in parallel with the riskless rate.

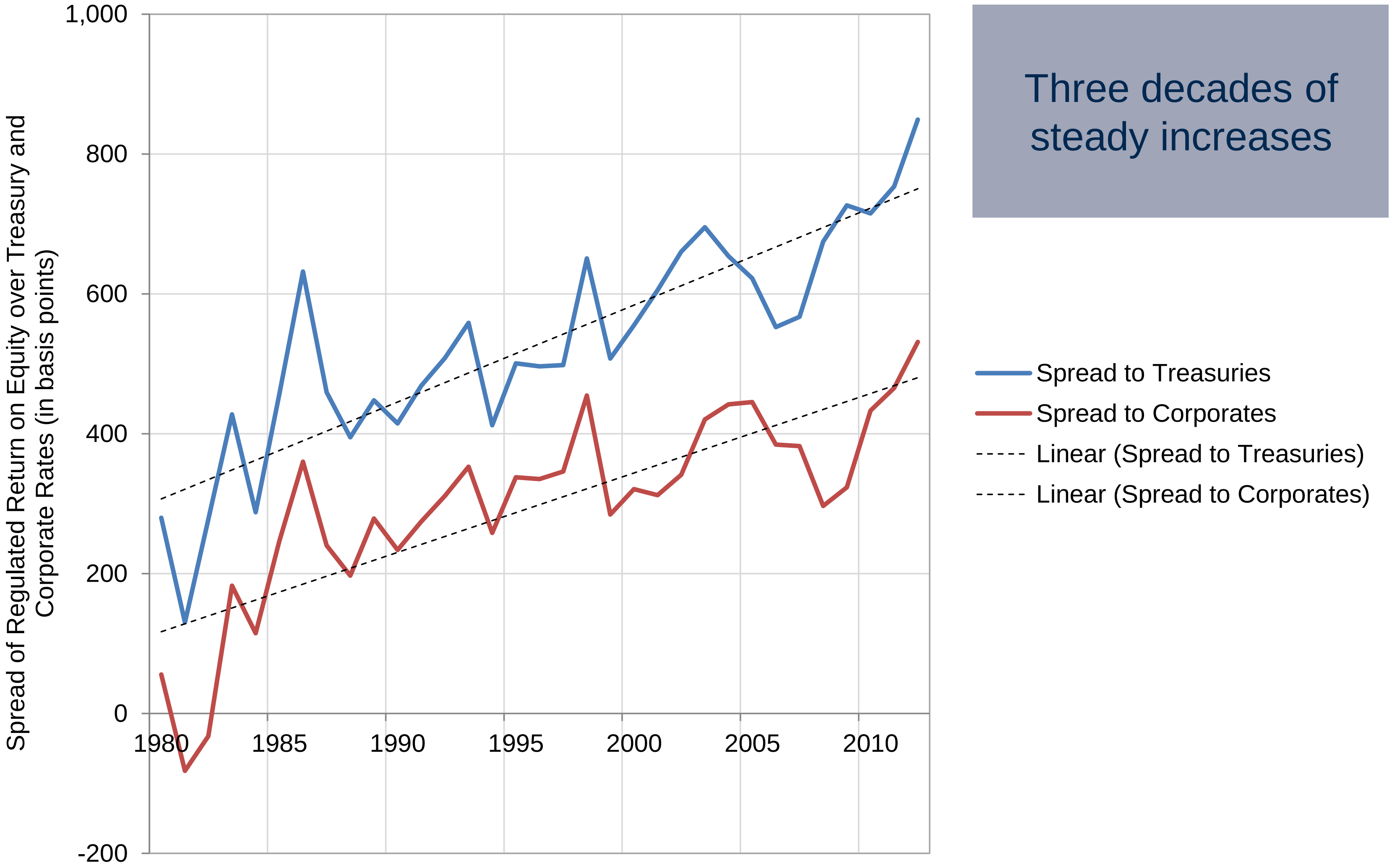
• They do not. Since 1980, Treasury and corporate bond rates have fallen by much more than utility return on equity rates. Regulated returns also appear to have "leveled off" around 10%.

• Why aren't allowed equity returns much lower? Before we speculate on what's behind this, let's look at the actual data.

