Hanlin Shang
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Department of Actuarial Studies and Business Analytics
Transforming Energy Markets Research Centre
Frontier AI Research Centre
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Biography

Research Interests

Functional data analysis

Nonparametric and semiparametric statistics

Bayesian econometrics

Computational statistics

Demographic forecasting
Editorial Board

Editor, Australian and New Zealand Journal of Statistics (7/2019-)

Associate Editor, Computational Statistics (1/2019-)

Associate Editor, International Journal of Forecasting (2/2021-)

Associate Editor, Demographic Research (4/2022-)

Associate Editor, Journal of Computational and Graphical Statistics (1/2017-7/2026)

Associate Editor, Forecasting (3/2020-8/2025)

Associate Editor, Journal of the Royal Statistical Society: Series A (1/2019-12/2022)

Associate Editor, Australian and New Zealand Journal of Statistics (1/2017-6/2019)
Grants & Awards

2026: National Natural Science Foundation of China General Program (NSFC72673148) "High-Dimensional Functional Time Series Regression Models with Supervised Factor Structures: Theory and Applications"

2024: ARC Future Fellow (FT240100338) "Functional Panel Data Analysis: Harnessing Big Data for Society"

2023-2024: Visiting International Scholar Award, Macquarie University

2023-2024 Macquarie University Data Horizons Projects

2022: ARC Discovery Project (DP230102250) "Feature Learning for High-dimensional Functional Time Series"

2022: Macquarie University Data Horizons Consilience Research Centre

2022: Visiting Domestic Scholar Award, Macquarie University

2020: Research Accelerator Grant Scheme, Macquarie University

2018, 2019: Mid-Career Research Grant Scheme, Australian National University

2018, 2019: RSFAS Cross-Disciplinary Grant Scheme, Australian National University

2017: ARC Discovery Project (DP170102468) "Overcoming the problems of inconsistent migration data in the Asia Pacific"

2016, 2017: Research School of Social Science Cross-College Grant

2017: IUSSP Travel Grant

2016: SOA Travel Grant

2013: IIF Travel Grant

2010: Mollie Holman Doctoral Medal, Monash University

Visiting Experience

Department of Child & Adolescent Psychiatry, New York University (7/2013)

Mailman School of Public Health, Columbia University (8/2013; 4/2018)

Cass Business School, City, University of London (6/2014; 12/2015; 6/2018)

Institute of Statistical Science, Academia Sinica, Taipei (12/2014)

ESRC Centre for Population Change, University of Southampton (12/2015; 6/2017; 7/2018)

Department of Statistics, Colorado State University (1/2017; 2/2018)

Department of Statistical Science, Cornell University (3/2018)

United Nations Population Division (3/2018)

Department of Statistics & Actuarial Science, University of Waterloo (4/2018)

Department of Statistics & Actuarial Science, Simon Fraser University (5/2018)

Department of Mathematics, University of York (5/2018)

Academic Positions

Professor, Macquarie University, 1 June 2020 -

Associate Professor, Australian National University, 1 January 2018 - 31 May 2020

Senior Lecturer, Australian National University, 1 January 2016 - 31 December 2017

Lecturer, Australian National University, 9 January 2014 - 31 December 2015

Postdoc Experience

ESRC Centre for Population at the University of Southampton (January - December, 2013)

Department of Econometrics and Business Statistics, Monash University (July, 2010 - December, 2012)

Affiliations

I am also a visiting scholar at the ESRC Centre for Population Change at the University of Southampton.

I am an affiliated member at the School of Demography at the Australian National University.

Supervision

Supervised Dr Jasmine Ha for her postdoc project, Australian National University, July 2018 - June 2020 (a Lecturer at Vietnam National University)

Supervised Dr. Philip Drummond as a panel member for his Ph.D. program, July 2018 - April 2023 (a Lecturer at Monash University); April 2023 - present (Associate, The Brattle Group)

Supervised Dr. Antonio Elias Fernandez, visiting 4th year Ph.D. student from Universidad Carlos III de Madrid, November 2018 - April 2019 (a postdoc research fellow at Universidad de Málaga)

Supervised Dr. Yuan Gao for her Ph.D. program, April 2015 - July 2020 (a Lecturer at the ANU from July 2020)

Supervised Dr. Yang Yang for his Ph.D. program, February 2016 - September 2020, September 2020 - August 2022 (a postdoc research fellow at Monash University); September 2022 - present (a Lecturer at the University of Newcastle)

Supervised Dr. Chen Tang for his Ph.D. program, March 2016 - present (a Lecturer at the ANU)

Supervised Dr. Xin (Landy) Huang for her Ph.D. program, September 2020 - May 2022 (a data analyst at Deloitte Australia); June 2022 - present (a data analyst @ Commonwealth Bank of Australia)

Supervised Ms. Kehan Zhao (a first-class honors student @ ANU; a Master student @ the University of Chicago)

Supervised Ms. Vanessa Tan (Honours student @ MQ)

Supervised Dr. Cristian Felipe Jimenez Varon (KAUST, a postdoc at the University of York in England)

Supervised Mr. Jacky S. K. Wang (Reinsurance Group of America, Sydney)

Supervised Mr. Hengzhe Zhao (Master student, Executive Dean's Commendation for Academic Excellence)

Supervised Ms. Hasna Afifahrusyda (PhD student; a lecturer at Padjadjaran University)

Supervised Mr. Runze Yang (Cotutelle PhD student)

Supervised Ms. Michelle Dong (EY Global, London)

Supervised Ms. Lin Wu (honours student)

Supervised Dr. Angel Lopez Oriona (a postdoc @ KAUST, a lecturer at Zayed University, Dubai)

Supervising Dr. Adam Nie (a postdoc @ ANU)

Supervising Dr. Jiazhen Xu (a postdoc @ MQ)

Supervising Ms. Maryam Laeeq (PhD student)

Supervising Ms. Ning Zhang (PhD student)

Supervising Mr. Yap Zhong Jing (PhD student, Universiti Malaya)

