Tao Chen

CONTACT INFORMATION	University of Waterloo Hagey Hall of Humanities Waterloo, ON, Canada N2L 3G1	Phone: (519) 888-4567 ext. 32558 E-mail: t66chen@uwaterloo.ca https://uwaterloo.ca/big-data-research-lab/our-people/lab-director

RESEARCH INTERESTS

Mathematical Statistics, Econometric Theory, Machine Learning, Labor Economics, Mental Health and Cognition, Vascular Diseases

EDUCATION

University of Connecticut, Storrs, CT, USA

Ph.D., Economics (with M.A. degree) Major advisor: Dr. Gautam Tripathi	2003.8 - 2011.6
Ph.D., Mathematics (A.B.D. with M.S. degree) Major advisor: Dr. Richard Bass	2005.8 - present

Shanghai International Studies University, Shanghai, China

B.A., Finance	1997.9 - 2001.7

PROFESSIONAL EXPERIENCE

Academic

Tenured Professor at University of Waterloo, cross-appointed to

Statistics and Actuarial Science, Faculty of Mathematics	2020.9 - present
Economics, Faculty of Arts	2018.7 - present

Senior Research Fellow of Labor and Worklife Program, Harvard University	2015.9 - 2021.8
Assistant Professor of Economics, University of Waterloo	2011.7 - 2018.6

Others

Founding Director of Big Data Research Lab, University of Waterloo	2014.5 - present
KPMG, Shanghai	2001.7 - 2002.8

BOOK CHAPTER

Non-parametric and semi-parametric regressions (with A. Almeida and C. Azzoni). In D. Mukherjee (Ed.), *Selected Topics in Cross Section and Panel Data Econometric*s, Springer, forthcoming.

JOURNAL PUBLICATIONS

Prediction of in-hospital mortality rate in patients with acute aortic dissection by machine learning, *BMJ Open*, forthcoming (with Z. Wu, Y. Li, Z. Xu, H. Liu, K. Liu, P. Qiu and X. Lu).

Attenuated niacin response is associated with a sub-type of first episode psychosis characterized as serious negative symptoms, *European Archives of Psychiatry and Clinical Neuroscience*, forthcoming (with T. Zhang, R. Gan, G. Wu, J. Zeng, Y. Hu, L. Xu, Y. Wei, X. Tang, C. Li, H. Liu and J. Wang).

A deep LSTM-CNN based on self-attention mechanism with input data reduction for short-Term Load Forecasting, *IET Generation, Transmission & Distribution*, forthcoming (with Y. Yi, H. Liu, J. Zhang and Y. Fan).

Serum complement proteins rather than inflammatory factors is effective in predicting psychosis in individuals in clinical high risk, *Translational Psychiatry*, forthcoming (with T. Zhang, J. Zeng, J. Ye, Y. Gao, Y. Hu, L. Xu, Y. Wei, X. Tang, H. Liu, C. Li, C. Wan and J. Wang).

Changes in Inflammatory Markers in Clinical High Risk of Developing Psychosis, *Neuropsychobiology*, forthcoming (with T. Zhang, J. Zeng, Y. Wei, J. Ye, X. Tang, L. Xu, Y. Hu, H. Liu, C. Li and J. Wang).

Developing and optimizing a machine learning predictive model for postthrombotic syndrome in a longitudinal cohort of patients with proximal deep venous thrombosis, *Journal of Vascular Surgery: Venous and Lymphatic Disorders*, forthcoming (with Z. Wu, Y. Li, Jiahao Lei, H. Liu, P. Qiu and X. Lu).

Changes in inflammatory balance correlates with conversion to psychosis among individuals at clinical high-risk: A prospective cohort study, *Psychiatry Research*, forthcoming (with T. Zhang, J. Zeng, Y. Wei, J. Ye, X. Tang, L. Xu, Y. Hu, H. Cui, Y. Xie, Y. Tang, X. Liu, H. Liu, C. Li and J. Wang).

