"Market Frictions and Financial Risks"
NBER Proposal

Project Title:
Anatomy of Option Retail Trading

Co-Principal Investigators:
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I. Project Proposal

I.1 Introduction

As with equity retail trading over the last five years, retail participation in the U.S. options market has grown exponentially. Bryzgalova et al. (2023), for example, estimate that retail options trading increased by 101% from January 2020 to July 2021.[1] This growth has been spurred by the switch to commission-free trading by retail brokers in 2019, both for equity and option trades.[2]

This trend has important implications for financial stability. For example, nearly half of the options trading volume on the S&P 500 is now for zero-day-to-expiration. SPY and SPX options represent almost 30% of all trades, based on April 2024 OPRA Data. Such options have very low premiums, implying very high leverage, greater than 100.[3] The trading and hedging of such options could mechanically amplify the volatility of the underlying asset. Indeed, the IMF has stated that "the rapid growth of this market among a wide range of investors raises concerns regarding whether these instruments could amplify market movements, potentially leading, in the worst-case scenario, to panic selling."[4]

To evaluate the potential risks to financial stability, it is essential to understand the determinants of pricing and liquidity, as well as to properly identify retail trades. Brokers were able to reduce commissions to zero in part due to payments for order flow (PFOF), i.e., payments to retail brokers in exchange for routing customer orders to wholesalers for trade execution. The PFOF practice is controversial, however, because it may create conflicts of interests that could potentially lead to worse trade execution for brokers' customers.

For equity trading, a body of empirical work suggests that PFOF does not seem to affect execution quality (Schwarz et al. (2024)) and, more generally, that off-exchange trades receive better execution than on-exchange trades (Battalio and Jennings (2023) and Ernst and Spatt (2024)).[5] The body of research on options trading and options markets, in contrast, is relatively small. This is particularly striking given the substantial trading volumes in options, which resulted in aggregate PFOF from options that is close to $2 billion in 2023, nearly triple those from equity trading (e.g., Ernst and Spatt (2024). So, the option market certainly warrants close scrutiny.

The market structure for options, however, differs in important, fundamental ways from that for equities. In particular, options trades are required to be executed on exchanges. Many of the exchanges have a Designated Market Maker (DMM) with special obligations to quote prices and special privileges in trading. Notably, the wholesalers, or venues, may also operate an affiliated DMM, allowing them to potentially "internalize" trades.

This market structure also has implications for regulatory proposals that would reform U.S. equity trading. Securities and Exchange Commission (SEC) Chair Gary Gensler has praised the auction

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[1] Bryzgalova, S., A. Pavlova, and T. Sikorskaya, 2023, "Retail Trading in Options and the Rise of the Big Three Wholesalers," *Journal of Finance* 78, 3465–3514.

[2] Robinhood charges no commissions or fees. Other brokers charge no commissions but may charge a fee.

[3] ECB, Financial Stability Review, November 2023.

[4] IMF, Global Financial Stability Report, April 2023, P.51.

[5] Battalio, R. and R. Jennings, 2023. "Wholesaler Execution Quality," available at SSRN 4304124.
Ernst, T. and C. Spatt, 2024, "Payment for Order Flow and Option Internalization," available at SSRN 4056512.

structure of options exchanges, as they open individual orders to competition, regardless of PFOF.[6] Indeed, the SEC proposed in 2022 changing the U.S. equity market structure to an auction format.[7]

For such analyses, databases available to academic researchers suffer from severe limitations. U.S. equity data are available through TAQ and U.S. options data from OPRA. These databases report transaction prices, but otherwise none of the trades have any identifying information attached to them. Researchers do not know the direction of the trade, whether it is retail or not, or the identity of the venue that routed the trade. This makes it difficult to investigate issues of interest to the *NBER Market Frictions and Financial Risks Initiative*, in particular the drivers of price execution, such as the roles of PFOF, of routing patterns, and of the identity of market participants. Regulators are also keenly interested in price execution quality.

Our project aims to generate our own data by placing parallel trades in options at several brokers. In contrast to OPRA data, our trading will generate the full detail of the entire path of every trade we place. This will allow us to investigate directly the impact of these variables on price execution as well as to create a better understanding of the market structure for U.S. options.

I.2 Planned Work

In this proposal, we plan to expand our prior work that focused on improving our understanding of the microstructure of U.S. equity markets by performing a similar experiment on the U.S. retail option market. To perform our analyses, we will generate our own unique dataset which we first describe below. We will then use these data to systematically implement our research agenda.

A. Generation of Data

To help us evaluate this marketplace, we will generate the primary source of our data by placing actual option trades at six major brokerage firms -- TD Ameritrade, Fidelity, E*TRADE, Schwab, Robinhood, and Vanguard. These brokers account for the bulk of retail trading volume. They also offer cross-sectional variation in key features, such as payment for order flow levels and fees.

Bryzgalova et al. (2023) document that the majority of retail trades are for one contract, expire within one week, and have a strike price within 10% of the current underlying price. Thus, we will concentrate our trading on these contract characteristics in the most popular symbols. In addition, orders for five contracts or less do not need to be split, so orders of this size are most likely to be "internalized." We will also trade one-contract/ six- contract pairs to investigate the impact of the five-contract threshold. These two important market structure details are documented and discussed by Ernst and Spatt (2024).

As noted previously, our data will have several advantages over traditional datasets. Rather than rely on algorithms with Type 1 and 2 errors, we will know our trades are retail trades and whether they are buys or sells. Third, we know the identity of the originating broker and the venue for the trade through SEC Rule 606(b)(1). Finally, when we combine our data with the OPRA, we will have the executed exchange and execution method. Thus, we will have a complete trade path from trade placement to execution that reveals routing patterns and price execution by venue, exchange, execution type, venue-DMM firm connection, and other subgroups.

[6] https://www.sec.gov/news/speech/gensler-remarks-piper-sandler-global-exchange-conference-060822
[7] SEC (2022), "Order Competition Rule." Release No. 34-96496.

The generation of this dataset requires substantial effort, including our personal, direct funding for the accounts, trading (either manual or through an API), monitoring, cleaning data, importing broker data across formats, and ultimately matching our trades to OPRA.

B. Research Agenda

The primary objective of this research project is to answer fundamental questions about the market microstructure of U.S. retail option trading. First, using our self-generated trade data, we can examine whether differential pricing exists for customers. While trades on exchanges are anonymous, there could be information spillovers across the various steps in the trading process that allow differential pricing. If this occurs, we will be able to determine how this arises.

Second, we will be able to address directly whether PFOF impacts differential pricing, by examining the relation between the retail broker's PFOF and execution quality. Schwarz et al. (2024) find no evidence that PFOF impacts execution quality for equity trades.[8] Instead, execution differences seem to be primarily driven by differences in order flow characteristics, also as suggested by Eaton et al. (2022).[9] On the other hand, PFOFs for options are much larger and toxicity differences across brokers seem smaller, as shown by Eaton et al. (2024),[10] potentially making PFOF more impactful for options than equities.

Third, we will be able to examine whether the ability of venues to "internalize" trades is a widespread practice and, if so, whether those trades lead to worse price execution due to a lack of competition. The current academic literature assumes that internalization is widespread and shows that pricing is significantly worse for trades associated with greater PFOFs.

Finally, our ability to trace the entire path of option execution will enable us to evaluate the quality of current algorithms to identify and sign retail trades, which is essential to evaluate spillover effect of option retail trades.

I.3 Existing Work

The authors in this proposal have already used a similar strategy, i.e., self-generating equity trades, to investigate questions of interest to the "Market Frictions and Financial Risks" initiative. First, Schwarz et al. (2024) show that there is substantial, unexpected dispersion in the quality of execution of equity trades across brokers. This dispersion is due to off-exchange wholesalers systematically giving different execution prices to different brokers. Also, variation in PFOF across brokers cannot explain the large variation in price execution. Rather the paper provides evidence that differences in "toxicity" (i.e., adverse selection and order bunching) may explain the observed execution differences for equities. This paper was heavily cited in the recently approved

[8] Schwarz, C., B. Barber, X. Huang, P. Jorion, and T. Odean, 2024, "The 'Actual Retail Price' of Equity Trades," forthcoming, *Journal of Finance*.

[9] Eaton, G., C. Green, B. Roseman, and Y. Wu. 2022. "Retail Trader Sophistication and Stock Market Quality: Evidence from Brokerage Outages." *Journal of Financial Economics* 146, 502–528.

[10] Eaton, G., C. Green, B. Roseman, and Y. Wu. 2024. "Retail Option Traders and the Implied Volatility Surface." Available at SSRN4104788

SEC "Enhanced Disclosure of Order Execution Information" rule.[11] Also, this paper has been heavily quoted in two other SEC proposals advancing modifications to the retail equity market.[12]

In a second paper, Barber et al. (2024) evaluate the Boehmer et al. (2021) algorithm's ability to identify and sign their retail trades.[13] The paper recommends modifications to make signing trades more accurate and points out potential biases in identification. This improvement is directly beneficial to empirical research on equity retail trading.

Finally, a third paper, Huang et al. (2024) examines competition in the wholesaler marketplace.[14] The paper finds a large dispersion in execution prices, this time within brokers across wholesalers. Even though execution is persistent, the paper also reports that brokers make little adjustment in their routing patterns. In fact, a majority of brokers route more orders to wholesalers with worse execution. The paper also finds that the entry of a new wholesaler significantly improves execution. These results can be interpreted by a stylized model that explains slow adjustments by switching costs, which vary across brokers, allowing some wholesalers to exercise market power.