Supervising Mr. Jacky S. K. Wang (Reinsurance Group of America Sydney, part-time PhD student)

Supervising Mr. Chang Liu (PhD student)

Supervising Ms. Linbin Wang (PhD student)

Qualifications

Statistics, Ph.D., Visualizing and forecasting functional time series, Monash University
1 Mar 2007 → 28 Feb 2010
Award Date: 23 Sept 2010

Statistics, Bachelor with First Class Honours, Multiple hypothesis testing, La Trobe University
1 Mar 2004 → 29 Dec 2006
Award Date: 29 Dec 2006

31 Dec 2020 HDR30: HDR Supervision Orientation 2020-2023, HDR31

Employment

Professor

Professor
Department of Actuarial Studies and Business Analytics
Macquarie University
1 Jun 2020 → present

Transforming Energy Markets Research Centre

Macquarie University
1 Jan 2023 → 31 Dec 2027

Frontier AI Research Centre

Macquarie University
1 Jan 2025 → 31 Dec 2029

Emerging Risks Research Centre

Macquarie University
1 Jan 2025 → 31 Dec 2029

Programme external assessor

Universiti Malaya
Kuala Lumpur, Malaysia
25 Feb 2026 → 24 Feb 2029

Research outputs

Interpretable additive model for analyzing high-dimensional functional time series
Wang, H., Guan, T. & Shang, H. L., Jan 2027, In: Journal of Multivariate Analysis. 217, p. 1-20 20 p., 105722.

Double Descent in High-dimensional Linear Discriminant Analysis
Lu, Y., Shang, H. L., Yang, Y. & Zhao, K., 18 Oct 2026, (Accepted/In press) In: Communications in Statistics - Theory and Methods.

Enhancing mortality forecasting with ensemble learning: A shapley-based approach
Bimonte, G., Russolillo, M., Yang, Y. & Shang, H. L., Oct 2026, In: International Journal of Forecasting. 42, 4, p. 1254-1274 21 p.

Long Memory Time Series Analysis
Shang, H. L., Oct 2026, In: International Journal of Forecasting. 42, 4, 1 p., 1381.

Interpretable models for forecasting high-dimensional functional time series
Shang, H. L. & Jiménez-Varón, C. F., Dec 2026, In: Statistics and Computing. 36, 6, p. 1-24 24 p., 236.

Visualizing, modeling and forecasting age distribution of fertility
Shang, H. L. & Yang, Y., 25 Sept 2026, In: Mathematical Population Studies.

A hierarchical copula-based sparse VECM for cause-of-death mortality rates: modeling, forecasting, and connectedness
Rusyda, H. A., Shi, Y. & Shang, H. L., Sept 2026, In: ASTIN Bulletin. 56, 3, p. 927-950 24 p.

Spatial scalar-on-function quantile regression model
Mutis, M., Beyaztas, U., Karaman, F. & Shang, H. L., Sept 2026, In: Australian and New Zealand Journal of Statistics. 68, 3, p. 1-28 28 p., e70062.

On the distributed estimation for scalar-on-function regression models
He, P., Shang, H. L. & Zou, N., 12 Aug 2026, (E-pub ahead of print) In: Communications in Statistics: Simulation and Computation.

Forecast reconciliation meets compositional data analysis: a study of Italian cause specific age-at-death
Nigri, A., Lanfiuti Baldi, G., Mattera, R. & Shang, H. L., 8 Aug 2026, (E-pub ahead of print) In: Journal of the Royal Statistical Society. Series C: Applied Statistics.

Age-specific demographic modeling and forecasting: rolling window, expanding window, or both?
Chen, S. & Shang, H. L., Aug 2026, In: Social Indicators Research. 184, 1, p. 1-42 42 p., 3.

Change-point detection in functional time series: applications to age-specific mortality and fertility
Shang, H. L., Aug 2026, In: Annals of Operations Research. 363, 2, p. 1113-1131 19 p.

Robust spatial scalar-on-function regression: A Fisher-consistent redescending M-estimation approach
Mutis, M., Beyaztas, U. & Shang, H. L., 29 Jul 2026, (Accepted/In press) In: Environmental and Ecological Statistics.

Forecasting high-dimensional functional time series with dual-factor structures
Tang, C., Shang, H. L., Yang, Y. & Yang, Y., Jul 2026, In: Journal of the Royal Statistical Society. Series A: Statistics in Society. 189, 3, p. 1792–1815 24 p.

Forecast mortality rates with copula-based approaches: Novel evidence from integrated reconciliation
Rusyda, H. A., Shi, Y. & Shang, H. L., Jul 2026, In: Insurance: Mathematics and Economics. 129, p. 1-20 20 p., 103263.

Conformal prediction for functional time series: application to age-specific mortality rates
Shang, H. L., Jun 2026, In: Journal of Population Research. 43, 2, p. 1-21 21 p., 14.

Forecasting residential aged care expenditure with learning algorithm and demographic simulation
Zhao, H., Zhang, J., Shang, H. L. & Lee, E., Dec 2026, In: Population Health Metrics. 24, 1, p. 1-16 16 p., 59.

Testing for integer integration in functional time series
Seo, W.-K. & Shang, H. L., 10 Apr 2026, (E-pub ahead of print) In: Journal of the American Statistical Association.

ESG decoupling phenomenon: A systematic and bibliometric analysis
Laeeq, M., Akhtar, F. & Shang, H. L., 12 Mar 2026, (E-pub ahead of print) In: Business Strategy and the Environment.

AR-sieve bootstrap for high-dimensional time series
Bi, D., Shang, H. L., Yang, Y. & Zhu, H., Dec 2026, In: Journal of Statistical Planning and Inference. 245, p. 1-16 16 p., 106402.

Enhancing spatial functional linear regression with robust dimension reduction methods
Beyaztas, U., Mandal, A. & Shang, H. L., Jan 2026, In: Journal of Multivariate Analysis. 211, p. 1-18 18 p., 105538.