Portfolio selection – from under-diversification to concentration, *Empirical Economics*, forthcoming (with J. Xu, Y. Li and K. Liu).

Multivariate joint models for the dynamic prediction of psychosis in individuals with clinical high risk, *Asian Journal of Psychiatry*, 2023 (with T. Zhang, X. Tang, Y. Zhang, L. Xu, Y. Wei, Y. Hu, H. Cui, Y. Tang, H. Liu, C. Li, J. Wang), Doi.org/10.1016/j.ajp.2023.103468.

Eye movement indices as predictors of conversion to psychosis in individuals at clinical high risk, *European Archives of Psychiatry and Clinical Neuroscience*, 2022 (with D. Zhang, L. Xu, Y. Xie, X. Tang, Y. Hu, X. Liu, G. Wu, Z. Qian, Y. Tang, H. Liu, T. Zhang and J. Wang), DOI:10.1007/s00406-022-01463-z.

Antipsychotic exposure in clinical high risk of psychosis: empirical insights from a large cohort study, *Journal of Clinical Psychiatry*, forthcoming (with J. Zeng, A. Raballo, R. Gan, G. Wu, Y. Wei, L. Xu, X. Tang, Y. Hu, Y. Tang, C. Li, J. Wang and T. Zhang).

Highly accurate heart failure classification using carbon nanotube thin film biosensors and machine learning assisted data analysis, *Biosensors and Bioelectronics: X*, 12 (2022), 100187 (with Z. Guo, R. Tian, W. Xu and D. Yip, M. Radyk, F. Santos, A. Yip and S. Tang).

Electric vehicle range estimation using regression techniques, *The World Electric Vehicle Journal*, 13 (2022), Article 105 (with M. Ahmed, Z. Mao, Y. Zheng and Z. Chen).

Prognostic impact of blood pressure change patterns on patients with aortic dissection after admission, *Frontiers in Cardiovascular Medicine, Section Hypertension*, 9 (2022), 832770 (with Z. Wu, Y. Li, P. Qiu, H. Liu, K. Liu, R. Wang and X. Lu).

Effective differentiation between depressed patients and controls using discriminative eye movement features, *Journal of Affective Disorders*, 307 (2022), 237-243 (with D. Zhang, X. Liu, L. Xu, Y. Li, Y. Xu, M. Xia, Z. Qian, Y. Tang, Z. Liu, H. Liu, T. Zhang, J. Wang).

Gender differences in prodromal psychotic symptom screening in a counseling center population, *Archives of Women's Mental Health*, 25 (2022), 291-299 (with Q. Hu, Z. Chen, Z. Lin, Z. Li, Y. Wei, L. Xu, X. Tang, Y. Hu, J. Wang, T. Zhang and C. Li).

Automatic auditory processing features in distinct subtypes of patients at clinical high risk for psychosis: forecasting remission with mismatch negativity, *Human Brain Mapping*, 43 (2022), 5452-5464 (with G. Wu, X. Tang, R. Gan, J. Zeng, Y. Hu, L. Xu, Y. Wei, Y. Tang, H. Liu, C. Li, J. Wang and T. Zhang).

Replication of the abnormal niacin response in first episode psychosis measured using laser doppler flowmeter, *Asia-Pacific Psychiatry*, 14 (2022), E12516 (with R. Gan, G. Wu, J, Zeng, Y. Hu, L. Xu, Y. Wei, X. Tang, X. Liu, J. Wang and T. Zhang).

Antipsychotic prescription, assumption and conversion to psychosis in clinical high risk individuals: resolving missing clinical links to optimize prevention through precision, *Schizophrenia*, 8 (2022), Article 48 (with T. Zhang, A. Raballo, J. Zeng, R. Gan, G. Wu, Y. Wei, L. Xu, X. Tang, Y. Hu, Y. Tang, C. Li and J. Wang).