I.4 Preliminary Summary Statistics

We have recently begun running our experiment on a few brokers to begin our data collection. For now, during testing, we use a subset of the planned six brokers and only have venue information for one of those brokers. We expect that the experiment will be fully operational in June and generate a substantial amount of data over the next few months. Even so, results from our preliminary data demonstrate the importance of our experiment.

We first report how our trades are being handled on the exchanges. Bryzgalova et al. (2023) use the SLAN (Single Leg Auction Non-ISO) flag from OPRA (code 114) to identify retail trades. Using our trades, we can observe what percentage of our trades fall under this code.

Trade Code	Description	%Trades
18	Auto Execution (no DMM exchange)	35%
95	IntermarketSweep	6%
114	Single Leg Auction	59%

The table shows that only 59% of our trades have the SLAN flag. A full 35% of our trades are labeled as trading code 18, which means that they are automatically executed. Thus, using the SLAN flag for retail trade identification will omit a large percentage of actual retail trades. This is important because the size of price improvement is highly dependent on how the trade is handled by the exchange. Below is the average execution quality for our trades, measured by the ratio of effective over quoted spread (E/Q), sorted by execution method. We also report the average Price

[11] SEC (2024), "Disclosure of Order Execution Information." Release No. 34-99679.
[12] In addition to the previously referenced proposal, our work is also referenced in SEC (2022b), "Order Competition Rule" Release No. 34-96495 and SEC (2022c), "Regulation Best Execution" Release No. 34-96496.
[13] Barber, B., X. Huang, P. Jorion, T. Odean, and C. Schwarz, 2024, "A (Sub) penny For Your Thoughts: Tracking Retail Investor Activity in TAQ," forthcoming, *Journal of Finance*. See also Boehmer, E., C. Jones, X. Zhang, and X. Zhang, 2021, "Tracking Retail Investor Activity," *Journal of Finance* 76, 2249–2305.
[14] Huang, P. Jorion, M. Lee, and C. Schwarz, 2024,"Who is Minding the Store? Order Routing and Competition in Retail Trade Execution," available at SSRN 4609895.

Improvement (PI), which is a one-to-one transformation of E/Q, and the average quoted spread of our trades.

Trade Code	Description	%Trades	PI (%)	E/Q	Quoted Spread
	All trades		24.9%	0.50	$0.0392
18	Auto Execution	35%	4.2%	0.92	$0.0416
95	Intermarket Sweep	6%	0.0%	1.00	$0.0398
114	Single Leg Auction	59%	39.2%	0.22	$0.0378

Overall, our trades receive substantial price improvement. On average, our trades have an E/Q of 0.50. In comparison, Schwarz et al. (2024) report E/Qs across their brokers ranging from 0.06 to 0.64, with an average of 0.39. Thus, our option execution is slightly worse than these equity trades, but better than expected given that option markets are less liquid, and do not allow subpenny pricing. Note that the quoted spread does not appear to be related to the execution mechanism. We also verified that our average spread is in line with that of the overall market.[15]

In contrast, measuring price execution from the OPRA data is fraught with difficulties because there is no flag to indicate whether the order originated as a buy or a sell. This is in contrast with our self-generated sample, where we have this information, which leads to an accurate measurement of price improvement. Below is our price improvement sorted by quoted spread. We also report the percentage of our trades with some price improvement, as well as the percentage of trades that the Lee-Ready (1991) algorithm would incorrectly sign or be unable to sign (since the trade was at the midpoint).

Spread (cents)	%Trades	%Trades with PI	PI (%)	E/Q	%Incorrect Signing (L-R)
All		43.4%	24.9%	0.50	23.8%
1	22%	45.6%	45.6%	0.09	45.6%
2 or 3	42%	30.4%	15.4%	0.69	16.3%
4 or 5	19%	61.5%	23.0%	0.54	16.9%
5 to 9	6%	50.0%	24.8%	0.50	23.7%
10 or more	11%	53.2%	23.5%	0.53	20.8%

The amount of price improvement is spread dependent. More importantly, the last column shows that a large percentage of our trades are not correctly signed by the Lee-Ready (1991) technique. This is especially true when the spread is exactly one cent, as sub-penny pricing is not possible.

Overall, our preliminary summary statistics point to the importance of having more detailed data. We observe large variations in execution prices across trade types. A large fraction of our trades, about 40%, would not be identified by the usual methods; these are precisely the trades with less price improvement. In addition, a large fraction of our trades, about 25%, would be incorrectly signed by traditional methods. We are looking forward to having further results shortly that should provide useful insights into the market microstructure of U.S. equity option trading.

[15] A firm that is both a venue and a DMM told us that the average volume-weighted spread in the options market is between three and four cents.

II. Conflict of Interest Statement

In line with the NBER's Financial Conflict of Interest (FCOIs) policy, the Principal Investigators (PIs) report no Significant Financial Interest (SFIs) in institutions related to the proposed research project.

In particular, all the brokerage accounts for our retail trading were funded directly by the authors with personal money. No outside compensation was received for this study. The authors and their direct families have no direct income, direct equity investments, or any other current potential conflicts of interest with any brokers or wholesalers.

III. Summary of Public Policy Issues Addressed

This line of research could help inform regulatory policies for market structures for retail equity and option trading. The SEC is considering the expansion of Rule 605 reports, which cover execution statistics for equity trading, to cover options. Additionally, the SEC Chair has stated that the options auction structure should be a good template for overall market structure. Indeed, the SEC has proposed an auction trading structure for equities.

Our trading experiment generates a controlled dataset that is ideal for comparing price execution across brokers, wholesalers, and order handling. It also allows for careful investigation of potential conflicts of interest and how client identification, even when orders are anonymous on exchanges, may impact pricing. We hope to be able to contribute to the understanding of these markets, which should have public policy implications.

IV. Curriculum Vitae

See enclosed.

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ACADEMIC APPOINTMENT

Associate Professor	Department of Finance, Washington University in St. Louis	2023 - Present
Assistant Professor	Department of Finance, Washington University in St. Louis	2017 - 2023
Assistant Professor	Department of Finance, Michigan State University	2013 - 2017

EDUCATION

Ph.D.	Economics	University of California, Berkeley	2013
M.A.	Finance	Guanghua School of Management, Peking University	2007
B.A.	Finance	Guanghua School of Management, Peking University	2005

RESEARCH FIELDS

Research Fields: Behavioral Finance, Investor Behavior, Market Efficiency, Information Acquisition, Mutual Funds, Household Finance, Asset Pricing

PUBLICATIONS

1. Thinking Outside the Borders: Investors' Underreaction to Foreign Operations, 2015, *Review of Financial Studies* 28, 3109-3152.
2. Rushing into American Dream? House Prices, Timing of Homeownership, and Adjustment of Consumer Credit (with Sumit Agarwal, Luojia Hu), 2016, *Review of Finance* 20, 2183-2218.
3. Which Factors Matter to Investors? Evidence from Mutual Fund Flows (with Brad Barber, Terrance Odean), 2016, *Review of Financial Studies* 29, 2643-2676.
4. Mark Twain's Cat: Industry Investment Experience, Categorical Thinking and Stock Selection, 2019, *Journal of Financial Economics* 131, 404-432.
5. Harnessing the Wisdom of Crowds (with Zhi Da), 2020, *Management Science* 66, 1847-1867.
6. Extrapolative Beliefs in the Cross-section: What Can We Learn from the Crowds? (with Zhi Da, Lawrence Jin), 2021, *Journal of Financial Economics* 140, 175-196.
7. Attention Induced Trading and Returns: Evidence from Robinhood Users (with Brad Barber, Terrance Odean, Christopher Schwarz), 2022, *Journal of Finance* 77, 3141-3190.
8. Angel Investment and First Impressions (with Zoran Ivkovic, John Jiang, Isabel Wang), *Journal of Financial Economics* 149, 161-178.
9. A (Sub)penny For Your Thoughts: Tracking Retail Investor Activity in TAQ (with Brad Barber, Philippe Jorion, Terrance Odean, Christopher Schwarz), Accepted at *Journal of Finance*

10. The 'Actual Retail Price' of Equity Trades (with Christopher Schwarz, Brad Barber, Philippe Jorion, Terrance Odean), Accepted at *Journal of Finance*

WORKING PAPERS

11. Leveraged Overconfidence (with Brad Barber, K. Jeremy Ko, Terrance Odean), Revise and Resubmit at *Journal of Financial Economics*
12. More Money, More Options? The Effect of Cash Windfalls on Entrepreneurial Activities in Small Businesses (with Jacelly Cespedes, Carlos Parra), Revise and Resubmit at *Review of Financial Studies*
13. The True Colors of Money: Racial Diversity and Asset Management (with Lina Han, Ohad Kadan, Jimmy Wu), Revise and Resubmit at *Review of Financial Studies*
14. Who Is Minding the Store? Order Routing and Competition in Retail Trade Execution (with Philippe Jorion, Jeongmin Lee and Christopher Schwarz)
15. Risk Aversion Propagation: Evidence from Financial Markets and Controlled Experiments (with Nancy Xu)
16. Credit Score Doctor (with Luojia Hu, Andrei Simonov)
17. Swayed by Sweet Words? Textual Analysis of Index Fund Prospectus (with Alex Ferko, Hayong Yun)

