JUSHAN BAI

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CONTACT INFORMATION

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EDUCATION

University of California, Berkeley, Ph.D. in Economics, 1992
Pennsylvania State University, M.A. in Economics, 1988
Nankai University, Tianjin, China, B.S. 1982, M.A. in Mathematics, 1985

CURRENT AND PAST POSITIONS

Professor, Department of Economics, Columbia, since 2008
Professor, Department of Economics, NYU, 2002-2008
Professor , Department of Economics, Boston College, 1999-2002
Associate Professor, Boston College, 1998-1999
Associate Professor, Department of Economics, MIT 1997-1998
Assistant Professor, Department of Economics, MIT, 1992-1997

RESEARCH INTERESTS

Econometrics; Panel Data Analysis, Time Series Econometrics

FORTHCOMING ARTICLES

"Estimation of unbalanced panel data models with interactive effects (with J. Yang and Y. Liao), 2012, forthcoming in Oxford Handbook of Panel Data Econometrics.

"Principal components estimation and identification of static factors" (with S. Ng), forthcoming in *Journal of Econometrics*.

"Panel data models and factor analysis," forthcoming in *Advances in Economics* and *Econometrics, Theory and Applications*, The Tenth World Congress of the Econometric Society, Vol. III.

Testing panel cointegration with dynamic common factors that are correlated with the regressors (with Josep Lluis Carrion-i-Silverstre), forthcoming in *Econometrics Journal.*

PUBLICATIONS

"Fixed effects dynamic panel data models, a factor analytical method," *Econometrica,* 81, 285-314, January, 2013

"Statistical analysis of factor models of high dimension", (with K.P. Li), *Annals of Statistics*, 40, 436-465, 2012.

"The Theory and Applications of TAR Model with two Threshold Variables," (with T. Chong and H.Q. Chen), *Econometric Reviews* , 31(2), 142-170, 2012.

"Estimating high dimensional covariance matrices and its applications" (with Shuzhong Shi), *Annals of Economics and Finance*, 12, 199-215, 2011.

"Conditional Markov Chain and its Application in Economic Time Series Analysis" (with P. Wang), *Journal of Applied Econometrics,* 26, 715-734, 2011

"A simple method for estimating betas when factors are measured with error" (with G. Meng and G. Hu). *Journal of Financial Research*, Vol. 34, Issue 1, 27-60, 2011

"Instrumental Variable estimation in a data rich environment" (with Serena Ng), *Econometric Theory, 26*, 1577-1606, 2010

"Panel Unit Root Tests with Cross-Section Dependence, a further investigation," (with Serena Ng) *Econometric Theory, 26*, 1088-1114, 2010

"Common breaks in means and in variances for panel data," *Journal of Econometrics*, 157, 78-92, 2010.

"Panel data models with interactive fixed effects", *Econometrica, 77,* 1229-1279, 2009

"Structural Changes, Common Stochastic Trends, and Unit Roots in Panel Data" (with Josep Lluis Carrion-i-Silverstre), *Review of Economic Studies,* 471-501, 2009

"Selecting instrument variables in a data rich environment" (with Serena Ng), *Journal of Time Series Econometrics,* 1, Article 4, 2009

"Panel Cointegration with Global Stochastic Trends" (with C. Kao, S. Ng) *Journal of Econometrics,* 145, 82-99, 2009

"Boosting diffusion indices" (with Serena Ng), _Journal of Applied Econometrics._ 24, 607-629, 2009

"Forecasting Economic Time Series with Targeted Variables" (with Serena Ng), _Journal of Econometrics._ 146, 304-317, 2008.

"Extreme estimation when the predictors are estimated from large panels" (with Serena Ng), _Annals of Economics and Finance_. 9-2, 201-222, 2008.

"Factor Models," New _Palgrave Dictionary of Economics_, 2008.

"Large Dimensional Factor Models" (with Serena Ng), _Foundations and Trends in Econometrics,_ 3 (2), 89-163, 2008.

``Generic Consistency for Multiple Breaks under Misspecification (with Terence Chong, H. Chen, and S.X. Wang), _Econometrics Journal, 11 (2), 287-307, 2008._

"Testing multivariate distributions in GARCH models" (with Zhihong Chen), _Journal of Econometrics,_ Vol. 143, 19-36, 2008.

