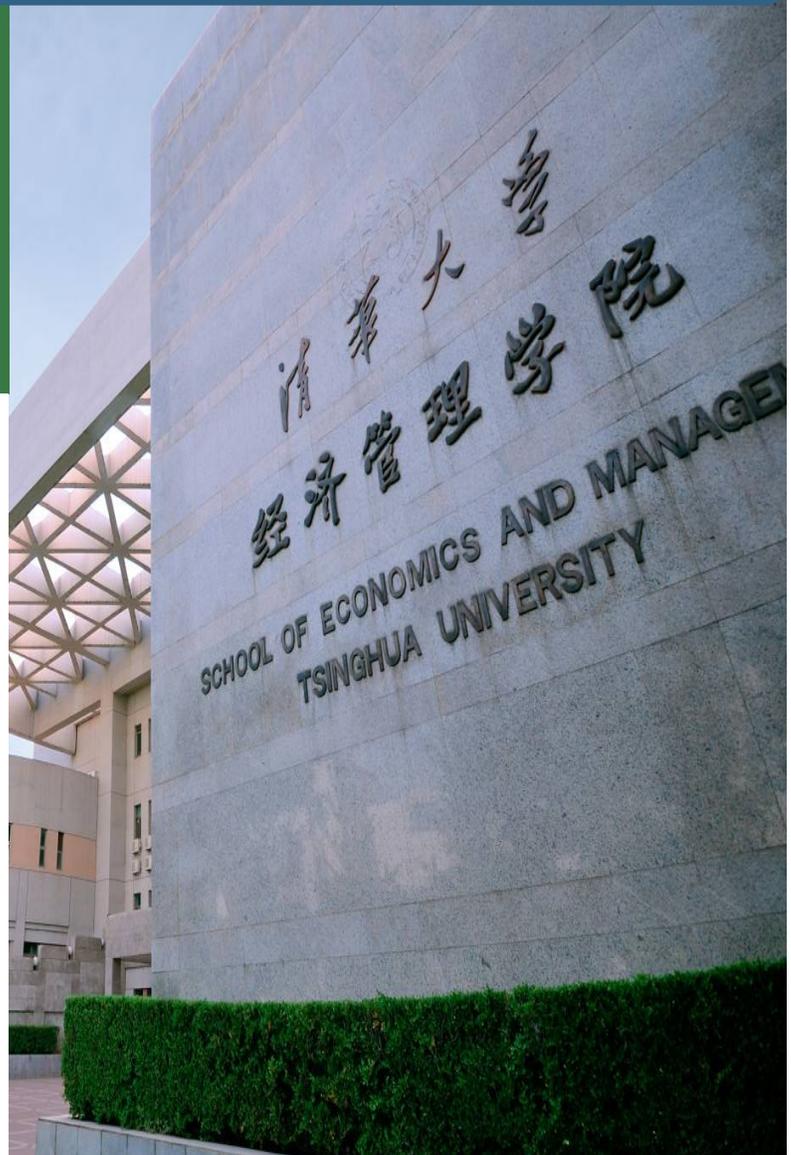# 2019 Tsinghua International Econometrics Conference

Conference Booklet

清华经管学院
Tsinghua SEM

- *22-23 June, 2019*
- *School of Economics and Management, Tsinghua University*
- *Beijing, China*

WELCOME

From the Local Organizing Committee

The Local Organizing Committee warmly welcomes you to this year's conference at Tsinghua University, and wishes you a fruitful and enjoyable stay.

Organizing Committee:

Chair:	**Chong-En Bai** (Department of Economics, Tsinghua University)
Co-chairs:	**Liangjun Su** (School of Economics, Singapore Management University)
	Shengjie Hong (Department of Economics, Tsinghua University)
Committee members:	(in alphabetical order of last name)
	Yubo Chen (Department of Marketing, Tsinghua University)
	Sainan Jin (School of Economics, Singapore Management University)
	Qi Li (Department of Economics, Texas A&M University)
	Taoxiong Liu (Institute of Economics, Tsinghua University)
	Wenqing Pan (Department of Economics, Tsinghua University)
	Ke Tang (Institute of Economics, Tsinghua University)
	Xiaohan Zhong (Department of Economics, Tsinghua University)
	Lin Zhu (Department of Economics, Tsinghua University)

Administrative staff and students:

Yu Wang
Xin Tian
Yi Li
Yinong Tan
Zechao Li

(If you need any assistant during the conference, please feel free to contact **Yu Wang** at (86) 15910606359, or **Yi Li** at (86) 13021254832.)

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Acknowledgements

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Chong-En Bai, Liangjun Su and Shengjie Hong

Program Committee Co-chairs

School of Economics & Management

Tsinghua University

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About the National Institute for Fiscal Studies

National Institute for Fiscal Studies of Tsinghua University (NIFS in short), established in January 2008, is an academic institute conducting academic research and giving policy recommendations on public finance issues.

NIFS is jointly initiated by the Ministry of Finance, the Ministry of Education, and Tsinghua University. With sufficient academic independence, NIFS is affiliated with the university and has close connection with the Ministry of Finance, other government agencies, and research institutes. NIFS is committed to conducting forward-looking and scientific research on major issues on public finance, and exploring new ideas and new methods for analyzing those issues. It merits from international predecessors, as well as draws on domestic experience. NIFS aims to improve the fiscal policies of developing countries, to provide professional and independent insights and supports for China's fiscal and related major policies.

The daily management and scientific research of NIFS is under the leadership of the Academic Advisory Board while the director takes the responsibility. The present director of NIFS is Professor Chong-En Bai --- Mansfield Freeman Chair Professor and the Dean of Tsinghua School of Economics and Management (SEM). NIFS has more than 10 researchers focusing on academic researches and policy analyses on corporate taxation or subsidies, taxation analysis and forecasting, incentives and constraints of local governments' behavior, routine research work in cooperation with the taxation departments, income distribution, and social security.

