

# **Exhibit B**

**Expert Disclosure – Professor Richard Lyons**

(September 1, 2023)

Professor Richard Lyons is the Associate Vice Chancellor for Innovation & Entrepreneurship, and the William & Janet Cronk Chair in Innovative Leadership at the University of California, Berkeley. The Government expects to call Professor Lyons to testify regarding economic concepts and data analysis, as further described below.

**A. Qualifications and Prior Testimony**

Professor Lyons has extensive experience researching and publishing on FX markets and microstructure, including the textbook *The Microstructure Approach to Exchange Rates*. His textbook and decades of publication in this field are based on direct observation of foreign exchange traders and trading floors and use of data from multiple trading systems. His opinions are based on his research, teaching, and experience, including, but not limited to the materials cited herein. A copy of Professor Lyons' CV, as well as a list of all publications authored by Professor Lyons, is attached as Appendix A.

Professor Lyons has previously testified in *United States v. Akshay Aiyer* (No. 20-3594 (2d Cir. 2022)) and *CFTC v. Michael Zelener* (No. 03 C 4346).

Professor Lyons is compensated for his time at the rate of \$1,250 per hour. His work is being supported by personnel at the consulting firm Analysis Group, which has performed research and analysis under his direction. Analysis Group is being compensated separately for its work on this matter. Neither Professor Lyons' compensation nor that of Analysis Group is contingent upon Professor Lyons' testimony or the outcome of this matter.

**B. Summary of Materials Reviewed**

In preparing his opinions, Professor Lyons has received and reviewed materials produced in discovery during the course of this case, including materials listed in Appendix B.

**C. Anticipated Opinions**

The Government anticipates that Professor Lyons will offer the following opinions during his testimony:

1. Professor Lyons's testimony will include necessary background so the jury can understand the concepts and bases for his opinions, including the following: Professor Lyons will provide a general summary of FX markets, including the market for South African Rand ("ZAR"); a description of how the FX market operates, including how and where FX is traded; and basic background of FX derivatives and options.

2. Professor Lyons will identify Glen Point's relevant United States Dollar ("USD")ZAR option positions around the trading activity at issue in December 2017, using Glen Point's trading data. This will include identifying key characteristics and the timeline of the one touch barrier option entered on October 30, 2017 with a strike price of 12.50 USD/ZAR (the "At-Issue Option").

3. Professor Lyons will explain that Glen Point did not itself trade in the market on December 26, 2017, but rather asked trader(s) at Nomura to execute trades on its behalf between 1:50 and 2:48 AM South Africa Standard Time (“SAST”) on that date (“Relevant Period”). As a result, the trading data provided by Glen Point does not include detailed information on the individual trades such as the size, price, and exact timing of execution, but rather only shows that it made one large sale of \$725 million USD for South African Rand to Nomura on this date. Professor Lyons will further explain that the Nomura trading data available in this case does include detailed trading records and that he relies on these data for many of the analyses to which he intends to testify. The Nomura data do not distinguish the underlying clients (such as Glen Point) that it was trading on the behalf of, however, Nomura sold approximately \$729 million USD/ZAR in the interdealer market during the Relevant Period, and the Nomura trade with Glen Point was \$725 million of that volume. As such, nearly all of Nomura’s selling was on the behalf of Glen Point. His opinion is based principally on Nomura and Glen Point trading data, as well as messages between Glen Point and Nomura during the Relevant Period.

4. Professor Lyons will explain typical trading patterns observed in the USD/ZAR market based on the market data available to him, including data from Refinitiv and FastMatch, which is where the Nomura did the significant majority of its trading on behalf of Glen Point during the Relevant Period. He will explain that the USD/ZAR market has a typical pattern of active, liquid trading from roughly 9am through 7pm SAST, and inactive, less liquid trading from roughly 7pm to 9am SAST.<sup>1</sup>

5. Professor Lyons will testify about the typical trading pattern and liquidity observed in the USD/ZAR market around weekends and holiday periods, including Christmas and Boxing Day. Professor Lyons will use data from the Refinitiv platform for the period 2015 through end of 2018 to show that trading on weekends, Christmas, and Boxing Day was drastically lower than on weekdays.

6. Professor Lyons will present analyses showing that Glen Point’s volume of trading in USD/ZAR during the Relevant Period was highly anomalous for that time of day, and, in fact, anomalous relative to any point in the typical trading day. It was also a large and unusual volume of trading relative to the *maximum* observed trading volumes across all days during the October 2017 through January 2018 period.

7. Professor Lyons will present analyses showing that Glen Point’s volume of trading in USD/ZAR during the Relevant Period, which occurred on Boxing Day 2017, was significantly greater than that observed on weekends, Christmas Day, and Boxing Day in 2015, 2016 and 2018.

8. Professor Lyons will present data showing how the USD/ZAR price evolved from the time the At-Issue Option was entered into on October 30, 2017, through the Relevant Period on December 26, 2017. This will include a general explanation of how the change in USD/ZAR price before Christmas Day 2017 corresponded to certain events in South Africa. Professor Lyons will also explain that, on Christmas Day, the price was roughly 12.60 USD/ZAR, and on December

---

<sup>1</sup> Trading patterns over the 24-hour FX trading day are well documented in, e.g., in Anderson and Bollerslev (1997), “Intraday Periodicity and Volatility Persistence in Financial Markets,” *Journal of Empirical Finance*. See also Dacorogna, Muller, Nagler, Olsen and Pictet (1993), “A geographical model for the daily and weekly seasonal volatility in the foreign exchange market,” *Journal of International Money and Finance*.

26 the rate fell suddenly and sharply over a relatively short interval, below 12.50 USD/ZAR, coinciding with Nomura's trading in the market on the behalf of Glen Point.

