BING LIANG, PhD

Department of Finance
Isenberg School of Management
University of Massachusetts Amherst
121 President's Dr., Amherst, MA 01003-9310
Tel: (413) 545-3180, Fax: (413) 545-3858
E-Mail: bliang@isenberg.umass.edu
Website: https://www.isenberg.umass.edu/people/bing-liang
SSRN author page: https://ssrn.com/author=2348660

47 Summerfield Rd.
Amherst, MA 01002

Date: December 2022

EDUCATION

Ph.D. in Finance, the University of Iowa
M.S. in Quality Management and Productivity, The University of Iowa
M.S. in Applied Statistics, Chinese Academy of Science
B.S. in Maritime Meteorology, Ocean University of China

AREAS OF SPECIALIZATION

Hedge Funds and Mutual Funds, Risk Management, Liquidity, Capital Market Anomalies, Climate Finance, and Econometrics

EMPLOYMENT

2018-present	Charles P. McQuaid Professor of Finance
2008-present	Professor of Finance, Isenberg School of Management
2015-2018	Dean's Fellow, Isenberg School of Management
Fall 2013	Visiting Professor, Shanghai Advanced Institute of Finance, Shanghai Jiao Tong University
Fall 2010	Visiting Professor of Finance, The International Center for Finance, Yale School of Management
2003-2008	Associate Professor of Finance Isenberg School of Management, UMass Amherst
2004	Visiting Scholar, London School of Economics
1995-2003	Assistant Professor of Finance Weatherhead School of Management, Case Western Reserve University

OTHER APPOINTMENTS AT UMASS

2020-2022	Chair, Department Personnel Committee
2017-2022	Faculty Director, Master of Finance in Alternative Investments
2003-2004	Chair, Department Faculty Recruiting Committee
2004-2010, 2015-2016	Area Coordinator, Ph.D. Program in Finance
2016-2017	Member, Provost's Advisory Council

AFFILIATIONS

The International Center for Finance, Yale School of Management, 2010-present
MIT Laboratory for Financial Engineering (LFE), 2020-present
Shanghai Advanced Institute of Finance (SAIF), Shanghai Jiao Tong University, 2010-present

AWARDS AND HONORS

Charles P. McQuaid Professor of Finance, 2018-present
The Graham-Dodd Scroll Award for 2018, *The Financial Analysts Journal*
The Dean's Faculty Fellow, Isenberg School of Management, 2015-2018
Research Excellence Award, Isenberg School of Management, 2020-2021, 2016- 2017, 2013-2014, 2012-2013, 2011-2012
Exceptional Merit, University of Massachusetts, Amherst, 2015, 2012
Outstanding Teaching Award, Isenberg School of Management, 2013-2014
Exceptional Merit, University of Massachusetts, Amherst, 2015, 2012
Outstanding Research Award, Isenberg School of Management, 2005-2006
CAFR (China Academy of Financial Research) Research Grant, 2013, 2012
Singapore Management University's BNP Paribas Hedge Fund Center Research Grant, 2012, 2009
The Q-Group Research Grant, 2005, 2010
Graham and Dodd Award for 2009, *The Financial Analysts Journal*
Research Fellow, Isenberg School of Management, 2007, 2008
BSI Gamma Foundation Award, 2007
Best Paper Award, China International Conference in Finance, 2007
Award for Outstanding Accomplishments in Research and Creative Activity, University of Massachusetts, Amherst, 2006
Outstanding Research Award, Isenberg School of Management, 2006
INQUIRE UK Research Grant, 2006
Lilly Teaching Fellowship, 2005-2006, University of Massachusetts, Amherst
Best Paper Award in Hedge Funds, European Finance Associate Meetings, 2003
Weatherhead School of Management Summer Research Grant 1997-2001, 2003
Research Grant, the Foundation for Managed Derivatives Research, 2000
Ponder Fellowship, the University of Iowa, 1990-1995

PUBLICATIONS

1. "Hedge Fund Manager Skills and Style-Shifting" (with George Jiang and Huacheng Zhang), 2021, ***Management Science*** 68, No. 3.

2. "Are Mutual Fund Manager Skills Transferable to Private Funds?" (With Ying Huang and Kai Wu), 2021, ***International Review of Economics and Finance*** 76, 614-638.