Artificial intelligence assisted niacin skin flush screening in early psychosis identification and prediction, *General Psychiatry*, 35 (2022), E100753 (with H. Liu, R. Tian, R. Gan, W. Xu, T. Zhang and J. Wang).

Attenuated niacin-induced skin flush response in individuals with clinical high-risk for psychosis, *General Psychiatry*, 35 (2022), E100748 (with R. Gan, Y. Wei, G. Wu, J. Zeng, Y. Hu, L. Xu, X. Tang, X. Liu, H. Liu, J. Wang and T. Zhang).

Temporal and time-frequency features of auditory oddball response in distinct subtypes of patients at clinical high risk for psychosis, *European Archives of Psychiatry and Clinical Neuroscience*, 272 (2022), 449-459 (with G. Wu, X. Tang, R. Gan, J. Zeng, Y. Hu, L. Xu, Y. Wei, Y. Tang, C. Li, J. Wang and T. Zhang).

Neurocognitive assessments are more important among adolescents than adults for predicting psychosis in clinical high risk, *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 7 (2022), 56-65 (with T. Zhang, H. Cui, Y. Wei, X. Tang, L. Xu, Y. Hu, Y. Tang, C. Li and J. Wang).

A potential objective marker in first-episode schizophrenia based on abnormal niacin response, *Schizophrenia Research*, 243 (2022), 405-412 (with Y. Gu, L. Xu, R. Gan, G. Wu, X. Tang, Y. Wei, H. Cui, L. Hui, Y. Tang, C. Li, C. Wan, J. Wang and T. Zhang).

Imbalance model of hear rate variability and pulse wave velocity in psychotic and non-psychotic disorders, *Schizophrenia Bulletin*, 48 (2022), 154-165 (with T. Zhang, X. Tang, L. Xu, Y Wei, Y. Hu, H. Cui, Y, Tang, C. Li, L. Zhou and J. Wang).

Inefficient integration during multiple facial processing in pre-morbid and early phases of psychosis, *The World Journal of Biological Psychiatry*, 23 (2021), 361-373 (with T. Zhang, Y. Yang, L. Xu, X. Tang, Y. Hu, X. Xiong, Y. Wei, H. Cui, Y. Tang, H. Liu, Z. Liu, L. Hui, C. Li, X. Guo and J. Wang).

When and why contexts predict unethical behavior: evidence from a laboratory bribery game, *Frontiers in Psychology*, 12 (2021), 675319 (with S. Wang).

Identifying key factors in momentum in basketball games, *Journal of Applied Statistics*, 48 (2021), 3116-3129 (with Q. Fan, K. Liu and L. Le).

数字医疗在精神病学领域中的应用,《中国神经精神疾病杂志》, 47 (2021), 310-313 (with J. Zeng, H. Liu, J. Wang and T. Zhang).

Pre-screening and treatment of aortic dissection through analyzing data of infinite dimensions, *BioData Mining*, 14 (2021), Article 24 (with P. Qiu, Y. Li, K. Liu, J. Qin, K. Ye and X. Lu).

Semiparametric efficiency for censored linear regression models with heteroskedastic errors, *Econometric Theory*, 34 (2018), 228-245.

Differences across versions of Penn World Table: a functional data analysis approach, *Economics Letters*, 170 (2018), 179-184 (with J. DeJuan and R. Tian).

Testing conditional mean independence under symmetry, *Journal of Business & Economic Statistics*, 36 (2018), 615-627 (with Y. Ji, Y. Zhou and P. Zhu).

A functional data approach to model score difference process in professional basketball games, *Journal of Applied Statistics*, 45 (2018), 112-127 (with Q. Fan).

Single game career high Vs. highest season average of NBA players, *Journal of the Chinese Statistical Association*, 56 (2018), 25-36 (with Y. Li).

A simple consistent test of conditional symmetry in symmetrically trimmed regression models, *Journal of Econometrics*, 198 (2017), 29-40 (with G. Tripathi).

