Moving Toward Value in Utility Compensation *Shareholder Value Concept*

Presented to:

California Public Utilities Commission

Presented by:

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Topics Discussed

There are errors in the "r minus k" framework

Allowed rates of return ("r") are *NOT* routinely above the cost of capital ("k")

Utility Investments are generally zero-NPV investments, before the fact, and that is sufficient motivation except in special circumstances

A market-to-book ratio for a utility greater than 1.0 does not mean that the allowed rate of return ("r") is greater than the cost of capital ("k")

Conclusions

The "r" minus "k" framework is based upon incorrect assumptions which lead to incorrect conclusions

June 1st clarification memo from LBNL:

- "k" is either the cost of capital perceived by the regulator or the cost of capital required by the market.
- Regulatory k is higher than market k, apparently because of the legal framework.
- "r" is either the allowed ROE or the realized ROE.

The first of these points is incorrect: There are not two "k"s, there is only one, the market determined cost of capital.

- Standard practice is for U.S. regulators first to take evidence on the market-determined cost of equity, "k".
- Then to base the allowed ROE, "r", on that evidence (i.e., "r" = "k"), recognizing that there is no perfect way to determine "k".
- Then to set rates so utilities expect to earn that allowed ROE on average.

The "r" minus "k" framework is based upon incorrect assumptions (continued)

The second point from the memo is also incorrect: Legal standards do *not* lead regulators routinely to set the authorized "r" greater than the market-determined "k".

- The plain language of the relevant legal standards is entirely consistent with the view that the allowed "r" should equal "k"
- The LBNL memo cites the part of *Hope* that approved the contested change in rate base methodology. The rate-of-return part of *Hope* holds that:

> The rate-making process under the Act, i.e., the fixing of 'just and reasonable' rates, involves *a balancing of the investor and the consumer interests*. … *the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks*. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. (320 U.S. 603, emphases added)

The "r" minus "k" framework is based upon incorrect assumptions (continued)

The cost of capital is *defined* as the expected (i.e., statistical mean) rate of return in capital markets on alternative investments of equivalent risk.

- Therefore, *by definition*, r = k provides a return "commensurate with returns on investments in other enterprises having corresponding risks" (as long as expected ROE = allowed ROE).
- r = k will therefore also enable the utility to attract capital and maintain its financial integrity (see our zero-NPV discussion, below).
- If r were routinely set above k, so the utility expected to earn returns in excess of the cost of capital, customers would pay more than necessary; customer and investor interests would not be "balanced".
- One goal of rate regulation is to prevent the excess profits that a "natural monopoly" might otherwise enjoy; a routine excess of r over k would instead embed such profits.

Are allowed rates of return routinely in excess of the cost of capital?

No -- not if regulators are doing what they've always claimed to be doing.

- Regulators attempt to set the allowed "r" equal to the market determined "k" and not at a level above that.
- If regulators base allowed rates of return ("r") on their assessment of the merits of the different estimates of "k", they are doing the best they can to set an allowed "r" equal to "k" itself, *NOT* to the market "k" plus some premium so utilities can "add value" for shareholders.
  - We do not know the "true" model of the cost of capital, so the evidence presented may use a variety of techniques (DCF, CAPM, Fama-French, etc.) and be subject to differences of opinion on key parameters.
  - But evidence from experts with differing views, subject to cross-examination by parties with varying interests, permits regulators to assess their relative merits.

Are allowed rates of return routinely in excess of the cost of capital? (continued)

It is true that regulators may consciously set an allowed ROE above the cost of capital to address special circumstances.

- FERC adopted an ROE premium to provide an incentive for new investments in electric transmission.
- Sometimes the allowed "r" is set above "k" to recognize special risks that would otherwise preclude the opportunity to earn the cost of capital on average, for example, non-completion risk for Alaska natural gas pipeline.

Other considerations:

- Regulation tends to adapt to changes in the cost of capital with a lag, which helps (investors / customers) when the cost of capital (decreases / increases), but which should balance out over time.
- There may need to be an adjustment for market versus book capital structure.

Nonetheless, with more than 60 years of combined rate-regulation experience between us, we have *never* seen a regulatory commission conclude that it had to set the allowed ROE above the market cost of capital as a routine policy, because utilities must be able to "add value" for their shareholders.

