Andrew Ang

Andrew Ang, PhD, is a well-known financial economist specializing in quantitative investing. Author of over 100 publications, Dr. Ang has published on sustainable investing, factor investing, and alternative assets. His research also includes tax-optimized strategies, tactical and strategic portfolio allocation, and private markets. His major papers include research starting the “low risk anomaly” literature which led to minimum volatility ETF strategies, incorporating macro factors into bond pricing models, and factor modeling of illiquid assets. His book, *Asset Management: A Systematic Approach to Factor Investing*, has been translated into Chinese, Japanese, Korean, and Spanish.

Dr. Ang was previously Managing Director and Head of Factors, Sustainable and Solutions at BlackRock. Dr. Ang was responsible for BlackRock’s factor investing strategies, which included passive and active factor ETFs and proprietary long-only and multi-asset, long-short solutions. His research on factor timing led to BlackRock’s first active ETF. Dr. Ang served as Senior Adviser to BlackRock Retirement Solutions and was the co-creator of BlackRock Tax Managed Equity strategies. His research was incorporated into Aladdin, BlackRock’s data and technology platform, as well as other financial modeling tools.

Before joining BlackRock in 2015, Dr. Ang was the Ann F. Kaplan Professor of Business at Columbia Business School. He was previously Chair of the Finance and Economics Division and a Faculty Research Fellow of the National Bureau of Economic Research. As a professor, Dr. Ang worked with several large institutional managers as an advisor. His work with industry was recognized by aiCIO naming him one of the top 10 most influential academics in the institutional investing world. Dr. Ang has been granted a patent, and he won several industry prizes and grants including the Harry Markowitz award, the Bernstein Fabozzi/Jacobs Levy award, and prizes and grants from the Q Group, INQUIRE, Netspar, and the National Science Foundation. Dr. Ang continues his work in the academy as an adjunct professor at Columbia University teaching a class on Climate Change and ESG Investing.

Dr. Ang earned a BEc(Hons) from Macquarie University, and a PhD in finance and MS in statistics from Stanford University. Dr. Ang used to be a Fellow of the Institute of Actuaries of Australia. He is a member of the Advisory Council of the *Financial Analysts Journal* and is a member of the advisory boards of several sovereign wealth funds.

In his spare time, Dr. Ang is a classical pianist but has been known to play the keyboard in rock bands specializing in cheesy 80s and 90s songs.

Professional Experience

Current Appointments

Board Positions

Board member and Co-Chair of the Program Committee, The Q-Group
Board member, Wilshire Benchmarks Topco Limited (private company producing indexes and portfolio analytics)
Member, Academic Board, AIF Global

Advisory Positions

Member, *Financial Analysts Journal* Advisory Council
Member, Investments and Risk Advisory Panel (IRAP), Monetary Authority of Singapore
Member, Investment Advisory Panel of the Sarawak Sovereign Wealth Future Fund Board
Advisor, Altbridge Inc (private company applying LLM reasoning to investment decisions)

Other Positions

Adjunct Professor, School of International and Public Affairs, Columbia University

Past Positions

2022-2025	Head of Factors, Sustainable and Solutions, BlackRock Senior Advisor to BlackRock Retirement Solutions
2015-2022	Head of the Factor-Based Strategies Group, BlackRock
2015-2025	Managing Director, BlackRock
1999-2016	Ann F. Kaplan Professor of Business Chair of the Finance and Economics Division, Columbia Business School Research Fellow, National Bureau of Economic Research (NBER)

Other Selected Past Appointments

Consultant, Canada Pension Plan Investment Board (CPPIB), 2014-2015, 2024-2025
Member, FTSE Academic Advisory Board, 2009-2015
Member, Norwegian Ministry of Finance Expert Panel, 2007-2015
Member, Investment Advisory Council UAW Retiree Medical Benefits Trust, 2013-2015

Education

PhD, Finance	Graduate School of Business, Stanford University, 1999
MS, Statistics	Stanford University, 1997
BEc, First Class Honours	Macquarie University, Australia, 1994

Patent

US Patent No. 10,706,473. Systems and methods for customizing a portfolio using visualization and control of factor exposure.