"Determine the number of primitive shocks in factor models" (with Serena Ng), _Journal of Business and Economics Statistics,_ 83, 171-222, 2007

"Confidence intervals for diffusion index forecast and inference with factor-augmented regressions" (with Serena Ng), _Econometrica_, 74, 1133-1155, 2006.

"Evaluating Latent and Observed Factors in Macroeconomics and Finance" (with Serena Ng), _Journal of Econometrics_, 131, 507-537, 2006.

"On the estimation and inference of panel data cointegration with cross-section dependence" (with Chihwa Kao), *Panel data econometrics, Theoretical Contributions and empirical applications* edited by B.H. Baltagi, 2006, page 1-30. Elsevier, New York.

"Testing Skewness, Kurtosis, and Normality for Time Series" (with Serena Ng) , _Journal of Business and Economic Statistics_, 23, 49-61, 2005.

"A Panic Attack on Unit Roots and Cointegration" (with Serena Ng), _Econometrica_, 1127-1177, 2004.

"Estimating Cross-Section Common Stochastic Trends in Nonstationary Panel Data," _Journal of Econometrics_, 137-183, 2004.

"Testing Parametric Conditional Distributions of Dynamic Models," *Review of Economics and Statistics*, 85, 531-549, 2003.

"Inferential Theory for Factor Models of Large Dimensions," *Econometrica* 71, 135-171, 2003.

"Critical Values of Multiple Structural Change Tests" (with {Pierre Perron), *Econometrics Journal*, 6, 72-78, 2003.

"Computation and Analysis of Multiple Structural Changes" (with Pierre Perron), *Journal of Applied Econometrics*, 18, 1-22, 2003.

"Determine the Number of Factors in Approximate Factor Models" (with Serena Ng), *Econometrica*, 70, 191-221, 2002.

"A Consistent Test for Conditional Symmetry of Time Series." (with Serena Ng) *Journal of Econometrics***,** 103, 225-258, 2001**.**

"Vector Autoregressive Models with Structural Change in Regression Coefficients and in Variance-Covariance Matrix," *Annals of Economics and Finance*, Vol. 1, 303-339, 2000.

"Likelihood Ratio Tests for Multiple Structural Changes." *Journal of Econometrics*, Vol. 91, No. 2, 299-323, 1999.

"Multiple-Regime Regression with Least Absolutes Deviation Estimation." *Journal of Statistical Planning and Inference*, 74, 103-134, 1998.

"A Note on Spurious Breaks." *Econometric Theory*, 14, 663-669, 1998.

"Testing for and Dating Common Breaks in Multivariate Time Series," with Robin Lumsdaine and James Stock. *Review of Economic Studies*, 65, 395-432, 1998.

"Testing for and Estimation of Multiple Structural Changes," (with Pierre Perron). *Econometrica*, 66, 47-79, 1998. Reprinted in *The Economics of Structural Change* (H. Hagemann, M. Landesmann, and R. Scazzieri, eds.), The International Library of Critical Writings in Economics (Series Editor: Mark Blaug and Adrian Darnell).

"Estimation of a Change Point in Multiple Regressions" *Review of Economics and Statistics*, 79, 551-563, 1997.

"Estimating Multiple Breaks One at a Time." *Econometric Theory*, 13, 315-352, 1997.

"Testing for Parameter Constancy in Linear Regressions: an Empirical Distribution Function Approach." *Econometrica*, 64, 597-

622, 1996.

"Least Absolute Deviation Estimation of a Shift." *Econometric Theory*, 11, 403-436, 1995.

"The Impact of 1989 California Major Anti-Smoking Legislation on Cigarette Consumption: Three Years Later," with Tehwei Hu, Ted Keeler, and Paul Barnett. *Journal of Public Health Policy*, 15, 26-36, 1994.

"Least Squares Estimation of a Shift in Linear Processes." *Journal of Time Series Analysis*, 15, 453-470, 1994. Reprinted in *Recent Developments in Time Series* (Paul Newbold and Stephen J. Leybourne eds.), The International Library of Critical Writings in Economics (Series Editor: Mark Blaug and Adrian Darnell).

