Yu(Jasmine) **Hao**

Ph.D. candidate in Economics · University of British Columbia

6000 Iona Drive, Vancouver, BC, Canada, V6T 1L4

(+1) 778-865-8573 | yu.hao@alumni.ubc.ca | jasminehao.com | JasmineHao | Jasmine Hao

Research Interest

Primary fields, Industrial Organization,Econometrics

Secondary fields, Machine learning, Behavior Economics, Game Theory

Education

Graduate Studies

University of British Columbia *Vancouver, BC, Canada*

Ph.D. candidate in Economics *2015 - Expected 2021*

Thesis: How do firms build up mutual trust in a dynamic game: A study on collusive pricing in the Chilean pharmacy retailing industry

University of British Columbia *Vancouver, BC, Canada*

Master of Arts Economics *2014 - 2015*

Thesis: A Simple Application of Dynamic Game Estimation in U.S. Airline Industry with Entry-Exit Decision

Undergraduate Studies

Xiamen University *Xiamen, China*

Bachelor of Management, Accounting *2008 - 2014*

Specialization: Accountancy with ACCA standards

University of Waterloo *Waterloo, ON, Canada*

Bachelor of Arts, Honours Mathematical Economics *2010 - 2012*

Specialization: Mathematical Economics

Honors & Awards

Graduate Student Paper Award, Bank of Canada *2020*

President's Academic Excellence Initiative PhD Award, University of British Columbia *2020*

Graduate Fellowship in Gambling Research, University of British Columbia *2019*

Student Travel Grant, IAAE Conference *2019*

Student Travel Grant, CEA Conference *2019*

St John's College Itoko Muraoka Fellowship, University of British Columbia, St John's College *2017*

Faculty of Arts Graduate Award, University of British Columbia, Vancouver School of Economics *2014-2020*

International Tuition Award, University of British Columbia, Vancouver School of Economics *2014-2017*

References

Professor Hiroyuki Kasahara
Vancouver School of Economics, University of British Columbia
604-822-4814, hkasahar@mail.ubc.ca

Professor Paul Schrimpf
Vancouver School of Economics, University of British Columbia
604-822-5360, Paul.Schrimpf@ubc.ca

Professor Florian Hoffmann
Vancouver School of Economics, University of British Columbia
604-822-4792, Florian.Hoffmann@ubc.ca

Professor Victor Aguirregabiria
Department of Economics, University of Toronto
416-978-4358, victor.aguirregabiria@utoronto.ca

Research Experience and Other Employment

Visiting Student
Toronto, ON, Canada

University of Toronto
Jan, 2019 - Aug, 2019

Visiting **Professor Victor Aguirregabiria** to work on my job market paper

Summer Intern
Ottawa, ON, Canada

Bank of Canada
May, 2018 - Sep, 2018

Work with vector error correction model and improve the model's in-sample fit by over 30 %

Research Assistant
Vancouer, BC, Canada

University of British Columbia
Jan, 2015 - present

- Design and implement docker system for department server. **with Professor Jesse Perla**
- Estimate of Discrete Choice Dynamic Programming Models, **with Professor Hiro Kasahara**
- Testing the Number of Components in Finite Mixture Models, **with Professor Hiro Kasahara**
- Identification and estimation of dynamic games with continuous states and controls, **with Professor Paul Schrimpf**

Research Papers

Research Papers

How do firms build up mutual trust in a dynamic game: A study on collusive pricing in the Chilean pharmacy retailing industry (Job Market Paper)

Literature in collusion focuses on *implementation* but overlooks *initiation* of collusion. This paper provides a tractable model that considers firms' *incentive problems* and *coordination problems* separately. Firms learn to coordinate in the initiation stage. The knowledge are carried over by the firms even after the litigation of the cartels. This model is under the Maskin and Tirole(1987) dynamic pricing framework. This model relaxes the rational expectations by estimating firm-specific "belief parameters" that disentangle firms' information acquisition with strategic interactions. Firms gradually build up the trust and learn other firms' "true" probability to cooperate. With multi-market contact, the gradualism in the initiation of collusion takes the form of diffusion among markets. Identifying the belief parameters relies on two exclusion restrictions: (1) one firm's lagged pricing decision affects his own payoff through adjustment costs while other firms' lagged pricing decisions do not. (2) The payoffs on a given market are not affected by the market outcomes in other markets. The framework with nonequilibrium belief represents the data observed better than the rational expectation model.

