Hanlin Shang
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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, Journal of Computational and Graphical Statistics (1/2017-)

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

Associate Editor, Computational Statistics (1/2019-)

Associate Editor, Forecasting (3/2020-)

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

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

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

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)
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, February 2014 - July 2018 (a Lecturer at Monash University)

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 as the chair for her Ph.D. program, April 2015 - July 2020 (a postdoc research fellow at Deakin University)

Supervised Dr. Yang Yang as the chair for his Ph.D. program, February 2016 - September 2020 (a postdoc research fellow at Monash University)

Supervised Mr. Chen Tang as the chair for his Ph.D. program, March 2016 - April 2021 (a Lecturer at the ANU from February 2021)

Supervising Ms. Xin (Landy) Huang as the chair for her Ph.D. program, September 2020 - present

Qualifications

Statistics, Ph.D., Monash University
1 Mar 2007 → 28 Feb 2010
Award Date: 23 Sep 2010

Statistics, Bachelor with First Class Honours, La Trobe University, Bundoora Victoria
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

Research outputs

A functional autoregressive model based on exogenous hydrometeorological variables for river flow prediction
Beyaztas, U., Shang, H. & Yaseen, Z., 25 Apr 2021, (Accepted/In press) In: Journal of Hydrology.

Not all long-memory estimators are born equal: A case of non-stationary curve time series
Shang, H., 9 Apr 2021, (Accepted/In press) In: Canadian Journal of Statistics.

Forecasting the old-age dependency ratio to determine a sustainable pension age
Hyndman, R. J., Shang, H. & Zeng, Y., 25 Mar 2021, (Accepted/In press) In: Australian and New Zealand Journal of Statistics.

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.

Change point detection for COVID-19 excess deaths in Belgium
Shang, H. L. & Xu, R., 6 Mar 2021, In: Journal of Population Research. 9 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.

Double bootstrapping for visualizing the distribution of descriptive statistics of functional data
Shang, H. L., 10 Feb 2021, In: Journal of Statistical Computation and Simulation. 17 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.

A partial least squares approach for function-on-function interaction regression
Beyaztas, U. & Shang, H., 6 Jan 2021, In: Computational Statistics. 29 p.

Functional time series forecasting of extreme values
Shang, H. & Xu, R., 6 Jan 2021, In: Communications in Statistics Case Studies Data Analysis and Applications.

Local Whittle estimation of long-range dependence for functional time series
Li, D., Robinson, P. M. & Shang, H. L., 12 Dec 2020, In: Journal of Time Series Analysis. 11 p.

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.

Robust bootstrap prediction intervals for univariate and multivariate autoregressive time series models
Beyaztas, U. & Shang, H. L., 1 Dec 2020, In: Journal of Applied Statistics. 24 p.

Bayesian bandwidth estimation for local linear fitting in nonparametric regression models
Shang, H. & Zhang, X., 30 Nov 2020, In: Studies in Nonlinear Dynamics and Econometrics.

Granger causality of bivariate stationary curve time series
Shang, H. L., Ji, K. & Beyaztas, U., 15 Oct 2020, In: Journal of Forecasting. 10 p.

Retiree mortality forecasting: A partial age-range or a full age-range model?
Shang, H. L. & Haberman, S., Sep 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., Sep 2020, In: Genus. 76, 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.

A comparison of parameter estimation in function-on-function regression
Beyaztas, U. & Shang, H. L., 6 Apr 2020, In: Communications in Statistics - Simulation and Computation. 31 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.

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.

Functional linear models for interval-valued data
Beyaztas, U., Shang, H. L. & Abdel-Salam, A-S. G., 25 Jan 2020, In: Communications in Statistics - Simulation and Computation. 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 Sep 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., Sep 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 Sep 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., Sep 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 Sep 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., Sep 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., Sep 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, Hanlin (Recipient), 23 Sep 2010