9. Professor Lyons will present analyses showing that during the Relevant Period, coinciding with the abrupt decline in market price, while Nomura (trading on behalf of Glen Point) was trading on Refinitiv and FastMatch, there were few other market participants and Nomura accounted for the vast majority of sell-side trading volume on those platforms. Professor Lyons will testify that while other market participants were also selling on these platforms, in more limited amounts, during the Relevant Period, the sequencing of trading activity is consistent with these other market participants entering the market in response to Nomura's trading. He will further testify, based on his experience and research, that such induced trading is a commonly observed phenomenon in FX markets.<sup>2</sup>

10. Professor Lyons will further testify that Nomura's trading on behalf of Glen Point during the Relevant Period directly influenced the prevailing market price by lowering the price and signaling that there was USD selling pressure against ZAR. Professor Lyons will explain that the Refinitiv data shows that Nomura's offers were placed on the platform and hit outstanding bids, which resulted in the best bid on the platform steadily declining during the trading period. This clearing of bids, absent market participants placing new, higher bids, mechanically results in a lower mid-price on the platform. This trading behavior also signals to market participants that there is selling pressure in the market, inducing other market participants to lower their bids and offers, i.e., reducing the market price.<sup>3</sup>

11. Professor Lyons will testify that there is no evidence that the USD/ZAR market price would have fallen below 12.50 based on the natural interplay of supply and demand during the Relevant Period, absent Glen Point's trading. In particular, he will testify that the rebound in the market price from below 12.50 USD/ZAR to above 12.60 USD/ZAR by midday SAST on December 26, 2017, which began in the early morning hours shortly after the end of the relevant trading period, is consistent with Nomura's trading causing the market price to decline and is consistent with such a decline not having occurred absent Nomura's trading. Short term price rebounds such as the one observed here are well studied phenomena in the FX microstructure literature and are generally deemed indicative of temporary dislocations in market prices.<sup>4</sup>

12. Professor Lyons will further testify that the market price's decline in subsequent days below 12.50 USD/ZAR is not evidence that the price would have reached 12.50 USD/ZAR

---

<sup>2</sup> See, e.g., Hasbrouck (2022), *Securities Trading: Principles and Procedures*, especially chapters 4, 7, and 16 (available online from the author). See also Lyons (2001), *The Microstructure Approach to Exchange Rates*, especially the index references on Liquidity, which includes ground-breaking papers like Kyle (1985), "Continuous Auctions and Insider Trading," *Econometrica*.

<sup>3</sup> See, e.g., Evans and Lyons (2002), "Order Flow and Exchange Rate Dynamics," *Journal of Political Economy*, and the many other references on this issue in Lyons (2001), op cit., e.g., Payne (2003), "Informed trade in spot foreign exchange markets: An empirical investigation," *Journal of International Economics*.

<sup>4</sup> See, e.g., Cao, Evans and Lyons (2006), "Inventory Information," *Journal of Business*, especially on the measurement of currency price movements that are transitory. Payne (2003), op cit., also addresses the transitory components of foreign exchange prices.

during the Relevant Period, absent Nomura's trading.<sup>5</sup> The trajectory of the market price on subsequent days is driven by macroeconomic developments and supply and demand conditions. Markets react quickly to such new information. The impact of a single event, such as Glen Point's trading during the Relevant Period, should be considered only in the context of immediate market developments, i.e., in this case during and shortly after the Relevant Period.<sup>6</sup>

13. Professor Lyons will testify that Glen Point's trading during the Relevant Period was not an economically sensible way to sell USD for ZAR. Investing in FX markets, like in all financial markets generally, follows the simple logic of "buy low, sell high" where investors seek to gain by acquiring an asset (currency) at as low of a price as possible, and then sell that asset at as high of a price as possible, with the intent of earning a profit. It follows that an investor pursuing an economically sensible strategy to sell USD for ZAR would seek to sell USD at as high of a price as possible against ZAR to maximize potential profits from its strategy.

14. Relatedly, Professor Lyons will testify that the economically sensible strategy when buying or selling currency is to seek to *minimize* the price impact of that trading on the market. This is because traders typically execute multiple trades to buy or sell a large volume of currency (as Glen Point did) and want to be able to execute the later trades at good prices. In other words, if traders are selling, they typically aim to avoid having their trading push the market price down, avoid clearing outstanding orders on the trading platforms, and avoid making their intent to sell large volumes clear to the market.<sup>7</sup>

15. Professor Lyons will testify that Glen Point's trading strategy for selling USD and buying ZAR shows that Glen Point's actions were not consistent with an effort to get the possible best pricing or to minimize the price impact of their trading. In this respect the observed trading patterns were not economically sensible absent the alleged intent to move the market price below 12.50 USD/ZAR. For example:

- a. Glen Point sought to execute a large, \$725 million trade, over approximately one-hour, during a highly illiquid time in the USD/ZAR markets on a highly illiquid day. FX market participants typically seek to trade large positions during liquid periods to minimize the price impact of their trading and to buy at the lowest average price across their trades (or sell at the highest average price), and even then generally spread their trading over time.
- b. Nomura, trading on the behalf of Glen Point, opted to trade on FastMatch, in particular, after 2:35 SAST, at prices *below* the best bid available on Refinitiv at the same time, i.e., Nomura traded on FastMatch despite better pricing being available on Refinitiv. Traders would typically aim to achieve the best pricing, in

---

<sup>5</sup> Professor Lyons's proposed testimony on this issue is not a concession that evidence of this exchange-rate change is admissible. This distinction is also addressed in the classic paper by Hasbrouck (1991), "Measuring the information content of stock trades," *Journal of Finance*.

<sup>6</sup> See Lyons (2001), *op. cit.*, on the role of macroeconomic information arrival in foreign exchange markets and the distinction between trading-caused price movements and price movements from public news. See also the classic paper by Admati and Pfleiderer (1988), "A theory of intraday patterns: Volume and price variability," *Review of Financial Studies*.

