Liyang Sun | February, 2026

Personal Statement

Research

I am an econometrician with research interests in causal inference. I primarily focus on developing new methods for causal inference in a more realistic setting of **treatment effect heterogeneity**. I have also contributed research on **weak identification/model misspecification** and the **synthetic control method**. The following subsections describe my contributions to each of these three research areas.

My work has attracted over 7,000 citations and has been recognized through publications in leading journals, competitive research grants, and professional service. As a Co-I, I won a grant of €147,000 from the Spanish Ministry of Science and Innovation, for **an international collaboration** with PI Professor Dmitry Arkhangelsky (CEMFI) on panel data methods. Going forward, I have developed a research agenda on extending my expertise on heterogeneous effects to identify individuals or groups that would benefit most from a policy intervention. This research agenda has been recognized by a grant of £243,705 from the **UKRI ESRC New Investigator Grant** for 2025-2027, for which I am the **Project Leader**.

Despite completing my PhD only four years ago, I have reviewed more than **100** times for scientific journals, four grant applications for leading funding bodies, and served on the programme committees for leading conferences eight times. I received the Excellence in Refereeing Award at the Review of Economic Studies, a top general interest journal in economics. I organize research seminars for cemmap and the Online Chamberlain Seminar in Econometrics. I also contribute to the development of several statistical software packages to facilitate the adoption of frontier econometric methods in applied research.

1. *Policy evaluation under heterogeneous effects*

My first line of work develops tools that allow researchers and policymakers to both estimate heterogeneous causal effects and optimally act upon them. My work in this area has attracted over 6,000 citations and has received multiple awards.

A. Identification and Estimation of Heterogeneous Effects

I have three papers that clarify what causal parameters are identified in event studies and instrumental variable estimates under heterogeneous effects. Event studies estimate the impact of a new policy or intervention by comparing the average changes in outcomes of the treated group around the time of the policy's introduction with the average changes in outcomes of some comparison group. In "**Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects**" (*Journal of Econometrics*, 2021), Sarah Abraham and I show that the traditional implementation, which assumes the policy impact is constant over time and across groups, is especially problematic when the comparison group includes individuals who are treated at a later time, as it fails to distinguish between the impacts on the treated group and the comparison group. We propose a more robust alternative estimator that

distinguishes the impacts of different groups. This paper is recognized by the Dennis Aigner Prize in the Journal of Econometrics (2023). In "**A Linear Panel Model with Heterogeneous Coefficients and Variation in Exposure**" (*Journal of Economic Perspectives*, 2022), Jesse Shapiro and I address similar challenges when the comparison group includes individuals who are less exposed to the policy than the treated group. Traditional implementation of event studies in this context conflates the variation in exposure with variation in impacts, and can therefore overstate or understate the average impacts.

In "**Double Robustness for Complier Parameters and a Semiparametric Test for Complier Characteristics**" (*Econometrics Journal*, 2024), coauthored with Rahul Singh, we introduce methods to assess if an instrumental variable estimate reflects the general population or just a subset influenced by the instrument. Our method can be flexibly applied to high-dimensional datasets, which improves upon similar methods that existed in the literature. This paper is recognized by the Denis Sargan Econometrics Prize from the Royal Economic Society (2025) and the editor's choice award in the Econometrics Journal (2024).

B. Decision-Making and Policy Learning

My ongoing agenda investigates how to incorporate heterogeneous effects of a policy intervention into policy decisions. In **"Empirical Welfare Maximization with Constraints"** (sole author, published in the Journal of Econometrics in 2026), I develop a framework for learning welfare-maximizing treatment assignment rules subject to realistic policy constraints, such as budget limits. I illustrate this framework by selecting budget-constrained Medicaid expansion policies based on the Oregon Health Insurance Experiment data. This work bridges econometric theory and policy design: rather than estimating heterogeneous treatment effects and costs as an end in itself, it provides tools for constructing implementable assignment rules with provable welfare performance. I have two working papers: **"Policy Learning with Confidence"**, joint with Victor Chernozhukov, Simon Lee and Adam Rosen, develops methods to conveniently account for sampling uncertainty in policy learning, while **"Compound Selection Decisions: An Almost SURE Approach"**, joint with Jiafeng Chen, Lihua Lei, Timothy Sudijono and Tian Xie, studies large-scale selection problems when data is limited. I've presented these two working papers at several invited seminars, such as at Harvard/MIT and the University of Chicago.

2. Robust estimation and inference

My second line of work investigates when traditional causal inference methods remain reliable, especially under weak identification or mild model misspecification. This work develops identification-robust inference procedures and adaptive estimators that maintain valid coverage even when standard assumptions fail. My work in this area has attracted over 1,000 citations.

For example, economists studying the impact of education on earnings know that even after controlling for many observed covariates, education decisions may also be influenced by unobserved factors that affect earnings. To isolate education's causal effect, economists use "instrumental variables", which are external factors that influence education level but not

earnings directly. Weak identification arises in this example when these instruments are weak (barely shifting education levels). It is well known that traditional inference methods can produce biased and highly variable estimates under weak instruments, and a vast econometric literature has developed methods to detect weak instruments when there are few instruments. In "**Inference with Many Weak Instruments**" (*Review of Economic Studies*, 2022), coauthored with Anna Mikusheva, we make an important theoretical contribution for detecting weak instruments when there are many weak instruments, which is particularly important for high-dimensional data. This serves as a significant contribution and provides the foundation for several recent papers in the literature. We also develop new inference methods that remain valid under many weak instruments, and in our follow-up paper ("**Weak Identification with Many Instruments**", *Econometrics Journal*, 2024), we examine how to address situations with high-dimensional covariates.

