RICHARD E. GOLDBERG

Principal

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Dr. Richard Goldberg specializes in complex litigation and management consulting matters in which careful analysis and modeling of economic, business, or financial data is critical. His work often requires statistical analysis of market price data, valuation of complex financial instruments, quantifying market risk, or analyzing records from internal company databases. Dr. Goldberg combines technical prowess with a deep knowledge of the practical aspects of analyzing and constructing large scale data, having extensive knowledge of the hardware, software, and programming skills needed in data intensive matters. He is also considered an industry expert in the application of derivative security pricing methods to calculate the market value of energy contracts and physical assets.

Dr. Goldberg has provided expert testimony before federal and state courts, arbitration panels, mediators, and regulatory bodies. His conclusions are often based on statistical analysis, market valuation, a determination of policy compliance, or a damages calculation. In addition to providing expert testimony, Dr. Goldberg consults to attorneys by providing assistance in the interpretation and evaluation of complex analyses and in preparing to depose or rebut economic experts proffered by an opposing party. He also provides energy companies with analysis, training, and tool development related to market price forecasting, valuation of power plants and energy supply contracts, and risk management.

Dr. Goldberg is the co-author of a leading textbook on digital audio technology and is a Visiting Scholar at Stanford University's Computer Center for Research in Music and Acoustics (CCRMA) where he teaches audio compression technology to graduate students and industry professionals.

Prior to joining The Brattle Group, Dr. Goldberg was Manager, Risk & Asset Management for the Electric Power Research Institute (EPRI). He has held research positions at Stanford University, Lawrence Livermore National Laboratory, Princeton University, the National Center for Atmospheric Research, and the Harvard-Smithsonian Center for Astrophysics. He holds an A.B. in Astrophysical Sciences from Princeton University and an M.S. and Ph.D. in Physics from Stanford University.

EXPERIENCE

Sample Engagements

- In the context of an investigation into alleged market manipulation, analyzed trading records to determine the impact of a company's short term trading on price indices affecting the value of the company's longer term derivative positions.
- Provided expert testimony in federal regulatory proceedings as to the relationships between spot and forward electricity prices during the Western Energy Market Crisis of 2000-2001.

This testimony played a critical role in showing that market manipulation carried out in the spot electricity markets affected the prices of long term contracts signed during the Crisis.

- Provided expert testimony and consulting support in civil suits, mediation, and arbitration proceedings on a variety of issues related to power and natural gas trading including valuation of terminated contracts, analysis of historical trading data for compliance with risk management protocols, and valuation of trading portfolios.

- Analyzed due diligence and quality control reports for loans in pools underlying mortgage-backed securities to determine the degree to which the securitized loans adhered to claimed underwriting standards. In related work, compared characteristics of loans held in inventory with those of loans included in pools rated subprime to identify the fraction of loans in inventory which would be reasonably considered subprime loans.

- Subsequent to disclosure of large trading losses associated with “potential irregularities” in a company’s energy trading business, analyzed the internal trading records and valuations underlying the disclosed losses to determine the portion of losses possibly related to “potential irregularities” as opposed to losses caused by adverse market price movements, accounting policy changes, internal model changes, and other unrelated causes.

- Performed analysis to estimate the risk of loss from the knock-out provision in a basket option agreement for which the taxable treatment of the gains and losses in the underlying basket of securities was subject to dispute with the IRS.

- Worked with a Nobel laureate to develop and implement an oligopoly model of short-term airline industry competition that was used in antitrust litigation to estimate the impact on ticket prices from changes in global distribution fee structures and levels.

- Analyzed historical wind generation output to determine an empirical relationship between wind speed measurements and generation output for use in estimating but-for output at times generation from the wind facility is curtailed.

- Carried out statistical analysis of the results from randomized testing of electricity meters to identify differences in meter accuracy by meter type and analyzed associated customer usage data to determine the effectiveness of using changes in customer-level billing data to identify inaccurate meters.

- During the course of litigation, analyzed the trading records of an energy hedge fund to determine the compliance of one of its traders with risk management policies and instructions.

- Following the disclosure of a coding error by a quantitative hedge fund, reviewed for a group of investors the fund's methodology for estimating trading losses caused by the error.

- For several energy companies, analyzed historical energy market prices to characterize the degree of uncertainty in future market prices. The resulting volatility description was then used in valuing energy contracts and for assessing the risk of portfolios of assets and contracts.

- Provided expert testimony in securities litigation on loss causation based on event study analysis of stock price movements following corporate disclosures.

- Provided expert testimony in state regulatory proceedings as to the prudence of company risk management and trading practices and policies.

- In several matters, analyzed employee stock option grant data using statistical tools to determine the likelihood that the reported grant dates were retroactively selected.

- In several matters, estimated the additional costs incurred by a company due to retroactive selection of employee stock option grant dates.

- Provided expert testimony in state regulatory proceedings as to the effect of a below-investment grade credit rating on the cost of purchasing power and natural gas.