Are allowed rates of return routinely in excess of the cost of capital? (continued)

The latest CPUC ROE decision is entirely consistent with r = k.

- The 2012 decision reviewed considerable evidence on the cost of equity.
  - Four utilities and six intervenors submitted cost of capital evidence.
  - CPUC did not accept specific numerical risk premiums requested by utilities and others to adjust the cost of equity model results, but relied on the financial modeling evidence to determine the cost of capital range.
- We find no indication that the Commission felt a need for an ROE premium over the cost of capital to permit the utilities to "add value" for their shareholders.
  - Instead, the Commission says that its goal is "to set the ROE at a level of return commensurate with market returns on investments having corresponding risks, and adequate to enable a utility to attract investors to finance the replacement and expansion of a utility's facilities to fulfill its public utility service obligation."[1] *As discussed above, this implies r = k*.

A commission that sets r = k on average provides the lowest cost to customers consistent with providing the utilities a fair opportunity to earn their cost of capital over the life of their investments.

[1] (Decision 12-12-034 December 20, 2012, p. 18)

Do companies and shareholders prefer positive-NPV investments to zero-NPV investments?

Net Present Value equals the current value of the investment (due to its future returns on and of capital), minus the cost of the investment.

- NPV = 0 means that the investment's future returns are exactly worth its cost, as of the present.

Investors prefer positive-NPV investments, *if* they are available.

- We are all taught to make investments with NPV > 0 and to avoid investments with NPV < 0.
- Making NPV > 0 investments will increase the value of the company, while NPV < 0 investments throw money away.
- If r = k, then investments will be zero-NPV investments.

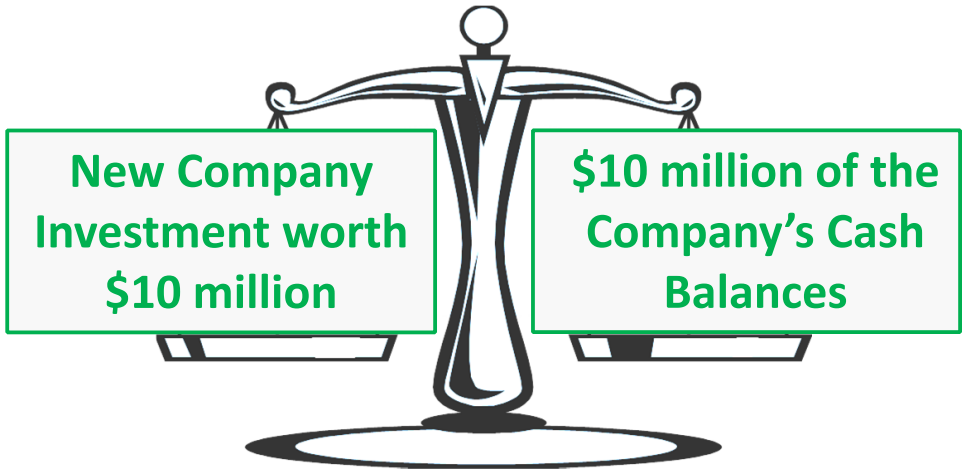
But a preference for positive-NPV investments does *not* make zero-NPV investments bad.

Does it harm shareholders to make a zero-NPV investment, versus returning the money to shareholders?

Absolutely not!

A zero-NPV investment is, *by definition*, worth what it costs

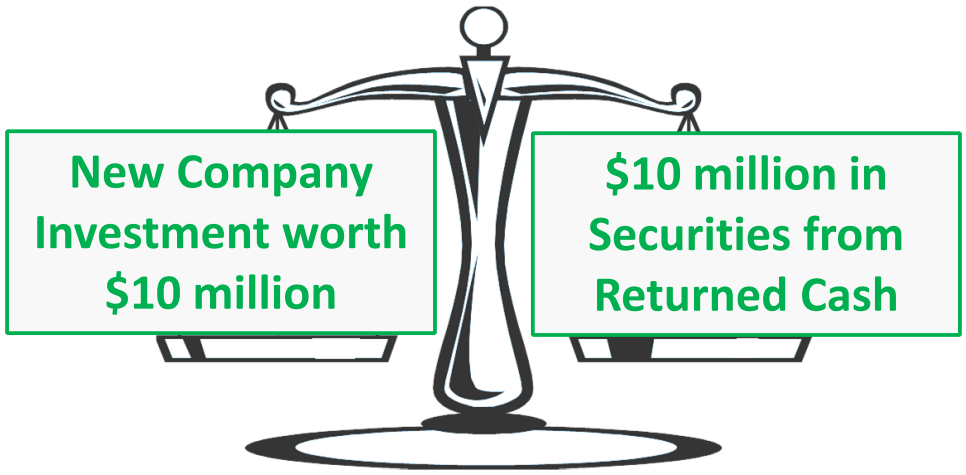
- Putting $10 million into a zero-NPV investment simply trades one company asset worth $10 million (i.e., cash), for another company asset worth $10 million (i.e., the investment).
- The mere exchange of assets of equal value does no harm to shareholders.