Awards, Grants, and Honors

George Kaufman ’54 Finance Speaker 2024, Oberlin.
Charles Goode Oration 2024, Melbourne Business School.
Harry Markowitz Award 2021, *Journal of Investment Management.*
Bernstein Fabozzi/Jacobs Levy Award 2020, *Journal of Portfolio Management.*
Online Education Excellence Award 2020, AIF Institute.
Asset Manager of the Year, Systematic Investing 2018, Risk.net
Asset Manager of the Year, Central Banking Awards 2018. Innovative product by the BlackRock Factor-Based Strategies Group specifically cited in the award.
Factor Investing Manager of the Year 2017, an industry award from Incisive Business Media sponsored by Aon Hewitt. Awarded to BlackRock Factor-Based Strategies Group.
Jacobs Levy Center Research Paper Prize for Outstanding Paper 2017.
Asset International’s Chief Investment Officer (aiCIO) Industry Innovation Award for Asset Management and Servicing 2015. Awarded to BlackRock Factor-Based Strategies Group.
Second Prize, Roger F. Murray Prize Competition 2014, Q Group.
aiCIO Top 10 Most Influential Academics in the Institutional Investing World 2013.
Dean’s Award for Teaching Excellence in an Elective Course 2012, Columbia Business School.
Second Prize, Roger F. Murray Prize Competition 2011, Q Group.
Netspar Theme Grant 2011-2014.
Chazen Institute and Columbia University CIBER Grant 2010.
Centre for Hedge Fund Research (CHFR) at Imperial College London Grant 2009.
INQUIRE Europe Grant 2009.
Second Prize, Crowell Memorial Prize Competition 2005.
BSI GAMMA Foundation Grant 2004.
Chazen Fellowship 2003, Columbia Business School.
INQUIRE Europe First Prize 2002.
INQUIRE UK Grant 2002.
Second Prize, Roger F. Murray Prize Competition 2002, Q Group.
National Science Foundation (NSF) Grant 2002-2007.
First Prize, Chicago Quantitative Alliance Academic Paper Competition 2001.
First Prize, Crowell Memorial Prize Paper Competition 2001.
Q-Group Grant 2001.
INQUIRE Europe Grant 2001.
First Prize, International Investment Forum Paper Competition 2000.
Chazen Fellowship 1999, Columbia Business School.
Eugene Lang Fellowship 1999, Columbia Business School.
Fellow, Institute of Actuaries of Australia 1998.
Jaedicke Merit Fellowship 1997, Stanford Business School.

Reddington Prize 1997, Society of Actuaries.
Macquarie University Medal 1994.
Hubert Vaughan Prize 1993 (for actuarial studies), Macquarie University.
NRMA Insurance Prize for Actuarial Management 1993, Macquarie University.
Victor Argy Memorial Prize 1993 (for macroeconomics), Macquarie University.
AMP Actuarial Scholarship 1991-1994.
Rotary Exchange Scholarship 1990.
National Mathematics Summer School 1989.
General Exhibition 1989 (for outstanding academic achievement in Year 12).
Australian Youth Orchestra Tour 1994.
J. B. Vincent Memorial Prize for Licentiate Violin 1989.
Licentiate in Music, Australia (L.Mus.A.) Violin 1989.
A. J. Leckie Memorial Award for Associate Pianoforte 1988.
Associate in Music, Australia (A.Mus.A.) Piano 1988.

Representative Publications

(Reverse chronological order)

Google Scholar h index = 51

Hodges, Philip, Ked Hogan, Justin Peterson, and Andrew Ang. 2017. "Factor Timing with Cross-Sectional and Time-Series Predictors." *Journal of Portfolio Management* 44 (1): 30-43.

> Introduced BlackRock's factor timing portfolio strategies, leading to BlackRock's first active ETF.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang. 2006. "The Cross-Section of Volatility and Expected Returns," *Journal of Finance* 51 (1): 259-299.

> Started the "low risk anomaly" literature which led to minimum volatility factor ETFs.

Ang, Andrew, and Monika Piazzesi. 2003. "A No-Arbitrage Vector-Autoregression of Term Structure Dynamics with Macroeconomic and Latent Variables." *Journal of Monetary Economics* 50 (4): 745-787.

> Integrated asset pricing and macro models, contributing to the "macro finance" literature.

Book

1. Ang, Andrew. 2014. *Asset Management: A Systematic Approach to Factor Investing*. Oxford University Press.

Japanese edition, 2016, Kinzai. Supervised and translated by Yusaku Sakaguchi.
Chinese edition, 2017, China Development Press. Supervised and translated by Jane Long.
Spanish translation, 2021, Farogue S. L.
Korean translation, 2021, Acorn Publishing Company

Working Papers

2. "A Systematic Approach to Sustainable and ESG Investing," with Gerald T. Garvey and Katharina Schwaiger.

3. "ESG Return and Positioning Attribution via Shapley Values," with Debarshi Basu and Marco Corsi.

4. "Paris-Aligned Commodities," with Taylor Dufour, He Ren, and Katharina Schwaiger.

Journal Articles

(Reverse chronological order)

2021 – 2025

5. Jacobs, Peter, Ursula Marchioni, Stefan Poechhacker, Nicholas Werbach, and Andrew Ang. 2025. "Comparisons of Asset Manager, Asset Owner, and Wealth and Retail Portfolios." Forthcoming *Journal of Investing*.

6. Almufti, Ali, Linus Franngard, Scott Gladstone, and Andrew Ang. 2025. "Exit Predictions for Venture Capital Over Different Economic Regimes." *Journal of Alternative Investments*, 27 (4), DOI 10.3905/jai.2025.1.235

7. Ang, Andrew, and Ananth Madhavan. 2024. "Filled and Killed: Forecast and Realized Trading Costs Across Horizons from Global Equity and Fixed Income Portfolio Trades." *Journal of Portfolio Management* 50 (9): 8-28.

8. Zhang, Chi, Xinyang Li, Andrea Tamoni, and Misha van Beek. 2024. "ESG Risk and Returns Implied by Demand-Based Asset Pricing Models." *Journal of Asset Management* 25: 203-221.

9. Ang, Andrew, Henry Shen, Jeff Shen, and Rui Zhao. 2024. "Optimal Portfolio Choice with Absorbing State Markov Chains: Application to Markets that May Potentially Decouple." *Journal of Investment Management* 22 (2): 4-24.

