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Positions held

Primary appointment: Kenneth G. Langone Professor of Business Administration and Professor of Finance, Stern School of Business, New York University (2002 to present); Professor of Finance (1995 to 2002); Associate Professor (1986 to 1995); Assistant Professor (1983-1985). Acting Chair (2008/2009 academic year).

2005-2006. Visiting Professor of Finance and Economics, Graduate School of Business, Columbia University.

1990-1992. Visiting Research Economist, New York Stock Exchange (while on leave/sabbatical from NYU).

Education

Wharton School, University of Pennsylvania. M.A., Ph.D.

Haverford College, B.S., Phi Beta Kappa

Research Interests

Market microstructure; econometrics.

Books

Securities Trading: Principles and Procedures, draft manuscript, 2020.

Empirical Market Microstructure, Oxford University Press, 2007.

Current working papers

FX Liquidity and Market Metrics: New Findings Based on CLS Bank Settlement Data, with Richard Levich, August 2019.

Online Appendix 1: Additional Tables and Figures; Online Appendix 2: Reconciliation and comparison of the CLS settlement data with other sources.

Publications

<u>Network Structure and Pricing in the FX Market</u>, with Richard Levich, *Journal of Financial Economics*, forthcoming 2021

<u>Price Discovery in High Resolution</u>, *Journal of Financial Econometrics*, 2019. <u>Computational appendix, programs and data</u>.

Rejoinder: Price Discovery in High Resolution, Journal of Financial Econometrics, 2019.

<u>High frequency quoting: short-term volatility in bids and offers</u>, *Journal of Financial and Quantitative Analysis*, 53 (2), 613-641 (2018).

Low-latency trading, with Gideon Saar. Journal of Financial Markets 16, 646-679 (2013).

<u>Trading Costs and Returns for US Equities: Estimating Effective Costs from Daily Data,</u> *Journal of Finance,* 64, 1445-1477 (2009).

<u>Technology and Liquidity Provision: The Blurring of Traditional Definitions</u> (with Gideon Saar), *Journal of Financial Markets*, 12(2), 143-172 (2009).

<u>Liquidity in the Futures Pits: Inferring Market Dynamics from Incomplete Data</u>, *Journal of Financial and Quantitative Analysis*, 39, 2 (2004)

<u>Intraday Price Formation in the Market for U.S. Equity Indexes</u>, *Journal of Finance*, 58, 2375-2400 (2003).

Stalking the "Efficient Price" in Market Microstructure Specifications: An Overview, *Journal of Financial Markets*, 5, 329-339; (2002).

Common Factors in Prices, Order Flows and Liquidity (with Duane Seppi), *Journal of Financial Economics*, 59, 2, 383-411; (2001).

The Dynamics of Discrete Bid and Ask Quotes, *Journal of Finance*, 54, 6, 2109-2142 (2000).

Security Bid/Ask Dynamics with Discreteness and Clustering, *Journal of Financial Markets*, 2, 1, 1-28 (1999).

Market vs. Limit Orders: The SuperDot Evidence on Order Submission Strategy (with Lawrence Harris), *Journal of Financial and Quantitative Analysis*, 31, 213-232 (1996)

Order Characteristics and Stock Price Evolution: Program Trading on the NYSE, *Journal of Financial Economics*, 41, 129-149 (1996).

Modeling Microstructure Time Series, in G.S. Maddala and C. R. Rao (eds.) *Statistical Methods in Finance (Handbook of Statistics, Volume 14)* (1996, North-Holland).

One Security, Many Markets: Determining the Location of Price Discovery, *Journal of Finance*, September, 1995.

Securities Trading in the Absence of Dealers: Trades and Quotes on the Tokyo Stock Exchange (with Yasushi Hamao), *Review of Financial Studies*, 8, (Fall, 1995).

Trade and Quote Transparency: Principles and Prospects, in Robert Schwartz, editor, Global Equity Markets: Technical, Competitive and Regulatory Challenges, (1995, Irwin, New York).

The Trades of Market Makers: An Empirical Examination of New York Stock Exchange Specialists (with George Sofianos), *Journal of Finance*, December, 1993.

Forecasting Volatilities and Correlations with EGARCH Models, (with Robert Cumby and Stephen Figlewski) *Journal of Derivatives*, Winter, 1993.

International Asset Allocation with Time Varying Risk: An Analysis and Implementation (with Stephen Figlewski and Robert Cumby), *Japan and the World Economy*, 6 (1994) 1-25.

Assessing the Quality of a Security Market: A New Approach to Transactions Cost Measurement, *Review of Financial Studies*, 1992.