Does it harm shareholders to make a zero-NPV investment, versus returning the money to shareholders? (continued)

Securities (stocks and bonds) in well-functioning capital markets are themselves zero-NPV investments!

- If a company returns the $10 million to shareholders and they reinvest it by buying $10 million in other stocks or bonds, they are no better off than if the company had made the investment worth $10 million instead.



Does it harm shareholders to make a zero-NPV investment, versus returning the money to shareholders? (continued)

There is no such thing as a free lunch:

- If a company whose stock shareholders buy with returned cash is expected to make positive-NPV investments, the shareholders will have to pay more for that new stock than otherwise.
- Individual investors cannot buy a stock for the *cost* of a positive-NPV investment; they have to pay the cost of the investment *plus* the value of the positive NPV.
- No existing shareholder would sell a stock for the *cost* per share of a $10 million investment if the *value* of that investment were $11 million (i.e., if it had a positive NPV of $1 million).

In fact, shareholders may be worse off if the company pays out the $10 million instead of investing it, if they have to pay more in taxes (or pay taxes sooner) on the $10 million payout than they would have if the company had invested the money at zero-NPV instead.

Does it harm shareholders to make a zero-NPV investment, versus returning the money to shareholders? (continued)

In competitive markets in equilibrium, companies expect to earn the cost of capital on the investments they make, not the cost of capital plus a premium.

- A wheat farmer who decides to replace a tractor does not expect a super-normal return in wheat farming from the investment in the new tractor.
- Companies do seek NPV > 0 investments and try to take advantage of any they find; but competition will cause the NPV of subsequent investments of the same sort to move back towards 0.
- The availability of only zero-NPV investments does not mean a firm should or would go out of business, else much of the economy would disappear; we need ordinary businesses, too.

In short, there is nothing intrinsically wrong with a zero-NPV investment.

Do utilities have incentives to make zero-NPV investments?

Of course, else utilities would not exist in their present form.

- Traditional rate regulation attempts to provide, on average, a competitive rather than a monopoly rate of return.
- In exchange for limitations on the ability to make more-than-competitive profits, utilities are supposed to be able to recover their prudently incurred costs, even in cases when unregulated firms could not.
- Utilities also accept various obligations to provide service and to meet quality standards.
- U.S. utility regulation accomplishes these goals by reviewing and approving the costs and conditions of service and by setting the allowed ROE equal to a commission's best estimate of the cost of capital.
- If regulators succeed in achieving these goals, utility investments on average are zero-NPV.

Do utilities have an inherent capital expenditure bias?

No. An "r minus k" greater than zero is associated with the Averch – Johnson-Wellisz Effect (AJW), which says that regulated companies have an incentive to invest more than necessary.

Researchers have found little evidence to support the AJW effect.

- "In my view, students of regulation of legal monopolies wasted at least 15 years extending the Averch-Johnson model of regulatory behavior and trying to test it empirically without much success."[1]
- "This paper expands upon the observation of Paul Joskow (2005) that exploration of the Averch-Johnson-Wellisz (AJW) effect over the previous fifteen years had been a waste of time and effort. … In general, there is little evidence to suggest that there was ever an AJW effect."[2]

[1] Paul L. Joskow, "Regulation and Deregulation after 25 Years: Lessons Learned for Research in Industrial Organization," *Review of Industrial Organization* (2005).

[2] Stephen M. Law, "Assessing the Averch-Johnson-Wellisz Effect for Regulated Utilities", *International Journal of Economics and Finance*, (Aug 2014)

Do utilities focus on "r minus k"?