10. Ang, Andrew, Melissa Brown, Bob Hum, Anthony Renshaw, Katharina Schwaiger, Hamish Seegopaul, Arun Singhal, and Lukas Smart. 2024. "How Do Low Tracking Error, Multifactor ETFs Fit Into the Factor Investment Landscape?" *Journal of Beta Investment Strategies* 15 (1): 28-38.

11. Paul, Alyson, Bart Sikora, Mehul Rawal, Susan Wasserman, and Andrew Ang. 2024. "Modeling Models: Factor and Risk Decompositions of Model Advisor Portfolios." *Journal of Portfolio Management* 50 (3): 174-190.

12. Ang, Andrew, Jennie Bai, and Hao Zhou. 2023. "The Great Wall of Debt: The Cross Section of Chinese Local Government Credit Spreads." *Journal of Finance and Data Science* 9, 100098.

13. Ang, Andrew, Tom Morris, and Raffaele Savi. 2023. "Asset Allocation with Crypto: Application of Preferences for Positive Skewness." *Journal of Alternative Investments*, 25 (4): 7-28.

14. Diamond, Steven, Stephen Boyd, David Greenberg, Mykel J. Kochenderfer, and Andrew Ang. 2023. "Optimal Claiming of Social Security Benefits." *Journal of Retirement* 10 (3): 33-46.

15. Ang, Andrew. 2023. "Trends and Cycles of Style Factors in the 20th and 21st Centuries." *Journal of Portfolio Management* 49 (2): 33-56.

16. Moehle, Nicholas, Stephen Boyd, and Andrew Ang. 2022. "Attribution via Shapley Value." *Journal of Investment Management* 20 (3): 33-52.

17. Kaul, Karishma, Katharina Schwaiger, Muling Si, and Andrew Ang. 2022. "Sustainable Alpha in Sovereign and Corporate Bonds." *Journal of Investment Management* 20 (2): 30-50.

18. Ang, Andrew, Calvin Yu, Sarah Siwinski, and He Ren. 2022. "Public Pension Portfolios in a World of Low Rates and Low Risk Premiums." *Journal of Investment Consulting* 21 (1): 30-44.

19. Hodges, Philip, He Ren, Katharina Schwaiger, and Andrew Ang. 2022. "Net Zero Investing for Multi-Asset Portfolios Satisfying Paris Aligned Benchmark Requirements with Climate Alpha Signals." *Journal of Portfolio Management* 48 (4): 33-58.

20. Pauksta, Eugene, Karishma Kaul, Tom Parker, Scott Radell. and Andrew Ang. 2022. "Investing in US Core Fixed Income with Macro and Style Factors." *Journal of Portfolio Management* 48 (2): 45-65.

21. Kazdin, Joshua, Katharina Schwaiger, Viktoria-Sophie Wendt, and Andrew Ang. 2021. "Climate Alpha with Predictors also Improving Firm Efficiency." *Journal of Impact and ESG Investing* 2 (2): 35-56.

22. Ang, Andrew, Linxi Chen, Michael Gates, and Paul D. Henderson. 2021. "Index + Factors + Alpha." *Financial Analysts Journal* 77 (4): 45-64.

23. Madhavan, Ananth, Aleksander Sobczyk, and Andrew Ang. 2021. "What Happens with More Funds than Stocks? Analysis of Crowding in Style Factors and Individual Equities." *Journal of Investment Management* 18 (4): 1-26. Winner Harry Markowitz Award, 2021.

24. Moehle, Nicholas , Mykel J. Kochenderfer, Stephen Boyd, and Andrew Ang. 2021. "Tax-Aware Portfolio Construction via Convex Optimization." *Journal of Optimization Theory and Applications* 189 (2): 364-383.

25. Gladstone, Scott, Ananth Madhavan, Anita Rana, and Andrew Ang. 2021. "Macro Factor Model: Application to Liquid Private Portfolios." *Journal of Portfolio Management* 47 (5): 72-90.

26. Kimura, Keiko, Katharina Schwaiger, Deepika Sharma, and Andrew Ang. 2021. "Factors with Style." *Journal of Investing* 30 (3): 21-46.

2016 – 2020

27. Madhavan, Ananth, Aleksander Sobczyk, and Andrew Ang. 2020. "Toward ESG Alpha: Analyzing ESG Exposures Through a Factor Lens," *Financial Analysts Journal* 77 (1): 69-88.

28. Chan, Ying, Ked Hogan, Katharina Schwaiger, and Andrew Ang. 2020. "ESG in Factors." *Journal of Impact and ESG Investing* 1 (1): 26-45.

29. Ang, Andrew, Jun Liu, and Krista Schwarz. 2020. "Using Stocks or Portfolios in Tests of Factor Models," *Journal of Financial and Quantitative Analysis* 55 (3): 709-750. Funded by INQUIRE Europe. Winner Outstanding Paper, Jacobs Levy Center Research Paper Prize 2017.

30. Madhavan, Ananth, Aleksander Sobczyk, and Andrew Ang. 2020. "Alpha vs. Alpha: Selection, Timing, and Factor Exposures from Different Factor Models." *Journal of Portfolio Management* 46 (5): 90-103. Winner Bernstein Fabozzi/Jacobs Levy Award, 2020.

31. Lawler, Brian, Brett M. Mossman, Patrick Nolan, and Andrew Ang. 2020. "Factors and Advisors Portfolios."*Journal of Wealth Management* 22 (4): 37-61.