3. "Hedge Fund Leverage: 2002-2017" (with Liping Qiu), 2019, ***European Financial Management*** 25, 908-941.

4. “The Role of Hedge Funds in the Price Formation Process” (with Charles Cao, Yong Chen, and William Goetzmann), 2018, ***The Financial Analysts Journal*** 74, 54-68. Awarded the FAJ’s Graham-Dodd Scroll Award of 2018.

5. “Hedge Fund Holdings and Stock Market Efficiency” (with Charles Cao, Andrew Lo, and Lubomir Petrasek), 2018, ***Review of Asset Pricing Studies*** 8, 77-116.

6. “Liquidity Costs, Return Smoothing, and Investor Flows: Evidence from a Separate Account Platform” (with Charles Cao, Grant Farnsworth, and Andrew Lo), 2016, ***Management Science***, 1-18.

7. “What Is the Nature of Hedge Fund Manager Skills? Evidence from the Risk Arbitrage Strategy” (with Charles Cao, Bradley Goldie, and Lubomir Petrasek), 2016, ***Journal of Financial and Quantitative Analysis*** 51, 929-957.

8. “Onshore and Offshore Hedge Funds: Are They Twins?” (With George Aragon and Hyuna Park), 2014. Received the best paper award at the 2007 China International Conference in Finance. ***Management Science*** 60, 74-91.

9. “Can Hedge Funds Time Market Liquidity?” (With Charles Cao, Yong Chen, and Andrew Lo), 2013. Supported by a grant from the Q-Group. ***Journal of Financial Economics***109, 493-51.

10. “Trust and Delegation” (with Stephen Brown, Will Goetzmann, and Chris Schwarz), 2012, ***Journal of Financial Economics*** 103, 221-234. Lead article.

11. “Asset Allocation Dynamics in the Hedge Fund Industry” (with Li Cai), 2012, ***Journal of Investment Management*** 10, 35-39.

12. “On the Dynamics of Hedge Fund Strategies” (with Li Cai), 2012, ***Journal of Alternative Investments*** 14, 51-68.

13. “Predicting Hedge Fund Failure: A Comparison of Risk Measures” (with Hyuna Park), 2010, ***Journal of Financial and Quantitative Analysis*** 45, 199-222. Featured in Risk Management Research Report (RMRR) as one of the most important scholarly articles in risk management published.

14. “Estimating Operational Risk for Hedge Funds: The ϖ Score” (with Stephen Brown, Will Goetzmann, and Chris Schwarz), 2009, ***Financial Analysts Journal*** 65, 43-53. Awarded the FAJ Graham and Dodd Awards of Excellence in 2009.

15. “Mandatory Disclosure and Operational Risk: Evidence from Hedge Fund Registration” (with Stephen Brown, Will Goetzmann, and Chris Schwarz), 2008, ***Journal of Finance*** 63, 2785-2815. Part of the testimony given before a Hearing of the U.S. Congress House Financial Services Committee on Hedge Funds and Systemic Risk, March 13, 2007.

16. “Do Market Timing Hedge Funds Time the Market?” (With Yong Chen), December 2007, 827-856, ***Journal of Financial and Quantitative Analysis*** 42 (**invited)**.

17. “Hedge Fund Due Diligence: A Source of Alpha in a Hedge Fund Portfolio Strategy” (with Stephen Brown and Tom Fraser), 2008, ***Journal of Investment Management*** 6, 23-33.

18. “Value at Risk and the Cross-Section of Hedge Fund Returns” (with Turan Bali and Suleyman Gokcan), an invited paper by Inquire Europe fall seminar, 2005. April 2007, 1135-1166, ***Journal of Banking and Finance*** 31(**invited).**

19. “Risk Measures for Hedge Funds: A Cross-Sectional Approach” (with Hyuna Park), March 2007, 333-370, ***European Financial Management*** (**invited)**.

20. “Do Hedge Funds Have Enough Capital? A Value at Risk Approach” (with Anurag Gupta). ***Journal of Financial Economics*** 77, 219-253, July 2005.

21. “Fees on Fees in Funds of Funds” (with Stephen Brown and William Goetzmann). ***Journal of Investment Management*** 2, 39-56, Fourth Quarter 2004.

22. “Alternative Investments: CTAs, Hedge Funds, and Funds of Funds”. ***Journal of Investment Management*** 2, 76-93, Fourth Quarter 2004.