<sup>7</sup> See Hasbrouck (2022), *op. cit.*, especially chapters 15, 16, and 18.

this case selling at the highest price possible, rather than moving to platforms to sell at lower, less favorable prices.

- c. As explained above, shortly after Glen Point stopped selling USD during the Relevant Period, the USD/ZAR exchange rate rebounded above 12.50 USD/ZAR. Glen Point, however, did not return to selling USD for ZAR, which would not be consistent with a strategy to sell at more advantageous prices above 12.50 USD/ZAR.

16. In addition, Professor Lyons will testify that Glen Point's strategy and chat discussion also appear at odds with the effort to sell USD at a high price and minimize the impact of that selling.

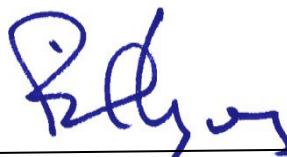
- a. Mr. Phillips repeatedly stated in the chats that he sought to trade at a specific price level that was worse than the prevailing market price ("My aim is to trade thru 50"). Had Glen Point sought to sell USD and purchase ZAR one would expect it to seek the best possible price for the volume it intended to trade rather than to seek to trade at a particular, lower and less favorable price.
- b. Mr. Phillips requested that the Nomura trader sell very large volumes of USD in a short period of time despite doing so in a market the Nomura trader described as illiquid ("liquidity very thin") and despite the Nomura trader suggesting that trading slowly would minimize price impact ("We will have to go very slowly to minimize price impact").

17. Professor Lyons will also testify that Glen Point's records show that Glen Point was not selling USD to hedge an existing risk position unrelated to the At-Issue Option, and was trading in the wrong direction (selling USD) if it were attempting to hedge the At-Issue Option. Glen Point had an existing, large net short USD position (against ZAR) and the spot trades during the Relevant Period further increased this short position. As such, the trading was in the wrong direction to hedge the At-Issue Option.

18. Professor Lyons will present data showing Glen Point's net daily spot and forward trading in USD/ZAR over the course of 2017. Professor Lyons will testify that Glen Point's net spot and forward USD/ZAR trading during the Relevant Period was drastically larger than any other period during 2017. The only remotely comparable period of trading occurred on or about December 28, 2017, when Glen Point unwound much of the position that it took during the Relevant Period.

#### **D. Approval and Signature**

I hereby approve the disclosure of my qualifications, anticipated opinions, and bases for such opinions, as set forth above.



Professor Richard Lyons

## Appendix A

## RICHARD K. (RICH) LYONS

UC Berkeley  
Berkeley, CA 94720

lyons@berkeley.edu  
Twitter: @richlyons

**LEADERSHIP****University**

Associate Vice Chancellor for Innovation & Entrepreneurship, UC Berkeley (UCB) campus.  
Dean, Haas School of Business, UCB, 2008-18.

- Anchored the culture of Berkeley Haas in four defining principles ([shorturl.at/avy17](https://shorturl.at/avy17)).
- Brought in eight of ten largest gifts in Haas School's history.
- Established and launched vision for suite of dual-degree programs with STEM fields.

Co-Chair, UCB campus-wide Strategic Plan Steering Committee, 2017-18.

Divisional Council of UCB Academic Senate, 2001-2.

Chair, UC President's Council for Entrepreneurship, 2023-24.

**Private Sector**

Board member, Matthews Asia Funds.

Board member, Syntax Funds LLC.

Chief Learning Officer, Goldman Sachs (GS), 2006-08.

- Headed leadership development for Managing Directors and GS University.

Board member, iShares, Barclays Global Investors (until had to step down to join GS).

General Building Contractor, State of California (license expired, #443785).

**Civic Sector**

Finance Committee Member, Ashesi University Foundation (university in Accra, Ghana).

Board member, Bay Area Council Economic Institute, 2012-2017.

Board member, Association to Advance Collegiate Schools of Business (AACSB), 2012-15.

**ACADEMIC****Positions**

Cronk Chair in Innovative Leadership, since 2018.

Professor of Economics and Finance, Haas School, UCB, since 1993.

Professor of Economics, Columbia Business School, Asst. Professor, 1987-93.

Summer Intern, Board of Governors of the Federal Reserve System, 1985.

**Honors**

Berkeley Citation, 2018.

Distinguished Teaching Award, highest career teaching honor at UCB, 1998.

Diversity: Schoen Award (from The Consortium for adv. access for under-rep. groups).

Excellence in Management Award, UCB, 2022.

Teacher-of-the-year, Haas School MBA Program, 1994, 1995, 1996, 1999, 2000, 2003.

National Science Foundation Graduate Fellowship, 1984-87.

Highest Honors, UCB, 1982 | Phi Beta Kappa, 1981.

**Selected Publications**

Book: *The Microstructure Approach to Exchange Rates*, MIT Press, 2001.

"Order Flow and Exchange Rate Dynamics," with M. Evans, *J. of Political Economy*, 2002.

"External Effects in US Pro-cyclical Productivity," with R. Caballero, *J. of Mon. Econ.*, 1992.

"Not Just Hollywood: How to Create a Gender-Inclusive Company," *Forbes Online*, 2017.

Case: "Berkeley Haas: Codifying, Embedding, & Sust. Culture (B)," with J. Chatman, 2019.

"What Keeps Stablecoins Stable?" *J. of Int'l Money & Finance*, March 2023.

**PERSONAL**

PhD (Economics) MIT, 1984-87; BS (Business—Finance) UC Berkeley, 1979-82.

Member, Council on Foreign Relations.

Misc: Married, two children. Fluent French. Principal obsession (my wife's word): guitar.