- Calculated the market value of fossil-fired, nuclear, and wind-powered generating units. In related work, also evaluated the benefit of major unit upgrades based on how the upgrades affected the market value of the unit.

- Designed service offerings for mass-market retail electric customer segments based on the results of customer surveys to assess customer preferences for differing aspects of electric service offerings.

- Developed market price forecasts of wholesale electric prices and associated uncertainty bands based on historical data, the prices of traded power contracts, and analysis of large-scale market models. In related work, also developed market price forecasts of natural gas prices and associated uncertainty bands based on the prices of traded gas contracts (including options).

- Assessed the financial risks of energy company portfolios consisting of production facilities, purchase/sale contracts, and retail customers. Specifically addressed market price risks, volumetric sales risk, and operational risks. Also quantified the underlying risk exposures and used that information to recommend potential hedging programs to reduce the overall risk.

- Designed scenario-based risk assessment methods and built a software tool using these methods for use by a major west coast utility in its power procurement decision-making and in its risk reporting process. Presented the methods and tools to the utility's senior management and to a regulatory body consisting of state regulators and consumer advocates.

- Developed fuel purchase portfolio strategies and valued specific purchase agreements for coal, natural gas, and uranium. Particular attention was given to the effect on value of typically hard-to-quantify non-price factors such as minimum takes, take limits, penalties, renewal options, evergreen provisions, and other terms that limit or provide flexibility to alter contract usage in response to unanticipated events.

- Evaluated a variety of wholesale power and natural gas deals using option valuation techniques. Deals varied from simple swaps to complex custom-contracts with an assortment of embedded options.

- Facilitated development of capital budgets, including data collection and evaluation, interviewing senior management to define financial and non-financial investment objectives and associated trade-offs, and putting together the project prioritization list.

- Provided training to industry professionals on methods for calculating the value and managing the risks associated with physical assets (*e.g.*, power plants), contract commitments (*e.g.*, bulk power and gas trades, fuel purchase agreements), and retail customers.

PUBLICATIONS

- R. Goldberg and J. Read, "Oil and Gas Termination Payments: Devil is in the Details", Law360, April 2016.

- R. Goldberg and J. Read, "Hedge Timing: There's No Magic in Dollar Cost Averaging", Public Utilities Fortnightly, May 2012.

- R. Goldberg and J. Read, "Advances in Volatility Modeling for Energy Markets: Methods for Reproducing Volatility Clustering, Fat Tails, Smiles, and Smirks in Energy Price Forecasts," EPRI Technical Report TR-1021812, December 2011.

- M. Cragg, R. Goldberg, V. Khatchatrian and J. DeFoneska "Cleaning Up Spark Spreads: How Plant Owners Can Reduce Risk Through Carbon Markets", *The Brattle Group* Discussion Paper, March 2011.

- J. Wharton, M. Vilbert, R. Goldberg and T. Brown "The Impact of Decoupling on the Cost of Capital", *The Brattle Group* Discussion Paper, March 2011.

- J. Read, R. Goldberg, and P. Fox-Penner, "Smart Power, Energy Price Risk Management Evolution", *Electric Light and Power*, vol. 88, issue 6, Nov/Dec 2010.
- R. Goldberg and J. Read, "Just Lucky? A Statistical Test for Option Backdating", Social Science Research Network (SSRN), March 2007. Available at SSRN: http://ssrn.com/abstract=977518
- R. Goldberg and J. Read, "Delta Hedging Energy Portfolios: An Exploratory Study," EPRI Technical Report TR-1010686, December 2005.
- D. Andrade, J. Read, and R. Goldberg, "Seasonal Volatility in Energy Prices: Modeling Seasonality in Natural Gas and Electricity Price Volatility", EPRI Technical Report TR-1009864, December 2004.
- R. Goldberg and J. Read, "Analytical Approximations for Generation Option Values: A New Approach," EPRI Technical Report TR-1002209, December 2003.
- R. Goldberg and J. Read, "Retail Risk Management: A Primer," EPRI Technical Update 1002225, December 2003.
- R. Goldberg, D. Andrade, and J. Read, "Financial Engineering in the Energy Book System – A Wind Turbine," EPRI Technical Update 1007470, December 2002.
- R. Goldberg and J. Read, "Modeling Seasonal Volatility in the Energy Book System" EPRI Technical Brief TB-100662, December 2001.
- J. Read and R. Goldberg, "Optimization and Valuation of Natural Gas Storage or How to Get More out of the Gas Piggy Bank," EPRI Technical Report TR-1005947, June 2001.
- R. Goldberg and J. Read, "Describing Commodity Prices in the Energy Book System," EPRI Technical Report TR-1001170, December 2000.
- R. Goldberg and J. Read, "Dealing with a Price Spike World," *Energy + Power Risk Management Magazine*, May 2000.
- R. Goldberg, "From Price Forecasts to Price Models," EPRI Technical Brief TB-109808, January 1998.
- R. Goldberg, "Forward Curve Dynamics and Asset Valuation," EPRI Technical Brief TB-108991, October 1997.
- R. Goldberg, "The Forward Price in Commodity Markets," EPRI Technical Brief TB-107218, March 1997.