The Summary Informativeness of Stock Trades: An Econometric Analysis, *Review of Financial Studies*, 1991, vol. 4, no. 3.

Measuring the Information Content of Stock Trades, Journal of Finance, March, 1991.

Security Markets, Information and Liquidity, *Financial Markets and Portfolio Management*, 1990, vol. 4, no. 3. Reprinted in Journal of Financial Practice and Education, 1991.

Trades, Quotes, Inventories and Information, *Journal of Financial Economics*, 22, 2 (December 1988).

Liquidity and Execution Costs in Equity Markets, (with Robert Schwartz). *Journal of Portfolio Management*, Spring, 1988.

Order Arrival, Quote Behavior and the Return Generating Process, (with Thomas S.Y. Ho). *Journal of Finance*, September, 1987.

Estimating Linear Models of Expectations and Uncertainty, in *Essays in Financial Economics*, Marshall Sarnat, editor, (NorthHolland, 1988)

The Determinants of Capital Structure (with Irwin Friend), in *Research in Finance, Volume VII*, Andrew Chen, editor, (JAI Press, 1988).

A Note on the Estimation of Linear Heteroscedasticity Models, *Economics Letters* 22, 1986.

A Note on Forecaster Discord and Consensus Prediction Error, *Journal of Business and Economics Statistics*, January, 1987.

The Characteristics of Takeover Targets: Q and Other Measures, *Journal of Banking and Finance*, December, 1985. (Awarded the 1986 Iddo Sarnat Prize by the European Finance Association.)

Stock Returns, Inflation and Economic Activity: The Survey Evidence, *Journal of Finance*, December, 1984.

Comment on Why Companies Pay Dividends (with Irwin Friend), *American Economic Review*, December, 1984.

Savings and After-Tax Rates of Return (with Irwin Friend), *Review of Economics and Statistics*, February, 1984.

A Note on Estimates of Long-Run Rates of Return, *Journal of Financial and Quantitative Analysis*, December, 1983.

The Impact of Inflation on Corporate Taxation, National Tax Journal, March, 1983.

Comment on Inflation and the Stock Market (with Irwin Friend), *American Economic Review*, March, 1982.

The Effect of Inflation on the Profitability and Valuation of U.S. Corporations (with Irwin Friend), in *Proceedings of the Conference on Savings, Investment and Capital Markets in an Inflationary Environment*, Giorgio Szego and Marshall Sarnat, editors, (Ballinger, 1982).

Other Working Papers

The best bid and offer: A short note on programs and practices (October, 2010)

<u>Trading costs and returns for US equities: Evidence from daily data</u> (February, 2005)

<u>Limit Orders and Volatility in a Hybrid Market: The Island ECN</u>, with Gideon Saar (December, 2004).

Markov Chain Monte Carlo Methods for Bayesian Estimation of Microstructure Models (Technical appendix to "Liquidity in the Futures Pits)

Trading Fast and Slow: Security Market Events in Real Time, February, 1999

New York Stock Exchange Systems and Trading Procedures (with George Sofianos and Deborah Sosebee).

Using the TORQ Database, 1992.

Professional Activities

Current

Associate Editor, Review of Asset Pricing Studies

Advisory Editor, Journal of Financial Markets

Associate Editor, Journal of Financial Econometrics

Fellow of the Columbia Program on Law and Capital Markets

Fellow of the Financial Econometric Society

Former

Consultant, US Commodities Futures Trading Commission (September 2020 to August 2021)

Visiting Scholar, Haas School of Business, University of California (Spring, 2020)

Visiting Scholar, US Commodities Futures Trading Commission (November 2019)

Visiting Scholar, US Securities and Exchange Commission (September 2019)

Distinguished Scholar, Eastern Finance Association, 2018.

Member, Commodities Futures Trading Commission, Technology Advisory Committee, High Frequency Trading Subcommittee (2012 - 2014).

Editor, Review of Financial Studies (2004-2008)

Director, American Finance Association (2001)

Associate Editor, *Finance Research Letters* (2008-2012)

Associate Editor, Review of Financial Studies (1995-1997, 2002-2004)

Associate Editor, Journal of Finance (1993-1999, 2003-2004)

Nasdaq Economic Advisory Board (1998-2001)

Scientific Advisory Board, ITG, Inc. (1999-2003)

While at the New York Stock Exchange (1991), I produced the TORQ database CD-ROM. This is a comprehensive sample of transactions, orders, reports, quotes and audit trail data that enables academic researches to obtain an unprecedented view of market operations. The data are in use at fifty universities in the U.S. and Europe.