Constructing prediction intervals for the age distribution of deaths
Shang, H. L. & Haberman, S., 2026, In: Scandinavian Actuarial Journal. 2026, 5, p. 469-486 18 p.

Covariance function estimation for high-dimensional functional time series with dual factor structures
Leng, C., Li, D., Shang, H. L. & Xia, Y., 2026, In: Journal of Business and Economic Statistics. 44, 4, p. 1331-1345 15 p.

Extending finite mixture models with skew-normal distributions and hidden Markov models for time series
Nigri, A., Forti, M. & Shang, H. L., 2026, In: Journal of Statistical Computation and Simulation. 96, 3, p. 563-590 28 p.

Penalized spatial function-on-function regression
Beyaztas, U., Shang, H. L. & Sezer, G. B., 2026, In: Statistics and Computing. 36, 1, p. 1-22 22 p., 36.

Age-period modeling of mortality gaps: the cases of cancer and circulatory diseases
Lanfiuti Baldi, G., Nigri, A. & Shang, H. L., Dec 2025, In: Journal of Official Statistics. 41, 4, p. 1154-1180 27 p.

Forecasting a time series of Lorenz curves: one-way functional analysis of variance
Shang, H. L., Dec 2025, In: Journal of Applied Statistics. 52, 15, p. 2924-2940 17 p.

Forecasting intraday particle number size distribution: a functional time-series approach
Shang, H. L. & Martinez Hernandez, I., Dec 2025, In: Environmental and Ecological Statistics. 32, 4, p. 1313-1338 26 p.

Mortality models ensemble via Shapley value
Bimonte, G., Russolillo, M., Shang, H. L. & Yang, Y., Dec 2025, In: Decisions in Economics and Finance. 48, 2, p. 1131-1159 29 p.

A compositional approach to modeling cause-specific mortality with zero counts
Dong, Z. M., Shang, H. L., Hui, F. & Bruhn, A., Nov 2025, In: Annals of Actuarial Science. 19, 3, p. 416-441 26 p.

Making distributionally robust portfolios feasible in high dimension
Wu, R., Yang, Y., Shang, H. L. & Zhu, H., Nov 2025, In: Journal of Econometrics. 252, Part A, p. 1-23 23 p., 106118.

Forecasting density-valued functional panel data
Jiménez-Varón, C. F., Sun, Y. & Shang, H. L., Sept 2025, In: Australian and New Zealand Journal of Statistics. 67, 3, p. 401-415 15 p.

Stock return prediction based on a functional capital asset pricing model
Beyaztas, U., Ji, K., Shang, H. L. & Wu, E., Sept 2025, In: Journal of Forecasting. 44, 6, p. 2017-2036 20 p.

Spatial function-on-function regression
Beyaztas, U., Shang, H. L., Sezer, G. B., Mandal, A., Zoh, R. S. & Tekwe, C. D., 5 Aug 2025, (E-pub ahead of print) In: Journal of Agricultural, Biological, and Environmental Statistics. 19 p.

Nonstationary functional time series forecasting
Shang, H. L. & Yang, Y., Jul 2025, In: Journal of Forecasting. 44, 4, p. 1347-1362 16 p.

Hierarchical forecasting of Italian mortality data with gender and cause of death reconciliation
Lanfiuti Baldi, G., Mattera, R., Nigri, A. & Shang, H. L., 21 Jun 2025, *Statistics for Innovation III: SIS 2025, Short Papers, Contributed Sessions 2.* di Bella, E., Gioia, V., Lagazio, C. & Zaccarin, S. (eds.). Cham: Springer, Springer Nature, p. 408-414 7 p. (Italian Statistical Society Series on Advances in Statistics).

Robust function-on-function interaction regression
Beyaztas, U., Shang, H. L. & Mandal, A., Jun 2025, In: Statistical Modelling. 25, 3, p. 195-215 21 p.

Forecasting age distribution of deaths: cumulative distribution function transformation
Shang, H. L. & Haberman, S., May 2025, In: Insurance: Mathematics and Economics. 122, p. 249-261 13 p.

Is the age pension in Australia sustainable and fair? Evidence from forecasting the old-age dependency ratio using the Hamilton-Perry model
Chen, S., Shang, H. & Yang, Y., Mar 2025, In: Journal of Population Research. 42, 1, p. 1-27 27 p., 2.

Robust functional logistic regression
Akturk, B., Beyaztas, U., Shang, H. L. & Mandal, A., Mar 2025, In: Advances in Data Analysis and Classification. 19, 1, p. 121-145 25 p.

An IID test for functional time series with applications to high-frequency VIX index data
Huang, L., Shang, H. L. & Siu, T. K., Feb 2025, In: Risks. 13, 2, p. 1-25 25 p., 25.

Penalized function-on-function linear quantile regression
Beyaztas, U., Shang, H. L. & Saricam, S., Jan 2025, In: Computational Statistics. 40, 1, p. 301-329 29 p.

Bootstrap prediction intervals for the age distribution of life-table death counts
Shang, H. L., 2025, In: Mathematical Population Studies. 32, 3, p. 166-181 16 p.

Dependence-based fuzzy clustering of functional time series
López-Oriona, Á., Sun, Y. & Shang, H. L., 2025, In: Journal of Computational and Graphical Statistics. 34, 4, p. 1729-1741 13 p.

Forecasting age distribution of deaths at subnational level
Shang, H. L., 2025, *New trends in functional statistics and related fields.* Aneiros, G., Bongiorno, E. G., Goia, A. & Hušková , M. (eds.). Cham: Springer, Springer Nature, p. 493-501 9 p. (Contributions to Statistics).

Forecasting age distribution of life-table death counts via α-transformation
Shang, H. L. & Haberman, S., 2025, In: Scandinavian Actuarial Journal. 2025, 4, p. 387-403 17 p.

On function-on-function linear quantile regression
Mutis, M., Beyaztas, U., Karaman, F. & Shang, H. L., 2025, In: Journal of Applied Statistics. 52, 4, p. 814-840 27 p.