Together with Tim Armstrong and Pat Kline, we study how to balance variance and bias in estimation when models are only mildly misspecified in "**Adapting to Misspecification**" (*Econometrica*, 2025). This project creatively combines the theory of adaptation from statistics with the theory of local asymptotics. Specializing to a common form of misspecification in applied work, which is to assume constant treatment effects when effects may vary flexibly with covariates, I have a working paper **"Estimating Treatment Effects Under Bounded Heterogeneity"** with Soonwoo Kwon. This paper provides a sensitivity analysis framework for estimating the average treatment effects under explicit bounds on effect heterogeneity, yielding robust confidence intervals for applied researchers even in settings where lack of overlap precludes modeling fully flexible heterogeneity. I've presented this working paper at several invited seminars and leading conferences, such as in the 2025 World Congress of the Econometric Society and Stanford University.

3. Synthetic Control Method

My third line of work focuses on improving the empirical implementation of synthetic control methods, particularly in high-dimensional and high-frequency settings that fall outside the classical framework. The synthetic control method is a popular tool to estimate the policy impact using aggregated panel data. Eli Ben-Michael, Avi Feller, and I study the properties of synthetic control method using a novel perspective from high-dimensional statistics. This allows us to derive useful guidance in practically relevant settings that are not covered in the classical setting of single-outcome and annual data. In "**Temporal Aggregation for the Synthetic Control Method**," featured in the prestigious *AEA Papers & Proceedings* (2024), we propose smoothing high-frequency data as a preprocessing step, which is particularly useful for analyzing finance data. In "**Using Multiple Outcomes to Improve the Synthetic Control Method**" (Review of Economics and Statistics, forthcoming), we propose combining multiple correlated outcomes into an index when applying the synthetic control method. The classical synthetic control method analyzes multiple outcomes one at a time, and our proposal makes the synthetic control method more applicable by allowing researchers to analyze multiple outcomes simultaneously.

Education

I have taught at the master's and PhD levels since I joined UCL. I currently supervise four PhD students, including two who recently passed their upgrades with outstanding MPhil dissertations and one who completed a strong MRes dissertation, all under my supervision. I am also the letter writer for a PhD student on the academic job market. In 2025 I obtained the **UCL Arena/UK Advance HE Fellowship** (Fellow), with strong support from Professor Dunli Li (Senior Fellow) and Professor Peter Postl (Director of Education). Their support emphasizes the impact I have made on teaching real-world econometric analysis in the MSc programme and the methodological development for the PhD students.

For the master's program, I teach Program Evaluation (ECON0070) and Advanced Microeconometrics (ECON0060), where I **substantially updated the syllabus by introducing machine learning methods and developed new approaches to pedagogy via monte carlo simulations**. The new material I incorporated better prepares the students for analyst jobs in consulting, data science, and public policy. For the PhD program, I teach Advanced Topics in Econometrics where I developed an **innovative curriculum** covering frontier causal inference methods. I designed this curriculum by **working collaboratively** with faculty and students who use these methods in their applied economics research, which led me to fill a gap in the methodological education in the department. Beyond UCL, I am **a respected provider of short courses for professional development**. I was the keynote speaker for the NBER Summer Institute methods lecture to develop and present a master course on "event studies" in July 2023, a popular collection of methods for policy evaluation. The NBER is a renowned institution promoting economics research and invites only prominent senior faculty members for the keynote. Attendees of my lecture include not only academic economists, but also economists from governments and businesses. I have also taught this course to research professionals at the University of Exeter Business School and have been invited to teach similar courses at leading universities in Portugal and Italy. Furthermore, I have made all course materials openly available, therefore benefitting an even broader audience, totalling over 8,500 YouTube views since July 2023.

Public Engagement

As the field representative for econometrics on the UCL Policy Lab Departmental Committee, I advise on methodological aspects of the Lab's policy agenda, contribute to events that bring researchers and policymakers together, and ensure that developments in econometrics are represented in the Lab's external activities. In 2025, I was interviewed by Maddy Breen for the Party Conference issue of the Policy Lab Magazine, where **I discussed how contemporary econometric methods can inform policy evaluation and design in the UK.** I also have **engagement with international policy working groups**. I published a peer-reviewed policy report for the International Monetary Fund (IMF), where I used my econometrics expertise to evaluate the reliability of economic indicators that the IMF routinely publishes to assess the structural performance of a given country, such as the IMF's Structural and Financial Indicators database.

Institutional Citizenship

I have fulfilled numerous duties that contribute to the department at several levels. I make **significant contributions to important departmental projects.** I organise an **annual econometrics PhD student research day**. Twelve PhD students presented their thesis this year, and I invited faculty to give structured feedback after each presentation. I am the **faculty coordinator** for ENTER, a prestigious network that started 30 years ago. I **collaborate with external peers** to facilitate student research exchange visits and conferences across eight leading economics departments in Europe. This maintains the department's active role in **cross-institutional exchanges and collaboration.** I serve as the **deputy graduate tutor** (DGT) for MSc, MRes, MPhil and PhD students. I work closely with the program directors, coordinate and examine MPhil upgrade seminars (fifteen per year), thus contributing to a successful internal academic process. I have **initiated a mentoring programme** where I meet with students one-on-one, actively listening to their concerns and connecting them with resources to support their well-being. I have made **a personal impact on equality, diversity and inclusion in this initiative**. As the only asian female graduate tutor, I bring a unique perspective and use my experiences to build confidence among students from similar backgrounds.

Publication List

Sun, L., Ben-Michael, E., & Feller, A. (2027). Using Multiple Outcomes to Improve the Synthetic Control Method. *Review of Economics and Statistics*. doi:10.1162/rest_a_01592

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