"Weak Convergence of Sequential Empirical Processes of Residuals in ARMA Models." *Annals of Statistics*, 22, 2051-2061, 1994.

"On the Partial Sum Processes of Residuals in Autoregressive and Moving Average Models." *Journal of Time Series Analysis*, 14, 247-260, 1993.

Other Publications:

"A New Look at Panel Stationarity Tests and the PPP Hypothesis" (with Serena Ng), in *Identification and Inference for Econometric Models: Essays in Honor of Thomas J. Rothenberg*, Cambridge University Press, edited by D.W.K. Andrews and J.H. Stock, 2005.

"Multiple Structural Changes Models: a Simulation Analysis," (with Pierre Perron). *Econometric Theory and Practice,* D. Corbea, S. Durlauf and B.E. Hansen (eds.), Cambridge University Press, 2006, 212-234.

RECENT WORKING PAPERS

Limit theory for non-stationary panel data, Revised August 2009.

Likelihood approach to small T dynamic panel data models with interactive effects, March 2009, revision December 2010.

Factor analysis and principal components, evaluating commonly used estimation procedures, November, 2010, revision and resubmit to *Journal of Applied Econometrics*.

Maximum likelihood estimation and inference of approximate factor models of high dimension (with Kunpeng Li), September 2010, revised June, 2012

Theory and methods for panel regressions with interactive effects (with Kunpeng Li), December 2010, revised December 2012.

A contribution to dynamic panel data analysis, February, 2011.

Inference for FAVAR models under structural restrictions (with Kenpeng Li), Unpublished manuscript, 2012.

Identification and estimation of dynamic factor models (with Peng Wang), unpublished manuscript, Columbia University, 2012

Efficient estimation of approximate factors models via regularized maximum likelihood (with Yuan Liao), October, 2012.

Identification theory for high dimensional static and dynamic factor models (with P. Wang), January, 2013.

Generalized Principal components for panel data and factor models, (with Y. Liao), April 2013

Multifactor asset pricing with a large number of observable risk factors and unobservable common and group-specific factors (with Tomohiro Ando), May, 2013

CURRENT RESEARCH

Panel Data Analysis, fixed effect, interactive fixed effects;
Instrumental Variable Estimation with Large Number of Instruments;
Forecasting with large number of predictors
High Dimensional Time Series Analysis;
Structural VAR with short-run and long-run restrictions;
Structural VAR with cointegration restrictions
Cross-sectional dependence
Penalized maximum likelihood method, LASSO

PROFESSIONAL ACTIVITIES

Editorial Boards:

1. Associate Editor: *Econometrica*, January 2006-

2. Associate Editor, Journal of Econometrics, April, 2012-
3. Advisory Editor: *Economics Letters*, 2003-present
4. Associate Editor: *Trends and Foundations in Econometrics*, 2004-present.
5. Co-editor: *Annals of Economics and Finance,* 2000-present
6. Associate Editor: *Frontiers of Economics in China, 2012-*
7. Associate Editor: *Econometric Theory*, 1997-2000
8. Associate Editor: *Studies of Nonlinear Dynamics and Econometrics*, 2001-2013.

Member of the Scientific Committee of Panel Data Conferences, 2009-present

Conference organizations:

1. Program Committee of Far Eastern Econometric Society Meeting, Beijing, July , 2006
2. Program Committee of Far Eastern Econometric Society Meeting, Taipei, July, 2007
3. Program Committee of Latin American Econometric Society Meeting, Bogota, Columbia, October, 2007
4. Program Committee of Far Eastern Econometric Society Meeting, Singapore, 2008
5. Program Committee of Fourth Symposium of Econometric Theory and Applications, Seoul, Korea, 2008.
6. Program Committee of the 10th World Congress Econometric Society, Shanghai, China, 2010
7. Program Committee of the 18th Panel Data Conference, Paris, France, 2012.
8. Program Committee of the 6th SoFiE Conference in Singapore, June, 2013.
9. The Inaugural China Meeting of the Econometric Society, Beijing, June, 2013
10. Large-scale Factor Models in Finance (SoFiE), Lugano, Switzerland, October, 2013