Model-based versus data-driven approach for road safety analysis: do more data help? *Transportation Research Record: Journal of the Transportation Research Board*, 2601 (2016), 33-41 (with L. Thakali and L. Fu).

Models specification tests and the estimation of treatment effects: an application with random and nonrandom administrative records, *Journal of Economic and Social Measurement*, 41 (2016), 1-16 (with K. Couch).

Nonparametric instrumental variable estimation in practice, *Journal of Econometric Methods*, 5 (2016), 153-177 (with P. Shaw and M. Cohen).

Changing tastes: estimating changing attribute prices in hedonic and repeated sales price indices, *Journal of Real Estate Finance and Economics*, 52 (2016), 141-175 (with J. Harding).

An approximation of logarithmic functions in the regression setting, *Statistical Methodology*, 23 (2015), 50-58 (with K. Couch).

Intragenerational mobility and the ratio of permanent to total inequality, *Applied Economics*, 46 (2014), 4399-4408 (with G. Bayaz and K. Couch).

Semiparametric efficiency bound for partially linear single-index regression models, *Journal of Multivariate Analysis*, 130 (2014), 376-386 (with T. Parker).

Permanent and transitory inequality and intra-generational mobility, *Economics Letters*, 120 (2013), 200-202 (with K. Couch).

Testing conditional symmetry without smoothing, *Journal of Nonparametric Statistics*, 25 (2013), 273-313 (with G. Tripathi).

Vibration spectra of finitely ramified, symmetric fractals, *Fractals*, 16 (2008), 243-258 (with N. Bajorin, A. Dagan, C. Emmons, M. Hussein, M. Khalil, P. Mody, B. Steinhurst and A. Teplyaev).

Vibration modes of 3n-gaskets and other fractals, *Journal of Physics A: Mathematical and Theoretical*, 41 (2008), 015101 (with N. Bajorin, A. Dagan, C. Emmons, M. Hussein, M. Khalil, P. Mody, B. Steinhurst and A. Teplyaev).

WORKING PAPERS AND WORK IN PROGRESS, PARTIAL LIST

Where does the heaviness start (with Z. Zhang, revision at *Communications in Statistics - Simulation and Computation*).

Atypical salient regions enhancement network for visual saliency prediction of individuals with autism spectrum disorder (with H. Duan, Z. Liu, W. Wei, T. Zhang, J. Wang, L. Xu and H. Liu, under review).

A nonparametric resolution for continuous-time analysis subject to modeling discrepancy (with Y. Li and R. Tian, under review).

Equity premium puzzle – an illusion in the physical world from partial identification's perspective (with J. Xu, under review).

Functional dynamic factor models (with J. Xu and R. Tian, under review).

Deep neural network empowered two-stage regression with a non-linear first stage (with R. Tian and W. Xu, under review).

Classification of Schizophrenia patients and feature selection in terms of DNA methylation data (with Q. Li, C. Pan, H. Liu, L. Li, Q. Zhang and H. Li, under review).

A data driven approach for resting-state EEG signal classification of schizophrenia with control participants using random matrix theory (with H. Liu, T. Zhang, C. Pan, G. Yang, J. Wang and R. Qiu, under review).

Automatic drawing method of biological targets in liver tumor images (with Q. Liu, A. Bolufe-Rohler and K. Liu, under review).

Schizophrenia diagnosis method based on emotion recognition in a reconstructed speech phase space (with K. Liu, J. Liu, A. Bolufe-Rohler, X. Huang, under review).

Testing the specification of a linear IV regression model when the instruments are weak (with G. Tripathi and R. Tian, under review).

Stochastic discount factors in incomplete markets (with Y. Li, under review).

Eletroencephalogram feature extraction through a hybrid model (with J. Wang, G. W, W. Xu, T. Zhang and X. Zhang, under review).