Keynote Speaker:

Prof. Xiaohong Chen

Xiaohong Chen is currently the Malcolm K. Brachman Professor of Economics at Yale University. After graduation from the University of California, San Diego in 1993, she became an assistant professor in economics at the University of Chicago, a lecturer and reader at the London School of Economics from 1999 to 2002. Thereafter, she joined the New York University as an associate professor and she was promoted to professor of economics in 2005. She became a professor of economics at the Yale University in 2007 and a Malcolm K. Brachman Professor of Economics and a professor of management and of statistic at the Yale University in 2014. In addition, Xiaohong has held visiting positions in more than a dozen of top universities such as Harvard, Princeton, UC Berkeley, North Western, and Cambridge.

As one of the leading experts in econometrics, Xiaohong's researches focus on econometric theory, semi/nonparametric estimation and inference methods, sieve methods, nonlinear time series, and semi/nonparametric models. She has been publishing regularly in the top five economics journals and various leading econometrics and statistics journals. As to April 2019, she has published 76 papers in leading economics and statistics journals, including 9 in *Econometrica*, 2 in *Review of Economic Studies*, 2 in *Quantitative Economics*, 19 in *Journal of Econometrics*, 7 in *Econometric Theory*, 4 in *Annals of Statistics*, and 2 in *Journal of the American Statistical Association*. She also published in *Review of Economic Statistics*, *Journal of Business & Economic Statistics*, *Journal of Applied Econometrics*, *Journal of Economic*

Theory, *Statistica Sinica*, *IEEE Transactions on Information Theory, IEEE Transactions on Neural Networks*, among others.

Xiaohong has won numerous prizes, awards, and honors. She is the winner of **The Arnold Zellner Award** for the best theory paper published in Journal of Econometrics in 2006 and 2007, the winner of **The Richard Stone Prize in Applied Econometrics** for the years 2008 and 2009, the winner of **The Journal of Nonparametric Statistics 2010 Best Paper Award**, and **The 2012 Econometric Theory Multa Scripsit Award**. She became an elected fellow of the **Econometric Society** in 2007, an elected fellow of the **Journal of Econometrics** in 2012, and a laureate of the **China Economics Prize** in 2017 (shared with Professor Gregory Chow). She was elected to **the American Academy of Arts and Sciences** in 2019.

Xiaohong has served the economics community extensively. She has served as a supervisor and/or a member of dissertation committee for more than 30 PhD students. She has served as a Program Committee member or a panelist for dozens of international conferences and organizations. She has been a keynote speaker for various international conferences and meetings. She has served as an associate editor for about 10 journals, including *Econometrica, Review of Economic Studies, Quantitative Economics, Journal of Econometrics, Econometric Theory, The Econometrics Journal, Journal of Econometric Methods, The Berkeley Journal of Time Series Econometrics*, and *Journal of Nonparametric Statistics*. Currently, she is one of the four editors for *Journal of Econometrics*, the best field journal in econometrics.

2019 Tsinghua International Econometrics Conference

Program

22 June, Saturday

8:30-8:45: Registration   Room 620

8:45-9:00: Opening Remarks   Room 620
Speaker: Chong-En Bai, Dean of the School of Economics and Management, Tsinghua University

9:00-10:00: Keynote Session   Room 620
Chair: Liangjun Su, Singapore Management University
"Adaptive Minimax Testing in Instrumental Variables Models"
Xiaohong Chen, Yale University

10:00-10:30: Tea break

10:30-12:00: Invited Session 1   Room 620
Chair: Qi Li, Texas A&M University
[1]*"Estimation and Inference for Distribution Functions and Quantile Functions in Continuous Treatment Effect Models"*
Chunrong Ai, University of Florida
[2] *"Inferences for Partially Conditional Quantile Treatment Effect Models"*
Zongwu Cai, University of Kansas
[3] *"Quantile Treatment Effects with Two-Sided Measurement Error"*
Tong Li, Vanderbilt University

12:00-13:50: Lunch

14:00-15:30: Invited Session 2   Room 620
Chair: Jin Seo Cho, Yonsei University
[1] *"Testing Stochastic Dominance with Many Conditioning Variables"*
Yong-Jae Whang, Seoul National University
[2] *"Testing for Structural Change with Good Size and Power"*
Zhijie Xiao, Boston College
[3] *"Testing for the Threshold Autoregressive Distributed Lag Model"*
Jin Seo Cho, Yonsei University

15:30-16:00: Tea break

16:00-17:30: Invited Session 3a   Room 620
Chair: Kunpeng Li, Capital University of Economics and Business

[1] *"Functional-Coefficient Panel Data Models with Cross-Sectional Dependence with An Application to Inferences on Capital Asset Pricing Models"*

Ying Fang, Xiamen University

[2] *"A Structural Analysis of Simple Contracts"*

Shengjie Hong, Tsinghua University

[3] *"Threshold Spatial Autoregressive Model"*

Kunpeng Li, Capital University of Economics and Business

16:00-17:30: Invited Session 3b   Room 321

Chair: Sainan Jin, Singapore Management University

[1] *"Trade and Environmental Pollution: New Evidence from China's Firm Level Pollution Data"*

Shiyi Chen, Fudan University

[2] *"Life Expectancy and Economic Growth: A New Perspective of Interpretation"*

Weiguo Wang, Dongbei University of Finance and Economics

[3] *"Composite Index Construction with Expert Opinion"*

Pingfang Zhu, Shanghai Academy of Social Science

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Chair: Shengjie Hong, Tsinghua University

[1] *"A Panel Data Estimator for the Distribution and Quantiles of Marginal Effects in Nonlinear Structural Models with an Application to the Demand for Junk Food"*