Weighted compositional functional data analysis for modeling and forecasting life-table death counts
Shang, H. L. & Haberman, S., Dec 2024, In: Journal of Forecasting. 43, 8, p. 3051-3071 21 p.

Fractionally integrated curve time series with cointegration
Seo, W.-K. & Shang, H. L., 9 Oct 2024, In: Electronic Journal of Statistics. 18, 2, p. 3858 - 3902 45 p.

Forecasting high-dimensional functional time series: Application to sub-national age-specific mortality
Jiménez-Varón, C. F., Sun, Y. & Shang, H. L., 1 Oct 2024, In: Journal of Computational and Graphical Statistics. 33, 4, p. 1160-1174 15 p.

Locally sparse and robust partial least squares in scalar-on-function regression
Gurer, S., Shang, H. L., Mandal, A. & Beyaztas, U., Oct 2024, In: Statistics and Computing. 34, 5, p. 1-17 17 p., 150.

Detection and estimation of structural breaks in high-dimensional functional time series
Li, D., Li, R. & Shang, H. L., Aug 2024, In: Annals of Statistics. 52, 4, p. 1716-1740 25 p.

Development of functional quantile autoregressive model for river flow curve forecasting
Mutis, M., Beyaztas, U., Simsek, G. G., Shang, H. L. & Yaseen, Z. M., Aug 2024, In: Earth and Space Science. 11, 8, 18 p., e2024EA003564.

Forecasting age- and sex-specific survival functions: application to annuity pricing
Wang, S., Shang, H. L., Tickle, L. & Li, H., Jul 2024, In: Risks. 12, 7, p. 1-15 15 p., 117.

Forecasting Australian fertility by age, region, and birthplace
Yang, Y., Shang, H. L. & Raymer, J., Apr 2024, In: International Journal of Forecasting. 40, 2, p. 532-548 17 p.

Bootstrapping long-run covariance of stationary functional time series
Shang, H. L., Mar 2024, In: Forecasting. 6, 1, p. 138–151 14 p.

Assessing the impact of climate risk stresses on life insurance portfolios
Dong, M., Bruhn, A., Shang, H. L. & Hui, F., Jan 2024, In: Asia-Pacific Journal of Risk and Insurance. 18, 1, p. 87-114 28 p.

Factor-augmented model for functional data
Gao, Y., Shang, H. L. & Yang, Y., Jan 2024, In: Statistica Sinica. 34, 1, p. 1-26 26 p.

Robust scalar-on-function partial quantile regression
Beyaztas, U., Tez, M. & Shang, H. L., 2024, In: Journal of Applied Statistics. 51, 7, p. 1359-1377 19 p.

Forecasting intraday financial time series with sieve bootstrapping and dynamic updating
Shang, H. L. & Ji, K., Dec 2023, In: Journal of Forecasting. 42, 8, p. 1973-1988 16 p.

Weighted compositional data analysis for modeling and forecasting life-table death counts
Shang, H. L. & Haberman, S., 30 Nov 2023, *Living to 100 Research Symposium.* Orlando, Florida: Society of Actuaries, 20 p.

A robust scalar-on-function logistic regression for classification
Mutis, M., Beyaztas, U., Simsek, G. G. & Shang, H. L., Oct 2023, In: Communications in Statistics - Theory and Methods. 52, 23, p. 8538-8554 17 p.

Depth-based reconstruction method for incomplete functional data
Elías, A., Jiménez, R. & Shang, H. L., Sept 2023, In: Computational Statistics. 38, 3, p. 1507-1535 29 p.

Sieve bootstrapping the memory parameter in long-range dependent stationary functional time series
Shang, H. L., Sept 2023, In: AStA Advances in Statistical Analysis. 107, 3, p. 421-441 21 p.

Discussion of "Thirty years on: A review of the Lee–Carter method for forecasting mortality"
Shang, H. L. & Tickle, L., Jul 2023, In: International Journal of Forecasting. 39, 3, p. 1055-1056 2 p.

Nonstationary fractionally integrated functional time series
Li, D., Robinson, P. M. & Shang, H. L., May 2023, In: Bernoulli. 29, 2, p. 1505-1526 22 p.

Robust functional linear regression models
Beyaztas, U. & Shang, H. L., Mar 2023, In: R Journal. 15, 1, p. 212-233 22 p.

Nonlinear autocorrelation function of functional time series
Huang, X. & Shang, H. L., Feb 2023, In: Nonlinear Dynamics. 111, 3, p. 2537–2554 18 p.

Functional time series forecasting: Functional singular spectrum analysis approaches
Trinka, J., Haghbin, H., Shang, H. L. & Maadooliat, M., Jan 2023, In: Stat. 12, 1, p. 1-13 13 p., e621.

Bootstrap prediction bands for functional time series
Paparoditis, E. & Shang, H. L., 2023, In: Journal of the American Statistical Association. 118, 542, p. 972-986 15 p.

Data governance in Australia: 2023 report
Selvadurai, N., Shang, H., Gopinath, B., Abedin, B., McLean, J., Proctor, M. & Chariton, A., 2023, Governance Institute of Australia. 24 p.

Change point detection for COVID-19 excess deaths in Belgium
Shang, H. L. & Xu, R., Dec 2022, In: Journal of Population Research. 39, 4, p. 557-565 9 p.

Clustering and forecasting multiple functional time series
Tang, C., Shang, H. L. & Yang, Y., Dec 2022, In: Annals of Applied Statistics. 16, 4, p. 2523-2553 31 p.

On partial least squares estimation in scalar-on-function regression models
Saricam, S., Beyaztas, U., Asikgil, B. & Shang, H. L., Dec 2022, In: Journal of Chemometrics. 36, 12, p. 1-16 16 p., e3452.

Permutation entropy and its variants for measuring temporal dependence
Huang, X., Shang, H. L. & Pitt, D., Dec 2022, In: Australian and New Zealand Journal of Statistics. 64, 4, p. 442-477 36 p.

