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Finance and Economics

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EDUCATION

- University of Rochester, Rochester, NY 1995
Ph.D. in Economics
- University of Rochester, Rochester, NY 1994
M.A. in Economics
- Indian Statistical Institute, Calcutta, India 1988
B.Statistics (Honors)

COURSES OF INTEREST

- *Capital Markets*
- *Equities*
- *Derivatives*
- *Financial Economics*
- *Big Data in Finance*
- *Financial Programming*
- *Financial Econometrics*
- *Law and Finance*
- *Corporate Finance*

PROFESSIONAL AFFILIATIONS

- Visiting Professor 2021-present
Southern Methodist University
- President 2019-present
Washington Finance and Economics
- Visiting Clinical Professor 2018-2019
University of Maryland
- Practice/Affiliate Professor 2015-2019
Georgetown University
- Finance and Big Data Expert 2015-present
FTI Consulting, Vega Economics, and Nathan Associates
- Managing Director (position then called Director) 2011-2013
Berkeley Research Group
- Senior Lecturer 2009-2011
Washington University in St. Louis
- Principal 2007-2009
Law & Economics Consulting Group

- Associate Principal 2005-2007
Charles River Associates
- Associate 2001-2004
Cornerstone Research
- Consultant 1999-2001
Boston Consulting Group
- Assistant Professor (tenure-track) 1995-1999
University of New South Wales

PUBLICATIONS

1. “An Option Theoretic Approach to Market Efficiency,” *Annals of Financial Economics*, 2019 (<http://ssrn.com/abstract=3178740>)
2. “Objective Measures of Market Efficiency; Applications to Securities Class Actions and Valuations,” *Berkeley Business Law Journal*, 2019 (<https://ssrn.com/abstract=3147071>)
3. *Options and Market Efficiency: A Big Data Approach*, Lambert Academic Publishing, 2020 (https://www.amazon.com/Options-and-Market-Efficiency/dp/6200532281/ref=sr_1_1?keywords=options+market+efficiency&qid=1583235021&sr=8-1)

4. “Nash Bargaining Solution in Intellectual Property Litigation; *VirnetX* and Analysis of the Court’s Decision,” *Journal of International Business and Law*, 2020
(<https://ssrn.com/abstract=2981024>)
5. “The Economics and Antitrust of Bundling,” *Journal of Business, Entrepreneurship and the Law*, 2020 (<http://ssrn.com/abstract=3384230>)
6. “Arbitrage Risk and Market Efficiency – Applications to Securities Class Actions,” with Stephen O’Brien, *Santa Clara Law Review*, 2015; profiled on the website of Stanford University (<http://securities.stanford.edu/resources-academic.html>)
7. “Capital Asset Pricing Model (CAPM),” in David Teece and Mie Augier (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014
(<https://ssrn.com/abstract=2981076>)
8. “Multistage Games,” with Edward Sherry, in David Teece and Mie Augier (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014
(<https://ssrn.com/abstract=2981092>)
9. “Bertrand Competition,” with Edward Sherry, in Mie Augier and David Teece (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014
(<https://ssrn.com/abstract=2981091>)

10. “Linear Programming,” in Mie Augier and David Teece (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014 (<https://ssrn.com/abstract=2981081>)
11. “Repeated Games,” in Mie Augier and David Teece (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014 (<https://ssrn.com/abstract=2981086>)
12. “Price Discrimination,” in Mie Augier and David Teece (eds.), *The Palgrave Encyclopedia of Strategic Management*, Palgrave Macmillan, 2014 (<https://ssrn.com/abstract=2981084>)
13. “A Formal Model of Trust Based on Outcomes,” with Timothy Devinney and Madan Pillutla, *Academy of Management Review*, 1998 (over 1,050 citations)
14. “When Principals Elect Agents,” with Ray Ball and Glenn MacDonald, in Peter Bardsley and Vance Martin (eds.), *Econometric Society Australasian Meeting 1997 Proceedings*, University of Melbourne, 1997
15. “Non-Monotonicity of Equilibrium Price – Two Static Models,” in Michael McAleer, Paul Miller, Anthony Hall, and William Schworm (eds.), *Econometric Society Australasian Meeting 1996 Proceedings*, University of Western Australia, 1996