Stefan Hoderlein, Boston College

[2] *"A Spatial Panel Quantile Model with Unobserved Heterogeneity"*

Tomohiro Ando, University of Melbourne

[3] *"Clustering for Multi-dimensional Heterogeneity with Application to Production Function Estimation"*

Xu Cheng, University of Pennsylvania

10:15-10:45: Tea break

10:45-12:15: Invited Session 5   Room 620

Chair: Taoxiong Liu, Tsinghua University

[1] *"Entropy Based Estimation of Econometric Functions"*

Ullah Aman, University of California, Riverside

[2] *"Quantile Regression with Censored Selection"*

Songnian Chen, Hong Kong University of Science & Technology

[3] *"Optimal Prediction Estimator and Weighted LASSO"*

Taoxiong Liu, Tsinghua University

12:15-14:00: Lunch

14:00-15:30: Invited Session 6a   Room 620

Chair: Ye Chen, Capital University of Economics and Business

[1] *"Instrument Validity for Local Average Treatment Effects"*

Zhenting Sun, Peking University

[2] *"Improved Inference on the Rank of a Matrix"*

Qihui Chen, Chinese University of Hong Kong, Shenzhen

[3] *"Detecting Common Bubbles in a Large-Dimensional Financial System"*

Ye Chen, Capital University of Economics and Business

14:00-15:30: Invited Session 6b   Room 321

Chair: Wenqing Pan, Tsinghua University

[1] *"Research on the Initial Carbon Quota Allocation Scheme of Chinese Provincial Regions — Based on the Perspective of Responsibility and Objective, Fairness and Efficiency"*

Wenju Wang, Beijing Wuzi University

[2] *"Testing for No-cointegration under Time-varying Variance"*

Shaoping Wang, Huazhong University of Science and Technology

[3] *"China National Value Chain: Spatial Linkage and Changes in Value-Added"*

Wenqing Pan, Tsinghua University

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16:00-17:30: Invited Session 7

Chair: Yingyao Hu, Johns Hopkins University

[1] *"Identification and Estimation of Dynamic Structural Models with Unobserved Choices"*

Yingyao Hu, Johns Hopkins University

[2] *"Inference in Partially Identified Panel Data Models with Interactive Fixed Effects"*

Liangjun Su, Singapore Management University

[3] *"Social Networks with Misclassified or Unobserved Links"*

Xun Tang, Rice University

17:50-19:50: Dinner

Presentation information

Keynote speech

"Adaptive Minimax Testing in Instrumental Variables Models"

Christoph Breunig[1] and Xiaohong Chen[2]

[1] Humboldt University, [2] Yale University

Abstract: This paper is concerned with adaptive inference on a structural function in the semiparametric or nonparametric models defined by conditional moment restrictions. We propose test statistics for hypothesis testing based on a leave-one-out, sieve estimator. Our tests are applicable to identified and partially identified models. We analyze a class of alternative models which are separated from the null hypothesis by a rate of testing which is sensitive to the form of identification and degree of ill-posedness. This rate of testing is shown to be minimax: The first type error and the second type error of our test, uniformly over the class of alternative models, cannot be improved by any other test. We also propose an adaptive test statistic that provides a data driven choice of tuning parameters and attains the minimax optimal rate of testing within a $\log\log n$ term, where n is the sample size. An extension of inverting the test to derive adaptive L^2 confidence sets is provided. This paper concludes with a finite sample analysis and empirical illustrations, where testing for monotonicity of an endogenous demand function is presented.

Invited Session 1

"Estimation and Inference for Distribution Functions and Quantile Functions in Continuous Treatment Effect Models"

Chunrong Ai

University of Florida

Abstract: Donald and Hsu (2014) propose an estimation and inference of the distribution and quantile functions of the potential outcomes in the binary treatment effect models. This paper extends their results to the continuous treatment effect models. Specifically, we propose a covariate-balanced weighting estimator of the distribution functions of the potential outcomes and then estimate the quantile functions by inverse mapping. Unlike the results of Donald and Hsu (2014), our estimators converge weakly to the Gaussian processes at rate less than square-root of N. We then construct the Mann-Whitney statistics for testing the null hypothesis of the equality of two distribution functions and stochastic dominance statistics for the null hypothesis of the stochastic dominance of the potential outcome of treatment.

"Inferences for Partially Conditional Quantile Treatment Effect Models"

Zongwu Cai

University of Kansas

Abstract: Motivated by studying how the first-time mother's smoking during pregnancy has an effect on the baby's birth weight as a function of the mother's age across different baby's birth weights (particularly for low baby's birth weights), due to the asymmetry of the distribution of birth weight, this paper proposes a new model called the partially conditional quantile treatment effect (PCQTE) model, designed to capture the heterogeneity of a treatment effect across sub-populations, say mother's age or other variables. First, we show that the PCQTE parameter is nonparametrically identified under selection on observable variables, which leads to an estimation procedure with two steps: nonparametric or parametric estimation of the propensity score and computation of the difference between the solutions of two separate minimization problems. Under some regularity conditions, we then show consistency and asymptotic normality of a fully nonparametric and a semiparametric estimator. The Monte Carlo study shows that, for a moderate sample size, the method produces good estimates. Moreover, the method developed here is applied to estimating the effect of the first-time mother's smoking during pregnancy on the baby's birth weight as a function of the mother's age across different quantiles for both whites and blacks. As result, the most interesting findings are that the effect changes over the mother's age only for whites but not for blacks for a certain quantile. This leads us to further consider the testing issue that the effect has a particular form or there is no effect at all over age or a constant effect. In the other words, our interest is to test if the partially conditional quantile treatment effect model is correctly specified. To this end, we propose a consistent test based on the well-known Cramér–von Mises criterion and derive the asymptotic properties, including consistency and asymptotic normality, which is the novel in the econometrics/statistics literature. Finally, we apply the proposed procedure to testing if the partially conditional quantile treatment effect for both whites and blacks changes over age. It turns out that the partially conditional quantile treatment effect for whites indeed changes over age but not for blacks for some quantiles.