Stopping time detection of wood panel compression: A functional time series approach
Shang, H. L., Cao, J. & Sang, P., Nov 2022, In: Journal of the Royal Statistical Society. Series C: Applied Statistics. 71, 5, p. 1205-1224 20 p.

Temporal and spatial Taylor's law: application to Japanese subnational mortality rates
Yang, Y., Shang, H. L. & Cohen, J. E., Oct 2022, In: Journal of the Royal Statistical Society. Series A: Statistics in Society. 185, 4, p. 1979-2006 28 p.

Multi-population modelling and forecasting life-table death counts
Shang, H. L., Haberman, S. & Xu, R., Sept 2022, In: Insurance: Mathematics and Economics. 106, p. 239-253 15 p.

A model sufficiency test using permutation entropy
Huang, X., Shang, H. L. & Pitt, D., Aug 2022, In: Journal of Forecasting. 41, 5, p. 1017-1036 20 p.

Functional linear models for interval-valued data
Beyaztas, U., Shang, H. L. & Abdel-Salam, A.-S. G., 3 Jul 2022, In: Communications in Statistics - Simulation and Computation. 51, 7, p. 3513-3532 20 p.

Dynamic functional time-series forecasts of foreign exchange implied volatility surfaces
Shang, H. L. & Kearney, F., Jul 2022, In: International Journal of Forecasting. 38, 3, p. 1025-1049 25 p.

Forecasting: theory and practice
Petropoulos, F., Apiletti, D., Assimakopoulos, V., Babai, M. Z., Barrow, D. K., Ben Taieb, S., Bergmeir, C., Bessa, R. J., Bijak, J., Boylan, J. E., Browell, J., Carnevale, C., Castle, J., Cirillo, P., Clements, M. P., Cordeiro, C., Cyrino Oliveira, F. L., De Baets, S., Dokumentov, A. & Ellison, J. & 60 others, Fiszeder, P., Franses, P. H., Frazier, D. T., Gilliland, M., Gönül, M. S., Goodwin, P., Grossi, L., Grushka-Cockayne, Y., Guidolin, M., Guidolin, M., Gunter, U., Guo, X., Guess, R., Harvey, N., Hendry, D. F., Hollyman, R., Januschowski, T., Jeon, J., Jose, V. R. R., Kang, Y., Koehler, A. B., Kolassa, S., Kourentzes, N., Leva, S., Li, F., Litsiou, K., Makridakis, S., Martin, G. M., Martinez, A. B., Meeran, S., Modis, T., Nikolopoulos, K., Önkal, D., Paccagnini, A., Panagiotelis, A., Panapakidis, I., Pavía, J. M., Pedio, M., Pedregal, D. J., Pinson, P., Ramos, P., Rapach, D. E., Reade, J. J., Rostami-Tabar, B., Rubaszek, M., Sermpinis, G., Shang, H. L., Spiliotis, E., Syntetos, A. A., Talagala, P. D., Talagala, T. S., Tashman, L., Thomakos, D., Thorarinsdottir, T., Todini, E., Trapero Arenas, J. R., Wang, X., Winkler, R. L., Yusupova, A. & Ziel, F., Jul 2022, In: International Journal of Forecasting. 38, 3, p. 705-871 167 p.

Is the group structure important in grouped functional time series?
Yang, Y. & Shang, H. L., Jul 2022, In: Journal of Data Science. 20, 3, p. 303-324 22 p.

Air pollution and mortality impacts
Dong, Z. M., Shang, H. L. & Bruhn, A., Jun 2022, In: Risks. 10, 6, p. 1-21 21 p., 126.

A robust partial least squares approach for function-on-function regression
Beyaztas, U. & Shang, H. L., Jun 2022, In: Brazilian Journal of Probability and Statistics. 36, 2, p. 199-219 21 p.

Selecting the derivative of a functional covariate in scalar-on-function regression
Hooker, G. & Shang, H. L., Jun 2022, In: Statistics and Computing. 32, 3, p. 1-12 12 p., 35.

Feature extraction for functional time series: Theory and application to NIR spectroscopy data
Yang, Y., Yang, Y. & Shang, H. L., May 2022, In: Journal of Multivariate Analysis. 189, p. 1-21 21 p., 104863.

On projection methods for functional time series forecasting
Elías, A., Jiménez, R. & Shang, H. L., May 2022, In: Journal of Multivariate Analysis. 189, p. 1-13 13 p., 104890.

Function-on-function linear quantile regression
Beyaztas, U. & Shang, H. L., 27 Apr 2022, In: Mathematical Modelling and Analysis. 27, 2, p. 322-341 20 p.

Robust bootstrap prediction intervals for univariate and multivariate autoregressive time series models
Beyaztas, U. & Shang, H. L., 4 Apr 2022, In: Journal of Applied Statistics. 49, 5, p. 1179-1202 24 p.

A robust functional partial least squares for scalar-on-multiple-function regression
Beyaztas, U. & Shang, H. L., Apr 2022, In: Journal of Chemometrics. 36, 4, p. 1-19 19 p., e3394.

Machine-learning-based functional time series forecasting: Application to age-specific mortality rates
Beyaztas, U. & Shang, H., 18 Mar 2022, In: Forecasting. 4, 1, p. 394-408 15 p.

Function-on-function partial quantile regression
Beyaztas, U., Shang, H. L. & Alin, A., Mar 2022, In: Journal of Agricultural, Biological, and Environmental Statistics. 27, 1, p. 149-174 26 p.

Not all long-memory estimators are born equal: The case of nonstationary functional time series
Shang, H. L., Mar 2022, In: Canadian Journal of Statistics. 50, 1, p. 357-380 24 p.

Bayesian bandwidth estimation for local linear fitting in nonparametric regression models
Shang, H. & Zhang, X., Feb 2022, In: Studies in Nonlinear Dynamics and Econometrics. 26, 1, p. 55-71 17 p.