23. “The Accuracy of Hedge Fund Returns”. ***Journal of Portfolio Management*** 29 (**invited**), 111-122, Spring 2003. Part of the testimony given before a Hearing at the SEC’s Roundtable on Hedge Funds, May 14-15, 2003. Posted on the SEC’s website.

24. “Hedge Fund Performance: 1990-1999”. ***Financial Analysts Journal*** 57 (**invited**), 11-18, Jan./Feb. 2001.

25. “Hedge Funds: The Living and the Dead”. ***Journal of Financial and Quantitative Analysis*** 35 (**invited**), 309-326, September 2000.

26. “Portfolio Formation, Measurement Errors, and Beta Shifts: A Random Sampling Approach”. ***The Journal of Financial Research*** 23, 261-284, Fall 2000.

27. “Do All-stars Shine? An Evaluation of Analysts’ Recommendations” (with Hemang Desai and Ajai Singh). ***Financial Analysts Journal*** 56, 20-29, May/June 2000.

28. “On the Performance of Hedge Funds”. ***Financial Analysts Journal*** 55, 72-85, July/Aug. 1999. This paper has been included in *the International Library of Critical Writings in Financial Economics* (Editor: Richard Roll, UCLA).

29. “Price Pressure: Evidence from the ‘Dartboard’ Column”. ***The Journal of Business*** 72, 119-134, January 1999.

OTHER PUBLICATION

"Understanding, Improving and Applying the Theory of Expenditure System," *Statistical Research*, No.1, 52-64, 1989.

WORKING PAPERS

1. "Share Restrictions and Investor Flows in the Hedge Fund Industry" (with Chris Schwarz, Mila Getmansky Sherman, and Russ Wermers). Supported by a grant from the Q-Group.

2. "Liquidity Characteristics of Market Anomalies and Institutional Trading" (with Charles Cao, Tong Yao, and Andrew Zhang).

3. "Strength of Performance-Based Compensation: Evidence from Hedge Fund Closing and Reopening Events" (with Chris Schwarz).

4. "Hedge Fund Returns: Believe It or Not?" (With Liping Qiu).

5. "The Economic Consequences of Mutual Fund Advisory Misconduct" (with Yuying Sun and Kai Wu).

6. "Mutual Fund Carbon Risk Exposure" (with Huan Kuang).

7. "Climate-related Innovations: Economic Value and Risk Mitigation" (with Huan Kuang).

8. "Managerial Structure in the Hedge Fund Industry" (with Yuhao Chen and Huan Kuang)

BOOK CHAPTER

1. "On the Performance of Hedge Funds", *Investment Performance Measurement*, The CFA Institute, 2009.

2. "Hedge Funds: Characteristics, Performance Measures, Indices of", *Encyclopedia of Quantitative Finance*. John Wiley & Sons, 2010.

3. "Alternative Investments: CTAs, Hedge Funds, and Funds of Funds". *Foundation of Managed Derivatives*, McGraw Hill, forthcoming.

4. "Alternative Investments: CTAs, Hedge Funds, and Funds of Funds". *World of Hedge Funds*, World Scientific Publishing, 2005.

5. "Fees on Fees in Funds of Funds". *Handbuch Alternative Investments*, Band 1, Gabler, 2006.

6. "Hedge Funds and Asian Financial Crisis". *The Asian Financial Crisis and Taiwan's Economy*, China Economics Press, 2000.