Referee for:
Econometrica; Journal of Econometrics; Econometric Theory;
Review of Financial Studies; Econometric Reviews
Journal of Applied Econometrics; Economics Letters;
Review of Economics and Statistics; Review of Economic Studies
American Economic Review; Rand Journal of Economics
Quarterly Journal of Economics; Journal of Business and Economic Statistics; Journal of the Royal Statistical Society, Series B; Journal of Statistical Planning and Inference; Annals of Institute of Statistical Mathematics; Bernoulli; The Manchester School; Statistics and Probability Letters; Journal of Stochastic Processes and Their

Applications; Communications in Statistics: Theory and Methods Journal of Time Series Analysis; Economic Inquiry; International Economic Review; Journal of International Money and Finance; Journal of Comparative Economics; National Science Foundation; European Economic Review; Journal of Forecasting; ESAIM: Probability and Statistics; Annals of Economics and Finance; Studies of Nonlinear Dynamics in Econometrics; Economic Modeling, Statistica Sinica; Annals of Statistics; Journal of the American Statistical Association; Journal of Financial Econometrics; International Journal of Forecasting; Quantitative Finance; Computational Economics; Journal of Banking and Finance; Empirical Economics; Economics and Politics; Journal of Money, Credit and Banking; The Scandinavian Journal of Economics; TEST; Journal of Applied Statistics; Review of Accounting and Finance; Journal of Development Economics; American Economic Journal: Macroeconomics; Canadian Journal of Economics; European Journal of Political Economy, Metrika.

SELECTED HONORS, FELLOWSHIPS

A keynote speaker at the Cross-sectional Dependence in Panel Data Models, Cambridge, UK, May 30-31, 2013.

An Invited speaker at The 2012 International Symposium on Econometric Theory and Applications (SETA 2012), Shanghai, China, *May 19-21, 2012.*

Distinguished Visitor, Boston University, April 19-April 22, 2011.

A paired-invited speaker at the Asian Meeting of Econometric Society, August 11 (11-13) 2011, Seoul, Korea.

A keynote speaker at the 16th African Econometric Society Meeting, July 14 (13-15) , 2011, Nairobi, Kenya.

A paired-invited speaker at the 10th World Congress of the Econometric Society, August 2010, Shanghai, China.

A keynote speaker at the 15th International Conference on Panel Data, Bonn, Germany, July 3rd-5th, 2009

An invited speaker at the Far Eastern Econometric Society Meeting, July 11-13, 2007, Taipei, Taiwan

A keynote speaker at the Third Symposium on Econometric Theory and Applications, April 13-15, 2007, Hong Kong

A keynote speaker at the International Conference on Breaks and Persistence in Econometrics, London, Dec 11-12, 2006

A Keynote speaker at the conference "Common Features in London," December 2004.

Econometric Theory Award, in Recognition of Research Contributions to the Science of Econometrics, 1999.

The *Review of Economic Studies tour, 1992*.

Alfred P. Sloan Foundation Dissertation Fellowship, UC Berkeley, 1991-1992

RECENT CONFERENCES (FROM 2005)

Financial engineering and risk management conference in Shanghai, presenter, July 3-4, 2005,

Econometric Society World Congress, London, August 19-24, 2005.

Columbia Econometrics Colloquium, Columbia University, Presenter, December 3, 2005.

New York Camp Econometrics, Saratogas Spring, Presenter and session chair. February 3-4, 2006.

Conference to Honor the 25th Anniversary of Seminal Research by Stephen Beveridge and Charles R. Nelson, The Federal Reserve Bank of Atlanta, March 31-April 1, 2006.

2006 Conerence on Public Affairs in China, November 18, New York City, presenter.

Greater New York Metropolitan Area Econometrics Colloquium at Yale University, presented "Panel cointegration and global stochastic trends," December 2, 2006.

CIREQ Time Series conference Montreal, Dec 8-9, 2006, presenter

International Conference on Breaks and Persistence in Econometrics, London, Dec 11-12, 2006, keynote speaker

Third Symposium on Econometric Theory and Applications, April 13-15, 2007, Hong Kong, keynote speaker

Far Eastern Econometric Society Meetings, July 11-13, 2007. Taipei, Taiwan, invited speaker and session chair

Bank of England Research Forum: Recent Development in Dynamic Factor Models, Oct 8-10, 2007, invited speaker.