A comparison of parameter estimation in function-on-function regression
Beyaztas, U. & Shang, H. L., 2022, In: Communications in Statistics - Simulation and Computation. 51, 8, p. 4607-4637 31 p.

Local Whittle estimation of long-range dependence for functional time series
Li, D., Robinson, P. M. & Shang, H. L., Sept 2021, In: Journal of Time Series Analysis. 42, 5-6, p. 685-695 11 p.

Double bootstrapping for visualizing the distribution of descriptive statistics of functional data
Shang, H. L., 3 Jul 2021, In: Journal of Statistical Computation and Simulation. 91, 10, p. 2116-2132 17 p.

A functional autoregressive model based on exogenous hydrometeorological variables for river flow prediction
Beyaztas, U., Shang, H. & Yaseen, Z., Jul 2021, In: Journal of Hydrology. 598, p. 1-19 19 p., 126380.

Granger causality of bivariate stationary curve time series
Shang, H. L., Ji, K. & Beyaztas, U., Jul 2021, In: Journal of Forecasting. 40, 4, p. 626-635 10 p.

Functional time series forecasting of extreme values
Shang, H. & Xu, R., 8 Jun 2021, In: Communications in Statistics Case Studies Data Analysis and Applications. 7, 2, p. 182-199 18 p.

A partial least squares approach for function-on-function interaction regression
Beyaztas, U. & Shang, H. L., Jun 2021, In: Computational Statistics. 36, 2, p. 911-939 29 p.

Forecasting the old-age dependency ratio to determine a sustainable pension age
Hyndman, R. J., Zeng, Y. & Shang, H. L., Jun 2021, In: Australian and New Zealand Journal of Statistics. 63, 2, p. 241-256 16 p.

Bayesian bandwidth estimation and semi-metric selection for a functional partial linear model with unknown error density
Shang, H. L., 12 Mar 2021, In: Journal of Applied Statistics. 48, 4, p. 583-604 22 p.

Forecasting Australian subnational age-specific mortality rates
Shang, H. L. & Yang, Y., Mar 2021, In: Journal of Population Research. 38, 1, p. 1-24 24 p.

Neural network prediction of crude oil futures using B-splines
Butler, S., Kokoszka, P., Miao, H. & Shang, H. L., 1 Feb 2021, In: Energy Economics. 94, p. 1-11 11 p., 105080.

Estimation of a functional single index model with dependent errors and unknown error density
Shang, H. L., 1 Dec 2020, In: Communications in Statistics - Simulation and Computation. 49, 12, p. 3111-3133 23 p.

Retiree mortality forecasting: A partial age-range or a full age-range model?
Shang, H. L. & Haberman, S., Sept 2020, In: Risks. 8, 3, p. 1-11 11 p., 69.

Synergy in fertility forecasting: improving forecast accuracy through model averaging
Shang, H. & Booth, H., Sept 2020, In: Genus. 76, 1, p. 1-27 23 p., 27.

Modelling functional data with high-dimensional error structure
Gao, Y., Shang, H. & Yang, Y., Jun 2020, *Functional and high-dimensional statistics and related fields.* Aneiros, G., Horová, I., Huésková, M. & Vieu, P. (eds.). Cham: Springer, Springer Nature, p. 99-106 8 p. (Contributions to Statistics).

Forecasting multiple functional time series in a group structure: An application to mortality
Shang, H. L. & Haberman, S., 18 May 2020, In: ASTIN Bulletin. 50, 2, p. 357-379 23 p.

Dynamic principal component regression for forecasting functional time series in a group structure
Shang, H. L., 20 Apr 2020, In: Scandinavian Actuarial Journal. 2020, 4, p. 307-322 16 p.

Long-range dependent curve time series
Li, D., Robinson, P. M. & Shang, H. L., 2 Apr 2020, In: Journal of the American Statistical Association. 115, 530, p. 957-971 15 p.

Discussion on the Paper by Dubey and Müller
Shang, H. L., Apr 2020, In: Journal of the Royal Statistical Society. Series B: Statistical Methodology. 82, 2, p. 320 1 p.

Forecasting age distribution of death counts: an application to annuity pricing
Shang, H. L. & Haberman, S., 17 Mar 2020, In: Annals of Actuarial Science. 14, 1, p. 150-169 20 p.

On function-on-function regression: partial least squares approach
Beyaztas, U. & Shang, H. L., 7 Mar 2020, In: Environmental and Ecological Statistics. 27, 1, p. 95–114 20 p.

Uncovering predictability in the evolution of the WTI oil futures curve
Kearney, F. & Shang, H. L., 14 Jan 2020, In: European Financial Management. 26, 1, p. 238-257 20 p.

A comparison of Hurst exponent estimators in long-range dependent curve time series
Shang, H., Jan 2020, In: Journal of time series econometrics. 12, 1, p. 1-39 39 p., 20190009.

Incorporating model uncertainty in the construction of bootstrap prediction intervals for functional time series
Paparoditis, E. & Shang, H., 2020, *Nonparametric Statistics: 4th ISNPS, Salerno, Italy, June 2018.* La Rocca, M., Liseo, B. & Salmaso, L. (eds.). Salerno: Springer, Springer Nature, p. 415-422 8 p. (Springer Proceedings in Mathematics & Statistics; vol. 339).

Intraday forecasts of a volatility index: functional time series methods with dynamic updating
Shang, H. L., Yang, Y. & Kearney, F., 7 Nov 2019, In: Annals of Operations Research. 282, 1-2, p. 331–354 24 p.

Forecasting functional time series using weighted likelihood methodology
Beyaztas, U. & Shang, H. L., 2 Nov 2019, In: Journal of Statistical Computation and Simulation. 89, 16, p. 3046-3060 15 p.

Implied volatility surface predictability: the case of commodity markets
Kearney, F., Shang, H. L. & Sheenan, L., Nov 2019, In: Journal of Banking and Finance. 108, 16 p., 105657.