INVITED PRESENTATIONS

University of Birmingham-Dubai, November 2022
University of Oregon, November 2022
The University of Iowa, October 2012, April 2022
Washington State University, November 2019
The Chinese University of Hong Kong, December 2018
National Taiwan University, December 2018
Nankai University, November 2018
University of Nevada Las Vegas, November 2018
Rutgers University, April 2017
Portuguese Catholic University Lisbon, March 2017
Johns Hopkins University, March 2016
DePaul University, January 2016
UC Davis, December 2015
University of Georgia, October 2015
Case Western Reserve University, March 1995, October 2015
Texas Christian University, September 2015
Hong Kong University of Science and Technology, June 1999, December 2006, July 2015
Hong Kong Polytechnic University, July 2015
Cheung Kong Graduate School of Business, June 2015
University of Central Florida, April 2015
Louisiana State University, Feb. 2015
University of New South Wales, June 2014
University of Sydney, June 2014
University of Melbourne, June 2014
University of Technology, Sydney, June 2014
Imperial College, May 2014
Warwick University, May 2014, May 2004
Cambridge University, May 2014
University of Connecticut, March 2016, May 2014, October 2010
Georgetown University, May 2014
UC Irvine, April 2014
Texas A&M University, April 2014
Bentley University, Feb. 2014
Peking University, Jan. 2014
Southwestern University of Finance and Economics, Nov. 2013
Korea University, Dec. 2012
KAIST, Dec. 2012
Lehigh University, Nov. 2012
The National Taiwan University, May 2012
The National Cheung Kung University, May 2012
Yale University, November 2010
Penn State University, November 2010
University of Rhode Island, October 2010
Cheung Kong GSB, July 2010

Shanghai Jiao Tong University, July 2010
Baruch College, March 2010
GAIM Ops Cayman Ops, March 2010 (Keynote)
University at Buffalo SUNY, December 2009
The 9th Alternative Investment Conference (Keynote), December 2009
Oxford-Man Institute, October, May 2009
University of Amsterdam, October 2008
Koc University, March 2008
Society of Quantitative Analysts, January 2008
The BSI Gamma Foundation Conference, November 2007
The Hedge Fund General Counsel Summit, September 2007
SUNY Binghamton, September 2007
INQUIRE UK/Europe Spring Seminar, March 2007
Singapore Management University, December 2006
National Sun Yat-Sen University, December 2006
Babson College, November 2006
The University of Amsterdam, July 2006 (2nd Annual Empirical Asset Pricing retreat)
SUNY-Albany, April 2006
INQUIRE Europe Fall Seminar, October 2005
University of Vienna, October 2005
World Hedge Funds Summit, Canada, October 2005 (Keynote)
The 2nd International Conference on Hedge Funds, University of Quebec, Oct. 2005
Chinese Finance Association Meeting, September 2005
Institutional Investor's Seminar on Hedge Funds, November 2004
European Alternative & Institutional Investing Summit, October 2004
INQUIRE UK Autumn Seminar, September 2004
London School of Economics, May 2004
The 3rd Annual Alternative Investment Conference, University of Western Ontario, November 2003 (Keynote)
The Q-Group Fall Seminar, October 2003
Wharton Financial Institutions Center, May 2003
University of Massachusetts, Amherst, March 2003
Virginia Tech, December 2001
George Washington University, November 2001
University of Massachusetts-Boston, February 1995

PRESENTATIONS AT PROFESSIONAL MEETINGS

Southern Finance Association Annual Meeting, November 2022
5th World Symposium in Investment Research, May 2022
Spanish Finance Association Meeting, June 2021
China Financial Research Conference, July 2019
ARIMAC Annual Conference, November 2018 (Keynote)
American Finance Association Meetings, Jan. 2013, Jan. 2015, Jan. 2016
International Risk Management Conference, June 2014 (Keynote)
Asian Finance Association Meeting, July 2012
China International Conference in Finance, 2004, 2007-2009, 2011, 2013, 2017

FIRS Conference, May 2009, June 2011, June 2013
JOIM Fall 2008 Conference, October 2008
Asian Finance Association/Nippon Finance Association Meeting, July 2008
The Financial Intermediation Research Society Meeting, June 2008
Western Finance Association Meetings, June 1996, June 2003, June 2007
Chinese Finance Association Meeting, Sept. 2005
CISDM Annual Conference, 2003, 2004, 2005
European Finance Association Meeting, 2003, 2005, 2014 (Keynote)
CISDM London Conference, May 2004
Multinational Society Meeting, July 2002
European FMA Meeting, June 1999, June 2000, July 2006
Financial Management Association Meeting, 1995, 1996, 1998-2001
FMA International Meetings, May 1997, May 1998, June 1999, May 2000, May 2001, June 2002
National Economic Research Associates, Inc., February 1995

TEACHING EXPERIENCES

University of Massachusetts Amherst (2003-present)

Investments (Undergraduate)
Capital Markets and Institutions (Undergraduate)
International Finance (Undergraduate)
Personal Finance (Undergraduate)
Advanced Investments (Undergraduate)
Hedge Funds (MF)
Financial Analysis and Decisions (MBA)
Empirical Financial Economics (PhD)
Finance Seminar (PhD)