PRESENTATIONS & DISCUSSIONS

2024 Iowa State University, MFA Annual Meeting*, GT-FRBA Household Finance Conference (Discussion), CQA 2024 Spring Conference, University of Kentucky Finance Conference (Discussion), Northeastern University Finance Conference, University of Connecticut Finance Conference†, SFS Cavalcade†, PHBS Finance Symposium†, 10th annual WiMM†

2023 AFA Annual Meeting*, NBER Big Data and Securities Markets, Utah Winter Finance Conference*, London School of Economics, FSU Truist Beach Conference (Discussion), Advances in Macro-Finance Tepper-LAEF Conference (Discussion), UC Irvine, SFS Cavalcade (Discussion), WFA (Discussion), European Summer Symposium in Financial Markets, Red Rock Finance Conference, Georgia State University, Michigan Ross, Tilburg University, Maastricht University

2022 AFA Annual Meeting*, NBER Behavioral Finance (Discussion), SFS Cavalcade (Discussion), Boulder Summer Conference on Consumer Financial Decision Making*, WFA (2 Discussions), CICF (Discussion), Machine Learning and AI in Finance (Discussion), George Washington University, Rutgers University, Financial Research Association (FRA) Conference

2021 3rd Virtual QES NLP and Machine Learning in Investment Management Conference, MFA Annual Meeting (2 Discussions), FSU SunTrust Beach Conference, Erasmus University Rotterdam, SFS Cavalcade, Maastricht University, ECWFC*, WFA Annual Meeting (1 Paper*, 1 Discussion), Econometric Society Asia Meeting, CICF (1 Discussion), CIRF*, EFA Annual Meeting*, Indiana University

2020 Cal Poly, MFA Annual Meeting (1 Paper, 1 Discussion), NBER Behavioral Finance (Discussion), FIRS (2 papers, cancelled), SFS Cavalcade (Discussion), Swedish House of Finance Conference on "Consumer Behavior in Financial Markets", EFA Annual Meeting (Discussion), Washington University in St. Louis (Brownbag), FMA Annual Meeting (Discussion), Shanghai Advanced Institute of Finance, Singapore Management University

2019 AFA Annual Meeting*, Utah Winter Finance Conference, CUNY Baruch (Brownbag), MFA Annual Meeting (1 Paper, 2 Discussions), Vanderbilt University, Chicago Booth 1st Annual Conference in Behavioral Finance and Decision Making, Lehigh University, NYU Stern Conference on Household Finance*, Northeastern Finance Conference*, SFS Cavalcade (1 Paper*, 1 Discussion), Australian National University, Mitsui Finance Symposium, Peking University, NBER SI Entrepreneurship*, University of Washington, EFA Annual Meeting*, NFA Annual Meeting, Showcasing Women in Finance EU 2019

2018 AFA Annual Meeting (1 Paper, 1 Discussion), Washington University in St. Louis (Brownbag), California Institute of Technology, Boston College, LA Finance Day Conference*, 15th Annual Conference in Financial Economics Research (IDC), CKGSB, FIRS, Barcelona GSE workshop on Economics of Science and Innovation, CICF (1 Paper, 1 Discussion), SWUFE, Geneva Workshop on Financial Stability in a New Era (1 Paper, 1 Discussion), EFA Annual Meeting (1 Paper, 1 Discussion), Research in Behavioral Finance Conference 2018*, UC Berkeley (Haas), WAPFIN@Stern*, FMA Annual Meeting*, TAU Finance Conference

2017 Utah Winter Finance Conference, Washington University in St. Louis, Finance Down Under Conference, National University of Singapore, MFA*, ITAM Finance Conference (Discussion), FIRS (2 Discussions), Early Career Women in Finance Conference, European Summer Symposium in Financial Markets (Evening session), AAA Annual Meeting*, New Perspectives on Consumer Behavior in Credit and Payments Markets Conference (Philadelphia Fed)*, Yale Junior Finance Conference, WFA-CFAR and JFI "The Post-Crisis Evolution of Banks and Financial Markets" Conference (Discussion), WAPFIN@Stern

2016 FSU SunTrust Beach Conference, SFS Cavalcade, ABFER 4th Annual Conference*, CEIBS Finance Conference 2016, Paul Woolley 9th Conference (Discussion), WFA Annual Meeting*, Early-Career Behavioral Economics 2016, CICF*, NBER PRIT Workshop, EFA Annual Meeting, Helsinki Finance Summit*, CFEA, WAPFIN@Stern, Arizona State University (Brownbag), Chicago Fed, Emory University (Brownbag), Tsinghua PBC, Caltech Behavioral Finance Junior Faculty Conference

2015 CICF, the Ben Graham Centre's 4th Intelligent Investing Symposium*, Emory University (Economics), Indiana University*, Shanghai Advanced Institute of Finance, Tulane University*

2014 AAEA, CICF (Discussion), EFA Annual Meeting*, FIRS (Discussion), FRA (Early idea session), Helsinki Finance Summit*, IBEFA (1 Paper, 1 Discussion), Miami Behavioral Finance Conference*, Rotterdam Behavioural Finance Conference, WFA Annual Meeting, Case Western University*, Vanderbilt University*

2013 AFA Annual Meeting, Arrowstreet Capital, Chicago Fed, Cornerstone Research, Housing, Stability and the Macroeconomy Conference (Dallas Fed), Helsinki Finance Summit, Michigan State University, PDT Partners, SEC, Temple University, University of Illinois Chicago, University of Toronto, Virginia Tech, Yale University

2012 Academy of Behavioral Finance & Economics Annual Meeting, Chicago Fed, EconCon, Miami Behavioral Finance Conference, Olin Business School Corporate Finance Conference (Poster), UC Davis, UC Berkeley (Finance, Economics), WEAI Annual Meeting (Discussion)

2011 Chicago Fed, LBS Transatlantic Doctoral Conference, UC Berkeley (Finance, Economics)

2010 UC Berkeley (Economics)

† - scheduled, ∗ - presented by coauthors

INVITED PARTICIPATION

2011 NBER Entrepreneurship Boot Camp (Cambridge), Price Theory Summer Camp (Chicago)

2010 Summer Institute in Behavioral Economics (Trento, Italy)

2009 Yale Summer School in Behavioral Finance (New Haven)

HONORS AND AWARDS

2023 Red Rock Finance Conference Best Paper Award (with Chris Schwarz, Brad Barber, Terrance Odean, Philippe Jorion)

2023 Utah Winter Finance Conference Best Paper Award (with Chris Schwarz, Brad Barber, Terrance Odean, Philippe Jorion)

2022 Financial Research Association (FRA) Conference Best Paper Award (with Chris Schwarz, Brad Barber, Terrance Odean, Philippe Jorion)

2021 Center for the Study of Race, Ethnicity & Equity Research Scholar Grant (with Ohad Kadan)

2019 Midwest Finance Association Outstanding Paper (with Zhi Da and Lawrence Jin)

2016 CICF XY Investments Best Paper (with Zhi Da)

2016 Broad College's Summer Research Grant Award

2012 Stuart I. Greenbaum Best Finance Ph.D. Dissertation Award, Finalist

2011 American Finance Association Student Travel Grant Award; UC Berkeley Graduate Division Travel Grant

2010 Dean's Normative Time Fellowship, UC Berkeley

2007 Shapiro Fellowship, UC Berkeley

2006 Yang Fuqing & Wang Yangyuan Academician Fund of Peking University

2005 Excellent Graduate of Peking University

2004 Dawa Securities Scholarship of Peking University; Lingrui Scholarship of Peking University

2003 UFJ International Syndicate Scholarship of Peking University

2002 May 4th Scholarship of Peking University

RESEARCH & PROFESSIONAL EXPERIENCE

2011	Summer Research Fellow	Federal Reserve Bank of Chicago
2011	Research Associate (Intern)	Morgan Stanley Capital International
2008-2012	Research Assistant for Prof. Nancy Wallace	UC Berkeley
2011	Research Assistant for Prof. Terrance Odean	UC Berkeley
2009	Research Assistant for Prof. Stefano DellaVigna	UC Berkeley
2008	Research Assistant for Prof. Ulrike Malmendier	UC Berkeley

TEACHING

2020 - Present	Instructor for Behavioral Finance (master)	WashU Finance
2017 - Present	Instructor for Investments (undergraduate)	WashU Finance
2013 - 2017	Instructor for Introduction to Investments (undergraduate)	MSU Finance
2010	Reader for Empirical Asset Pricing (Ph.D.)	UC Berkeley Haas
2008, 2009	Teaching Assistant for Financial Economics (undergraduate)	UC Berkeley Economics

PROFESSIONAL ACTIVITIES

Journal Referee: American Economic Review, Journal of Finance, Review of Financial Studies, Journal of the European Economic Association, Management Science, Review of Finance, Journal of Banking and Finance, Journal of Empirical Finance, Journal of Marketing Research, Journal of International Financial Markets, Institutions & Money, Real Estate Economics, Scandinavian Journal of Economics, International Review of Economics and Finance, International Review of Finance, Journal of Financial Markets, Accounting Review, Review of Accounting Studies

Conference committee: SFS Cavalcade 2019, SFS Cavalcade 2020, SFS Cavalcade 2021, CFEA 2016, EFA 2017, EFA 2016, EFA 2015, MFA 2019, MFA 2020, Napa Conference 2017, Napa Conference 2016, WFA 2020, WFA 2021