Semiparametric regression using variational approximations
Hui, F. K. C., You, C., Shang, H. L. & Müller, S., 2 Oct 2019, In: Journal of the American Statistical Association. 114, 528, p. 1765-1777 13 p.

Forecasting of density functions with an application to cross-sectional and intraday returns
Kokoszka, P., Miao, H., Petersen, A. & Shang, H., 1 Oct 2019, In: International Journal of Forecasting. 35, 4, p. 1304-1317 14 p.

Dynamic principal component regression: Application to age-specific mortality forecasting
Shang, H. L., 20 Sept 2019, In: ASTIN Bulletin. 49, 3, p. 619-645 27 p.

A robust functional time series forecasting method
Shang, H. L., 24 Mar 2019, In: Journal of Statistical Computation and Simulation. 89, 5, p. 795-814 20 p.

High-dimensional functional time series forecasting: An application to age-specific mortality rates
Gao, Y., Shang, H. L. & Yang, Y., Mar 2019, In: Journal of Multivariate Analysis. 170, p. 232-243 12 p.

Visualizing rate of change: an application to age-specific fertility rates
Shang, H. L., Jan 2019, In: Journal of the Royal Statistical Society. Series A: Statistics in Society. 182, 1, p. 249-262 14 p.

Model confidence sets and forecast combination: an application to age-specific mortality
Shang, H. L. & Haberman, S., 21 Nov 2018, In: Genus. 74, 1, 23 p., 19.

Bootstrap methods for stationary functional time series
Shang, H. L., 8 Jan 2018, In: Statistics and Computing. 28, 1, p. 1-10 10 p.

Forecasting intraday S&P 500 index returns: A functional time series approach
Shang, H. L., Nov 2017, In: Journal of Forecasting. 36, 7, p. 741-755 15 p.

Inference for the autocovariance of a functional time series under conditional heteroscedasticity
Kokoszka, P., Rice, G. & Shang, H., Nov 2017, In: Journal of Multivariate Analysis. 162, p. 32-50 19 p.

Methods for scalar-on-function regression
Reiss, P. T., Goldsmith, J., Shang, H. L. & Ogden, R. T., Aug 2017, In: International Statistical Review. 85, 2, p. 228-249 22 p.

A Plug-in bandwidth selection procedure for long-run covariance estimation with stationary functional time series
Rice, G. & Shang, H. L., Jul 2017, In: Journal of Time Series Analysis. 38, 4, p. 591-609 19 p.

Grouped multivariate and functional time series forecasting: An application to annuity pricing
Shang, H. L. & Haberman, S., Jul 2017, In: Insurance: Mathematics and Economics. 75, p. 166-179 14 p.

Grouped functional time series forecasting: An application to age-specific mortality rates
Shang, H. L. & Hyndman, R. J., 3 Apr 2017, In: Journal of Computational and Graphical Statistics. 26, 2, p. 330-343 14 p.

Multivariate functional time series forecasting: application to age-specific mortality rates
Gao, Y. & Shang, H., Mar 2017, In: Risks. 5, 2, 18 p., 21.

Reconciling forecasts of infant mortality rates at national and sub-national levels: grouped time-series methods
Shang, H. L., 8 Feb 2017, In: Population Research and Policy Review. 36, 1, p. 55-84 30 p.

Functional time series forecasting with dynamic updating: An application to intraday particulate matter concentration
Shang, H. L., Jan 2017, In: Econometrics and Statistics. 1, p. 184-200 17 p.

Grouped multivariate and functional time series forecasting: An application to annuity pricing
Shang, H. & Haberman, S., 2017, *2017 Living to 100 Monograph*. Society of Actuaries, 27 p.

Grouped multivariate functional time series method: An application to mortality forecasting
Shang, H. L. & Yang, Y., 2017, *Functional statistics and related fields.* Aneiros, G., Bongiorno, E. G., Cao, R. & Vieu, P. (eds.). Cham: Springer, p. 233-241 9 p. (Contributions to statistics).

High-dimensional functional time series forecasting
Gao, Y., Shang, H. & Yang, Y., 2017, *Functional statistics and related fields.* Aneiros, G., Bongiorno, E. G., Cao, R. & Vieu, P. (eds.). Cham: Springer, p. 131-136 6 p. (Contributions to statistics).

Mortality and life expectancy forecasting for a group of populations in developed countries: A multilevel functional data method
Shang, H. L., Sept 2016, In: Annals of Applied Statistics. 10, 3, p. 1639-1672 34 p.

A multilevel functional data method for forecasting population, with an application to the United Kingdom
Shang, H. L., Smith, P., Bijak, J. & Wiśniowski, A., Jul 2016, In: International Journal of Forecasting. 32, 3, p. 629-649 21 p.

Bayesian bandwidth selection for a nonparametric regression model with mixed types of regressors
Zhang, X., King, M. L. & Shang, H. L., 22 Apr 2016, In: Econometrics. 4, 2, 27 p., 24.

A Bayesian approach for determining the optimal semi-metric and bandwidth in scalar-on-function quantile regression with unknown error density and dependent functional data
Shang, H. L., Apr 2016, In: Journal of Multivariate Analysis. 146, p. 95-104 10 p.

Mortality and life expectancy forecasting for a group of populations in developed countries: A robust multilevel functional data method
Shang, H. L., 2016, *Recent advances in robust statistics: theory and applications.* Agostinelli, C., Basu, A., Filzmoser, P. & Mukherjee, D. (eds.). New Delhi: Springer, p. 169-184 16 p.

Statistically tested comparisons of the accuracy of forecasting methods for age-specific and sex-specific mortality and life expectancy
Shang, H. L., 2 Sept 2015, In: Population Studies. 69, 3, p. 317-335 19 p.

Selection of the optimal Box–Cox transformation parameter for modelling and forecasting age-specific fertility
Shang, H. L., Mar 2015, In: Journal of Population Research. 32, 1, p. 69-79 11 p.