"Quantile Treatment Effects with Two-Sided Measurement Error"

Tong Li[1], Brantly Callaway[2], and Irina Murtazashvili[3]

[1] Vanderbilt University, [2] Temple University, [3] Drexel University

Abstract: This paper considers quantile effects when there is measurement error both in the outcome variable and in a continuous "treatment" variable while allowing for other covariates that are not measured with error. We identify these effects under two key conditions (i) the quantiles of the outcome and the quantile of the treatment are linear in the covariates and (ii) the measurement errors are "classical." In our framework, no instruments are required nor are repeated measures, and we do not need to impose distributional assumptions on the measurement errors. We develop two-step semiparametric estimators of the parameters of interest that are straightforward to

implement in practice.   We apply our method to study intergenerational income mobility. Using NLSY data on annual income of parents and children, we find that accounting for measurement error tends to decrease estimated intergenerational mobility across several nonlinear measures of intergenerational income mobility.

Invited Session 2

"Testing Stochastic Dominance with Many Conditioning Variables"

Oliver Linton[1], Myung Hwan Seo[2], and Yoon-Jae Whang[2]

[1] University of Cambridge, [2] Seoul National University

Abstract: We propose a test of the hypothesis of conditional stochastic dominance in the presence of many conditioning variables (whose dimension may grow to infinity as the sample size diverges). Our approach builds on a semiparametric location scale model in the sense that the conditional distribution of the outcome given the covariates is characterized by a nonparametric mean function and a nonparametric skedastic function with an independent innovation whose distribution is unknown. We propose to estimate the nonparametric mean and skedastic regression functions by the L_1-penalized nonparametric series estimation with thresholding. Under the sparsity assumption, where the number of truly relevant series terms are relatively small (but their identities are unknown), we develop the estimation error bounds for the regression functions and series coefficients estimates allowing for the time series dependence. We derive the asymptotic distribution of the test statistic, which is not pivotal asymptotically, and introduce the smooth stationary bootstrap to approximate its sample distribution. We investigate the finite sample performance of the bootstrap critical values by a set of Monte Carlo simulations. Finally, our method is illustrated by an application to stochastic dominance among portfolio returns given all the past information.

"Testing for Structural Change with Good Size and Power"

Bo Wang[1], Zhongjun Qu[1] and Zhijie Xiao[1]

[1] Boston College

Abstract: This paper studies procedures for testing structural changes with good size and power properties. We focus on dynamic models and our analysis covers a wide range important inference problems. A leading case is testing for changing trend in dynamic models. In this case, existing tests suffers from either substantial size distortions or non-monotonic power. Power and size problems also surfaces in other dynamic models. We try to address the size and power issues simultaneously and construct tests with good size and power properties. A modified bootstrap procedure is also proposed. We show, via theory and simulation that the procedure yields tests with adequate size and good power against a broad class of structural changes, including one-time discrete change, smooth change and multiple structural changes. Interestingly, the procedure offers power improvement both locally and globally over tests based on asymptotic critical values. The

results obtained in this paper are of interests not only from the perspective of testing for structural change, but also from the broader perspective of understanding the size and power properties of bootstrap testing procedures applied to dynamic models.

"Testing for the Threshold Autoregressive Distributed Lag Model"

Jin Seo Cho[1], Matthew Greenwood-Nimmo[2] and Yongcheol Shin[3]

[1] Yonsei University, [2] University of Melbourne, [3] University of York

Abstract: The current paper investigates a testing methodology for nonlinear autoregressive distributed lag (NARDL) process with unknown threshold level. The quasi-likelihood ratio (QLR) test statistic is employed, and we derive its null limit distribution by explicitly examining a possible multifold identification problem and a singularity problem of a statistic constituting the null approximation of the QLR test statistic. We also derive the null limit distributions of other QLR test statistics that are defined by supposing variational alternative models and investigate the interrelationships between the QLR test statistics. In addition, the QLR test statistic is further exploited to estimate the unknown number of threshold levels by a sequential testing procedure that assumes a NARDL process with multiple number of unknown threshold levels.

Invited Session 3a

"Functional-Coefficient Panel Data Models with Cross-Sectional Dependence with An Application to Inferences on Capital Asset Pricing Models"

Zongwu Cai[1], Ying Fang[2], and Qiuhua Xu[3]

[1] University of Kansas, [2]Xiamen University, [3] Southwestern University of Finance and Economics

Abstract: This paper proposes a functional-coefficient panel data model with cross-sectional dependence motivated by re-examining the empirical performance of conditional capital asset pricing model. In order to characterize the time-varying property of assets' betas and alpha, our proposed model allows the betas to be unknown functions of some macroeconomic and financial instruments. Moreover, a common factor structure is introduced to characterize cross-sectional dependence which is an attractive feature under a panel data regression setting as different assets or portfolios may be affected by same unobserved shocks. Compared to the extant studies, such as the classic Fama MacBeth two-step procedure, our model can achieve substantial efficiency gains for inference by adopting a one-step procedure using the entire sample rather than a single cross-sectional regression at each time point. We propose a local linear common correlated effects estimator for estimating time-varying betas by pooling the data. The consistency and asymptotic normality of the proposed estimators are established. More importantly, an L2-norm statistic is constructed for testing the constancy of conditional betas and the significance of pricing errors. We show that the new test statistic has a limiting standard

normal distribution under the null hypothesis. Finally, the method is applied to test the model in Fama and French (1993) using Fama-French 25 and 100 portfolios, sorted by size and book-to-market ratio, respectively, dated from July 1963 to July 2018.