## RICHARD K. (RICH) LYONS

Associate Vice Chancellor and Former Dean, UC Berkeley

UC Berkeley (UCB)  
Berkeley, CA 94720-1900  
Tel: 510-642-2708

Web: [faculty.haas.berkeley.edu/lyons](http://faculty.haas.berkeley.edu/lyons)  
Email: [lyons@berkeley.edu](mailto:lyons@berkeley.edu)  
Twitter: @richlyons

---

**POSITIONS** Assoc. Vice Chancellor and Chief Innovation & Entrep. Officer, UCB, since 2020.  
Chair, UC President's Council for Entrepreneurship, since 2023.  
Dean, Haas School, UCB, 2008-18 (Acting Dean 2004-05).  
Professor, Haas School, UCB (Chair/Full/Assoc/Asst), since 1993.  
Chief Learning Officer, Goldman Sachs, New York, 2006-08.  
Professor, Columbia Business School (Assoc/Asst), 1987-93.  
Summer Intern, Board of Governors of the Federal Reserve System, 1985.  
Research Analyst, SRI International, Menlo Park, 1983-84.  
General Contractor, CA license #443785 (issued 1983, expired).

**EDUCATION** PhD (Economics) MIT, 1984-87. Focus fields: International and Macro.  
BS (Business) UC Berkeley, 1979-82. Focus field: Finance.

**HONORS**

**Scholastic**  
Highest Honors, UC Berkeley, 1982  
National Science Foundation Graduate Fellowship, 1984-87  
Beta Gamma Sigma, 1981  
Phi Beta Kappa, 1981

**Research**  
National Science Foundation grant, sole investigator, 1994-97  
National Science Foundation grant for Special Creativity, 1997-00  
National Science Foundation grant, co-investigator, 2000-03  
Nominating Committee, American Finance Association, 2000  
Schwabacher Fellowship, UC Berkeley, 1994  
International Affairs Fellowship, Council on Foreign Relations, 1993

**Teaching**  
Career teaching award (DTA), highest at UC Berkeley, 1998  
Teacher-of-the-year, UC Berkeley, MBA: 1994, 2000  
Teacher-of-the-year, UC Berkeley, Evening MBA: 1995, 1996, 1999  
Teacher-of-the-year, UC Berkeley, MS in Fin. Eng. (MFE): 2003

**Professional**  
Excellence in Management Award, UC Berkeley, 2022  
Berkeley Citation, 2018  
Sterling Schoen Award (for advancing URM access to management education)  
William & Janet Cronk Chair in Innovative Leadership, since 2018

**PERSONAL** Born 10 February 1961 (USA). Married, two kids (22 & 19). French fluent.  
Principal hobby: guitar; musical copyrights.



**PROFESSIONAL  
ACTIVITIES**

**Leadership (UCB)**

Co-Chair, campus-wide Strategic Plan Steering Committee, UCB (2017-18)  
Intercollegiate Athletics Taskforce, UCB (2016-17)  
Divisional Council of UCB Faculty Senate, ex-officio as COMS chair (2001-02)  
Chair, UC President's Council for Entrepreneurship (2023-24)  
Board Chair, Bakar BioEnginuity Hub, UCB, since 2021  
Campus Capital Campaign Funding-Model Task Force (2015-16)  
Campus Steering Committee for Online Education (2012-18)  
Co-Sponsor, Campus High Performance Culture initiative (2011-14)  
Acting Dean, Haas School (2004-05)  
Executive Associate Dean, Haas School (2005-06)  
Associate Dean for Academic Affairs, Haas School (2004)  
Faculty Chair, Haas School (2004)  
Chair, Finance Group, Haas School (2001-02)  
Chair, Policy and Planning Committee, Haas School (1996-97,2003-04)

**Academic**

Research Associate, National Bureau of Economic Research (IFM, AP)  
Assoc. Editor, *California Management Review* (former)  
Assoc. Editor, *Journal of Financial Markets* (former)  
Assoc. Editor, *Emerging Markets Review* (former)  
Advisory Board, *Economic Policy Review* (NY Fed, former)  
Extended academic visits: London School of Economics, U. Toulouse, Stockholm  
U., and U. Aix-Marseille

**Professional**

Board of Trustees, Matthews Asia Funds  
Board of Trustees, Syntax ETF Trust  
Finance Committee, Ashesi University Foundation (university in Accra, Ghana)  
Board member, Bay Area Council Economic Institute (former).  
Board member, Association to Advance Collegiate Schools of Business (former).  
Trustee, iShares Inc. (until Goldman Sachs CLO role in 2006)  
Trustee, Barclays Global Investors Funds (until Goldman Sachs)  
Member, Council on Foreign Relations  
*Who's Who in America* listing  
Consultant: Past work for IMF, World Bank, Federal Reserve Bank, European  
Commission, United Nations, and Citibank

**Books**

*The Microstructure Approach to Exchange Rates*, MIT Press: Cambridge, MA, published December 2001. Chinese publication by the China Financial Publishing House in 2014. This monograph presents a new, micro-based approach to exchange rate economics (for a clearinghouse for the field, see [faculty.haas.berkeley.edu/lyons/NewField.html](http://faculty.haas.berkeley.edu/lyons/NewField.html)).

**ACADEMIC PUBLICATIONS**

"Tests of the Foreign Exchange Risk Premium Using the Expected Second Moments Implied by Option Pricing," *Journal of International Money and Finance*, March 1988, 91-108 (thesis #1).

"Internal versus External Economies in European Industry," with R. Caballero, *European Economic Review*, June 1990, 805-830.

"Whence Exchange Rate Overshooting: Money Stock or Flow?" *Journal of International Economics*, November 1990, 369-384 (thesis #2).

"The Mutual Amplification Effect of Exchange Rate Volatility and Unresponsive Trade Prices," with R. Baldwin, *Journal of International Financial Markets, Institutions & Money*, Spring 1991, 1-20.

"The Potential for Self-fulfilling Expectations: External Economies and European Integration," with R. Baldwin, *European Economy*, 1991, 56-75.

"External Effects and Europe's Integration," with R. Caballero, in A. Winters and A. Venables eds., *European Integration: Trade and Industry*, Cambridge University Press, 1991, 34-51.