Session chair: SFS Cavalcade 2021

OTHER INFORMATION

Affiliations: American Economic Association; American Finance Association

Languages: English (Fluent); Chinese (Native)

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Academic Experience

1994-	Professor, University of California at Irvine
2005-	Chaired Professor, UC Irvine
2004-06	Senior Associate Dean, Graduate School of Management
1998-02	Vice Dean, Graduate School of Management
1996-98	Associate Dean, Executive Degree Programs
1992-94	Associate Professor, University of California at Irvine
1992	Visiting Professor, INSEAD
1987-92	Associate Professor, Columbia University
1988	Visiting Associate Professor, University of Chicago
1987-88	Visiting Assistant Professor, Northwestern University
1984-87	Assistant Professor, Columbia University
1983-84	Assistant Professor, University of British Columbia

Education

1980-83	Ph.D. (International Finance), University of Chicago
1978-80	M.B.A., University of Chicago
1975-78	Ingénieur Civil Mécanicien et Electricien (Highest Honors), Université Libre de Bruxelles, Belgium
1973-75	Candidat Ingénieur Civil, Faculté Polytechnique de Mons, Belgium

Honors

Docteur Honoris Causa, Université de Liège, 2010
Utah Winter Finance Conference Best Paper Award, 2023
Financial Research Association Conference Best Paper Award, 2022
Graham and Dodd Scroll Award, 2012
(awarded to the top papers in the Financial Analysts Journal)
Roger Murray Prize for Excellence in Quantitative Research in Finance, 2010
Best Paper in Emerging Manager Research, Journal of Investing, 2009
Graham and Dodd Scroll Award, 2004
Award for Faculty Service Excellence, 2002
BSI Gamma Foundation Research Grant, 2002,
for proposal "Enhanced Index Funds and Tracking Error Optimization"
Smith Breeden Prize, distinguished paper, 1999
(awarded to the top papers in the Journal of Finance)
William F. Sharpe Award for Scholarship in Financial Research, 1999
(awarded to the top three papers in the Journal of Financial and Quantitative Analysis)
Best Paper Award, European Financial Management, 2000
Roger Murray Prize for Excellence in Quantitative Research in Finance, 1997

Honors (continued)

Q-Group Research Grant, 1996,
for proposal "A Re-examination of the Benefits of Emerging Markets"
Award for Best Paper, International Investment Forum, 1996
Roger Murray Prize for Excellence in Quantitative Research in Finance, 1994
Q-Group Research Grant, 1993,
for proposal "Predicting Volatility in the Foreign Exchange Market"
Scholarship, Collège Interuniversitaire d'Etudes Doctorales dans les Sciences du Management, 1980-1983
Oscar and Elsa Mayer Prize for Academic Excellence (top of MBA class), 1980
University of Chicago Fellowships, 1980-1983
Scholarship, Belgian American Educational Foundation, 1978-79
Listed in *Who's Who in Economics* (4th ed., 2003), *Who's Who in America* (2007-2016) *Who's Who in the World* (2007-2017)

Research Interests

Empirical Research in Investments
Managing Financial Risks
Hedge Funds
Derivatives Markets

Courses Taught

Financial Risk Management
Hedge Funds
Derivatives: Futures and Options
Fixed-Income Markets
International Financial Management
Global Business
Ph.D. Seminar in International Finance

Business Experience

Managing Director, Pacific Alternative Asset Management Co. (2006-2018)
Member, Federal Reserve Board's Model Validation Council (2012-2014)
Board of Advisors of Wells Capital Management (1997-2004)
Consultant to PIMCO (1998-05): Development of fixed-income courses
Consultant to the World Bank (1997-99)
Consultant to Henwood Energy (1997)
Consultant to the Association for Investment Management Research (1996)
Visiting Scholar, Board of Governors of the Federal Reserve System (June 1996)
Consultant to the United Nations (1995)
Consultant to the Catalyst Institute (1994)
Advisor to various investment management firms
National commodity futures representative (1988)

Publications: Books

Jorion, P., *Financial Risk Manager Handbook,* sixth edition, Wiley (2010). Translated into Chinese and Vietnamese.

Jorion, P., *Financial Risk Manager Handbook,* fifth edition, Wiley (2009).

Jorion, P., *Financial Risk Manager Handbook,* fourth edition, Wiley (2007).

Jorion, P., *Value at Risk: The New Benchmark for Managing Financial Risk,* third edition, McGraw-Hill (2006).

Jorion, P., *Financial Risk Manager Handbook,* third edition, Wiley (2005). Translated into Chinese.

Jorion, P., editor, *The Journal of Risk Volume,* Incisive Financial Publishing (2004).

Jorion, P., *Financial Risk Manager Handbook,* second edition, Wiley (2003). Translated into Chinese.

Jorion, P., *Value at Risk: The New Benchmark for Managing Financial Risk,* second edition, McGraw-Hill (2000). Translated into Chinese, Farsi, Japanese, Polish, and Portuguese.

Jorion, P., *Value at Risk: The New Benchmark for Controlling Market Risk,* Irwin Professional: Illinois (1997). Translated into Chinese, Hungarian, Japanese, Korean, Polish, Portuguese, and Spanish.

Jorion, P., *Big Bets Gone Bad: Derivatives and Bankruptcy in Orange County*, Academic Press: San Diego (1995). Translated into Chinese and Spanish.

Jorion, P. and S. Khoury, *Financial Risk Management: Domestic and International Dimensions*, Blackwell: Cambridge (1995). Translated into Japanese.

Refereed Publications

Schwarz, C., B. Barber, X. Huang, P. Jorion, and T. Odean, "The 'Actual Retail Price' of Equity Trades," forthcoming, *Journal of Finance* (2024).

Barber, B., X. Huang, P. Jorion, T. Odean, and C. Schwarz, "A (Sub)penny For Your Thoughts: Tracking Retail Investor Activity in TAQ," forthcoming, *Journal of Finance* (2024).

Jorion, P., "Hedge Funds vs. Alternative Risk Premia," *Financial Analysts Journal* 77 (September 2021): 65–81.

Jorion, P., "Hedge Funds and Financial Misreporting," in *The Oxford Handbook of Hedge Funds,* G. Wood and D. Cumming, editors, Oxford University Press (2021).

Jorion, P. and C. Schwarz, "The Fix is In: Properly Backing out Backfill Bias," *Review of Financial Studies* 32 (December 2019): 5048–5099.

Jorion, P. and C. Schwarz, "Are Hedge Fund Managers Misreporting? Or Not?," *Journal of Financial Economics* 111 (February 2014): 311–327.

Jorion, P. and C. Schwarz, "The Strategic Listing Decisions of Hedge Funds," *Journal of Financial and Quantitative Analysis* 49 (June 2014): 773–796.

Jorion, P. and C. Schwarz, "The Delisting Bias in Hedge Funds," *Journal of Alternative Investments* 16 (Winter 2014): 37–47.

Aggarwal, R. and P. Jorion, "Is There a Cost to Transparency?," *Financial Analysts Journal* 68 (March 2012): 108–123.

Chernobai, A., P. Jorion and F. Yu, "The Determinants of Operational Risk in U.S. Financial Institutions," *Journal of Financial and Quantitative Analysis* 46 (December 2011): 1683–1725.

Jorion, P. and M. Cherem, "Limited Liability Leverage (L^3): A New Measure of Leverage," *Journal of Alternative Investments* 13 (Winter 2011): 35–42.

Jorion, P., "Risk Management," *Annual Review of Financial Economics* 2 (December 2010): 347–365.

Jorion, P. and G. Zhang, "Information Transfer Effects of Bond Rating Downgrades," *Financial Review* 45 (October 2010): 683–706.

Aggarwal, R. and P. Jorion, "The Performance of Emerging Hedge Funds and Managers," *Journal of Financial Economics* 96 (May 2010): 238–256.

Aggarwal, R. and P. Jorion, "Hidden Survivorship in Hedge Fund Returns," *Financial Analysts Journal* 66 (March 2010): 69–74.

Jorion, P., "Risk Management Lessons from the Credit Crisis," *European Financial Management* 15 (November 2009): 923–933.

Jorion, P. and G. Zhang, "Credit Contagion from Counterparty Risk," *Journal of Finance* 64 (October 2009): 2053–2087.

Aggarwal, R. and P. Jorion, "The Risks of Emerging Hedge Fund Managers," *Journal of Investing* (Spring 2009): 100–107.

Jorion, P., C. Shi, and S. Zhang, "Tightening Credit Standards: The Role of Accounting Quality," *Review of Accounting Studies* 14 (March 2009): 123–160.

Jorion, P., "How Portfolio Transparency Can Help Manage Hedge Fund Risk," *Journal of Financial Transformation* 22 (April 2008): 67–74.

Jorion, P., "Risk Management for Event-Driven Funds," *Financial Analysts Journal* 64 (January 2008): 61–73.

Jorion, P. and G. Zhang, "Good and Bad Credit Contagion: Evidence from Credit Default Swaps," *Journal of Financial Economics* 84 (June 2007): 860–881.

Jorion, P., "Risk Management for Hedge Funds with Position Information," *Journal of Portfolio Management* 34 (Fall 2007): 127–134.

Jorion, P. and G. Zhang, "Information Effects of Bond Ratings Changes: The Role of the Rating Prior to the Announcement," *Journal of Fixed Income* 16 (Spring 2007): 45–59.