"A Structural Analysis of Simple Contracts"

Shengjie Hong[1], Yonghong An[2] and Daiqiang Zhang[3]

[1] Tsinghua University, [2] Texas A&M University, [3] University at Albany, State University of New York

Abstract: This paper provides an econometric framework for analyzing simple contracts where an agent chooses between a fixed-price contract and a cost-reimbursement one provided by a principal in each contracting period during possibly multiple periods. First, we propose a consistent procedure for testing the null hypothesis of a corresponding cost function being linear, which is widely assumed for tractability in the literature. Motivated by the rejection of such a null under our empirical data, we then establish nonparametric identification, without restricting the cost function to be linear, for all model primitives given that the agent exerts effort. These primitives include agent's cost and disutility functions, distribution of agent type (innate cost), and parameters that characterize agent's bargaining power and intertemporal preference. We then propose a consistent estimation procedure based on the identification procedure. In our empirical study on transport procurement contracts in France, we find strong evidence that the agent's optimal effort is monotonic in its innate cost, rather than being a constant as would be implied by linear cost functions. A counterfactual analysis evidences the importance of this finding by showing that welfare implications under monotone optimal effort differ significantly from those under constant optimal effort.

"Threshold spatial autoregressive model"

Kunpeng Li

Capital University of Economics and Business

Abstract: This paper considers the estimation and inferential issues of threshold spatial autoregressive model, which is a hybrid of threshold model and spatial autoregressive model. We consider using the quasi maximum likelihood (QML) method to estimate the model. To investigate the asymptotic properties of the QML estimator, we first prove the tightness and the Hajek-Renyi type inequality for a quadratic form. With these results, we next establish a full inferential theory of the QML estimator under the setup that the threshold effect shrinks to zero along with an increasing sample size. Our analysis indicates that the limiting distribution of the QML estimator for the threshold value is pivotal up to a scale parameter which involves the skewness and kurtosis of the errors due to the misspecification on the distribution of errors. The QML estimators for the other parameters achieve the oracle property, that is, they have the same limiting distributions as the infeasible QML estimators, which are obtained supposing that the threshold value is observed a priori. We also consider the hypothesis testing on the presence of threshold

effect. Three super-type statistics are proposed to perform this testing. Their asymptotic behaviors are studied under the Pitman local alternatives. A bootstrap procedure is proposed to obtain the asymptotically correct critical value. We also consider the hypothesis testing on the threshold value equal to some prespecified one. We run Monte carlo simulations to investigate the finite sample performance of the QML estimators and find that the QML estimators have good performance.

Invited Session 3b

"Trade and Environmental Pollution: New Evidence from China's Firm Level Pollution Data"

Dengke Chen and Shiyi Chen

Fudan University

Summary: Trade and environment are important issues closely related to the development of national economy and the improvement of people's livelihood. The Report of the Nineteenth National Congress lists promoting trade as an important part of building a modern economic system and lists pollution prevention and control as one of the three key battles to win the victory of building a well-off society in an all-round way, which further highlights the importance of trade and environment.

At present, there are no literature to study the relationship between trade and environmental pollution of China using micro-data. Moreover, existing literature generally employ endogenous variables such as total volume of import and export or foreign direct investment to measure trade liberalization, which makes it relatively difficult to explain their results in a causal sense. In the light of this, this paper cleans China's industrial enterprise pollution database. After that, merge this very unique database with China's industrial enterprise database and industry level tariff rate data. Additionally, by virtue of the quasi-natural experiment of China's accession to WTO, a DID model is constructed to alleviate the endogeneity issue.

The results show: Trade liberalization has significantly reduced China's environmental pollution, and this conclusion is still valid after a series of robustness tests. In particular, SO_2, a major pollutant emitted by enterprises, decreased by 2.3% for every unit increase of trade liberalization; Trade liberalization mainly affects enterprises' pollution emissions through technique effects rather than scale effects; As far as the technique effects of trade liberalization on environmental pollution are concerned, biased technical change rather than neutral technical change dominates; For enterprises with higher export density and larger scale, the pollution reduction effect caused by trade liberalization is stronger.

The conclusions of this study imply that apart from regular channels have been identified by classical literature, trade can improve China's social welfare by improving its environmental conditions, which in turn provides useful policy enlightenment for promoting trade and winning the battle of pollution prevention and control in the new era.

"Life Expectancy and Economic Growth: A New Perspective of Interpretation"

Weiguo Wang

Dongbei University of Finance and Economics

Abstract: This paper develops an in-depth interpretation of life expectancy growth effects on the economy from a new perspective of the mortality rates of children, adults and the elderly. We develop an endogenous economic growth model including the above three kinds of mortality, and clarifies the growth effects on which the three kinds of mortality have different action paths, and their alternative effects and income effects in different directions. The empirical results show that the decline in child, adult and elderly mortality rates in most countries have promotion, promotion and inhibition effects on economic growth, respectively; but the results for countries to the south of sub-Saharan African are just the opposite. After replacing the alternative variable for mortality variable, controlling the heterogeneity and the endogeneity, the conclusion is still valid. The analysis of the human capital mechanism through these three mortality rates verifies the rationality of the theoretical model. This paper suggests that when dealing with longevity risks, we need to first identify the extent to which three types of mortality contribute to longevity. Based on the assessment of the effects of the three types of mortality, we comprehensively judge the degree of risk of longevity. Key Words Three Type of Mortalities，Overlapping Generation Model，Human Capital.