Case Western Reserve University (1995-2003)

Financial Management I (MBA)
Corporate Finance (Undergraduate)
Global Management (MBA)
Investment Management (MBA)

STUDENT SUPERVISION

Dissertation Chair

Yuhao Chen, Fall 2018-2022 (Placed: Minnesota State University)
Huan Kuang, Fall 2017-2022 (Placed: Bryant University)
Zheyuan Hu, Fall 2016-2019 (Placed: PwC)
Youhui Zhang, Fall 2011-2015 (Placed: Grove City College)
Liping Qiu, Fall 2010-2014 (Placed: University of Connecticut)
Li Cai, Fall 2008-2010 (Placed: Illinois Institute of Technology)
Gong Zhan, Fall 2007-2011 (Placed: Fudan University)
Chris Schwarz, Fall 2005-2008 (Placed: UC-Irvine)
Hyuna Park, Fall 2004-2007 (Placed: Minnesota State University)

Doctoral Committee

Satya Das, 2022-present
Raju Gholap, 2021-present
Rachel Koh, 2016-2018
Xiaohui Yang, 2014-2016
Chi Zhang, 2013-2016
Jian Du, 2010-2012
Shuang Feng, Spring 2010-2011
Roger Silvers, Fall 2011-2012
Min Xu, Spring 2009-2010
James Ma, Fall 2006-2008
Rosemond Desir, Summer 2007-2008
Hsiu-Lien Lu, Fall 2005-Summer 2007
Qian Bu, 2005-2006
Bhaswar Gupta, Fall 2003-Spring 2005
Ying Li, Fall 2004-2006
Jia Wang, Spring 2005-2007
Mira Weiss, 2000-2002, Case Western Reserve University

UNIVERSITY, SCHOOL, AND DEPARTMENT SERVICE

University

Provost's Advisory Council (PAC), 2016-2017
Graduate Fellowship Committee, 2007-2013
Graduate Council, 2007-2010
Academic Matters Council, 2006
Art Council, 2005-2007
Faculty Panelist, the New Faculty Orientation Program, 2004

School

Research Committee, 2016-present
Teaching Award Committee, 2015, 2016
Personnel Committee, 2014-present
PhD Curriculum Committee, 2004-2010, 2015-present
Undergraduate Curriculum and Policy Committee, 2004-2010
Curriculum Committee, 2003-2004
Assessment of Learning Taskforce, 2013
Scholarship Task Force, 2005
Chair, International Strategy Task Force, Weatherhead School of Management, 2000

Department

Faculty Director, Master of Finance in Alternative Investments, 2018-2022
Faculty Advisor for the Undergraduate Finance Society, 2014-2010
Curriculum Coordinator, 2015-present
Strategic Planning Committee, 2015-present

Personnel Committee, Chair, 2021-2022
Recruiting Committee, Chair, 2003-2004
Area Coordinator for the PhD Program, 2004-2010, 2015-2016

PROFESSIONAL SERVICE

Editorship: Editor: *Journal of Alternative Investments*, 2013-present
Guest Editor: *European Financial Management* 13, March 2007
Associate Editor: *Journal of Investment Management*, 2004-present
Associate Editor: *Asia-Pacific Journal of Financial Studies*, 2010-2011
Editorial Advisory Board: *Journal of Investment Consulting*, 2010-present
Editorial Board: *European Financial Management*, 2007-present
Editorial Board: *Journal of Alternative Investments*, 2004-2013

Ad Hoc Referee
Journal of Finance, Review of Financial Studies, Management Science, Journal of Financial and Quantitative Analysis, Review of Asset Pricing Studies, Review of Finance, Journal of Financial Intermediation, Journal of Banking and Finance, Financial Management, Journal of Empirical Finance, Journal of Corporate Finance, Journal of Financial Econometrics, Journal of Comparative Economics, Journal of Financial Services Research, Financial Analysts Journal, Journal of Risk, Journal of Futures Markets, Journal of Financial Research, Financial Review, Journal of Investment Management, Journal of Portfolio Management, European Financial Management, Journal of Alternative Investments, Quantitative Finance, Journal of Investment Consulting, Pacific-Basin Finance Journal, China Economic Review, Asia-Pacific Journal of Financial Studies, Finance Research Letters