"Floating Exchange Rates in Peru, 1950-54," *Journal of Development Economics*, January 1992, 99-118 (thesis #3).

"External Effects in U.S. Pro-cyclical Productivity," with R. Caballero, *Journal of Monetary Economics*, April 1992, 209-225.

"The Case for External Economies," with R. Caballero, in A. Cukierman, Z. Hercowitz, and L. Leiderman eds., *Political Economy, Growth, and Business Cycles*, MIT Press, 1992, 117-139.

"Exchange Rate Hysteresis? Large vs Small Policy Misalignments," with R. Baldwin, *European Economic Review*, January 1994, 1-22.

"Customer- and Supplier-Driven Externalities," with R. Caballero and E. Bartelsman, *American Economic Review*, September 1994, 1075-84.

"Fundamental Determinants of National Equity Market Returns: A Comment," in J. Frankel ed., *Internationalization of Equity Markets*, University of Chicago Press, 1994, 146-147.

"Explaining Forward Exchange Bias ... Intraday," with A. Rose, *Journal of Finance*, September 1995, 1321-1329.

"Tests of Microstructural Hypotheses in the Foreign Exchange Market," *Journal of Financial Economics*, October 1995, 321-351.

"Optimal Transparency in a Dealer Market with An Application to Foreign Exchange," *Journal of Financial Intermediation*, July 1996, 225-254.

**ACADEMIC PUBLICATIONS**

"Foreign Exchange Volume: Sound and Fury Signifying Nothing?" in J. Frankel et al., eds., *The Microstructure of Foreign Exchange Markets*, University of Chicago Press, 1996, 183-201.

"Heterogeneous Behavior in Exchange Rate Crises: A Comment," in J. Frankel et al., eds., *The Microstructure of Foreign Exchange Markets*, University of Chicago Press, 1996, 257-259.

"Dynamic Hedging and the Interest Rate Defense: A Comment," in J. Frankel et al., eds., *The Microstructure of Foreign Exchange Markets*, University of Chicago Press, 1996, 226-227.

"A Study of the Reuters D2000-2 Foreign Exchange Trading System: A Comment," in J. Frankel et al., eds., *The Microstructure of Foreign Exchange Markets*, University of Chicago Press, 1996, 180-182.

"Microstructure of the Foreign Exchange Market," in T. Ito and D. Folkerts-Landau, eds., *International Capital Markets*, International Monetary Fund, September 1996, 125.

"A Simultaneous Trade Model of the Foreign Exchange Hot Potato," *Journal of International Economics*, May 1997, 275-298.

"Explaining Trading Volume in Foreign Exchange: Lessons From Tokyo," *FRBSF Economic Letter*, #97-38, December 26, 1997.

"Profits and Position Control: A Week of FX Dealing," *Journal of International Money and Finance*, February 1998, 97-115.

"Options and the Currency Risk Premium," in Z. Chen ed., *Currency Options and Exchange Rate Economics*, World Scientific Publishing, April 1998, 94-107.

"Is There Private Information in the FX Market? The Tokyo Experiment," with T. Ito and M. Melvin, *Journal of Finance*, June 1998, 1111-1130.

"Introduction to the International Market Microstructure Special Issue," *Journal of International Financial Markets, Institutions & Money*, December 1998, 219-23.

"Tests of Microstructural Hypotheses in the Foreign Exchange Market," reprinted in H. Stoll, ed., *Microstructure: The Organization of Trading and Short-Term Price Behavior*, Edward Elgar Publishing, April 1999, 409-439.

"Discussion: Corporate Growth and Risk Around the World," in R. Glick et al. (eds.), *Financial Crises in Emerging Markets*, Cambridge University Press, 2001, 339-343.

"Mutual Fund Investment in Emerging Markets: An Overview," with G. Kaminsky and S. Schmukler, *World Bank Economic Review*, 2001, 15(2), 315-340. Reprinted in S. Claessens and K. Forbes (eds.), *International Financial Contagion*, Kluwer: Boston, 2001, 157-186.

**ACADEMIC PUBLICATIONS**

“Introduction: Capital Market Integration Special Issue,” *Journal of International Financial Markets, Institutions & Money*, September 2001, 241-244.

“A Good Investment for Excess Reserves,” with R. Portes, *Financial Times*, 9/22/2000.

“New Perspective on FX Markets: Order-Flow Analysis,” *International Finance*, Summer 2001, 303-320.

“A Simultaneous Trade Model of the Foreign Exchange Hot Potato,” reprinted in *New Developments in Exchange Rate Economics*, L. Sarno and M. Taylor (eds.), Edward Elgar, 2002.

“Tests of Microstructural Hypotheses in the Foreign Exchange Market,” reprinted in *New Developments in Exchange Rate Economics*, L. Sarno and M. Taylor (eds.), Edward Elgar, 2002.

“Is There Private Information in the Foreign Exchange Market? The Tokyo Experiment,” with T. Ito and M. Melvin, reprinted in *New Developments in Exchange Rate Economics*, L. Sarno and M. Taylor (eds.), Edward Elgar, 2002.

“Order Flow and Exchange Rate Dynamics,” with M. Evans, *Journal of Political Economy*, February 2002, 170-180. Reprinted in R. Sweeney (ed.), *Foreign Exchange Markets*, Edward Elgar, Northampton, 2006.

“Foreign Exchange: Macro Puzzles, Micro Tools,” *Economic Review*, June 2002, 51-69 (Federal Reserve Bank of San Francisco).

“Customer Trades and Extreme Events in Foreign Exchange,” with M. Fan, in *Central Banking, Monetary Theory and Practice: Essays in Honor of Charles Goodhart*, edited by P. Mizen, Edward Elgar, 2003, 160-179.

“The Future of the Foreign Exchange Market,” *Brookings-Wharton Papers on Financial Services*, Robert Litan and Richard Herring (eds.), Brookings Institution Press: Washington, DC, 2002, 253-280.