Associations between Coronavirus disease 2019 pandemic and psychiatric emergency visits: evidence from a distributed lag non-linear model (with T. Zhang, Z. Chen, Y. Xie, X. Yuan, X. Tang, L.Xu, Y. Wei, Y. Hu, H. Cui, Y. Tang, H. Liu, C. Li, Y. Zhang and J. Wang, under review).

A machine learning powered point-of-care biomarker testing system for heart failure classification (with Z. Guo, R. Tian, W. Xu and D. Yip, M. Radyk, F. Santos, A. Yip and S. Tang, under review).

Macroeconomics forecasting using mixed frequency dynamic factor model with random level shift loadings (with J. Xu, Y. Li, K. Liu and D. Luo, under review).

An algorithm based on empirical likelihood to identify outliers (with Z. Zhang, under review).

Sensitivity analysis of regression variables: a machine learning version (with R. Tian and W. Xu, under review).

Think outside the envelop – efficiency bound estimation through Extreme Value Theory (with F. Yang and Z. Zhang, under review).

GSGNet: global semantic-guided network for saliency prediction (with J. Xie, Z. Liu, G. Li and X. Lu, under review).

What's the optimal wage structure for NBA professional teams in terms of winning percentage? (with Y. Li and Z. Zhang, under review).

NBA all time score leader VS. 10-time scoring champing, which event is more unlikely? (with Z. Zhang, under review).

Selecting the optimal sample size in program evaluation studies: a sequential sampling approach.

Nonparametric estimation of the effects of clearance rates on crime with shape restrictions when policing is a public good (with P. Curry and A. Sen).

Another thought on nonparametric regression with endogenous variables (with R. Tian and W. Xu).

Bootstrap with unequal weights – an empirical likelihood approach (with Z. Zhang).

Test of high dimensionality (with H. Liu and Z. Zhang).

Resting-state connectivity in the prodromal phase of schizophrenia (with H. Liu and T. Zhang).

"War of four kingdoms" – a reinforcement approach (with H. Liu, W. Xu and Y. Yu).

Measuring the dynamic impact of affordable housing plan in NYC (with R. Zeng).

Deep learning for cerebral vessels segmentation in 3D-MRA (with T. Meng, X. Zhang, Z. Zhang, Z. Zhang and L. Gong).

Deep learning based segmentation for intracranial aneurysms in 3D-MRA (with T. Meng, X. Zhang, Z. Zhang, Z. Zhang and L. Gong).

Teaching Experience	Courses teaching at the University of Waterloo	2011.7 - Present

ECON 721: First year Ph.D. Econometrics
ECON 673: Machine Learning Applications
ECON 621: Econometrics I
ECON 600: Quantitative Methods
ECON 422: Nonparametric Estimation for Advanced Undergraduate
ECON 421: Econometric Theory
ECON 322: Econometric Analysis I
ECON 321: Introduction to Econometrics
ECON 311: Mathematics for Economists II

Courses taught at the University of Connecticut	2005.8 - 2009.5

As an independent instructor I taught: Empirical Methods in Economics, Principles of Microeconomics, Principles of Macroeconomics, Problem Solving, Calculus for Business and Economics and Calculus Sequence I-III.

Selected Presentations

Sept. 2019, "Two applications of Big Data Analysis in Medical Studies", Nan Kai University, Tian Jin, China.

Feb. 2019, "Seeing is behaving: Using revealed-strategy approach to understand cooperation in social Dilemma", Harvard University, USA.

Sept. 2018, "Seeing is behaving: Using revealed-strategy approach to understand cooperation in social Dilemma", at Shanghai Academy of Social Science, Shanghai, China

Sept. 2017, "Think outside the envelop – Efficiency bound estimation through Extreme Value Theory" at University of Connecticut, CT, USA.

June 2017, "A cognitive dissonance interpretation of the context effect in ethical decision-making experiments – evidence from a laboratory bribery game" at Shanghai University of Finance and Economics, Shanghai, China.