Jorion, P., "Trading Risk and Systemic Risk," in *The Risk of Financial Institutions*, R. Stulz and M. Carey, editors, NBER (2006), 29–57.

Jorion, P. and Y. Jin, "Firm Value And Hedging: Evidence From U.S. Oil and Gas Producers," *Journal of Finance* 61 (April 2006): 893–919. Also reprinted in *Insurance and Risk Management*, Elgar (2008).

Jorion, P., Z. Liu, and C. Shi, "Informational Effects of Regulation FD: Evidence from Rating Agencies," *Journal of Financial Economics* 76 (May 2005): 309–330.

Jorion, P., "The Long-Term Risks of Global Stock Markets," *Financial Management* 32 (Winter 2003): 5–26 (lead paper).

Jorion, P., "Portfolio Optimization with Constraints on Tracking Error," *Financial Analysts Journal* 59 (September 2003): 70–82.

Jorion, P., "Fallacies about the Effects of Market Risk Management Systems," *Journal of Risk* 5 (Fall 2002): 75–96. Also in Bank of England's *Financial Stability Review* 13 (December 2002): 115–127.

Jorion, P., "How Informative are Value-at-Risk Disclosures?," *Accounting Review* 77 (October 2002): 911–931.

Jorion, P., "Risk Management Lessons from Long-Term Capital Management," *European Financial Management* 6 (September 2000): 277–300 (lead paper; award for best paper).

Flôres, R., P. Jorion, P.-Y. Preumont, and A. Szafarz, "Multivariate Unit Root Tests of the PPP Hypothesis," *Journal of Empirical Finance* 6 (October 1999): 335–353.

Jorion, P. and W. Goetzmann, "Global Stock Markets in the Twentieth Century," *Journal of Finance* 54 (June 1999): 953–980 (Smith Breeden Prize). Also reprinted in *International Securities*, Elgar (2000), and *International Capital Markets*, Elgar (2002).

Goetzmann, W. and P. Jorion, "Re-emerging Markets," *Journal of Financial and Quantitative Analysis* 34 (March 1999) 1–32 (lead paper; William Sharpe Award). Also reprinted in *Emerging Markets*, Elgar (2004).

Jorion, P., "Lessons from the Orange County Bankruptcy," *Journal of Derivatives* 4 (Summer 1997): 61–66.

Jorion, P. and D. Miller, "Investing in Emerging Markets Using Depositary Receipts," *Emerging Market Quarterly* 1 (Spring 1997): 7–13. Also summarized in *CFA Digest*, Fall 1997.

Jorion, P., "Risk^2: Measuring the Risk in Value-At-Risk," *Financial Analysts Journal* 52 (November 1996): 47–56. Also reprinted in *VAR: A Risk Compilation*, Risk Publications, London (1997) and *Risk Management: Foundations for a Changing Financial World*, CFA Institute Publication (2010).

Jorion, P. and R. Sweeney, "Mean Reversion in Real Exchange Rates: Evidence and Implications for Forecasting," *Journal of International Money and Finance* 15 (August 1996): 535–550.

Jorion, P., "Returns to Japanese Investors from U.S. Investments," *Japan and the World Economy* 8 (September 1996): 229–241 (lead paper).

Jorion, P., "Does Real Interest Parity Hold at Longer Maturities?" *Journal of International Economics* 40 (February 1996): 105–126.

Jorion, P., "Risk and Turnover in the Foreign Exchange Market," in *Microstructure of Foreign Exchange Markets*, J. Frankel, editor, University of Chicago Press (1996).

Haugen, R. and P. Jorion, "The January Effect: Still There After All These Years," *Financial Analysts Journal* 52 (January 1996): 27–31.

Goetzmann, W. and P. Jorion, "A Longer Look at Dividend Yields," *Journal of Business* 68 (October 1995): 483–508.

Cuny, C. and P. Jorion, "Valuing Executive Stock Options with Endogenous Departure," *Journal of Accounting and Economics* 20 (September 1995): 193–205.

Jorion, P., "Predicting Volatility in the Foreign Exchange Market," *Journal of Finance* 50 (June 1995): 507–528. Also reprinted in *Forecasting Financial Markets*, Elgar (2001).

Jorion, P. and S. Khoury, "To Hedge or Not To Hedge: A Unified Framework," in *Advances in International Banking and Finance*, JAI Press: New York (1995). Pp. 181–204.

Jorion, P., "A Mean-Variance Analysis of Currency Overlays," *Financial Analysts Journal* 50 (May 1994): 48–56. Also summarized in *CFA Digest*, Fall 1994.

Jorion, P. and J. Glen, "Currency Hedging for International Portfolios," *Journal of Finance* 48 (December 1993): 1865–1886. Also summarized in *CFA Digest*, Spring 1994, and reprinted in *International Capital Markets*, Elgar (2002).

Jorion, P. and A. Giovannini, "Time-Series Tests of a Non-Expected Utility Model," *European Economic Review* 37 (June 1993): 1083-1100.

Goetzmann, W. and P. Jorion, "Testing the Predictive Power of Dividend Yields," *Journal of Finance* 48 (June 1993): 663–679.

Jorion, P. and L. Roisenberg, "Synthetic International Diversification," *Journal of Portfolio Management* 19 (Winter 1993): 65–73. Also summarized in *CFA Digest*, Spring 1993, and reprinted in *International Securities*, Elgar (2000).

Jorion, P., "Term Premiums and the Integration of the Eurocurrency Markets," *Journal of International Money and Finance* 11 (February 1992): 17–39.

Jorion, P. and J. Rolfo, "The Choice of a Multicurrency Portfolio for a Central Bank: Bonds, Eurodeposits and Currency Swaps," *Global Finance Journal* (Spring 1992): 1–22.

Adler, M. and P. Jorion, "Universal Currency Hedges for Global Portfolios," *Journal of Portfolio Management* 18 (Summer 1992): 28–35. Also summarized in *CFA Digest*, Winter 1993.

Jorion, P., "Portfolio Optimization in Practice," *Financial Analysts Journal* 48 (January 1992): 68–74.

Jorion, P., "The Pricing of Exchange Rate Risk in the Stock Market," *Journal of Financial and Quantitative Analysis* 26 (September 1991): 363–376. Also reprinted in *International Capital Markets*, Elgar (2002).

Jorion, P., "Bayesian and CAPM Estimators of the Means: Implications for Portfolio Selection," *Journal of Banking and Finance* 15 (June 1991): 717–727.

Jorion, P. and R. Mishkin, "A Multi-Country Comparison of Term Structure Forecasts at Long Horizons," *Journal of Financial Economics* 29 (March 1991): 59–80. Also summarized in *CFA Digest*, Spring 1991.

Jorion, P., "Portfolio Properties of the ECU," *Journal of Multinational Financial Management* (1991): 1–24.

Detemple, J. and P. Jorion, "Option Listing and Stock Returns: An Empirical Investigation," *Journal of Banking and Finance* 14 (September 1990): 781–801.

Jorion, P., "The Exchange Rate Exposure of US Multinationals," *Journal of Business* 63 (July 1990): 331–345.

Jorion, P. and N. Abuaf, "Purchasing Power Parity in the Long Run," *Journal of Finance* 45 (March 1990): 157–174. Also reprinted in *Purchasing Power Parity*, M. Manzur, editor, Elgar (2008).

Jorion, P., "Asset Allocation with Hedged and Unhedged Foreign Stocks and Bonds," *Journal of Portfolio Management* 15 (Summer 1989): 49–54. Also reprinted in *The Currency Hedging Debate*, L. Thomas, editor, IFR Publishing, London (1990) and summarized in *CFA Digest*, Winter 1990.

Giovannini, A. and P. Jorion, "The Time-Variation of Risk and Return in the Foreign Exchange and Stock Markets," *Journal of Finance* 44 (June 1989): 307–325.

Jorion, P. and N. Stoughton, "An Empirical Investigation of the Early Exercise of Foreign Currency Options," *Journal of Futures Market* 9 (October 1989): 365–375.

Jorion, P., "On Jump Processes in the Foreign Exchange and in the Stock Markets," *The Review of Financial Studies* 1 (Winter 1988): 427–445. Also reprinted in *Currency Derivatives*, D. DeRosa, editor, Wiley (1998).

Jorion, P. and N. Stoughton, "Tests of the Early Exercise Premium Using the Foreign Exchange Market," in *Recent Developments in International Banking and Finance*, S. Khoury, editor, Probus (1989): 159–190.

Giovannini, A. and P. Jorion, "Foreign Exchange Risk Premia Once Again," *Journal of International Money and Finance* 7 (March 1988): 111–113.

Giovannini, A. and P. Jorion, "Interest Rates and Risk Premia in the Foreign Exchange and the Stock Market," *Journal of International Money and Finance* 6 (March 1987): 107–123.

Jorion, P., "Bayes-Stein Estimation for Portfolio Analysis," *Journal of Financial and Quantitative Analysis* 21 (September 1986): 279–292.

Jorion, P. and E. Schwartz, "Integration vs. Segmentation in the Canadian Stock Market," *Journal of Finance* 41 (July 1986): 603–614.

Jorion, P., "International Portfolio Diversification with Estimation Risk," *Journal of Business* 58 (July 1985): 259–278. Also summarized in *CFA Digest*, Winter 1986.