External Examiner/Grant Reviewer
Research Grants Council of Hong Kong, 2017, 2018
Economic & Social Research Council (ESRC), UK, 2009
Social Science and Humanities Research Council of Canada (SSHRC), 2007, 2009
McGill University

Invited SEC Panelist
The SEC's Roundtable on Hedge Funds, May 14 and 15, 2003

Program Chair
Program Co-Chair, China International Conference in Finance, 2013

Program Committee
Western Finance Association Meetings, 2006-2021
American Finance Association Meetings, 2012, 2016
European Finance Association Meeting, 2006- 2009, 2015, 2017-2023
China International Conference in Finance, 2007- 2021
Conference on Professional Asset Management in Rotterdam, 2015-2019
European Financial Management Symposium on Alternative Investments, 2011
The Financial Intermediation Research Society Meeting, 2008, 2010-2022

Young Scholars Finance Consortium, 2020-2022
Asian Finance Association Conference, 2008, 2009, 2010
Conference on Financial Intermediation, 2008
Conference on Financial Intermediation and Regulation, 2008
European Financial Management Association Meetings, 2006, 2007, 2017
Financial Management Association Meetings, 1998-2005
Multinational Finance Society Meeting, 2002
Midwest Finance Association Meeting, 2002, 2016
Financial Management Association International Meetings, 1999, 2001, 2013

Session Chair
American Finance Association, 2012, 2016
Western Finance Association Meetings, 2009
China International Conference in Finance, 2007-2012, 2014, 2015, 2017-2021
Asian Finance Association Meetings, 2010
The Financial Intermediation Research Society Meeting (FIRS), 2008, 2009, 2022
Asian Finance Association/Nippon Finance Association Conference, 2008
European Finance Association Meeting, 2005
Financial Management Association Meetings, 1997-2000

Discussant
8th Annual Conference on Financial Market Regulation, May 2021
China International Conference in Finance, July 2018
SFS Cavalcade North America, May 2018
American Finance Association, January 2018, January 2012
Summer Institute of Finance (SIF) Conference, July 2011
Oxford-Man Hedge Fund Conference, October 2011
Institutional Investor Conference, UT-Austin, October 2010
Asian Finance Association Meetings, 2010
American Finance Association Meetings, 2009
The Financial Intermediation Research Society Meeting, 2008, 2009
European Finance Association Meetings, 2003, 2005
Western Finance Association Meeting, 2002, 2008
Financial Management Association International Meetings, 1997-2000
Financial Management Association Meetings, 1995-1997

Consulting
EnTrust Capital Inc., Senior Risk Advisor, 2006-2014
Analysis Group, Inc. Expert
Pacific American Foundation, Curriculum Committee Member
ARIMAC, Executive Board Member, 2004-present

Book Reviewer
"Corporate Finance: Theory and Practice" by Aswath Damodaran,
John Wiley and Sons
"Investment" by Charles Jones, 7th edition, John Wiley and Sons

"Fundamentals of Corporate Finance", by Brealey/Myers/Marcus 4/e, Irwin/McGraw- Hill
"Hedge Funds: Insights in Performance Measurement, Risk Analysis, and Portfolio Allocation" (Wiley Finance), by Greg N. Gregoriou, et al.

MEDIA APPEARANCES

Financial Times, October 14, 2009
Financial Times (Deutschland), October 14, 2009
The New Yorker, July 2, 2007
Amherst Bulletin, September 16, 2005
The Wall Street Journal, April 27, 2005, March 25, 2003, July 25, 2000, July 10, 1996
Registered Rep, March 1, 2005
The Economist, February 17, 2005
Forbes, May 24, 2004, June 14, 1999
Dow Jones Newswire, April 23, 2004, May 14, 2003, May 2, 2001
Federal Register 68, No. 195, October 8, 2003
The SEC Staff Report, September 2003
The Boston Globe, March 27, 2003
*Financial Times***,** May 5, 2001
WEWS-TV (ABC) Channel Five, April 4, 2001
Bloomberg News, October 19, 2000
The Voice of America, September 19, 2000, August 24, 2000,
Barron's, September 4, 2000
Business Week, April 3, 2000
Radio Free Asia, November 17, 1999
November 12, 1999, November 24, 1998
The Plain Dealer, January 21, 1999