32. Basu, Debarshi, Michael Gates, Vishal Karir, and Andrew Ang. 2019. "Model Portfolios." *Journal of Wealth Management* 21 (4): 46-63.

33. Ang, Andrew, Sara Shores, and Bob Bass with Di Sanborn, Kristin Fergis, and Katelyn Gallagher, 2018. "Strategic Factor Allocation: Applying Factors in Portfolio Design." *Risk & Rewards*, Society of Actuaries 72: 1-13.

34. Ang, Andrew, Bingxu Chen, William N. Goetzmann, and Ludovic Phalippou. 2018. "Estimating Private Equity Returns from Limited Partner Cash Flows." *Journal of Finance*, 73 (4): 1751-1783. Funded by Netspar. Second Prize, Roger F. Murray Prize Competition, 2014.

35. Ang, Andrew, Andrés Ayala and William N. Goetzmann. 2018. "Investment Beliefs of Endowments." *European Financial Management* 24 (1): 3-33. Funded by Netspar.

36. Madhavan, Ananth, Aleksander Sobczyk, and Andrew Ang. 2018. "What's in Your Benchmark? A Factor Analysis of Major Market Indexes." *Journal of Portfolio Management*, 44 (4): 46-59. Reprinted Madhavan, Ananth, Aleksander Sobczyk, and Andrew Ang. 2018. *Journal of Index Investing* 9 (2): 66-79.

37. Ang, Andrew, Ananth Madhavan and Aleksander Sobczyk. 2017. "Estimating Time-Varying Factor Exposures." *Financial Analysts Journal* 73 (4): 41-54.

38. Ang, Andrew, Ananth Madhavan and Aleksander Sobczyk. 2017. "Crowding, Capacity, and Valuation of Minimum Volatility Strategies." *Journal of Index Investing* 7 (4): 41-50.

39. Ang, Andrew, Ked Hogan and Sara Shores. 2017. "Factor Risk Premiums and Invested Capital: Calculations with Stochastic Discount Factors." *Journal of Asset Management*, 19 (3): 145-155.

40. Ratcliffe, Ronald, Paolo Miranda, and Andrew Ang. 2017. "Capacity of Smart Beta Strategies from a Transaction Cost Perspective." *Journal of Index Investing* 8 (3): 39-50.

41. Hodges, Philip, Ked Hogan, Justin Peterson, and Andrew Ang. 2017. "Factor Timing with Cross-Sectional and Time-Series Predictors." *Journal of Portfolio Management* 44 (1): 30-43.

42. Ang, Andrew, Richard C. Green, Francis A. Longstaff, and Yuhang Xing. 2017. "Advance Refundings of Municipal Bonds." *Journal of Finance* 72 (4): 1645-1682.

43. Bass, Robert, Scott Gladstone, and Andrew Ang. 2017. "Total Portfolio Factor, Not Just Asset, Allocation." *Journal of Portfolio Management* 43 (5): 38-53.

44. Ang, Andrew, Ananth Madhavan, and Aleksander Sobczyk. 2017. "Crowding, Capacity, and Valuation of Minimum Volatility Strategies," *Journal of Index Investing* 7 (4): 41-50.

45. Greenberg, David, Abhilash Babu, and Andrew Ang. 2016. "Factors to Assets: Mapping Factor Exposures to Asset Allocations." *Journal of Portfolio Management* 42 (5): 18-27.

2011 - 2015

46. Ang, Andrew, Dimitris Papanikolaou, and Mark M. Westerfield. 2014. "Portfolio Choice with Illiquid Assets." *Management Science* 60 (11): 2737-2761. Funded by Netspar. Second Prize, Roger F. Murray Prize Competition 2011, Q Group.

47. Ang, Andrew, Amit Goyal, and Antti Ilmanen. 2014. "Asset Allocation and Bad Habits." *Rotman International Journal of Pension Management* 7 (2): 16-26.

48. An, Byeong-Je, Andrew Ang, Turan Bali, and Nusret Cakici. 2014. "The Joint Cross Section of Stock and Option Returns." *Journal of Finance* 69 (5): 2279-2337. Funded by Netspar.

49. Ang, Andrew, Assaf Shtauber and Paul C. Tetlock. 2013. "Asset Pricing in the Dark: The Cross Section of OTC Stocks," *Review of Financial Studies* 26 (12): 2985-3028. Funded by Netspar.

50. Ang, Andrew, and Richard C. Green. 2013. "Lowering Borrowing Costs for States and Municipalities Through CommonMuni." *Municipal Finance Journal* 34 (3): 43-94. Also published as Discussion Paper 2011-01, The Hamilton Project, Brookings Institution. Funded by The Hamilton Project.

51. Ang, Andrew, Bingxu Chen, and Suresh M. Sundaresan. 2013. "Liability Driven Investment with Downside Risk." *Journal of Portfolio Management* 40 (1): 71-87. Funded by Netspar.

52. Ang, Andrew, Neil Nabar, and Samuel Wald. 2013. "Searching for a Common Factor in Public and Private Real Estate Returns." *Journal of Portfolio Management* 39 (5): 120-133. Funded by Netspar.

53. Ang, Andrew, and Francis A. Longstaff. 2013. "Systemic Sovereign Default Risk: Lessons from the U.S. and Europe." *Journal of Monetary Economics*, 60 (5): 493-510. Funded by Netspar.