“The Failure of Empirical Exchange Rate Models: Room for Optimism?” May 2002, *Economic Policy* (web essay), at [www.economic-policy.org/commentaries.asp](http://www.economic-policy.org/commentaries.asp).

“Theoretical Perspective on Euro Liquidity,” *Economic Policy*, October 2002, 35: 573-597.

“Portfolio Balance, Price Impact, and Secret Intervention,” paper synopsis, in *Financial Market Structure and Dynamics*, Bank of Canada, September 2002, 107-110.

“Conference Summary Discussion 3,” in *Financial Market Structure and Dynamics*, Bank of Canada, September 2002, 133-139.

“Time-Varying Liquidity in Foreign Exchange,” with M. Evans, *Journal of Monetary Economics*, 2002, 49(5): 1025-1051.

**ACADEMIC PUBLICATIONS**

“Informational Integration and FX Trading,” with M. Evans, *Journal of International Money and Finance*, November 2002, 21(6): 807-831.

“Explaining and Forecasting Exchange Rates with Order Flows,” *Economie Internationale*, 2003, 96: 107-127.

“Managers, Investors, and Crises: Mutual Fund Strategies in Emerging Markets,” with G. Kaminsky and S. Schmukler, *Journal of International Economics*, 2004, 64: 113-134.

“Are Different-Currency Assets Imperfect Substitutes?” with M. Evans, revision of NBER WP 8356, in P. de Grauwe (ed.), *Exchange Rate Economics: Where Do We Stand?* MIT Press: Cambridge, MA, 2005.

“Do Currency Markets Absorb News Quickly?” with M. Evans, *J. of International Money & Finance*, 2005, 24: 197-217.

“Meese-Rogoff Redux: Micro-Based Exchange Rate Forecasting,” with M. Evans, *American Economic Review*, 2005, 95: 405-414.

“Inventory Information,” with H. Cao and M. Evans, *Journal of Business*, 2006, 79: 325-364.

“Fixed versus Flexible: Lessons from EMS Order Flow,” with W. Killeen and M. Moore, *J. of Int’l Money & Finance*, 2006, 25: 551-579.

“Understanding Order Flow,” with M. Evans, *International Journal of Finance and Economics*, special issue on the Micro Approach to Foreign Exchange, 2006, 11: 3-23.

“Innovation in Services: Corporate Culture and Investment Banking,” with J. Chatman and C. Joyce, *California Management Review*, 2007, 50: 174-191.

“How is Macro News Transmitted to Exchange Rates?” with M. Evans, *Journal of Financial Economics*, 2008, 88: 26-50.

“An Information Approach to International Currencies,” with M. Moore, *Journal of International Economics*, 2009, 79: 211-221.

“For Business Schools, Culture Matters,” *Bloomberg Businessweek*, Viewpoint Column, December 23, 2010.

“Paths to Innovative Leadership,” *BizEd*, Jan/Feb 2011, 32-38.

“Haas School of Business: Building Innovative Leaders,” *The Exchange*, MBA Roundtable, Spring 2011, 1-14.

“Curriculum Reform: Getting More Macro, and More Micro,” *Journal of Management Development*, 2012, 31: 412-423.

“Review of *Exchange Rate Dynamics*,” book by M. Evans, *Journal of Economic Literature*, 2012, 50: 187-191.

**ACADEMIC PUBLICATIONS**      “Exchange Rate Fundamentals and Order Flow,” with M. Evans, *Quarterly Journal of Finance*, 2013, 2: 1-63.

“Doing Much More with Less: Implementing Operational Excellence at UC Berkeley,” with A. Szeri, P. Huston and J. Wilton, *Research Paper Series*, Center for Studies in Higher Education, UC Berkeley, 2013, <http://bit.ly/11afMf7>.

“Economics of the Ed Tech Revolution,” *California Management Review*, 2017: 59: 49-55.

“What Keeps Stablecoins Stable?” with G. Viswanath-Natraj, *J. of Int’l Money & Finance*, March 2023.

**OTHER PUBLICATIONS**      Case: “The Berkeley-Haas School of Business: Codifying, Embedding, and Sustaining Culture (Part A),” with J. Chatman,” *BerkeleyHaas Case Series*, 2017.

Case: “The Berkeley-Haas School of Business: Codifying, Embedding, and Sustaining Culture (Part B),” with J. Chatman,” *BerkeleyHaas Case Series*, 2019.

Forbes: “Not Just Hollywood: How to Create a Gender-Inclusive Company,” *Forbes Online Leadership Series*, November 2017, <http://bit.ly/2IH9VMu>.

Forbes: “Three Reasons Why Culture Efforts Fail,” *Forbes Online Leadership Series*, September 2017, <https://bit.ly/2MAAWN4>.

Forbes: “Three Ways Overconfidence Can Sink Your Ship,” *Forbes Online Leadership Series*, August 2017, <https://bit.ly/2M9YmwP>.

Forbes: “In An Era Of Distrust, Here Are Three Ways to Transform Your Organization,” *Forbes Online Leadership Series*, March 2018, <https://bit.ly/2M9aDRZ>.

Forbes: “Why Your Job Interviews Are Probably Worthless—And How To Fix Them,” *Forbes Online Leadership Series*, May 2018, <https://bit.ly/2KDloX3>.

VoxEU: “Stablecoins Don’t Inflate Crypto Markets,” with G. Viswanath-Natraj, April 17, 2020.