WORK IN PROGRESS

16. “Market Efficiency – A Structural Study” (<http://ssrn.com/abstract=3742378>)

Regression results:

<https://drive.google.com/drive/folders/1VCydoYF9iHkj4UQo1TL36ZWR02DNFKwQ?usp=sharing>

17. “Due Diligence and Strategic Behavior,” with Mahendra Gupta
18. “Short-run Constraints and Price Wars” (<https://ssrn.com/abstract=2980230>), under review
19. “Strong Non-Monotonicity of Equilibrium Price – Static and Dynamic Models” (<https://ssrn.com/abstract=2980215>), under review
20. “Market Power and Incremental Market Power,” with Joseph Bial
21. “Debt Relationships and Analyst Forecasts,” with Michael McDonald and Stoyan Stoyanov
22. “The Scientific Method Versus Faith” (<http://ssrn.com/abstract=3650610>), under review
23. “Intrinsic Uncertainty – An Explanation of the St. Petersburg Paradox,” with Nripesh Podder (<https://ssrn.com/abstract=2980237>), under review

SELECTED EXAMPLES OF PROJECTS AS TESTIFYING EXPERT

- Retained by an estate to opine on the level of efficiency of the market for a stock and its implications for the use of market price as an approximation for value. Applied cutting-edge research in finance and information to multiple terabytes of data to write draft report. Matter ongoing.
- Retained by a U.S. District Attorney’s Office and estimated damages, using event studies and other methods, to investors in a leading drugstore chain under allegations of securities

manipulation by its former vice chairman. Calculated and communicated liability and damages, created exhibits and drafted expert report, case settled prior to submission of expert report, deposition, or in-court testimony. *United States v. Brown*, United States Court of Appeals for the Third Circuit, 595 F. 3d 498 (3d Cir. 2010).

- Retained by a biotech firm in a litigation matter in which it was accused of delays in delivery of certain financial instruments. Valued various options, warrants and other derivatives at various points of time. Submitted expert report and testified at deposition. Case settled prior to in-court testimony. *Alpha Capital Anstalt v. Advanced Cell Technology, Inc.*, United States District Court for the Southern District of New York, 07/26/2012; Case No. 11 Civ. 6458 (PAC).
- Retained by a leading financial services firm to provide expert testimony on class certification and estimation of damages in a class action alleging fraudulent product information. Submitted expert report and testified at deposition. Case settled prior to in-court testimony. *Lorie J. Marshall, et. al., v. H&R Block*, in the United States District Court for the Southern District of Illinois, 08/31/2010; Case No. 3:08-CV591-MJR.
- Retained by a manufacturer of pipes to provide expert testimony on impact of the alleged vertical foreclosure on price, quantity, and quality. Submitted expert report and was deposed. Case settled prior to in-court testimony. *Boehmer Bros. Inc., v. J-M Manufacturing Company, Inc., et al.*, in the Circuit Court of St. Louis County, Twenty-First Judicial Circuit, State of Missouri, 06/11/2010; Case No. 10SL-CC00025.

- Retained by a retailer of funeral caskets in its suit against full-service funeral providers to provide expert testimony on illegal bundling and collusion. Analyzed the economics of bundling and collusion, and drafted expert report. Case settled prior to submission of expert report, deposition, or in-court testimony. *Caskets Direct, Inc. v. Hansen-Spear Funeral Directors, Ltd., and Haugh Funeral Homes d/b/a Duker & Haugh Funeral Homes, Inc.*, Circuit Court of the Eighth Judicial Circuit of Adams County, Illinois; Case No. 12-L-49.
- Retained by the plaintiff in an allegation of violation of intellectual property. Analyzed the framework of royalty base and royalty rate in the context of *Georgia Pacific* factors and Nash Bargaining with industry structure and comparables. Drafted expert report, case settled before submission of expert report, deposition or in-court testimony. *Navan Foods v. Spangler Candy Company*, U.S. District Court for the Eastern District of Virginia, Civil Action No. 2:16-cv-00157.
- Retained by the Inter-American Development Bank to opine on market power in electricity markets in Guatemala.
- Retained by a retailer in its suit against a telephone directory alleging lost profits due to a listing error. Estimated damages. Case settled prior to submission of expert report, deposition, or in-court testimony.