Feb. 2015, "Overeducation? Student Loans? Wage Bargaining and more?" at Harvard University, MA, USA.

Nov. 2014, "An approximation of logarithmic functions in the regression setting – An application to intergenerational mobility study" at Xiamen University, Fujian, China.

May 2014, "A simple consistent test of conditional symmetry in symmetrically trimmed regression models" at Shanghai University of Finance and Economics, Shanghai, China.

June 2013, "Assessing the inter-generation mobility – a functional data regression approach" at Nagoya University, Nagoya, Japan.

Feb. 2011, "Selecting the optimal sample size in program evaluation studies: a sequential sampling approach" at University of Waterloo, ON, Canada.

Grants

Brilliant Strategy Investment Consulting, China (PI, $2014 - 2017$, CAD $82,194$).

Wuhan Research Institute, China (PI, $2014 - 2015$, CAD $20,000$).

HuangHe Talents - City of Wuhan, China (Co-PI, $2015 - 2017$, RMB $1,500,000$).

Center for Green Buildings and Cities - Harvard University, USA (Co-PI, $2016 - 2017$, USD $100,000$).

Social Sciences and Humanities Research Council – Insight Development, Canada (PI, $2016 - 2018$, CAD $31,422$).

International Research Partnership - University of Waterloo, Canada (PI, $2016 - 2018$, CAD $20,000$).

UW/SSHRC Robert Harding & Lois Claxton Humanities and Social Sciences Grant, Ontario, Canada (PI, 2016, CAD 5,500).

Wuhan Research Institute, China (PI, 2017, CAD 20,000).

Wuhan Research Institute, China (PI, 2017, CAD 10,000).

International Research Partnership (China) - University of Waterloo, Canada (Co-PI, 2017−2018, CAD 20,000).

Zerone Research Lab, Ontario, Canada (PI, 2017−2023, CAD 85,000).

PaaS Global Inc., Hong Kong, China (PI, 2018−2022, CAD 150,173).

Mitacs - Betterworth Inc., Ontario, Canada (PI, 2019−2020, CAD 45,000).

Microsoft's AI Institute funding for AI in Social Good, Ontario, Canada (PI, 2020−2021, CAD 25,000).

UW/SSHRC Robert Harding & Lois Claxton Humanities and Social Sciences Grant, Ontario, Canada (PI, 2021−2022, CAD 10,000).

Centre for Bioengineering and Biotechnology Seed Fund - University of Waterloo, Canada (Co-PI, 2021−2022, CAD 15,000).

Interdisciplinary Trailblazer - University of Waterloo, Canada (Co-PI, 2022−2024, CAD 80,000).

Rogers Communications Canada Inc., matched by Ontario Centre for Innovation, Ontario, Canada (Co-PI, 2022−2024, CAD 285,000).

DOCTORAL STUDENTS SUPERVISION (AS MAJOR ADVISOR)	Renfang Tian: Tenure Track Assistant Professor at Western University - King's College, Canada, as her first placement, 2020.
	Peng Qiu: Attending Doctor, Department of Vascular Surgery, Shanghai Ninth People's Hospital, Shanghai JiaoTong University School of Medicine; Manager, Research Clinical Trials Office, Vascular Center of Shanghai JiaoTong University, China, as his first placement, 2021.
	Yixuan Li, Tenure Track Assistant Professor at MacEwan University, Canada, as her first placement, 2023.
	Zhuojing Zhang, ongoing.
	Wenzuo Xu, ongoing.
	Zetian Zhang, ongoing.
	Ruimin (Rachel) Zeng, ongoing (part time).
	Yan Yu, incubating.
POSTDOCTORAL FELLOWS	Meiying Zhong, China Securities Regulatory Commission.
	Sining Wang, Case Western Reserve University.
	Pramod Kalambate, ongoing.
PREPARED	February 2, 2023.