Other Publications

Jorion, P. and C. Schwarz, *Comment on Proposed Regulation Best Execution*, SEC File No. S7-32-22 (2023).

Jorion, P. and C. Schwarz, *Comment on Proposed Order Competition Rule*, SEC File No. S7-31-22 (2023).

Schwarz, C., Barber, B., Huang, X., Jorion, P., and T. Odean, *Comment on Proposed Disclosure of Order Execution Information*, SEC File No. S7-29-22 (2023).

Jorion, P. and G. Zhang, "Credit Contagion from Counterparty Risk," in *Lessons from the Financial Crisis: Insights and Analysis from Today's Leading Minds,* Robert Kolb, editor, Wiley (2010), and in *Financial Contagion: The Viral Threat to the Wealth of Nations,* Robert Kolb, editor, Wiley (2010).

Jorion, P., "Risk Management for Alternative Investments," in *CAIA Supplementary Level II Book,* Chartered Alternative Investment Analyst Association (2009).

Jorion, P., Book Review of "Plight of the Fortune Tellers: Why We Need to Manage Financial Risk Differently," by Riccardo Rebonato, in *Journal of Economic Literature* (June 2009) 47: 510–512.

Jorion, P., "How to Resolve Hedge Fund Transparency," *Pensions & Investments* (June 9, 2008).

Jorion, P., "Risk Management as an Active Portfolio Management Tool," *Canadian Investment Review* (Spring 2008).

Jorion, P., "Market Risk: Quantitative Approaches," in *Encyclopedia of Quantitative Finance*, Rama Cont, editor, Wiley (2008).

Jorion, P., "History of Financial Risk Management," in *Encyclopedia of Quantitative Finance*, Rama Cont, editor, Wiley (2008).

Jorion, P., "Monitoring Hedge Fund Risk with Portfolio Transparency," *Alternative Investment Review* (2008).

Jorion, P., Book Review of "The Black Swan: The Impact of the Highly Improbable," by Nassim Taleb, in *GARP Risk Review* (March 2007): 29-35.

Jorion, P., "Hedge Funds," in *The Princeton Encyclopedia of the World Economy,* K. Reinert and R. Rajan, editors, Princeton University Press: New Jersey (2006).

Jorion, P., "The Perceived Dangers of Following the Herd," *Financial Times* (September 30, 2005).

Jorion, P., Préface to *Asset and Risk Management: La Finance Orientée*, by L. Esch, R. Keiffer, and T. Lopez, De Boeck (2003) and Wiley (2005).

Jorion, P., "Medium-Term Risk Management Lessons from LTCM," in *Growth of Risk Management*, Risk Publications (2003). Also in *Handbuch Alternative Investments* (in German), Gabler Verlag (2006).

Jorion, P., "La Gestion des Risques après le 11 Septembre 2001," *HEC Montréal* (2002). Reprinted in *Au coeur des débats - Les grandes Conférences ppubliques du Fonds Gérard-Parizeau 2000-2010*, Presses de l'Université de Montréal (2013).

Jorion, P., Book Review of "Fooled by Randomness: The Hidden Role of Chance in the Markets and in Life," by Nassim Taleb, in *Risk* (November 2001): 97.

Jorion, P., "Value at Risk," in *The Global-Investor Book of Investing Rules*, edited by P. Jenks and S. Eckett, Harriman House (2001).

Jorion, P., "Value, Risk, and Control: A Dynamic Process in Need of Integration," *Financial Times* (May 16, 2000). Also reprinted in *Mastering Risk: Volume 1: Concepts*, J. Pickford, editor, Pearson: London (2001).

de Fontenay, P. and P. Jorion, "The Theory of Foreign Currency Liabilities in Debt Management," in *Sovereign Assets and Liabilities Management*, M. Cassard and D. Folkerts-Landau, editors, International Monetary Fund (2000).

Jorion, P., "How Long-Term Lost its Capital," *Risk* (September 1999).

Jorion, P., "The Role of Risk Management in Dealing with Volatility," *Investment Strategy Pack*, BIS (October 1999).

Jorion, P., Book Review of "Beyond Value at Risk: The New Science of Risk Management," by Kevin Dowd, in *Risk* (July 1998).

Jorion, P., Book Review of "Financial Calculus: An Introduction to Derivatives Pricing" by M. Baxter and A. Rennie, in *Journal of Economic Literature* (March 1998) 36: 251-252.

Jorion, P., Book Review of "An Introduction to the Mathematics of Financial Derivatives" by Salih Neftci, in *Journal of Economic Literature* (March 1998) 36: 255-256.

Goetzmann W. and P. Jorion, "Risk in Emerging Markets Revisited," in *Emerging Market Capital Flows*, R. Levich, editor, Kluwer (1997).

Jorion, P., "The Importance of Derivative Securities Markets to Modern Finance," *Catalyst Institute* Report to the Brazilian Legislature (1995).

Jorion, P., "Comment on 'International Equity Transactions and U.S. Portfolio Choice,' by Tesar and Werner," in *Internationalization of Equity Markets*, J. Frankel, editor, University of Chicago Press (1994).

Jorion, P., "Exchange Rates and Long-Term Interest Rates," in *Exchange Rates and Corporate Performance*, R. Levich and Y. Amihud, editors, Irwin (1994): 97-118.

Jorion, P., "Bayesian Decision Theory," in *The New Palgrave Dictionary of Money and Finance*, P. Newman, M. Milgate, and J. Eatwell, editors, MacMillan: London (1992).

Adler, M. and P. Jorion, "Foreign Portfolio Investment," in *The New Palgrave Dictionary of Money and Finance* (1992).

Adler, M. and P. Jorion, "The Exchange Rate Exposure of Multinationals," in *The New Palgrave Dictionary of Money and Finance* (1992).

Hamao, Y. and P. Jorion, "International Capital Market Integration," in *The New Palgrave Dictionary of Money and Finance* (1992).

Jorion, P. and G. Kirsten, "The Right Way to Measure International Fund Performance," *Investing* (Spring 1991): 40-46.

Jorion, P., "International Bonds: The Asset Class," in *Global Portfolios*, R. Aliber and B. Bruce, editors, Irwin (1991): 113-124.

Jorion, P., "The Linkages of International Equity Markets," in *The Handbook of International Financial Management*, R. Aliber, editor, Dow-Jones-Irwin (1989): 759-781.

Jorion, P., "International Asset Allocation," *Investment Management Review* (January 1989): 41-49.

Jorion, P., "Why Invest in International Bonds?" *Investment Management Quarterly* (Fall 1987): 19-28.

Jorion, P., "The ECU and Efficient Portfolio Choice," in *The ECU Market*, R. Levich and A. Sommariva, editors, Lexington Books (1987): 119-139.

Jorion, P. and M. Puterman, "An Application of Ridge Regression to Exchange Rate Determination," *American Statistical Association Proceedings* (June 1984): 602-607.

University Activities

2020-22, Chair, Masters' program committee
2003-04, Faculty chair
2002-04, Chair, GSM dean search committee
2001, Chair, GSM rankings task force committee
1996-97, Chair, GSM dean search committee
1993-96, Committee on research, UCI
1994-95, Personnel committee chair, GSM

Professional Activities

Honorary Member, *Global Fund Risk Association*, 2023-

Editor-in-Chief, *Journal of Risk*, 1998-2006
Associate Editor, *Financial Analysts Journal*, 2011-2016
Associate Editor, *Financial Markets and Portfolio Management*, 2005-
Advisory Editor, *Journal of Investing*, 1993-
Honorary Member, *Global Fund Risk Association*, 2023-

Associate Editor, *Journal of Derivatives Accounting*, 2003-2005
Associate Editor, *Emerging Markets Review*, 2002-2009
Associate Editor, *International Review of Finance*, 2000-2009
Associate Editor, *Journal of Risk Finance*, 1999-2010
Associate Editor, *Global Finance Journal*, 1994-2016
Associate Editor, *Journal of Empirical Finance*, 1991-2005

Pacific Regional Director, *Financial Management Association*, 1998-2000
Editorial Board, *Net Exposure*, 1997-1998
Exam Council, *Global Association of Risk Professionals*, 1997-1999
Associate Editor, *Emerging Markets Quarterly*, 1996-2000
Editorial Board Member, *Foundation for Research in Banking and Finance*, 1994-1995
Associate Editor, *Journal of Multinational Financial Management*, 1989-2002
Advisory Editor, *Journal of Economics and Business,* 1989-2000
Associate Editor, *Investment Management Quarterly,* 1987-1988

Referee for the *American Economic Review*, *Econometrica*, *Economic Enquiry*, *Econometrica*, *Empirical Economics*, *European Economic Review*, *Finance*, *Geneva Papers on Risk and Insurance*, *Global Finance Journal*, *International Economic Review*, *Journal of Accounting Research*, *Journal of Banking and Finance*, *Journal of Business*, *Journal of Business and Economics Statistics*, *Journal of Derivatives*, *Journal of Economic Dynamics and Control*, *Journal of Economic History*, *Journal of Economics and Business*, *Journal of Econometrics*, *Journal of Finance*, *Journal of Financial Economics*, *Journal of Financial Intermediation*, *Journal of Financial and Quantitative Analysis*, *Journal of Financial Research*, *Journal of Financial Services Research*, *Journal of International Economics*, *Journal of*

International Financial Management and Accounting, *Journal of International Money and Finance*, *Journal of Money, Credit and Banking*, *Journal of Multinational Financial Management*, *Journal of Portfolio Management*, *Management Science*, *Mathematical Finance*, *National Science Foundation*, *Princeton Essays in International Finance*, *Recent Developments in International Banking and Finance*, *Review of Derivatives Research*, *Review of Economic Studies*, *Review of Economics and Statistics*, *Review of Finance*, *Review of Financial Studies*, *Risk Magazine*.