## Regulated Return on Equity vs Treasury and Corporate Benchmarks



## The Spread Between Regulated Return on Equity and Treasury and Corporate Rates




Three decades of steady increases

## Findings & Speculation

• The spread has grown from less than 300bp in 1980 to more than 800bp today.

• The increase is also present when using corporate bonds as a benchmark and prior to 2008 (*i.e.*, it is not a function of the Fed's extraordinary easing in recent years).

• Based on our original slides (required return = riskless rate + risk premium), <u>the growing spread must be evidence of a growing risk premium</u> (*i.e.*, rearranging, risk premium = allowed return – riskless rate). There are four primary suspects:

(1) Beta. Regulated utilities have become riskier relative to the market as a whole.
(2) Market Risk Premium. Investors in general are requiring greater returns for holding risk.
(3) Regulatory Risk Premium. Investors are requiring greater returns for bearing regulatory risk (per the court's decision in *Duquesne Light*).
(4) Increased Leverage. Utility debt levels have increased, increasing equity risks and driving equity returns higher.

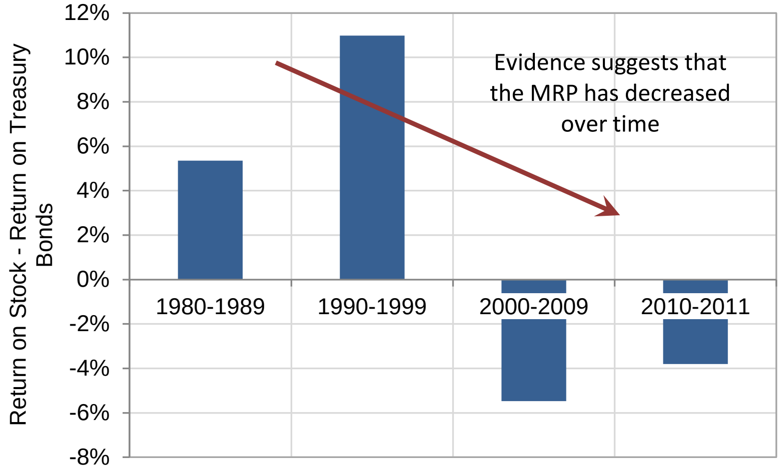
• The only problem with these four hypotheses is that they don't appear to hold up.

• On beta, the 5-year regression beta (unlevered asset beta adjusted for cash) for electric utilities was 0.48 in 1999 and 0.49 in 2012.[†] Although it has fluctuated over time, there is no clear evidence of a dramatic increase in beta that would generate a rising spread.

† Source: Prof. Aswath Damodaran, New York University

## Findings & Speculation

• On the market risk premium, the evidence is actually that it has declined over time.† As a result, the spread should be narrowing, not increasing (all else held equal).