- R. Goldberg, "Valuing Generation Assets in Uncertain Markets II: Tracing the Forward Curve," EPRI Technical Report TR-106897, September 1996.

- R. Goldberg, "Valuing Generation Assets in Uncertain Markets: An Introduction to Binomial Models," EPRI Technical Report TR-105523, October 1995

- R. Goldberg, "Valuing Utility Assets and New Investments," EPRI Technical Brief TB-104834. January 1995.

In addition to his personal publications, Dr. Goldberg was EPRI Project Manager on research projects in the areas of Fuel Planning, Capital Budgeting, Generation Asset Management, Power Trading, Retail Service Design, and Risk Management. This research resulted in the publication of several dozen additional EPRI Technical Reports under Dr. Goldberg's management.

TEXTBOOKS

- M. Bosi and R. Goldberg, *Introduction to Digital Audio Coding and Standards*, Springer, 2003, ISBN 978-1-4020-7357-1.

TESTIMONY

- Direct and rebuttal testimony filed in the United States District Court for the Southern District of New York on behalf of the United States in Case No. 11 Civ. 0071 filed August 2017 and February 2018.

- Direct and rebuttal testimony before the Federal Energy Regulatory Commission on behalf of the California Parties in Docket Nos. EL02-71-000 filed November 2016 and March 2017 with live testimony April 2017.

- Direct and rebuttal testimony before the Federal Energy Regulatory Commission on behalf of the California Parties in Docket Nos. EL02-60-007 and EL-02-62-006 (Consolidated) filed May 2015 and October 2015 with live testimony November 2015.

- Rebuttal expert report (filed jointly with Paul Pfleiderer) on behalf of the IRS in a tax dispute with a hedge fund, August 2013.

- Expert report filed in the District Court of Harris County, Texas on behalf of Saracen Energy Advisors L.P., et. al., in Cause No. 2008-29241, March 2011.

- Expert reports filed in the United States District Court for the Western District Of Louisiana on behalf of the plaintiffs in the derivative securities litigation against Stone Energy Corp. in Civil Action No. 6:05CV2088, May 2008 and October 2009

- Expert report filed in the United States Bankruptcy Court for the Southern District of New York on behalf of Reliant Energy Electric Solutions, LLC in Adv. Proc. No. 08-01251, March 2009.

- Expert report filed in the District Court of Dallas County, Texas 193rd Judicial District on behalf of the plaintiffs in the derivative securities litigation against Affiliated Computer Services, Inc. in Cause No. 06-03403, February 2008.

- Expert report submitted by plaintiffs to the Special Litigation Committee designated by the UnitedHealth Group Board of Directors to address derivative securities litigation against UnitedHealth Group, April 2007.

- Direct and rebuttal testimony in the Court of Chancery for the State of Delaware on behalf of the plaintiffs in the books and records proceeding related to allegations of stock option backdating/springloading by Countrywide Financial Corporation in Civil Action No. 2608-N, April 2007.

- Expert report filed in the United States District Court for the Southern District of New York on behalf of the plaintiffs in the securities litigation against the Omnicom Group in Docket 02-CV-4483, December 2006.

- Direct and rebuttal testimony in an arbitration proceeding between ExxonMobil and Duke Energy on behalf of ExxonMobil, October 2006.

- Expert report filed in the United States District Court for the Northern District of Oklahoma on behalf of the plaintiffs in the securities litigation against the Williams Companies in Docket No. 02-72, February 2006.

- Testimony in an arbitration proceeding between Duke Energy Trading and Marketing and Southern California Edison on behalf of Southern California Edison, November 2005.

- Expert report filed in the United States District Court, Northern District of California, on behalf of the U.S. Attorney's Office in Docket CR 04-0125 VRW, October 2005

- Surrebuttal testimony before the Illinois Commerce Commission on behalf of Ameren Corporation in Docket No. 04-0294, August 2004.

- Damages testimony before the Supreme Court of the State of New York, County of New York, on behalf of Sempra Energy Trading Corp. in Index No. 601505/01, October 2003.

- Direct testimony before the Public Utilities Commission of Nevada on behalf of Nevada Power Company in Docket No. 02-11021, April 2003.

- Direct testimony before the Federal Energy Regulatory Commission on behalf of the City of Seattle in Docket No. EL01-10-05, filed March 2003.

- Rebuttal testimony (with William G. Shepherd) before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company in Docket Nos. EL02-26-000, *et al.*, October 2002.

- Rebuttal testimony before the Public Utilities Commission of Nevada on behalf of Sierra Pacific Power Company in Docket No. 02-2002, May 2002.

- Rebuttal testimony before the Public Utilities Commission of Nevada on behalf of Nevada Power Company in Docket No. 01-11029, March 2002.