No, utility investments are routinely zero-NPV. Additionally, utilities have:

- Obligations to serve
- Requirements to provide safe and reliable service
- Oversight regarding the quality and conditions of service

Also, there is no conflict between a focus on service quality and the interests of investors.

> "Profitable firms are those with satisfied customers and loyal employees; firms with dissatisfied costumers and disgruntled employees will probably end up with declining profits and a low stock price." (Brealey, Myers, and Allen, *Principles of Corporate Finance,* 12th ed., p. 10.)

Do utilities have an incentive to prefer capital expenditures to contractual arrangements?

Not if:

- Any impact on the utility's cost of capital is reflected in the allowed rate of return, *and* if
- The contractual arrangements do not pose undue risks to utility stakeholders (customers, employees, investors), relative to capital expenditures.

Contractual arrangements can increase a utility's cost of capital:

- An increase in the proportion of a utility's fixed expenses due to contracts may increase its "operating leverage" and therefore its risk and its "k" (because the fixed expenses must be paid even when revenues are down).
- But if the new, higher cost of capital is recognized in regulators' estimate of "k" and reflected in the utility's "r", the utility is compensated.

If the contractual arrangements are for a new program that poses undue risks to its stakeholders, the utility in general will not be indifferent.

If regulators do not set "r" greater than "k", why are market-to-book ratios for utilities well above 1.0?

The short answer is, "no one knows"; the long answer takes some time to explain.

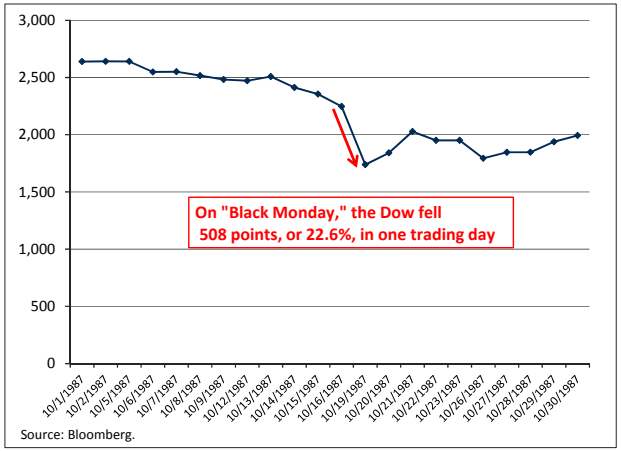
At one time, it was routine to use the standard DCF formula to show mathematically why the market-to-book ratio of utilities should equal 1.0, as the LBNL memo does here

- Even then, there were important additional conditions, for example:
  - The utility had to be regulated on a rate base identical to GAAP book value (unregulated firms would look instead to a market-to-net replacement cost ratio, known as "Tobin's q"; M/B has no clear interpretation for unregulated firms).
  - The utility had to be 100% engaged in the regulated business.
  - The regulatory system had to be fully in equilibrium, without any lags in adjustment of the allowed rate of return to the market cost of capital.
  - The ROE actually expected on average had to equal the allowed ROE.

If regulators do not set "r" greater than "k", why are market-to-book ratios for utilities well above 1.0? (cont.)

However, markets have now taught us that the traditional DCF formula does *NOT* explain stock prices:

- "Black Monday", October 19, 1987, saw the Dow drop nearly 23 percent in a single day, something the DCF formula cannot explain.



- The "tech bubble" of the late 1990s and 2000 cannot be explained by the DCF formula.
- "Flash crashes" cannot be explained by the DCF formula.
- Also, the stock market is too volatile for the DCF formula to explain.

If regulators do not set "r" greater than "k", why are market-to-book ratios for utilities well above 1.0? (cont.)

The current state of uncertainty is emphasized by the 2013 Nobel Prize in economics.

The prize was split among Eugene Fama, Robert Shiller and Lars Peter Hansen.

- Fama is the father of the "efficient market hypothesis", which, among other things, implies that there is an underlying economic model that explains stock prices and expected rates of return.
- Yet Shiller has called the logic behind the efficient market hypothesis "one of the most remarkable errors in the history of economic thought"
  - Shiller disputes the notion that stock prices can be explained by models of "rational" stock pricing, but instead may reflect "irrational" factors.
  - Part of Shiller's research showed that the DCF formula cannot explain stock prices.
- Hansen developed techniques to let people test such stock price theories.

If regulators do not set "r" greater than "k", why are market-to-book ratios for utilities well above 1.0? (cont.)