SELECTED EXAMPLES OF PROJECTS AS CONSULTING EXPERT

Finance

- A class action was filed against a Brazilian supplier of meat products alleging that the company had over-hedged on the foreign exchange market. Managed analyses, including detailed studies of currency hedging, and modeling the impact of the alleged over-hedging on the firm's controls through event studies and other methods. Drafted expert report.
- For the independent board of trustees of a major fund manager, investigated execution of trades by tainted trader-broker pairs to measure harm to shareholders. Managed the application of advanced econometric methods to analyze tens of terabytes of tick-by-tick trades and quotes data to test for significance of deviations from best execution. Drafted expert presentation.
- Retained by a leading bank to analyze class allegations that major banks were manipulating the rates of interest paid by auction rate securities. Managed analyses, including detailed auction-theoretic and econometric studies of price determination methods for a number of such securities and number of participants. Drafted expert reports.
- On behalf of the defendant, a former market maker, managed the estimation of damages to investors under allegations of securities manipulation and insider trading by defendant. Developed innovative methodologies based on the frontiers of finance to estimate harm. Also

estimated pre- and during-manipulation values of public firms in question. Drafted expert report.

- On behalf of a number of “bulge bracket” investment banks that were accused of illegal behavior in their allocation of 309 IPOs. Managed work on analyzing book building, appropriate metrics for excess commissions, price behavior in secondary markets, impact of potentially tainted trades on prices, and estimating links between allocations and actions in secondary markets. Firms analyzed in detail included an interactive agency firm and a network equipment manufacturer. Drafted expert reports.
- For a number of “bulge bracket” investment banks, tested for, and measured extent of, trading ahead, interpositioning, and front running, in response to Securities and Exchange Commission/Department of Justice and internal inquiries. Communicated methods and findings to different stakeholders.
- Managed the analyses of bankruptcy and fraudulent conveyance issues for an energy firm, a hospital chain, and a food services firm. Analyses included fiduciary responsibilities, market efficiency of relevant stocks and bonds, measurement of inflation of market capitalization using equity event studies, option-theoretic valuation of firm (Merton model), *ex ante* likelihood of default and credit ratings, reliability of analyst reports, insolvency using financial ratio analysis, undercapitalization, and inability to pay debts using Z-score analysis. Drafted expert reports.

- On behalf of a leading privately owned holding company, managed the valuation of its holdings in various subsidiaries of a well-diversified privately owned firm. Similar valuations performed in many different contexts. Drafted expert reports.
- Valued investment portfolios under ERISA for a number of clients. Drafted expert reports.
- On behalf of an arbitrator, valued a portfolio consisting primarily of options. Communicated methods and findings.
- Retained by a major investment bank which was sued by a class alleging that the bank's analyst reports on a leading internet search engine hyped stocks in order to earn investment banking business and excess trading revenue. Managed the evaluation of alleged conflicts of interest, and the determination of whether adequate disclosures were made in the context of the economic and regulatory environment in which investment banks operated during the relevant period. Drafted expert report.

Applied Microeconomics (e.g., Antitrust, Intellectual Property, Auctions, Damages)

- On behalf of a leading pharmaceutical company, whose Abbreviated New Drug Application (ANDA) for a blockbuster drug had been approved, and which was trying to enter as a generic under the Hatch-Waxman Act. Managed advanced economic and statistical analyses of the alleged monopolization, including demand estimation, market definition, and estimation of price erosion. Drafted expert report.