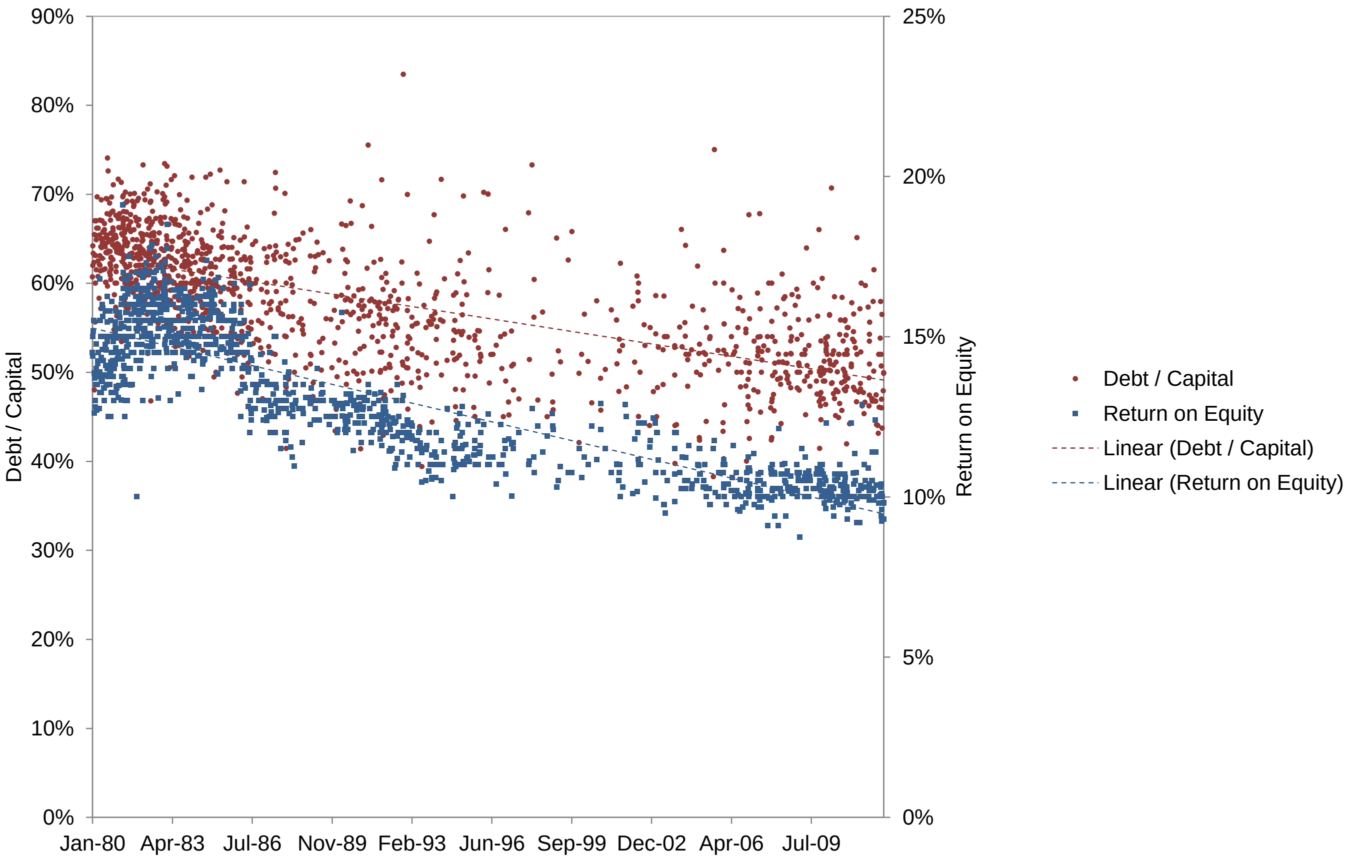

• On the regulatory risk premium, it would be difficult at least anecdotally to argue that today's regulatory risk premium would be greater than the one in 1980, in the aftermath of Three Mile Island and the cost recovery controversies that ensued. Nevertheless, there does not appear to be any inflection points in the trends around the implementation of the Natural Gas Policy Act in 1984/5, the deregulation of power markets in 1999, or re-regulatory activity following the collapse of Enron in 2001.

† Source: Federal Reserve

## Findings & Speculation

• On increased leverage, utilities actually are *less* levered today than they were in 1980. The average debt/capital ratio approved in rate cases from 1980-1985 was 63%. The debt/capital ratio after 2005 is only 52%. Therefore, less leverage would argue for a *lower* spread (because lower debt makes equity less risky).

• Indeed, equity returns have fallen while debt/capital ratios have declined. This is to be expected, only it doesn't help to explain why the spread has grown.



## Conclusions & Implications

• Since none of the 4 obvious candidates appear to explain this anomaly, we are forced to consider more esoteric possibilities:

- Has deregulation caused risk to "leak" into the regulated world because both regulated and deregulated entities have to compete for the same capital?
- Has the composition of the rate base itself changed (making it somehow riskier)?
- Has capital to regulated firms become increasingly scarce such that historically high spreads to riskless rates are justified?
- Regulators are (inadvertently) providing a windfall of sorts to regulated equity investors.

• The last possibility seems odd given the scrutiny that rate-making decisions get, but we include it simply because we can't find another explanation. In addition, several utilities have recently made moves designed to bolster their regulated operations:

- Exelon's acquisition of Constellation/Baltimore G&E adds a regulated utility to a largely merchant fleet
- PPL's acquisitions of the Kentucky utilities and U.K.'s Central Networks were a direct effort by the utility to increase the percentage of its EBITDA from regulated operations.
- Warren Buffet has often touted the attractiveness of Mid-American Energy's regulated returns as an investment

• It's possible that these actions were simply about exploiting an "excessive" return available in the market.