At present, the economics profession does not have a consensus as to whether stocks are "rationally" priced or not.

And if they are "rationally" priced, we plainly do *not* know the "true" model of the cost of capital that explains what those rational prices are.

We do know that the conventional DCF formula does *not* explain stock prices.

- So the "proof" that a market-to-book ratio in excess of one signals that a utility expects to earn more than its cost of capital cannot be relied upon, even if all the traditional conditions (slide 17, above) were satisfied.
- Moreover, the traditional conditions are effectively never satisfied.

If regulators do not set "r" greater than "k", why are market-to-book ratios for utilities well above 1.0? (cont.)

Conclusions:

- Current utility market-to-book ratios may be due to many factors other than an allowed rate of return routinely in excess of the cost of capital.
  - Longstanding explanations include factors such as regulatory lag and opportunities in non-utility businesses.
  - More recent explanations recognize that we currently do not know if stock prices are "rational," or, if they are, what formula can be used to interpret them.
  - The "proof" of the market-to-book test relies on a formula for stock prices that is known not to explain actual stock prices.

- Therefore, it is a mistake to take the existence of utility market-to-book ratios in excess of one as proof that the allowed rate of return exceeds the cost of capital.

Are the usual cost of capital estimation methods, e.g., the CAPM and the "DCF method", useless?

No. We know they do not reflect the "true" model of the cost of capital, but we do not know what the "true" model is, or even if a "true" model definitely exists.

- Regulators, like corporate managers everywhere, have to make decisions about the cost of capital that cannot wait until we know the "true" model, if there is one.
- Analysts may disagree on the parameters and implementation of the models, but all are attempting to provide a market determined cost of capital, i.e., "k"

In our view, the best a regulatory commission can do is to:

- Continue to evaluate the cost of capital evidence using the (definitely incomplete) models we do have, until the economics profession can make more progress towards better models, and
- Set the allowed ROE so the utility expects to earn its estimated market cost of capital on average.

Conclusions

Utility allowed rates of return ("r") are *not* routinely set above their cost of capital ("k")

- Therefore, there is no general "r minus k" obstacle to inducing utilities to consider non-capital expenditure approaches.
- However, if new non-capital expenditure approaches increase the utilities' cost of capital, "k", the allowed ROE, "r", must be adjusted accordingly.

Utilities consider more than shareholder value:

- Utilities generally operate in a zero-NPV environment.
- Utilities have obligations to stakeholders besides investors , e.g., customers.
- Utilities will not be indifferent to new programs that pose undue risks to those stakeholders.
- Utilities know that regulatory change can lead to massive industry disruption if implemented without sufficient forethought and testing.
  - For example, natural gas price deregulation in the 1980s bankrupted some regulated pipeline companies and nearly bankrupted others.

Conclusions (continued)

Special-purpose incentives are sometimes used in rate regulation.

- An example is the FERC's transmission rate of return adder.
- Whether the benefits of such an incentive outweigh its costs depends on the specific circumstances.
- Note, however, that to adopt an intentional excess of "r" over "k" on *all* investment is to lock in superior profits on *all* investment, not to reward greater efficiency or other specific goals.
  - For example, the FERC incentive targeted *new* transmission investment.

However, in our view, incentives by themselves are unlikely to overcome any utility reservations about a new program unless there first is adequate forethought and testing of the new program.

Additional Resources

Stewart C. Myers, "Application of Finance Theory to Public Utility Rate Cases," *The Bell Journal of Economics and Management Science,* Spring 1972, pp. 58-97.

- The first theoretical explanation of why the market-determined cost of capital is the appropriate allowed rate of return for a regulated company.

Stewart C. Myers, "Fuzzy Efficiency," *Institutional Investor*, December 1988.

- Discusses the 1987 market crash. Notes that the determinates of the *level* of stock prices are not well established although *relative* prices are efficient.

Robert J. Shiller, *Market Volatility*, Cambridge, MA: The MIT Press (1989).

- Source of the Shiller quotation on "the most remarkable error in the history of economic thought."

"Why Those Guys Won the Economics Nobels," *Harvard Business Review* online, April 2, 2014, available at: https://hbr.org/2014/04/why-those-guys-won-the-economics-nobels.

- Simple explanation of how the work of Fama, Shiller, and Hansen are related through the award of the 2013 Nobel Prize in Economics.