54. Ang, Andrew, and Morten Sorensen. 2013. "Investing in Private Equity." *Alternative Investment Analyst Review* 2 (1): 21-31.

55. Ang, Andrew, and Morten Sorensen. 2012. "Risk, Returns, and Optimal Holdings of Private Equity: A Survey of Existing Approaches." 2012, *Quarterly Journal of Finance* 2 (3), DOI: 10.1142/S2010139212500115. Funded by Netspar.

56. Ang, Andrew, and Allan Timmermann. 2012. "Regime Changes and Financial Markets." *Annual Review of Financial Economics* 4: 313-337. Funded by Netspar.

57. Ang, Andrew, and Dennis Kristensen. 2012. "Testing Conditional Factor Models." *Journal of Financial Economics* 106 (1): 132-156. Funded by Netspar.

58. Ang, Andrew, Marie Brière, and Ombretta Signori. 2012. "Inflation and Individual Equities," *Financial Analysts Journal* 68 (4): 36-55. Funded by Netspar.

59. Ang, Andrew. 2012. "Predicting Dividends in Log-Linear Present Value Models." *Pacific-Basin Finance Journal* 20 (1): 151-171.

60. Ang, Andrew, William N. Goetzmann, and Stephen M. Schaefer. 2011. "The Efficient Market Theory and Evidence: Implications for Active Investment Management." *Foundations and Trends in Finance* 5 (3): 157-242.

61. Ang, Andrew, Jean Boivin, Sen Dong, and Rudy Loo-Kung. 2011. "Monetary Policy Shifts and the Term Structure." *Review of Economic Studies* 78 (2): 429-457. Funded by the NSF.

2006 – 2010

62. Ang, Andrew, and Nicolas P. B. Bollen. 2010. "Locked Up by a Lockup: Valuing Liquidity as a Real Option," *Financial Management* 39 (3): 1069-1095. Funded by the Centre for Hedge Fund Research (CHFR) at Imperial College London.

63. Ang, Andrew, Vineer Bhansali, and Yuhang Xing. 2010. "Build America Bonds." *Journal of Fixed Income* 20 (1): 67-73.

64. Ang, Andrew, Vineer Bhansali, and Yuhang Xing. 2010. "Taxes on Tax-Exempt Bonds." *Journal of Finance* 65 (2): 565-601.

65. Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang. 2009. "High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence." *Journal of Financial Economics* 91 (1): 1-23. Funded by the NSF.

66. Ang, Andrew, Matthew Rhodes-Kropf, and Rui Zhao. 2008. "Do Funds-of-Funds Deserve Their Fees-on-Fees?" *Journal of Investment Management* 6 (4): 34-58. Funded by the BSI GAMMA Foundation.

67. Ang, Andrew, Geert Bekaert, and Min Wei. 2008. "The Term Structure of Real Rates and Expected Inflation." *Journal of Finance* 63 (2): 797-849. Funded by the NSF.

68. Ang, Andrew, Li Gu, and Yael V. Hochberg. 2007. "Is IPO Underperformance a Peso Problem?" *Journal of Financial and Quantitative Analysis* 42 (3): 565-594.

69. Ang, Andrew, and Jun Liu. 2007. "Risk, Return and Dividends." *Journal of Financial Economics* 85 (1): 1-38. Funded by the NSF.

70. Ang, Andrew, and Geert Bekaert. 2007. "Stock Return Predictability: Is it There?" *Review of Financial Studies* 20 (3): 651-707. Funded by the NSF.

71. Ang, Andrew, Geert Bekaert, and Min Wei. 2007. "Do Macro Variables, Asset Markets or Surveys Forecast Inflation Better?" *Journal of Monetary Economics* 54 (4): 1163-1212. Funded by the NSF.

72. Ang, Andrew, and Joseph S. Chen. 2007. "CAPM Over the Long Run: 1926-2001." *Journal of Empirical Finance* 14 (1): 1-40.

73. Ang, Andrew, Joseph S. Chen, and Yuhang Xing. 2006. "Downside Risk." *Review of Financial Studies* 19 (4): 1191-1239. Second prize Crowell Memorial Prize Competition 2005. Funded by the Q-Group.

74. Ang, Andrew, Monika Piazzesi, and Min Wei. 2006, "What Does the Yield Curve Tell us about GDP Growth?" *Journal of Econometrics* 131 (1-2): 359-403. Funded by the NSF.

75. Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang. 2006. "The Cross-Section of Volatility and Expected Returns," *Journal of Finance*, 51 (1): 259-299. Funded by the NSF.

2001 – 2005

76. Ang, Andrew, Geert Bekaert, and Jun Liu. 2005. "Why Stocks May Disappoint." *Journal of Financial Economics* 76 (3): 471-508.

77. Ang, Andrew, and Angela Maddaloni. 2005. "Do Demographic Changes Affect Risk Premiums? Evidence from International Data." *Journal of Business* 78 (1): 341-380. Funded by the NSF.

78. Ang, Andrew, and Jun Liu. 2004. "How to Discount Cashflows with Time-Varying Expected Returns." *Journal of Finance* 59 (6): 2745-2783. Funded by INQUIRE UK.