NBER Summer Institute, July 8-July 11， 2008: Conditional Markov Chain and its Application to Economic Time Series

The 2009 Summer Workshop in Econometrics, May 31-June 1, 2009, Tsinghua Beijing. Program committee and session chair

Cowles Foundation Summer Conference in Econometrics, June 22-23, 2009, presenter

The 15th International Conference on Panel Data, July 3- July 5th, Bonn, 2009, keynote speaker

The 10th World Congress of the Econometric Society, August, 2010, Shanghai, China, an invited speaker.

July 14, 2011, A keynote address at the African Econometric Society meetings, Nairobi, Kenya

Aug 10, 2011, An invited talk at the Pre-Conference of AMES, Seoul National University, Seoul, Korea (on The computational Aspects of Dynamic Panel data models with interactive effects")

Aug 11, 2011, A paired-invited talk at the Asian Meetings of Econometric Society, Seoul, Korea (on "A contribution to dynamic panel data models")

May 18, 2012, "2012 Econometrics Workshop," Shanghai University of Economics and Finance, an invited talk on "Identification and estimation of dynamic factor models."

May 19, 2012, The 2012 International Symposium on Econometric Theory and Applications (SETA 2012) (on Maximum likelihood estimation and inference for approximate factor models of high dimension).

May 30-31, 2013, Cross-sectional Dependence in Panel Data Models, Cambridge, UK, presented "Theory and methods for panel data models with interactive effects"

June 8-9, 2013, The 2013 International Symposium on Analysis of Panel Data, Xiamen, presented "Theory and methods for panel data models with interactive effects"

RECENT SEMINAR TALKS (FROM 2005)

1. April 4, 2005, University of Pennsylvania, presented "Panel data models with interactive fixed effects"

2. September 16, 2005, Rice University, presented "Panel data models with interactive fixed effects"

3. October 10, 2005, MIT/Harvard Econometrics Seminar, presented "Panel data models with interactive fixed effects."

4. June 12, 2006, European Central Bank/CFS/Goethe Frankfurt University Joint Seminar.

5. June 15, 2006, Malinvaud Seminar at CREST, Paris

6. June 21, 2006, Cambridge University, U.K.

7. June 22, 2006, London School of Economics, U.K.

8. December 13, 2006, Institute of Statistics at Universite Catholique de Louvain, Brussels, Belgium.

9. October 11, 2007, Queen Mary, University of London, U.K

10. October 25, 2007, University of Chicago, GSB

11. March 3, 2008, Stern School of Business, NYU.

12. March 31, 2009, Indiana University

13. April 28, 2009, Princeton University, presented "Likelihood approach to small T dynamic panel models with interactive effects"

14. October 1st, 2009, Harvard/MIT, presented "Likelihood approach to small T dynamic panel models with interactive effects"

15. March 4th, 2010, Rutgers University, presented "Fixed effects

dynamic panel data models, a factor analytical method"

16. May, 2nd, 2010 Michigan State University, presented "Fixed effects dynamic panel data models, a factor analytical method"

17. February 9th, 2011, Econometrics Colloquium, Columbia University, presented "Fixed effects dynamic panel data models, a factor analytical method"

18. April 11, 2011, Boston University, invited as a Distinguished Visitor, presented "Likelihood approach to small T dynamic panel data models with interactive effects"

19. September 29, 2011,Triangle Econometrics Seminar, presented "A contribution to dynamic panel data analysis"

20. October 9, 2012, Brown University, presented "Maximum likelihood estimation and inference for approximate factor models of high dimension"

21. October 17, 2012, Yale University, presented the same paper as above.

22. April 26, 2013, Montreal Econometric Series (joint seminar of Concordia, McGill, and Montreal U). Presented the paper "Theory and methods of panel data models with interactive effects."

RESEARCH GRANTS

National Science Foundation, SES0962410, 2010-2013
National Science Foundation, SES0551275, 2006-2009
National Science Foundation, SES0137084; SES0424540, 2002-2005
National Science Foundation, SBR9896329, 1999-2001
National Science Foundation, SBR9414083; SBR9709508, 1994-1998
Provost Fund of MIT, 1995
Dean's Faculty Development Fund, MIT, 1993
Provost Fund of MIT, 1992