American Finance Association Session chair, 1994, 2001, 2004, 2009

Western Finance Association Session chair, 1993, 1995

WFA Program committee, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

EFA Program committee, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

Organizing committee, McGill Conference on Global Asset Management, 2005, 2007, 2009, 2011, 2013, 2015

Organizing committee, Basel Conference on Risk Management in Banking, 2006

Scientific committee, International Conference on Credit Risk, 2002

Global Finance Association Program committee, 1994, 1995, 1996, 1997

Financial Management Association Program committee, 1993, 1998

Professional Presentations

Apr	2019	Quant Forum, New York
Jan	2018	Global Interdependence Center Conference, San Diego
May	2017	Alternatives Summit Korea Conference, Seoul
May	2017	Systemic Risk Conference, Chapman
Feb	2016	Risk Management Conference, New York
Oct	2014	Risk Management Roundtable, Luxembourg
Apr	2014	Risk Management for Hedge Funds, Seoul
Oct	2013	IFBL Presentation (keynote speaker), Luxembourg
May	2013	Institutional Society of Risk Professionals, Long Beach
Mar	2013	Financial Services Symposium, Melbourne
Aug	2012	Q-Group Seminar, Sydney
Jan	2011	CFA Society of Montréal
Nov	2010	Oxford Hedge Fund Conference, London
Oct	2010	PRiM Conference, Luxembourg
Jul	2010	Quant Congress (keynote speaker), New York
May	2010	ICBI Risk Management Conference (keynote speaker), Boston
Dec	2009	Financial Research Association Conference, Las Vegas
Sep	2009	RiskLab Risk Management Conference (keynote speaker), Madrid
Apr	2009	European Financial Management Association (keynote speaker), Nantes
Jan	2009	American Finance Association, San Francisco
Dec	2008	MPT Forum (keynote speaker), Tokyo
May	2008	CFA Society of Seattle
Apr	2008	NBER Conference on the Risks of Financial Institutions, Chicago
Jan	2008	Conference on Emerging Managers, New York
Dec	2007	ICBI Risk Management Conference, Geneva
Sep	2007	Inquire Conference, Cambridge, UK
Aug	2007	Risk Management Conference (keynote speaker), Québec
May	2007	Risk Management Conference, UCSD
Jan	2007	American Finance Association, Chicago
Dec	2006	ICBI Risk Management Conference, Geneva
Oct	2006	DEAM Global Quantitative Strategies Conference, Amsterdam
Jan	2006	American Finance Association, Boston
Nov	2005	BIS Conference on Accounting, Risk Management, and Regulation, Basel
Aug	2005	BM&F International Derivatives Conference, Sao Paulo
May	2005	IDC–Caesarea Center Conference, Tel Aviv
Dec	2004	Financial Research Association Conference, Las Vegas
Oct	2004	NBER Conference on the Risks of Financial Institutions, Woodstock
Jul	2004	GARP Seminars, Seoul and Taipei
Jun	2004	AIMR Risk Management Conference, Toronto
Jun	2004	Bourse de Montréal Causerie, Montréal
Jun	2004	CountryWide Financial Risk Symposium (keynote speaker), Santa Monica
May	2004	World Bank Risk Management Seminar, Washington
Jan	2004	Corporate Governance Program, Irvine

Professional Presentations (continued)

Nov	2003	Quantitative Investment Association, Los Angeles
Sep	2003	Inquire Conference (keynote speaker), Cambridge, UK
Jun	2003	RiskWaters Risk Management Conference, Boston
Dec	2002	ICBI Risk Management Conference, Geneva
Nov	2002	PrIM Conference, Luxembourg
Sep	2002	BSI Mutual Fund Industry Conference, Zurich
Jun	2002	FAME Lecture Series, Geneva
Jun	2002	Williams Institute Conference (keynote speaker), Tulsa
Apr	2002	HEC Parizeau Conference (keynote speaker), Montréal
Apr	2002	Portuguese Finance Association (keynote speaker), Lisbon
Dec	2001	ICBI Risk Management Conference, Geneva
Nov	2001	LBS Risk Management Seminar, London
Apr	2001	Wharton Risk Management Conference, Philadephia
Apr	2001	Quantitative Investment Association, Los Angeles
Feb	2001	GARP Risk Management Conference, New York
Apr	2000	UCLA Liquidity Conference, Los Angeles
Apr	2000	Risk Management Conference, Paris
Apr	2000	ICBI Global Derivatives Conference, Paris
Feb	2000	World Bank Risk Management Conference, Istanbul
Oct	1999	Risk Management Conference, KAIST, Seoul
Sep	1999	World Bank-IMF Annual Meetings, Washington
Aug	1999	Pension Fund Risk Management Conference, Québec
Jun	1999	Western Finance Association, Santa Monica
Jun	1999	Risk Management Congress, Boston
May	1999	UCLA Equity Premium Conference, Los Angeles
Feb	1999	Handelsblatt Risk Management Conference, Frankfurt
Oct	1998	Equity Strategy Conference, San Diego
Oct	1998	Conference on Value at Risk, Stockholm
Jul	1998	Orange County Society of Investment Managers, Costa Mesa
Apr	1998	ICBI Derivatives Conference, Paris
Mar	1998	Institute for Quantitative Research in Finance, Palm Beach
Mar	1998	Risk Management Lecture, Antwerp
Mar	1998	EIASM Workshop on Financial Risk Management, Brussels
Feb	1998	Conference on Portfolio Risk Analytics, New York
Feb	1998	Risk Management Seminar, International Monetary Fund, Washington
Nov	1997	Society of Quantitative Investment Analysts, Los Angeles
Nov	1997	Conference on Value at Risk, New York
Oct	1997	Financial Management Association, Hawaii
Sep	1997	Chicago Quantitative Alliance Conference, Chicago
Jul	1997	Inquire Conference, London
May	1997	Advanced Risk Management Conference, Copenhagen
Apr	1997	Conference on Financial Risk Management, Beijing
Apr	1997	Berkeley Conference on Global Investments, San Francisco
Feb	1997	Fed Conference on International Investments, Miami
Jan	1997	Conference on Value at Risk, New York
Dec	1996	American Finance Association, New Orleans
Dec	1996	International Investment Forum, Chicago

Professional Presentations (continued)

Nov	1996	Chicago Board of Trade Conference, Chicago
Nov	1996	Conference on Sovereign Asset and Liability Management, Hong Kong
Jun	1996	Conference on Mathematics in Finance, Berkeley
May	1996	Conference on Emerging Markets, New York University
Mar	1996	Vanderbilt Conference on Investing Internationally, Nashville
Dec	1995	International Monetary Fund, Washington
Oct	1995	Wharton Conference on Global Asset Management, Palm Beach
Jun	1995	Western Finance Association, Aspen
Apr	1995	Financial Investment Management Conference, Los Angeles
Feb	1995	Association for Investment Management Research, Palm Beach
Oct	1994	Institute for Quantitative Research in Finance, Lake Tahoe
Jul	1994	NBER Conference on Foreign Exchange Markets, Perugia
Jun	1994	Western Finance Association, Santa Fe
May	1994	Cornell Derivatives Conference, Ithaca
May	1994	Global Finance Conference, Monterey
Apr	1994	Society of Quantitative Investment Analysts, Los Angeles
Mar	1994	USC Conference on Mathematics in Today's Finance, Los Angeles
Oct	1993	NBER Conference on International Equity Markets, San Francisco
May	1993	CEPR International Finance Conference, Maastricht
Dec	1992	American Finance Association, Anaheim
Jun	1992	Western Finance Association, San Francisco
May	1992	CRSP Research Conference in Finance, Chicago
May	1992	Conference on Exchange Rate Volatility, New York University
Apr	1992	TIMS-ORSA Meetings, Orlando
Oct	1991	Inquire-Europe Conference, Rome
Oct	1991	CEPR International Finance Conference, Madrid
Jun	1991	Paine Webber Conference on Pension Funds Trading, New York
Apr	1991	NBER Seminar on International Asset Pricing, Philadephia
Apr	1991	Georgetown Seminar on Real Exchange Rates, Washington
Feb	1991	AMA Conference on Nondollar Bond Markets, New York
Nov	1990	CDC-RD Finance Conference, Paris
Oct	1990	Conference on Quantitative Finance and Accounting, Rutgers
Aug	1990	European Finance Association, Athens
Jun	1990	Western Finance Association, Santa Barbara
Apr	1990	Conference on Statistical Models of Volatility, San Diego
Apr	1990	Institutional Investor Conference on Global Pension Portfolios, NY
Nov	1989	CRSP Research Conference in Finance, Chicago
Jun	1989	SimCorp Conference on Advanced Risk Management, Copenhagen
Dec	1988	American Finance Association, New York
Jun	1988	HEC-ISA Conference on New Instruments in Finance, Paris
Apr	1988	TIMS-ORSA Meetings, Washington
Dec	1987	American Finance Association, Chicago
Jun	1987	Western Finance Association, San Diego
Jun	1986	HEC-ISA Conference on International Finance, Paris
Jan	1986	Conference on the ECU Market, New York University
Dec	1985	American Finance Association, New York
Apr	1983	NBER Conference on Bayesian Inference in Econometrics, Orlando.