**TEACHING**

**Berkeley:**      Currency Markets (MFE)  
                          International Finance (MBA)  
                          Microstructure Finance (PhD)  
                          International Finance (PhD)  
                          International Economics and Finance (UG)  
                          E-Finance (MBA)

**Columbia:**      International Finance (MBA)  
                          International and Domestic Money Markets (MBA)  
                          International Business (MBA)  
                          International Trade: The Manager's Perspective (MBA)

**Stanford:**      International Financial Markets (MBA)

**Grenoble:**      International Finance (Masters—DEA, taught in French)

**TEACHING OTHER**

Course on Micro-Based FX Research taught at:

International Monetary Fund (twice)

European Central Bank

Bank of England

US Treasury

Bank of Canada



**Appendix B**

**Legal Documents**

---

Indictment, United States of America v. Neil Phillips, Form No. USA-33s-274 (Ed. 9-25-5B), March 3, 2022

**Data and Attached Documentation**

---

***EuroNext (Fastmatch) Data***

SDNY\_10\_000000001-000000004

***Glen Point Trading Data***

SNDY\_GP0000001.xlsx

SNDY\_GP0000002.xlsx

***Nomura Data***

Annexure B1.pdf

Annexure B1.xlsx

NSI\_GPC\_0018955.xlsm

***Refinitiv Data***

SDNY\_01\_000000209

SDNY\_07\_000000001

SDNY\_09\_000000003-000000012

SDNY\_11\_000000001-000000002

**Other Produced Documents**

---

1. BBG49-00910617\_image.pdf, BBG49-00910617 – BBG49-00910643

10.30.17 OT GP JPM Confirm.pdf, JPMS000692 - JPMS000697

10.30.17 OT Quantum JPM Confirm.pdf, JPMS000685 - JPMS000691

2017.12.18 attachment.pdf, SDNY\_P02\_O\_000009073 - SDNY\_P02\_O\_000009102

2017.12.18.pdf, SDNY\_P02\_O\_000009020

2017.12.18.pdf, SDNY\_P02\_O\_000009072

2017.12.18.xlsx

2017.12.19 attachment.pdf, SDNY\_P02\_O\_000009041 - SDNY\_P02\_O\_000009069

2017.12.19.pdf, SDNY\_P02\_O\_000009003

2017.12.19.pdf, SDNY\_P02\_O\_000009040

2017.12.19.xlsx  
2017.12.20 attachment.pdf, SDNY\_P02\_O\_000008932 - SDNY\_P02\_O\_000008963  
2017.12.20.pdf, SDNY\_P02\_O\_000008841  
2017.12.20.pdf, SDNY\_P02\_O\_000008931  
2017.12.20.xlsx  
2017.12.21 attachment.pdf, SDNY\_P02\_O\_000008863 - SDNY\_P02\_O\_000008894  
2017.12.21.pdf, SDNY\_P02\_O\_000008862  
2017.12.21.pdf, SDNY\_P02\_O\_000008929  
2017.12.21.xlsx  
2017.12.22 attachment.pdf, SDNY\_P02\_O\_000008772 - SDNY\_P02\_O\_000008803  
2017.12.22.pdf, SDNY\_P02\_O\_000008810  
2017.12.22.pdf, SNDY\_P02\_O\_000008771  
2017.12.22.xlsx  
2017.12.27 attachment.pdf, SDNY\_P02\_O\_000002292 - SDNY\_P02\_O\_000002320  
2017.12.27.pdf, SDNY\_P02\_O\_000002291  
2017.12.27.pdf, SDNY\_P02\_O\_000008754  
2017.12.27.xlsx  
2017.12.28 attachment.pdf, SDNY\_P02\_000002485 - SDNY\_P02\_O\_000002514  
2017.12.28.pdf, SDNY\_P02\_O\_000002484  
JB Drax FX Trade Recap - GLEN POINT DS (RBS GU).msg  
Key Chat - NSI\_GPC\_0000001.pdf, NSI\_GPC\_0000001 - NSI\_GPC\_0000034  
MS Presentation - MS\_GP\_DOJ\_0000001 - MS\_GP\_DOJ\_0000037.pdf, MS\_GP\_DOJ\_0000001 - MS\_GP\_DOJ\_0000037  
NatWest Markets Plc Trade ID 17360LN030275D.pdf  
OIT\_SW\_000313597.pdf, SDNY\_P02\_O\_000005139  
OIT\_SW\_000313598.pdf, SDNY\_P02\_O\_000005140  
OIT\_SW\_000313599.pdf, SDNY\_P02\_O\_000005141  
OIT\_SW\_000313606.pdf, SDNY\_P02\_O\_000005150  
OIT\_SW\_000313608.pdf, SDNY\_P02\_O\_000005152  
OIT\_SW\_000313640.pdf, SDNY\_P02\_O\_000005147  
OIT\_SW\_000370600.pdf, SDNY\_P02\_O\_000008667  
OIT\_SW\_000370602.pdf, SDNY\_P02\_O\_000008672  
OIT\_SW\_000370611.pdf, SDNY\_P02\_O\_000008715  
OIT\_SW\_000370612.pdf, SDNY\_P02\_O\_000008716  
OIT\_SW\_000370617.pdf, SDNY\_P02\_O\_000008744