Using Euler equation to estimate non-finite-dependent dynamic discrete choice model with unobserved heterogeneity (joint work Hiro Kasahara)

In the dynamic discrete choice analysis, controlling for unobserved heterogeneity is an important issue, and finite mixture models provide flexible ways to account for it. The previous discussion of incorporating finite mixture model in the dynamic discrete choice model focuses on a class of models where the difference in future value terms depends on a few conditional choice probabilities(finite dependence property). Following the Euler Equation(EE) representation of dynamic discrete decision problems, we provide an alternative conditional choice probability (CCP) value function representation that relies only on the CCP of one action. Contrasting to the Hotz-Miller CCP representation that relies on all the conditional choice probabilities, this characterization avoids the matrix inversion in each EM iteration. The matrix inversion can be computed outside the EM iterations and therefore is computationally attractive. The characterization provides unbiased estimator for models with and without finite dependence property. We illustrate the computational gains with Monte Carlo simulations.

Testing the number of components in finite mixture model with normal panel regression(joint work Hiro Kasahara)

This paper develops the likelihood-ratio based test of the null hypothesis of a m_0-component model against an alternative of $(m_0 + 1)$-component model in the normal mixture panel regression. I show that the normal mixture panel regression does not suffer from the Fisher Information matrix degeneracy under the reparameterization proposed in Kasahara and Shimotsu(2012). As a result, the likelihood ratio test statistic can be approximated by a local quadratic expansion of squares and products of the reparameterized parameters. Moreover, I obtain the data-driven penalty function via computational experiments to attend to unbounded likelihood ratio. In addition, I apply the test to random coefficient Cobb-Douglas production function estimation following the framework of Gandhi et al.(2013) and Kasahara and Shimotsu(2015). The empirical findings suggest evidence of heterogeneous production technology beyond Hicks-neutral technology factor.

Work in Progress

Dynamic Decision Models with Continuous-Discrete Mix Choices

This paper generalizes the Euler equation expression to estimate the dynamic choice problems where agents make both discrete and continuous choices. The existence of both types of choices is natural under some circumstances. We show the discrete-and-continuous model is equivalent to the agents' making decisions that map every possible state to an outcome simultaneously. With the property, the agent's future value can be represented as the discounted payoff from repeatedly taking an arbitrary action.

Does the EV Rebate Program Raise Awareness on the Environment: Evidence Based on China Automobile Market(joint work with Yiran Hao(University of Toronto))

This project uses administrative vehicle registration data from one of China's major cities to identify consumers' preference over household vehicles' gas-efficient attributes over time. We propose to evaluate the long-run effect of electric vehicles(EV) adoption policy on the consumer's preference using administrative data from one major city in China. The identification relies on the relative preference of high displacement vehicles and low displacement vehicles.

Conference Presentation

How do firms build up mutual trust in a dynamic game: A study on collusive pricing in the Chilean pharmacy retailing industry (Job Market Paper)

- Bank of Canada Graduate Student Paper Award Workshop *Virtual, 2020*

Using Euler equation to estimate non-finite-dependent dynamic discrete choice model with unobserved heterogeneity (joint work Hiro Kasahara)

- Seattle-Vancouver Econometric Conference *Vancouver, 2019*
- Canadian Economic Association Annual Conference *Banff, 2019*

Testing the number of components in finite mixture model with normal panel regression(joint work Hiro Kasahara)

- IAAE 2019 Annual Conference *Nicosia, Cyprus, 2019*
- The Econometric Society 2019 China Meeting *Guangzhou, China, 2019*

Teaching Experience

Economics 628 Topics in Applied Econometrics I
Economics 425 Introduction to Econometrics
Economics 355 International Trade
Economics 326 Methods of Empirical Research in Economics
Economics 301 Theory of Microeconomics
Economics 221 Introduction to Strategic Thinking
Economics 101 Principles of Microeconomics
Economics 102 Principles of Macroeconomics

Miscellaneous

Programming Language Matlab , Python , MySQL , Julia , **R** , C , C++, LaTeX
Development Tools Docker , GitHub, Travis, Shell
Languages English, Chinese(Mandarin)
Citizenship Citizen in China, Permanant Resident in Canada