• There is an additional question: why do regulated returns appear to have stabilized around 10%? Is there something special about 10% that is unusually attractive to equity investors as a return?

## Conclusions & Implications

• So why has the spread of regulated equity returns over riskless rates increased so substantially and steadily for three decades?

• We don't have a definitive answer (yet).

• We raise this issue because there is a tendency in discussions of discount rate calculations to get bogged down in minutiae and lose sight of the big picture: *Hope's* End Results Doctrine. If we can't explain conclusively why the spread – the risk premium – is increasing, then it doesn't really matter which model is used. The end result just doesn't make sense.

• If we were to use the same spread prevailing in 1980 today, equity returns on regulated investments would be under 6% (≈2.5% riskless rate + ≈300bp spread). Somehow, that doesn't seem right either.

• And that's the puzzle. We can't explain where the growing risk premium has come from, but somehow it doesn't "feel" right to ignore it. As a result, in practice, there is considerable variation in what appraisers use for discount rates. You pick a model to use, derive parameters that seem reasonable, and go with it. The critical element in any appraisal exercise that uses discount rates, then, is to be able to benchmark it against other indicators of value.

**Think: End Results Doctrine.**

# Introduction to DAI

## Who is DAI?

- Nuclear Industry Experts
  - Advisors to institutional investors in nuclear assets
  - Advisors to firms developing new nuclear power plants
- Energy Market Experts
  - Industry-leading clients
  - University-affiliated experts at the Carnegie Mellon University Electricity Industry Center
  - Published, peer-reviewed research
- Appraisal & Valuation Specialists
  - ASA-accredited senior appraisers
- Power & Energy Market Engineers
- Electric Market Economists
- Plant Managers & Operators
  - Gas Turbine Combined Cycle (DAI Oildale)
  - Hydroelectric (DAI Great Falls)

## Recognized Expertise

- American Society of Appraisers Certified
- Licensed Professional Engineer by National Council of Examiners for Engineering
- Published, peer-reviewed research
  - *The Appraisal Journal*
  - *Journal of Structured and Project Finance*
  - *Journal of Economic Behavior and Organization*
  - *Public Utilities Fortnightly*
- 2008 Pittsburgh 100: Fastest-growing Companies

## Decision Analysis

- Quantitative Risk Analysis (“QRA”)
- Electric and Fuel Market Studies
- Electric Market Forecasts
- Fuel Market Forecasts
- Statistical Analysis of Asset Performance
- Hedging Strategy Analysis
- Analysis of Capital Cost Uncertainty
- Default Analysis for Loan Guarantees
- Acquisition and Divestiture Advisory
- Valuation Litigation Support

## Appraisal & Valuation

- Equipment Fair Market Value Appraisal
- Residual Value Determination
- Liquidation Value Determination
- Tax Analysis/Support
    - Alternative Energy Property Allocations
    - Business Combinations (SFAS 141)
    - Goodwill and Intangible Assets (SFAS 142)
    - Gain or Loss from Acquisition (IRC 1060)

## Engineering Consulting

- Independent Engineer Analysis
- New Technology Commercialization
- Power Plant Operation and Maintenance
- Portfolio Management
- Feasibility Studies
- Expert Witness Testimony/Consulting

## Asset Management

- Acquisition and Divestiture Support
- Operations Efficiency Analysis
- Outage Management
- On-Site Operations and Maintenance
- Environmental Compliance Review
- Permitting, Licensing, and Accounting

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Market advisory services in support of equity investment in new coal power plant

*July 2008*

**$1,200,000,000**

Valuation and appraisal services for lease financing of 570 MW wind project

*July 2010*

**$1,450,000,000**

Valuation services in support of thermal solar project loan guarantee recipient

*December 2009*

**$2,100,000,000**

Appraisal and market advisory services for acquisition of 824MW renewable portfolio

*December 2007*

**$1,000,000,000**

Market advisory services for turbine loan and wind project development pipeline

*June 2007*

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