OIT\_SW\_000370618.pdf, SDNY\_P02\_O\_000008745  
OIT\_SW\_000370623.pdf, SDNY\_P02\_O\_000008758  
OIT\_SW\_000370626.pdf, SDNY\_P02\_O\_000008762  
OIT\_SW\_000370627.pdf, SDNY\_P02\_O\_000008763  
OIT\_SW\_000370629.pdf, SDNY\_P02\_O\_000008765 - SDNY\_P02\_O\_000008766  
OIT\_SW\_000370632.pdf, SDNY\_P02\_O\_000008767 - SDNY\_P02\_O\_000008768  
OIT\_SW\_000370633.pdf, SDNY\_P02\_O\_000008769  
OIT\_SW\_000370639.pdf, SDNY\_P02\_O\_000008804  
OIT\_SW\_000370641.pdf, SDNY\_P02\_O\_000008809  
OIT\_SW\_000370648.pdf, SDNY\_P02\_O\_000008822  
OIT\_SW\_000370649.pdf, SDNY\_P02\_O\_000008823 - SDNY\_P02\_O\_000008824  
OIT\_SW\_000370654.pdf, SDNY\_P02\_O\_000008838 - SDNY\_P02\_O\_000008839  
OIT\_SW\_000370663.pdf, SDNY\_P02\_O\_000008856  
OIT\_SW\_000370666.pdf, SDNY\_P02\_O\_000008860  
OIT\_SW\_000370668.pdf, SDNY\_P02\_O\_000008861  
OIT\_SW\_000370675.pdf, SDNY\_P02\_O\_000008899 - SDNY\_P02\_O\_000008900  
OIT\_SW\_000370677.pdf, SDNY\_P02\_O\_000008901 - SDNY\_P02\_O\_000008902  
OIT\_SW\_000370679.pdf, SDNY\_P02\_O\_000008903 - SDNY\_P02\_O\_000008904  
OIT\_SW\_000370685.pdf, SDNY\_P02\_O\_000008914 - SDNY\_P02\_O\_000008915  
OIT\_SW\_000370691.pdf, SDNY\_P02\_O\_000008920  
OIT\_SW\_000370694.pdf, SDNY\_P02\_O\_000008921 - SDNY\_P02\_O\_000008922  
OIT\_SW\_000370696.pdf, SDNY\_P02\_O\_000008923 - SDNY\_P02\_O\_000008924  
OIT\_SW\_000370697.pdf, SDNY\_P02\_O\_000008925  
OIT\_SW\_000370700.pdf, SDNY\_P02\_O\_000008928  
OIT\_SW\_000370706.pdf, SDNY\_P02\_O\_000008964  
OIT\_SW\_000370712.pdf, SDNY\_P02\_O\_000009001 - SDNY\_P02\_O\_000009002  
OIT\_SW\_000370717.pdf, SDNY\_P02\_O\_000009008 - SDNY\_P02\_O\_000009009  
OIT\_SW\_000370720.pdf, SDNY\_P02\_O\_000009018 - SDNY\_P02\_O\_000009019  
OIT\_SW\_000370725.pdf, SDNY\_P02\_O\_000009022 - SDNY\_P02\_O\_000009023  
OIT\_SW\_000370726.pdf, SDNY\_P02\_O\_000009024 - SDNY\_P02\_O\_000009025  
OIT\_SW\_000370730.pdf, SDNY\_P02\_O\_000009034 - SDNY\_P02\_O\_000009035  
OIT\_SW\_000370733.pdf, SDNY\_P02\_O\_000009036 - SDNY\_P02\_O\_000009037  
OIT\_SW\_000370734.pdf, SDNY\_P02\_O\_000009038 - SDNY\_P02\_O\_000009039  
OIT\_SW\_000370738.pdf, SDNY\_P02\_O\_000009070 - SDNY\_P02\_O\_000009071

OIT\_SW\_000370741.pdf, SDNY\_P02\_O\_000009103 - SDNY\_P02\_O\_000009104  
OIT\_SW\_000370750.pdf, SDNY\_P02\_O\_000009116 - SDNY\_P02\_O\_000009117  
OIT\_SW\_000370752.pdf, SDNY\_P02\_O\_000009118  
OIT\_SW\_000370756.pdf, SDNY\_P02\_O\_000009127 - SDNY\_P02\_O\_000009128  
OIT\_SW\_000370758.pdf, SDNY\_P02\_O\_000009129 - SDNY\_P02\_O\_000009130  
OIT\_SW\_000370771.pdf, SDNY\_P02\_O\_000009158 - SDNY\_P02\_O\_000009159  
OIT\_SW\_000370786.pdf, SDNY\_P02\_O\_000009208 - SDNY\_P02\_O\_000009209  
OIT\_SW\_000370790.pdf, SDNY\_P02\_O\_000009212 - SDNY\_P02\_O\_000009213  
OIT\_SW\_000370792.pdf, SDNY\_P02\_O\_000009214 - SDNY\_P02\_O\_000009215  
OIT\_SW\_000370796.pdf, SDNY\_P02\_O\_000009228 - SDNY\_P02\_O\_000009229  
OIT\_SW\_000370798.pdf, SDNY\_P02\_O\_000009232 - SDNY\_P02\_O\_000009233  
OIT\_SW\_000370803.pdf, SDNY\_P02\_O\_000009236 - SDNY\_P02\_O\_000009237  
OIT\_SW\_000370804.pdf, SDNY\_P02\_O\_000009238 - SDNY\_P02\_O\_000009239  
OIT\_SW\_000370814.pdf, SDNY\_P02\_O\_000009286  
OIT\_SW\_000480682.pdf, SDNY\_P02\_O\_000024236 - SDNY\_P02\_O\_000024237

#### **Publicly-Available Documents**

---

Admati and Pfleiderer (1988), “A theory of intraday patterns: Volume and price variability,” *Review of Financial Studies*

Anderson and Bollerslev (1997), “Intraday Periodicity and Volatility Persistence in Financial Markets,” *Journal of Empirical Finance*

Bloomberg Daily USD/ZAR Price Data

Cao, Evans and Lyons (2006), “Inventory Information,” *Journal of Business*

Dacorogna, Muller, Nagler, Olsen and Pictet (1993), “A geographical model for the daily and weekly seasonal volatility in the foreign exchange market,” *Journal of International Money and Finance*

Evans and Lyons (2002), “Order Flow and Exchange Rate Dynamics,” *Journal of Political Economy*

Hasbrouck (1991), “Measuring the information content of stock trades,” *Journal of Finance*

Hasbrouck (2022), *Securities Trading: Principles and Procedures*

Kyle (1985), “Continuous Auctions and Insider Trading,” *Econometrica*

Lyons (2001), *The Microstructure Approach to Exchange Rates*

Payne (2003), “Informed trade in spot foreign exchange markets: An empirical investigation,” *Journal of International Economics*