79. Ang, Andrew, and Geert Bekaert. 2004. "How do Regimes Affect Asset Allocation?" *Financial Analysts Journal* 60 (2): 86-99. Funded by INQUIRE Europe.

80. Ang, Andrew, and Monika Piazzesi. 2003. "A No-Arbitrage Vector-Autoregression of Term Structure Dynamics with Macroeconomic and Latent Variables." *Journal of Monetary Economics* 50 (4): 745-787. Funded by the NSF.

81. Ang, Andrew, and Geert Bekaert. 2002a. "International Asset Allocation with Regime Shifts." *Review of Financial Studies* 15 (4): 1137-1187. First prize International Investment Forum Paper Competition 2000. First prize Crowell Memorial Prize Competition 2001. First prize Chicago Quantitative Alliance Academic Paper Competition 2001. Funded by the NSF.

82. Ang, Andrew, and Geert Bekaert. 2002b. "Short Rate Nonlinearities and Regime Switches." *Journal of Economic Dynamics and Control* 26 (7-8): 1243-1274. Funded by the NSF.

83. Ang, Andrew, and Geert Bekaert. 2002c. "Regime Switches in Interest Rates." *Journal of Business and Economic Statistics* 20 (2): 163-182. Funded by the NSF.

84. Ang, Andrew, and Joseph S. Chen. 2002. "Asymmetric Correlations of Equity Portfolios." *Journal of Financial Economics* 63 (3): 443-494. Second Prize, Roger F. Murray Prize Competition, 2002.

85. Ang, Andrew, and Jun Liu. 2001. "A General Affine Earnings Valuation Model." *Review of Accounting Studies* 6: 397-425.

Pre-2000

86. Ang, Andrew, and Michael Sherris. 1997. "Interest Rate Risk Management." *North American Actuarial Journal* 1 (2): 1-26. Winner of the Reddington prize, 1997.

87. Ang, Andrew. 1995. "Prepayment Penalties - Why MBS Investors Demand a Premium." *JASSA (Journal of the Securities Institute of Australia)* 4: 26-29.

Book Chapters, Manuscripts, and Other Articles

(Reverse chronological order)

88. Ang, Andrew, Debarshi Basu, and Marco Corsi. 2024. "Attribution of Portfolios with Climate-Related Signals." in *Investment Innovations Toward Achieving Net Zero*, CFA Institute, pp. 116-132.

89. Schwaiger, Katharina, Riyadh Ali, and Andrew Ang. 2023. "Net Zero Sovereign Bond Portfolios." In *Evolving Practices in Public Investment Management: Proceedings of the Eighth Public Investors Conference*, Bank of International Settlements, pp. 167-184.

90. Ang, Andrew, Jennifer Bender, Harindra de Silva, and Pim van Vliet. 2023. "Factor Investing Webinar." *Journal of Portfolio Management*, DOI: 10.3905/jpm.2023.1.491.

91. Schwaiger, Katharina, Jim Snow, Viktoria-Sophie Wendt, and Andrew Ang. 2022. "Active Paris Aligned Equity Investing." In Jurczenko, Emmanuel, ed. Climate Investing: New Strategies and Implementation Challenges. ISTE Wiley, pp. 123-140.

92. Ang, Andrew. 2020. "Including Factor Investing in Portfolio Design." *Journal of Investment Consulting*, 20, 1, 4-11.

93. Ang, Andrew, David Chua, Katelyn Gallagher, and Stephen Hull. 2020. "BlackRock: Reserves Management with Factors and Reference Portfolios." In Bjorheim, Jacob, ed. *Asset Management at Central Banks and Monetary Authorities: New Practices in Managing International Foreign Exchange Reserves*. Springer, pp. 459-484.

94. Ang, Andrew, Jia Liu, and He Ren. 2018. "Factor Investing." In Peng, Wu, Wallace Yu, and Li Yue, eds. *Discover the Frontier of Asset Management: Risk Parity Quantitative Investment*. CITIC Press Group, pp. 209-256.

95. Ang, Andrew, Ked Hogan, and Justin Peterson. 2018. "Is it Time to Tilt? Exploring a Fundamental Question in Factor Investing." *Investments & Wealth Monitor*, January/February, 40-45.

96. Ang, Andrew, and Sara Shores. 2018. "Quantifying Intuition: The Evolution of Factor-Based Investing." In *Factor Investing Focus: Leveraging Insights to Improve Performance*, European Pensions, pp. 30-32. Sponsored publication by BlackRock.

97. Ang, Andrew. 2017. "Introduction." In Jurczenko, Emmanuel, ed. *Factor Investing: From Traditional to Alternative Risk Premia*. ISTE Press – Elsevier, pp. xix-xxiii.

98. Ang, Andrew. 2016. "Factor Investing: More than Simply Investing in Factors." In Lussier, Jacques, ed. *Portfolio Structuring and the Value of Forecasting, Research Foundation Review*, CFA Research Foundation Institute.

99. Ang, Andrew. 2014. "Risk and Information in the Municipal Bond Market." *NBER Reporter*, 3, 9-11.

100. Ang, Andrew, Michael W. Brandt, and David F. Denison. 2014. "Review of the Active Management of the Norwegian Government Pension Fund Global." Commissioned by the Norwegian Ministry of Finance.