"Composite Index Construction with Expert Opinion"

Rong Chen, Yuanyuan Ji, Guolin Jiang, Ruoqing Xie and Pingfang Zhu

Shanghai Academy of Social Science

Abstract: Composite index is widely used in Economics, Finance, Policy Evaluation and so on. The construction of composite index has been studied extensively. The most widely used approach is the Principal Component Analysis approach. In this paper, we proposed a penalized optimization approach to incorporate expert opinions into the PCA approach for determine the weight in composite index. The index weights are obtained by both objective data and subjective expert opinion. Expert would provide importance score to index, along with a confidence score which reflects the expert's confidence in his assessment. There is a balance between the information provided by the data set and expert opinion. We use a data-driven approach to find the optimal balance. The theoretical properties of the procedure are investigated and simulation results are presented. Finally, an economic application on science and technology is carried out to illustrate the usefulness of our method.

"A Panel Data Estimator for the Distribution and Quantiles of Marginal Effects in Nonlinear Structural Models with an Application to the Demand for Junk Food"

Stefan Hoderlein, Alexander Meister, Rostock University and Joe Cooprider

Boston College

Abstract: In this paper we propose a framework to estimate the distribution of marginal effects in a general class of structural models that allow for arbitrary smooth nonlinearities, high dimensional heterogeneity, and unrestricted correlation between the persistent components of this heterogeneity and all covariates. The main idea is to form a derivative dependent variable using two periods of the panel, and use differences in outcome variables of nearby subpopulations to obtain the distribution of marginal effects. We establish constructive nonparametric identification for the population of stayers" (Chamberlain (1982)), and show generic non-identification for the movers". We propose natural semiparametric sample counterparts estimators, and establish that they achieve the optimal (minimax) rate. Moreover, we analyze their behavior through a Monte-Carlo study, and showcase the importance of allowing for nonlinearities and correlated heterogeneity through an application to demand for junk food. In this application, we establish profound differences in marginal income effects between poor and wealthy households, which may partially explain health issues faced by the less privileged population.

"A Spatial Panel Quantile Model with Unobserved Heterogeneity"

Tomohiro Ando[1] and Lina Lu[2]

[1] University of Melbourne, [2] Federal Reserve Bank Boston

Abstract: This paper introduces a spatial panel quantile model with unobserved heterogeneity. The proposed model is capable of capturing high-dimensional cross-sectional dependence and allows heterogeneous regression coefficients. For estimating model parameters, a new estimation procedure is proposed. When both the time and cross-sectional dimensions of the panel go to infinity, the uniform consistency and the asymptotic normality of the estimated parameters are established. In order to determine the dimension of the interactive fixed effects, we propose a new information criterion. It is shown that the criterion asymptotically selects the true dimension. Monte Carlo simulations document the satisfactory performance of the proposed method. Finally, the method is applied to study the quantile co-movement structure of the U.S. stock market by taking into account the input-output linkages as firms are connected through the input-output production network.

"Clustering for Multi-dimensional Heterogeneity with Application to Production Function Estimation"

Xu Cheng, Peng Shao, Frank Schorfheide

University of Pennsylvania

Extended Abstract: Modeling unobserved heterogeneity is at the center of econometrics research. Recent years have seen increasing popularity of modeling group heterogeneity through clusters and using machine-learning methods for classification (e.g., Bonhomme and Manresa, 2015; Su, Shi, and Phillips, 2016, etc). In panel data analysis, instead of modeling each individual with his own fixed effect or regression coefficient, researchers can divide the whole population into a finite-number of clusters and explore the commonality within clusters and differences across clusters. Parsimonious, yet flexible, modeling is achieved by reducing the number of parameters from the number of individuals to the number of clusters.

By imposing complete model homogeneity within a cluster, existing models exclude the possibility to cluster individuals that share some features but differ in other features in applications with multi-dimensional heterogeneity. This paper proposes to model group specific effect through multi-dimensional clustering. The model allows each entity to have multiple memberships. The main advantage is to borrow strength among entities who are homogeneous in one dimension but heterogeneous in other dimensions.

We study a nonlinear panel data model with multi-dimensional cluster specific effects and unknown cluster memberships. The model also allows for additional common parameters across clusters. Computationally, we provide a generalization of the K-mean methods for clustering in multiple dimensions. Theoretical results establish consistency of the classification method and derive the asymptotic distributions of the estimators. Finally, we provide an empirical study on production function estimation using US firm level data. The empirical evidence shed light on the evolution of markups and its macroeconomic implications to the US economy.

Invited Session 5

"Entropy Based Estimation of Econometric Functions"

Amos Golan[1]，Tae-Hwy Lee[2]，Millie Yi Mao[2] and Aman Ullah[2]

[1] American University, [2] University of California, Riverside

Abstract: We develop an information theoretic (IT) approach for the estimation of econometric functions which include regression function, marginal effect function, and variance function. This development is based on the multivariate maximum entropy (ME) distribution. We show that the ME-based econometric function estimator is asymptotically normal and root-n consistent, which is a faster rate of convergence compared to nonparametric kernel based econometric function. Model selection procedure is also proposed. An application of the IT regression and its marginal function is illustrated by an earning and age data set. The small sample performance of the IT method is investigated

through Monte Carlo simulations. We demonstrate that the IT method is easy to implement, and is advantageous over parametric and nonparametric kernel methods.

"Quantile Regression with Censored Selection"

Songnian Chen[1], Nianqing Liu[2], Hanghui Zhang[2] and Yahong Zhou[2]

[1] Hong Kong University of Science and Technology, [2] Shanghai University of Finance and Economics

Abstract: Arellano and Bonhomme (2017) considered quantile regression subject to sample selection. In this paper, we consider quantile regression with censored selection. While the outcome equation in Arellano and Bonhomme (2017) is modelled as the standard quantile regression, which allows heterogeneous covariate effects in different regions of conditional distribution, their binary selection equation follows a parametric specification. Instead of working with a binary selection equation, we consider a censored selection equation. Similar to Arellano and Bonhomme (2017), we model selection through a copula structure, linking the selection equation and outcome equation. Unlike Arellano and Bonhomme (2017), we adopt the standard quantile specification for both the outcome equation and the selection equation. Our estimator is shown to be consistent and asymptotically normal. Monte Carlo simulations indicate that our estimator performs well in finite samples. We apply our method to an empirical application.