Maximal autocorrelation factors for function-valued spatial/temporal data
Hooker, G., Roberts, S. & Shang, H. L., 1 Jan 2015, *MODSIM 2015: Proceedings of the 21st International Congress on Modelling and Simulation.* Weber, T., McPhee, M. & Anderssen, R. (eds.). Gold Coast: Modelling and Simulation Society of Australia and New Zealand, p. 159-165 7 p.

Resampling techniques for estimating the distribution of descriptive statistics of functional data
Shang, H. L., 2015, In: Communications in Statistics - Simulation and Computation. 44, 3, p. 614-635 22 p.

A sampling algorithm for bandwidth estimation in a nonparametric regression model with a flexible error density
Zhang, X., King, M. L. & Shang, H. L., Oct 2014, In: Computational Statistics and Data Analysis. 78, p. 218-234 17 p.

Forecasting scottish migration in the context of the 2014 constitutional change debate
Wiśniowski, A., Bijak, J. & Shang, H. L., Jul 2014, In: Population, Space and Place. 20, 5, p. 455-464 10 p.

Bayesian bandwidth estimation for a semi-functional partial linear regression model with unknown error density
Shang, H. L., Jun 2014, In: Computational Statistics. 29, 3-4, p. 829–848 20 p.

A survey of functional principal component analysis
Shang, H. L., Apr 2014, In: AStA Advances in Statistical Analysis. 98, 2, p. 121–142 22 p.

A Bayesian method for determining the optimal semi-metric and bandwidth in functional partial linear model with unknown error density
Shang, H. L., 2014, *Contributions in infinite-dimensional statistics and related topics.* Bongiorno, E. G., Salinelli, E., Goia, A. & Vieu, P. (eds.). Bologna : Societa Editrice Esculapio, p. 263-268 6 p.

Bayesian bandwidth estimation for a functional nonparametric regression model with mixed types of regressors and unknown error density
Shang, H. L., 2014, In: Journal of Nonparametric Statistics. 26, 3, p. 599-615 17 p.

Bayesian functional models in population forecasting
Shang, H. L., Wisniowski, A., Bijak, J., Smith, P. & Raymer, J., 2014, *Proceedings of the Sixth Eurostat/Unece Work Session on Demographic Projections.* Roma: Istituto nazionale di statistica, p. 313-325 13 p.

Bayesian bandwidth estimation for a nonparametric functional regression model with unknown error density
Shang, H. L., Nov 2013, In: Computational Statistics and Data Analysis. 67, p. 185-198 14 p.

ftsa: An R package for analyzing functional time series
Shang, H. L., Jun 2013, In: R Journal. 5, 1, p. 64-72 9 p.

Functional time series approach for forecasting very short-term electricity demand
Shang, H. L., 2013, In: Journal of Applied Statistics. 40, 1, p. 152-168 17 p.

Point and interval forecasts of age-specific life expectancies: A model averaging approach
Shang, H. L., 9 Nov 2012, In: Demographic Research. 27, p. 593–644 52 p., 21.

Point and interval forecasts of age-specific fertility rates: a comparison of functional principal component methods
Shang, H. L., Sept 2012, In: Journal of Population Research. 29, 3, p. 249–267 19 p.

Writing posters with beamerposter package in LATEX
Shang, H. L., 2012, In: The PracTex Journal. 2012, 1, 8 p.

Rainbow: An R package for visualizing functional time series
Shang, H. L., Dec 2011, In: R Journal. 3, 2, p. 54-59 6 p.

Optimal combination forecasts for hierarchical time series
Hyndman, R. J., Ahmed, R. A., Athanasopoulos, G. & Shang, H. L., 1 Sept 2011, In: Computational Statistics and Data Analysis. 55, 9, p. 2579-2589 21 p.

Point and interval forecasts of mortality rates and life expectancy: A comparison of ten principal component methods
Shang, H. L., Booth, H. & Hyndman, R., 15 Jul 2011, In: Demographic Research. 25, p. 173-214 42 p., 5.

Nonparametric time series forecasting with dynamic updating
Shang, H. L. & Hyndman, R. J., Mar 2011, In: Mathematics and Computers in Simulation. 81, 7, p. 1310-1324 15 p.

Bootstrapping functional data: A study of distributional property of sample eigenvalues
Shang, H. L., 2011, *MODSIM 2011: 19th International Congress on Modelling and Simulation: proceedings.* Chan, F., Marinova, D. & Anderssen, R. S. (eds.). Canberra: Modelling and Simulation Society of Australia and New Zealand, p. 740-746 7 p.

Rainbow plots, bagplots, and boxplots for functional data
Hyndman, R. J. & Shang, H. L., 2010, In: Journal of Computational and Graphical Statistics. 19, 1, p. 29-45 17 p.

Forecasting functional time series
Hyndman, R. J. & Shang, H. L., Sept 2009, In: Journal of the Korean Statistical Society. 38, 3, p. 199-211 13 p.

Rejoinder: Forecasting functional time series
Hyndman, R. J. & Shang, H. L., Sept 2009, In: Journal of the Korean Statistical Society. 38, 3, p. 219-221 3 p.

Nonparametric time series forecasting with dynamic updating
Shang, H. L. & Hyndman, R. J., 2009, *Interfacing modelling and simulation with mathematical and computational sciences: 18th IMACS World Congress, MODSIM09, Cairns, Australia 13-17 July 2009 : proceedings.* Anderssen, R. S., Braddock, R. D. & Newham, L. T. H. (eds.). Christchurch, NZ: Modelling and Simulation Society of Australia and New Zealand, p. 1552-1558 7 p.

Bagplots, boxplots, and outlier detection for functional data
Hyndman, R. J. & Shang, H. L., 2008, *Functional and operatorial statistics.* Dabo-Niang, S. & Ferraty, F. (eds.). Heidelberg: Springer, p. 201-207 7 p. (Contributions to statistics).

Prizes

Mollie Holman Doctoral Medal
Shang, H. (Recipient), 23 Sept 2010

MQBS staff excellence award for world-class research
Shang, H. (Recipient), 23 Mar 2026