CHRISTOPHER GEORGE SCHWARZ

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April 2024

Work Experience

2008 – Present **University of California Irvine**, The Paul Merage School of Business
Professor of Finance (2022 – Present)
Faculty Director, CIWM (2017 – Present)
Associate Professor of Finance (2014 – 2022)
Assistant Professor of Finance (2008 – 2014)

2022 – Present **Columbia Business School**, Finance Division
Chong Khoon Lin Visiting Professor of Business (2024 – Present)
Visiting Professor of Finance (2024)
Part-time Visiting Researcher (2022, 2023)

Affiliations

2007 – 2008 **Advisory Editor**, *Review of Financial Studies*

2007 **Yale University**, International Center of Finance
Visiting Doctoral Fellow

Education

2003 – 2008 **University of Massachusetts Amherst**, Amherst, MA
Ph.D. *Finance*, 2008

1995 - 1999 **Babson College**, Babson Park, MA
B.S. *Business Administration*, Honors, *summa cum laude*, 1999

Research Fields

Retail Trading, Microstructure, Investments Funds, Regulation

Publications

"The 'Actual Retail Price' of Equity Trades" with Brad Barber, Xing Huang, Philippe Jorion, and Terrance Odean, *Forthcoming* at the *Journal of Finance*. (link)

"A (Sub)Penny for You Thoughts: Tracking Retail Investor Activity in TAQ" with Brad Barber, Xing Huang, Philippe Jorion, and Terrance Odean, *Forthcoming* at the *Journal of Finance*. (link)

"How Fast Do Investors Learn? Asset Management Investors and Bayesian Learning," with Zheng Sun, 2023, *Review of Financial Studies* 36, 2397–2430. (link)

"Attention Induced Trading and Returns: Evidence from Robinhood Users," with Brad Barber, Xing Huang, Terry Odean, 2022, *Journal of Finance* 77, 3141 – 3190. (link)

"The Fix is In: Properly Backing out Backfill Bias," with Philippe Jorion, 2019, *Review of Financial Studies* 32, 5048 – 5099. (link)

"Revisiting Mutual Fund Portfolio Disclosure," with Mark E. Potter, 2016, *Review of Financial Studies* 29, 3519 – 3544. (link)

"The Strategic Listing Decisions of Hedge Funds," with Philippe Jorion, 2014, *Journal of Financial and Quantitative Analysis* 49, 773 – 796. (link)

"The Delisting Bias in Hedge Fund Databases," with Philippe Jorion, 2014, *Journal of Alternative Investments* 16, 37 – 47. (link)

"Are Hedge Fund Managers Systematically Misreporting? Or Not?" with Philippe Jorion, 2014, *Journal of Financial Economics* 111, 311 – 327. (link)

"Decision Making and Risk Aversion in the Cash Cab," with Richard Bliss and Mark Potter, 2012, Journal of Economic Behavior & Organization 84, 163 – 173. (link)

"Mutual Fund Tournaments: The Sorting Bias and New Evidence," 2012, *Review of Financial Studies* 25, 913 – 936. (link)

"Trust and Delegation," with Stephen J. Brown, William Goetzmann and Bing Liang, 2012, *Journal of Financial Economics* 103, 221 – 234. Lead Article. (link)

"Tax Equalization in Mutual Funds," with Steve Gill, 2011, *Journal of the American Tax Association* 33, 89 – 110. (link)

"Estimating Operational Risk for Hedge Funds: The ω-score," with Stephen J. Brown, William Goetzmann and Bing Liang, 2009, *Financial Analyst Journal* 65, 43—53. (link)

"Mandatory Disclosure and Operational Risk: Evidence from Hedge Fund Registration," with Stephen J. Brown, William Goetzmann and Bing Liang, 2008, *Journal of Finance* 63, 2785—2815. (link)

"Performance Characteristics of Individual vs. Team Managed Mutual Funds," with Richard Bliss and Mark Potter, 2008, *Journal of Portfolio Management* 34, 110—119. (link)

"The Progeny of CAPM," with Sanjay Nawalkha, 2004, *Journal of Investment Management*, 2,

1522—1540. (link)

Publications in Other Fields

"L(2,1)-labelings of the Cartesian products of two cycles," with Denise Troxell, 2006, *Discrete Applied Mathematics*, 154, 1522—1540.

Working Papers

"Who Is Minding the Store? Order Routing and Competition in Retail Trade Execution" with Xing Huang, Philippe Jorion, and Mina Lee. (link)

"The Ins and Outs of U.S. Hedge Fund Investor Flows" with Philippe Jorion. (link)

"Do Market Participants Care about Portfolio Disclosure? Evidence from Hedge Funds' 13F Filings," with Stephen Brown. (link)

"Revisiting the Effect of Net Unrealized Gains and Losses on Mutual Fund Investors," with Steve Gill.

"Share Restrictions and Investor Flows in the Hedge Fund Industry," with Mila Getmansky, Bing Liang, and Russ Wermers. (link)

"Is Pay for Performance Effective? Evidence from the Hedge Fund Industry," with Bing Liang. (link)

Awards and Grants

2023	**Red Rock Finance Conference**, Best Paper Award "The 'Actual Retail Price' of Equity Trades"
2012 – 2023	**Excellence in Teaching**, University of California, Irvine Fully-Employed (Part-time) MBA Program, (Every year)
2023	**Utah Winter Finance Conference**, Best Paper Award "The 'Actual Retail Price' of Equity Trades"
2022	**Financial Research Association (FRA)**, Best Paper Award "The 'Actual Retail Price' of Equity Trades"
2017	**Excellence in Teaching**, University of California, Irvine Executive MBA Program

Awards and Grants (cont.)

2016	**Faculty Service Award**, University of California, Irvine
2011 – 2013	**Excellence in Teaching**, University of California, Irvine Full-Time MBA Program, (Every year)
2009	**Graham and Dodd Award for Best Paper**, *Financial Analyst Journal*
2007	**BSI GAMMA Foundation Grant**
2007	**Outstanding Teaching Assistant**, Isenberg School of Management
2007 - 2008	**Graduate School Fellowship Award**, University of Massachusetts

Teaching Experience

2008 - Present	**Managerial Finance**, *University of California, Irvine* Full-time, Part-time, and Executive MBA, Avg. 3.95/4.00 rating
2008 – 2016	**Multinational Finance**, *University of California, Irvine* Full-time and part time MBA, Avg. 3.96/4.00 rating
2005 – 2007	**Corporate Finance**, *University of Massachusetts* Undergraduate, Avg. 4.8/5.0 rating

Conference Presentations

Utah Winter Conference (2023), FRA Conference (2022), AFA (2018, 2019), WFA (2007, 2021), Red Rock Finance Conference (2023), NBER Big Data and Securities Markets (2022), NBER Risks of Financial Institution Workshop (2010), European Summer Symposium in Financial Markets (2023), House of Finance Annual Hedge Fund and Private Equity Conference (2018, 2019), Helsinki Finance Summit (2016), NFA (2012, 2015), Berlin Asset Management Conference (2015), EFA (2011, 2015, 2021), FIRS (2009, 2009, 2011), FMA, 2005, 2006, 2008), SFS Cavalcade (2021)

University Presentations

Columbia Business School (2022, 2023), Cornell (2023), Notre Dame (2023), University of Arizona (2022), University of Alabama (2019), Claremont (2019), UNLV (2018), University of Miami (2018), The Hong Kong Polytechnic University (2015), University of Massachusetts (2015), CSU Fullerton (2014), Virginia Tech (2014), Rotman School of Management (2014), University of Kentucky (2013), Northeastern University (2013), Symposium on Financial Institutions/Intermediaries, UC

Davis (2011), UCLA-USC-UCI Finance Day (2011), University of Kansas Southwind Finance Conference (2010), University at Albany – SUNY (2009), University of Oregon (2008), University of Colorado (2008), Washington University in St. Louis (2008), University of Alabama (2008), University of California, Irvine (2008), University of Georgia (2007), University of Tennessee (2007)

Professional Activities

Ad Hoc Referee: *Journal of Finance, Journal of Financial Economics, Review of Financial Studies, Journal of Financial and Quantitative Analysis, Management Science, Review of Asset Pricing Studies, Financial Analysts Journal, Journal of Corporate Finance, The Financial Review, Quarterly Review of Economics and Finance, Journal of Financial Services Research, Journal of Economic Behavior & Organization*

Session Chair: American Finance Association (2019, 2020)

Discussant: 18th Central Bank Conference on the Microstructure of Financial Markets (2023), UC Irvine Finance Day (2023), FIRS Financial Conference (2016), European Finance Association Annual Meeting (2015, 2016, 2017), Berlin Asset Management Conference (2014, 2019), Oregon Finance Conference (2013), AFA Annual Meeting (2013), Oxford-Man Hedge Fund Conference (2011), NFA Annual Meeting (2011), FIRS Annual Meeting (2011, 2016), Citrus Conference (2019), USC Ph.D. Conference (2015), University of San Diego Finance and Law Conference (2016)

Program Committee Member: European Finance Association Annual Meeting (2014 – 2023), Napa Conference (2014 – 2023), Northern Finance Association Annual Meeting (2015), Midwest Finance Association Annual Meeting (2015)