- Managed the application of advanced economic methods to the estimation of impact of generic entry on worldwide sales and margins of a blockbuster drug. Communicated findings to attorneys and senior executives.
- Helped a leading pharmaceutical company in its investigation into allegations of off-label marketing. Managed analyses, including testing for, and measuring extent of, such behavior, estimation of prescription behavior models, impact of detailing and other marketing activities. Communicated findings to attorneys and executives.
- On behalf of the group of defendants in a class action in agriculture alleging price fixing, sophisticated analyses were done to estimate demand and supply functions, which enabled testing the impact of alleged conspiracy events on equilibrium price. Communicated findings to attorneys.
- On behalf of a major mining company, managed the analyses of potentially anti-competitive effects of a proposed merger. Work included detailed theoretical and empirical analyses of spot and contract markets.
- On behalf of a leading professional sports team in its monopolization suit against the league, managed econometric analyses of tickets, merchandise sales and broadcasting rights, market definition, demand estimation, and the single entity defense. Communicated findings and methods to senior executives and attorneys.

- Managed analyses, including advanced econometric modeling and comparison of prices, in a number of class actions alleging price fixing. Helped draft expert reports.
- Analyzed the impact on competition of a proposed merger between two leading Australian hospitals. Used state-of-the-art econometric analyses of hospital pricing data and demographic data to predict price and output as a result of the merger.
- On behalf of the plaintiff in a case involving valuation of a firm that had been privatized through a bidding process, analyses included theoretical and empirical modeling of optimal bidding behavior (including avoidance of the winner's curse), heterogeneity, reserve prices, etc., in various auction mechanisms.
- Managed analyses for a large international cement company in connection with potential complaints of collusion regarding a swap agreement with its competitors. Communicated methods and findings to senior executives and attorneys.
- Managed analyses for the plaintiff in a case alleging violations of intellectual property, analyses included lost profits and reasonable royalties. Drafted expert report.
- Worked on the proposed acquisition of a provider of television programming by a leading telco and provider of internet services. Analyzed diversion rates and merger simulations.

Class Actions

- Retained by a leading financial services firm to provide expert testimony on class certification and estimation of damages in a class action alleging fraudulent product information. Submitted expert report and was deposed. Case settled prior to in-court testimony.
- On behalf of the defendants in class actions alleging price fixing, managed advanced econometric modeling of prices. Drafted expert reports.
- In a number of securities class actions alleging fraud on the market under Section 10b-5/11, managed analyses and advised on class certification, loss causation, and damages. Drafted expert reports.
- For a number of investment banks accused of illegal behavior in their allocation of IPOs, managed work on event studies and other measures of market efficiency. Drafted expert reports.
- Worked for investors and creditors in bankruptcy and fraudulent conveyance issues for an energy firm, a hospital chain, and a food services firm. Drafted expert reports.
- Managed analyses for a leading bank regarding class allegations of manipulation of markets for auction rate securities; such analyses included detailed studies of price determination methods. Drafted expert reports.

- Retained by a leading bank for a class action alleging that an analyst was not in compliance with the relevant regulations, especially in terms of conflicts of interest. Managed analyses and drafted expert reports.
- Managed the evaluation of investment portfolios under ERISA for a number of class actions. Drafted expert reports.

Other

- Worked on market reports for entry assessments for many different clients, including firms in telecommunications, airlines, consulting and agriculture. Communicated findings to stakeholders.
- Worked on behalf of one of Australia's biggest companies to recommend transaction capabilities of online offerings for its diversification into financial services. Drafted presentation of findings.
- Worked on pricing strategy of one of the world's biggest international airlines. Communicated findings to senior executives.
- Worked on developing the pricing area of Boston Consulting Group (BCG). Worked in collaboration with leading academics and practitioners to develop innovative methodologies on pricing mechanisms/levels of various products and services.