101. Ang, Andrew. 2012. "The Four Benchmarks of Sovereign Wealth Funds." In Bolton, Patrick, Frederic Samama, and Joseph E. Stiglitz, eds. *Sovereign Wealth Funds and*

Long-Term Investing, Columbia University Press, pp. 94-105. Reprinted in Ang, Andrew, 2011. *Business & Management Journal*, 1, 4.

102. Ang, Andrew. 2011. "Illiquid Assets." *CFA Institute Conference Proceedings Quarterly*, 28, 4, 12-22.

103. Ang, Andrew, and Knut N. Kjaer. 2011. "Investing for the Long Run." In Franzen, Tomas, ed. *A Decade of Challenges – A Collection of Essays on Pensions and Investments*, Andra AP-fonden, Second Swedish National Pension Fund - AP2, pp. 94-111.

104. Ang, Andrew, and Xiaoyan Zhang. 2011. "Price-Earnings Ratios: Growth and Discount Rates." In Hammond, P. Brett Jr., Martin L. Leibowitz, and Laurence B. Siegel, eds. *Rethinking the Equity Risk Premium*, Research Foundation of the CFA Institute, pp. 130-142.

105. Ang, Andrew, William N. Goetzmann, and Stephen M. Schaefer, 2009. "Report on the Active Management of the Norwegian Government Pension Fund – Global." Commissioned by the Norwegian Ministry of Finance.

106. Ang, Andrew, Matthew Rhodes-Kropf, and Rui Zhao. 2006. "A New Measure for Measuring." *Institutional Investor's Alpha*, July/August, 40-45. Funded by the BSI GAMMA Foundation.

Cases

(Reverse chronological order)

107. Ang, Andrew, and Bruce Usher. 2015. "Stanford Dumps Coal." Columbia CaseWorks ID#150307.

108. Ang, Andrew. 2013. "Saving Public Pensions: Rhode Island Pension Reform." Columbia CaseWorks ID#120313.

109. Ang, Andrew. 2012. "GM Asset Management and Martingale's Low Volatility Strategy." Columbia CaseWorks ID#110315.

110. Ang, Andrew. 2012. "Factor Investing: The Reference Portfolio and Canada Pension Plan Investment Board." Columbia CaseWorks ID#120302.

111. Abrams, Jeremy, and Andrew Ang. 2012. "California Dreamin': The Mess at CalPERS." Columbia CaseWorks ID#120306.

112. Ang, Andrew. 2011. "Who Watches the Watchman? New York State Common Retirement Fund." Columbia CaseWorks ID#110307.

113. Ang, Andrew. 2011. "Stay the Course? Portfolio Advice in the Face of Large Losses." Columbia CaseWorks ID#110309.

114. Ang, Andrew, Lynne Sagalyn, and Rona Smith. 2011. "Is Real Estate Real?" Columbia CaseWorks ID#111704.

115. Ang, Andrew, Jaan Elias, William N. Goetzmann, Jean Rosenthal, and Olav Sorenson. 2010. "Norway Pension Fund – Global: A Nation Reconsiders How to Manage Its Nest Egg" Yale Case 2010-106.

116. Ang, Andrew. 2010. "Liquidating Harvard." Columbia CaseWorks ID#100312.

117. Ang, Andrew. 2008. "The Norwegian Government Pension Fund: The Divestiture of Wal-Mart Stores Inc." Columbia CaseWorks ID#080301.

118. Ang, Andrew. 2008. "The Quant Meltdown: August 2007." Columbia CaseWorks ID#080317.

Marketing

2019-2020 Defining Factors BlackRock Marketing Campaign

Marketing campaign to explain factor investing to the general public, with celebrities:
119. Danny Meyer, restauranteur
120. Idina Menzel, actor, singer, songwriter
121. Doc Rivers, NBA basketball coach

BlackRock In The Know

122. What if $2T Moves Toward Net Zero Emission Companies Every Year? August 2021.

Andrew's Angle Blog Entries
(Reverse chronological order)

123. Factor Timing Over Time, May 2024.
124. A Systematic Framework to Factor Tilting, January 2024.
125. When Momentum Loses Momentum, October 2023.
126. Factors and the Magnificent Seven, September 2023.
127. Factors and Sectors, July 2023.
128. International Styles, May 2023.
129. Quality Control, April 2023.
130. Trends in Factor Investing in the 20th and 21st Centuries, March 2023.
131. The Next Factor Revolution: Fixed Income Factor ETFs, October 2022.
132. Factors and That '70s Show, October 2022.
133. A Mid-Year Factor Focus, August 2022.
134. The Next Evolution of Factor investing, May 2022.
135. Factoring in Sustainability: A Worthy Pair, March 2022.
136. Performing a (Semi) Annual Checkup on Markets with Momentum, January 2022.
137. The Next Frontier: Factor Investing in Fixed Income, October 2021.
138. Mix and the Remix: Factors and Indexing, September 2021.
139. Turning the Lights Back on with Value and Quality, September 2021.