Additional Resources (continued)

John W. Campbell, "Empirical Asset Pricing: Eugene Fama, Lars Peter Hansen, and Robert Shiller," *The Scandinavian Journal of Economics*, Vol. 116 No. 3: 593-634 (July 2014).

- A more theoretical and mathematical explanation of the relationships among the work of Fama, Shiller, and Hansen, commissioned to discuss the work leading to the award of the 2013 Nobel Prize in economics.

A. Lawrence Kolbe and William B. Tye, "The *Duquesne* Opinion: How Much '*Hope*' Is There for Investors in Regulated Firms?", *Yale Journal on Regulation* Vol. 8, No. 1; (Winter 1991).

- A law-journal discussion of the economic implications of the Supreme Court's cost of capital decisions.

A. Lawrence Kolbe and James A. Read, Jr., with George R. Hall, *The Cost of Capital: Estimating the Rate of Return for Public Utilities*, Cambridge, MA: The MIT Press (1984)

- The cost of capital book stemming from work originally done by its authors and Prof. Stewart C. Myers for the California Public Utility Commission on methods used to estimate the cost of capital.

A. Lawrence Kolbe, William B. Tye, and Stewart C. Myers, *Regulatory Risk: Economic Principles and Applications to Natural Gas Pipelines and Other Industries*, Boston: Kluwer Academic Publishers (1993).

- Economic discussion of the "asymmetric" risks that can face regulated companies, with a particular focus on natural gas price deregulation.

Additional Resources (continued)

Richard A. Brealey, Stewart C. Myers, and Franklin Allen, *Principles of Corporate Finance,* 12th edition, New York: McGraw-Hill/Irwin (2017).

- The leading graduate-level textbook on corporate finance, available in many languages.

Richard A. Brealey and Stewart C. Myers, with The Brattle Group (Brattle author A. Lawrence Kolbe), *Capital Investment and Valuation*, New York: McGraw-Hill/Irwin (2003).

- Derived from *Principles of Corporate Finance*, with a focus on the asset side of the balance sheet.

Paul L. Joskow, "Regulation and Deregulation after 25 Years: Lessons Learned for Research in Industrial Organization," *Review of Industrial Organization* (2005).

- Source of quotation on the failure of empirical tests to validate the Averch-Johnson hypothesis.

Stephen M. Law, "Assessing the Averch-Johnson-Wellisz Effect for Regulated Utilities", International Journal of Economics and Finance, (Aug 2014).

- Additional evidence on the lack of empirical support for the AJW hypothesis.

Presenter Information



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Larry Kolbe is a retired financial economist. His work addressed risk, return, and regulatory policy for rate-regulated industries; income tax disputes; natural resource tax and royalty disputes; and firm, security, or project valuation questions in a wide variety of settings. Clients for this work included federal, state/provincial, and local government agencies (including the CPUC); national research institutes; industry organizations; and private firms in many industries.

Dr. Kolbe is the co-author of three books on risk, return and value, and he has published a number of articles. He has served as an expert witness in many venues in North America, as well as in The Hague, London, and Melbourne.

Before co-founding The Brattle Group, where he served as President and then Chairman for a number of years, he was a Director of Putnam, Hayes and Bartlett. Before that, he was a Vice President of Charles River Associates. Earlier, he spent 14 years on active duty in the U.S. Air Force.

He holds a Ph.D. from MIT and a B.S. from the U.S. Air Force Academy, both in economics.

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Mike Vilbert specializes in cost of capital, regulatory economics, financial planning, income tax disputes, and valuation. He has advised clients on these matters in various investment and regulatory decisions. He divides his time between the firm's Cambridge and San Francisco offices, working side-by-side with clients around the country.

His recent work has focused on evaluating the effects of various regulatory policy changes, such as decoupling of a company's cost of capital and asset valuation in arbitration proceedings.

Dr. Vilbert has testified before the U.S. Federal Energy Regulatory Commission, the Canadian National Energy Board, numerous state and provincial regulatory commissions and boards, and in federal court. He has also assisted the U.S. Department of Justice and the U.S. Internal Revenue Service in a variety of complex tax litigation cases.

He holds a Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania, an MBA from the University of Utah, an M.S. from the Fletcher School of Law and Diplomacy, Tufts University, and a B.S. from the U.S. Air Force Academy

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