"Optimal Prediction Estimator and Weighted LASSO"

Taoxiong Liu and Decai Yin

Tsinghua University

Abstract: It is well known that the OLS estimator is not necessary the best linear estimator with respect to prediction. Some biased estimator such as LASSO estimator might be better than unbiased OLS estimator. It is natural to ask whether there exists an optimal prediction estimator. We establish the optimal shrunken OLS estimator with some "oracle" and show that it can be incorporated into the LASSO methods. Based on the optimal forecast oracle estimator, we propose an approach of data dependent weighted LASSO, which is called OLASSO. The OLASSO can be seen as a variant of adaptive LASSO and also has the oracle properties. The simulation shows that the OLASSO performs similarly or better in variable selection but usually has smaller prediction error when compared to adapted LASSO. When the noise level is relatively large, the OLASSO significantly exceeds adaptive LASSO. This kind of optimal prediction estimator can also be extended to combining with ridge regression.

"Instrument Validity for Local Average Treatment Effects"

Zhenting Sun

Peking University

Abstract: This paper provides a testable implication for instrument validity in the local average treatment effect (LATE) framework with multivalued treatments, generalizing the one obtained by Balke & Pearl (1997), Imbens & Rubin (1997), and Heckman & Vytlacil (2005) for the LATE framework with binary treatments. Based on this testable implication, we construct a nonparametric test of instrument validity in the multivalued treatment LATE framework. Specifically, we transform the testable implication into an inequality involving the value of the supremum of a continuous map over a particular function space. A modified variance-weighted Kolmogorov-Smirnov test statistic is employed in our test. We extend the delta method and establish the asymptotic distribution of the test statistic, which takes a nonstandard Kolmogorov-Smirnov form. We then construct the critical value for this asymptotic distribution using the bootstrap method developed by Fang & Santos (2018) and show that the test is asymptotically consistent. The size of the test can be promoted to the nominal significance level over much of the null, indicating a good power property. We also show that with a minor modification the proposed test can easily be applied when there are conditioning covariates with finitely many possible values. Simulation evidence is provided to show the good performance of the test in finite samples. Finally, we use Vietnam-era draft lottery data to illustrate application of the test in practice.

"Improved Inference on the Rank of a Matrix"

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Abstract: This paper develops a general framework for conducting inference on the rank of an unknown matrix Π_0. A defining feature of our setup is the null hypothesis of the form H_0: rank $(\Pi_0) \leq r$. The problem is of first order importance because the previous literature focuses on H_0': rank $(\Pi_0) = r$ by implicitly assuming away rank$(\Pi_0) < r$, which may lead to invalid rank tests due to over-rejections. In particular, we show that limiting distributions of test statistics under H_0' may not stochastically dominate those under rank $(\Pi_0) < r$. A multiple test on the nulls rank $(\Pi_0) = r$, though valid, may be substantially conservative. We employ a testing statistic whose limiting distributions under H_0 are highly nonstandard due to the inherent irregular natures of the problem, and then construct bootstrap critical values that deliver size control and improved power. Since our procedure relies on a tuning parameter, a two-step procedure is designed to mitigate concerns on this nuisance. We additionally argue that our setup is also important for estimation. We illustrate the empirical relevance of our results through testing identification in linear IV models that allows for clustered data and inference on sorting dimensions in a two-sided matching model with transferrable utility.

"Detecting Common Bubbles in a Large-Dimensional Financial System"

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Abstract: Asset price bubbles tend to occur simultaneously in multiple assets. Such co-movement is likely to be driven by certain common latent factors in the market. Can we detect the presence of such common factors at an early stage of market exuberance? To answer this question, we build a factor model that includes both I(1) and explosive factors. The I(1) factor captures the driving force of market fundamentals. The explosive factor captures the driven forces of asset price bubbles, and is allowed to exist for parts of the sample period. We provide an algorithm for testing the presence and date stamping the origination of common bubbles in a large dimensional system. Asymptotics of the bubble test statistic are provided under both the null of no common bubbles and the alternative when there is a common bubble in the market. We show the consistency of the estimated bubble origination date. Simulation studies show satisfactory performance of the testing procedure in finite samples. Our methods are applied to the real estate markets of 89 major cities in China over the period of January 2003 to March 2013. Results suggest the presence of three common bubble episodes in Tier 1 and Tier 2 cities over the sample period, whereas little evidence of common bubbles is found in Tier 3 cities.

Invited Session 6b

"Research on the Initial Carbon Quota Allocation Scheme of Chinese Provincial Regions — Based on the Perspective of Responsibility and Objective, Fairness and Efficiency"

Wenju Wang[1] and Zhenling Chen[2]

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Abstract: The establishment of a fair and effective initial carbon quota allocation scheme at the provincial level is the cornerstone for the healthy and stable operation of Chinese unified carbon trading market. In terms of equity principle, this paper divides the responsibility of carbon emission reduction into historical emission responsibility and inter-provincial transfer responsibility. Among them, the historical emission responsibility mainly uses the years close to the level of economic development as the based-period for liability verification, thus reflecting "common but differentiated responsibilities"; while the transfer responsibility is mainly represented by the difference between the actual carbon emission and the "reasonable carbon emission" which is consistent with the regional development scale, technical level and economic structure. In terms of efficiency principle, this paper establishes the zero-sum DEA model considering the distribution game between regions, and obtains the initial quota allocation scheme when the efficiency of all regions is maximized through multiple adjustments. At the same time, the allocation scheme of fairness principle and efficiency principle is coupled by entropy method to form a comprehensive quota allocation scheme, and by comparing and analyzing the differences in the regional emission reduction cost effect of the three different quota allocation