140. Keeping Track of Markets with Momentum, June 2021.
141. Minimum Volatility: We've Been Here Before, April 2021.
142. The Latest Trends in Factors, March 2021.
143. Factors: A New Way, January 2021.
144. Keep More of What You Earn, December 2020.
145. Momentum: If You Can't Beat 'Em, Join 'Em, November 2020.
146. Style Factors and Elections, October 2020
147. The Sleeping Giant: Value's Dormant not Dead, September 2020.
148. Navigating Contraction, July 2020.
149. ESG in Factors, May 2020.
150. Relying on Factors in Crises, March 2020.
151. Factor Capacity by the Numbers, December 2019.
152. Fending Off Factor Investing Fallacies, September 2019.
153. The Lowdown on Low Vol, July 2019.
154. How to Prepare for an Unpredictable 2019, February 2019.
155. Defining Factors, February 2019.
156. How to Prepare for an Unpredictable 2019, February 2019.
157. Market Volatility Doth Make Cowards of Us All, December 2018.
158. Growth is Not the Opposite of Value, November 2018.
159. Value Investing: The Long-Term Appeal of the Underdog, September 2018.
160. Factors for Retirement Investing, August 2018.
161. Factors+Index+Alpha, July 2018.
162. Factors Making Waves, June 2018.
163. Telling the Factor Story, April 2018.
164. Factors in Indices: Going Beyond Market Averages, April 2018.
165. Factor, Not Just Asset, Allocation, February 2018.
166. The Factor Box: A New Lens, January 2018.
167. The Five Ws of Style Factors, December 2017.
168. Long-Short Factor Investing, October 2017.
169. Factor Checklist: Four Requirements for a Robust Factor, September 2017.
170. Factor Capacity – A Wide Highway Ahead? August 2017.
171. Factor Investing – A Time to Tilt, June 2017.

Other Blog Entries

172. Multifactor Strategies, with Holly Framsted, April 2018.
173. Investment vs. Risk Management Factors, April 2018.
174. 2018Q2 Factor Outlook, April 2018.
175. Factors to Pursue Outperformance, March 2018.
176. Marcoeconomic Factors: Important Diversifiers, with Ked Hogan, February 2018.
177. Factor ETFs: Making the Style Box Stylish Again, with Holly Framsted, September 2017.
178. How to Harness Value Strategies, with Holly Framsted, March 2017.
179. Three Facts about Momentum Investing, January 2017.
180. Are Michigan and Illinois Like Greece and Ireland? with Francis A. Longstaff, Vox EU column, May 2011.
181. Out of the Crisis, Now What? Columbia Business School Public Offering blog, September 2009.

182. A Checklist for Everyday Investing, Columbia Business School Public Offering blog, March 2009.
183. Wall Street's Roach Motels, Forbes.com, October 2008.

Selected Podcasts and Webcasts

184. S2: Educational Alpha, Chartered Alternative Investment Analysts (CAIA), May 2024.
185. FTSE Russell Convenes: Creating the Best Playlist for Your Portfolio, September 2023.
186. Our New Standard: The Facts about Factors, The Bid (BlackRock's podcast), March 2020.
187. Masters in Business by Barry Ritholz, June 2019.

Non-Published Papers

(Reverse chronological order)

188. Ang, Andrew, Fabrizio Coiai, Paul Henderson, and Anita Rana. 2021."Optimal Currency Allocation to Add Alpha and Reduce Risk."

189. Ang, Andrew, Ananth Madhavan, and Jason Ribando. 2021. "How Many Active Funds Should You Hold?"

190. An, Byeong-Je, Andrew Ang, and Pierre Collin-Dufresne. 2015. "How Often Should You Take Tactical Asset Allocation Decisions?"

191. Ang, Andrew, Vineer Bhansali, and Yuhang Xing. 2014. "The Muni Bond Spread: Credit, Illiquidity, and Tax." Funded by Netspar.

192. Ang, Andrew, and Maxim Ulrich. 2012. "Nominal Bonds, Real Bonds, and Equity." Funded by Netspar.

193. Ang, Andrew, and Joseph S. Chen. 2011. "Yield Curve Predictors of Foreign Exchange Returns."

194. Ang, Andrew, and Nicolas P. B. Bollen. 2010. "When Hedge Funds Block the Exits."

195. Ang, Andrew, Sen Dong and Monika Piazzesi. 2007. "No-Arbitrage Taylor Rules." Funded by the NSF.

PhD Students with a Significant Advisory Role

(Year of graduation and initial placement)

Renxuan Wang, 2021, China Europe International Business School (CEIBS)
Andrés Ayala, 2016, Amazon Economics
Byeong-Je An, 2016, Nanyang Technological University
Bingxu Chen, 2014, QMS Capital Management
Sergiy Gorovvy, 2012, Morgan Stanley
Bruno Carla Giovannetti, 2011, University of Sao Paolo
Krista Schwarz, 2010, Wharton

Xiaozheng (Sandra) Wang, 2009, Criterion Economics
Philippe Mueller, 2008, London School of Economics
Frank Yu Zhang, 2008, Citigroup
Po-Hsuan Hsu, 2007, University of Connecticut
Rui Zhao, 2007, BlackRock
Sen Dong, 2006, Lehman Brothers
Li Gu, 2006, Fordham University
Hangyong Lee, 2004, Korean Development Institute
Stefania D'Amico, 2004, Federal Reserve Board
Min Wei, 2004, Federal Reserve Board
Jaehoon Hahn, 2003, University of Washington
Angela Maddaloni, 2003, European Central Bank
Yuhang Xing, 2003, Rice University
Rong Qi, 2002, ING-Aeltus Asset Management
Xiaoyan Zhang 2002, Cornell University.