schemes to select provincial initial carbon quota allocation schemes that take into account both responsibility and objective, equity and efficiency. The result shows that: (1) From 1995 to 2016, Chinese inter-provincial trade creates a lot of regional carbon transfer, the direction of transfer is mainly from energy production to energy demand areas, flows from the regions with higher or middle economic growth rate to the regions with lower one. Due to the high historical emission, the well-developed areas and some energy-intensive areas should bear more responsibility for emission reduction; (2) In the initial quota allocation scheme, when the historical emission responsibility and the regional transfer responsibility are taken into overall account, the loss and gain from carbon quota of the well-developed areas show heterogeneity, and less-developed areas show homogeneity, which indicate that the responsibility of emission reduction in well-developed areas varies due to differences in energy structure and development mode, while the less-developed areas show consistency: bear less responsibility for emission reduction.(3) Quota schemes based on the principle of fairness will lead to "whipping the cows" and lose efficiency, thus lead to the higher developmental cost; The quota allocation scheme based on the principle of efficiency, though developmental cost is lower, may cause the Matthew effect which will lead to the regional gaps are further enlarged; Only a comprehensive quota allocation mechanism that takes into account both fairness and efficiency can not only alleviate regional development inequality, but also minimize the national cost of emission reduction. The conclusions of this paper have important policy implications for a fair and effective initial carbon quota allocation mechanism, achieving the national total carbon emission control objective, stimulating the vitality of the unified carbon market, and promoting coordinated regional emission reduction.

"Testing for No-cointegration under Time-varying Variance"

Shaoping Wang, Qing Zhan and Yanglin Li

Huazhong University of Science and Technology

Abstract: This study investigates the effects of time-varying variance on residual-based cointegration tests whose null hypothesis is no-cointegration. We found that time-varying variance results in obviously different null distributions. Wild bootstrap-based tests, which are asymptotically valid under time-varying variance, are proposed. We apply our proposed method to test cointegration between the price of Bitcoin and the CSI 300 Index of China, which highlights the usefulness of our test.

"China National Value Chain: Spatial Linkage and Changes in Value-Added"

Wenqing Pan

Tsinghua University

Abstract: Based on the China multiregional Input-Output Tables in 1997，2002，2007 and 2012，and through the three perspectives of intermediate, value-added and input-

output linkages, this paper investigates the spatial linkage characteristics among the eight regions in China, as well as their value- added gains from participating in NVC. We find the increase of the degree of both intermediate and value-added linkages among eight regions. There also exist the slight differences between regions: the intermediate linkage indices were higher in the Northwest, Beijing & Tianjin, and the Central regions, but lower in the North and the Southeast Coastal regions. The backward linkage indices were higher in Beijing & Tianjin and the Northwest regions, but lower in the Central and the North Costal regions. From the viewpoint of input-output linkage, both the Up-stream and the Down-stream indexes were more than 2 in 1997, and increased from 1997 to 2012, but there was no "smiling Curve". From the viewpoint of the ratio of value-added gains from participating in the NVC, the ratios were higher in the inland regions than in the coastal regions. The ratios also showed a decreasing trend as the eight regions participated more in the GVC.

Invited Session 7

"Identification and Estimation of Dynamic Structural Models with Unobserved Choices"

Yingyao Hu

Johns Hopkins University

Abstract: This paper develops identification and estimation methods for dynamic discrete choice structural models when agents' actions are unobserved by econometricians. We provide conditions under which choice probabilities and latent state transition rules are nonparametrically identified with a continuous state variable. Our identification results extend to models with serially correlated unobserved heterogeneity and to cases in which only discrete state variables are available. We apply our method to study moral hazard problems in US gubernatorial elections. We find that the probabilities of shirking increase as the governors approach the end of their terms.

"Inference in Partially Identified Panel Data Models with Interactive Fixed Effects"

Shengjie Hong [1], Liangjun Su [2], Yaqi Wang [3]

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Abstract: In this paper we develop methods for statistical inferences in a partially identified nonparametric panel data model with endogeneity and interactive fixed effects. We consider the case where the number of cross-sectional units (N) is large and the number of time series periods (T) as well as the number of unobserved common factors (R) are fixed. Under some normalization rules, we can concentrate out the large dimensional parameter vector of factor loadings and specify a set of conditional moment restrictions that are

involved with only the finite dimensional factor parameters along with the infinite dimensional nonparametric component. For a conjectured restriction on the parameter, we consider testing the null hypothesis that the restriction is satisfied by at least one element in the identified set and propose a test statistic based on a novel martingale difference divergence (MDD) measure for the distance between a conditional expectation object and zero. We derive the limiting distribution of the resultant test statistic under the null and show that it is divergent at rate-N under the global alternative based on the U-process theory. To obtain the critical values for our test, we propose a version of multiplier bootstrap and establish its asymptotic validity. Simulations demonstrate the finite sample properties of our inference procedure. We apply our method to study Engel curves for major nondurable expenditures in China by using a panel dataset from the China Family Panel Studies (CFPS).

"Social Networks with Misclassified or Unobserved Links"

Arthur Lewbel[1], Xi Qu[2] and Xun Tang[3]

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Abstract: We study the identification and estimation of social network models when network links are either misclassified or unobserved. We first derive conditions under which some misclassification of links does not interfere with the consistency or asymptotic properties of standard instrumental variable estimators of social effects. Second, we construct a consistent estimator of social effects in a model where network links are not observed at all. Our method does not require repeated observations of individual network members. We apply our estimator to data from Tennessee's Student/Teacher Achievement Ratio (STAR) Project. Without observing the latent network in each classroom, we identify and estimate peer and contextual effects on students' performance in mathematics. We find that peer effects tend to be larger in bigger classes, and that increasing peer effects would significantly improve students' average test scores.

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