235 Albany Street, Room 4046B
Cambridge, MA 02139

Measurement and Tracking of Subjective Well-Being for Aging Research
Application package
Liyang (Sophie) Sun, 2018

- Cover letter
- CV
- Complete PhD courses
- Letter of recommendation

Dear organizers,

I am a third-year Economics PhD student at MIT. My main fields are econometrics and public economics. A main focus of my research agenda is investigating how information about one's health affects financial decisions in old age.

I am writing to express my interest in attending the NBER Conference on Measurement and Tracking of SWB for Aging Research.

In an ongoing research project, I study how new information regarding blood pressure, blood sugar level, and cholesterol level affects self-rated health using the Health and Retirement Study (HRS) dataset. Starting in 2006, as part of its enhanced face-to-face interview, the HRS randomly assigned half of its respondents for medical screening. Those who accepted screening were informed whether their blood pressures, blood sugar levels, and cholesterol levels were out of normal range.[1] The HRS screening likely provided some new information to respondents regarding their health. For example, among respondents who were not previously diagnosed with hypertension as of 2006, the screening results show 30% of them had blood pressure higher than 120/80 mmHg, which would suggest they were at risk of hypertension.

Since screening assignment was random, I can estimate the causal effect of new health information on self-rated health, subjective expectations, and financial decisions, which HRS collects in its core survey. My current focus is the effect on self-rated health, which is measured based on the conventional Likert scale ranging from excellent to poor. Preliminary results suggest that after observing new and negative information regarding one's health, individuals lower their health ratings; however, new and positive information has no effect.

Next, I plan to analyze the effect of observing new health information on subjective expectations. The subjective expectations are elicited by the HRS on a scale from 0% to 100% by survey questions in the form of "What is the chance (0–100%) of *L*?", where *L* is for example "living up to 75 years old." The responses concentrate at 0%, 50%, and 100%; one explanation is that respondents interpret these choices as "extremely unlikely", "not sure", and "extremely likely" instead of actual probabilities. This creates a challenge in interpreting responses. A similar phenomenon – termed 'top-coding bias' – was discussed in Benjamin, Cooper, Heffetz and Kimball (2017).

Results from my project would shed light on whether self-rated health and subjective expectations convey information about actual health. Going forward, I plan to use self-rated health and subjective expectations to estimate the impact of health on financial decisions such as retirement timing.

This conference would teach me methods to improve this current project by addressing issues related measurement error and top-coding bias. I would also have the precious opportunity to learn from experts in this area and interacted with peer graduate students working on similar topics. It would be an invaluable input to my research agenda related to old age. Thank you for your consideration of my candidacy.

Sincerely,

Liyang (Sophie) Sun

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1 These details are not documented in the HRS data description, but are based on my correspondence with the HRS staff and Edwards (2017).

Reference:

Benjamin, Daniel J., Kristen B. Cooper, Ori Heffetz, and Miles S. Kimball. 2017. "Challenges in Constructing a Survey-Based Well-Being Index." *American Economic Review Papers and Proceedings,* 107(5): 81-85.

Edwards, Ryan. 2018. "If My Blood Pressure Is High, Do I Take It To Heart? Behavioral Impacts of Biomarker Collection in the Health and Retirement Study," *Demography*, 55(2): 403-434.

Liyang (Sophie) Sun

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA *Expected completion June 2020*

PhD, Economics

- **Fields:** Applied Econometrics and Public Economics (major); Industrial Organization and Organizational Economics (minor).
- **Honors & Relevant Coursework:**
  - MIT Department of Economics Fellowship (2015-2017).
  - **Economics:** Econometrics (Time Series & Non-linear), Industrial Organization, Labor Economics, Organizational Economics, Public Economics.
  - **Math:** Measure Theory, Probability Theory.

Wellesley College, Wellesley, MA *May 2014*

B.A. in Economics & Mathematics, Summa Cum Laude GPA: 4.0/4.0

- **Honors & Fellowships:**
  - Fanny Bullock Workman Fellowship ('17), Phi Beta Kappa ('14), The Natalie Bolton Economics Student Prize ('14), Wellesley College Albright Institute Fellow ('13), Wellesley in Washington Fellowship ('13)

EXPERIENCE

MIT Economics Department *Summer 2016 - present*

Research Assistant to MIT Economics Professor Isaiah Andrews Cambridge, MA

- Explored theoretical foundation for external validity.
  - Compiled a literature review of the empirical testing of external validity in randomized controlled trials.
  - Examined sample selection in an IV framework; drafted a model to study sharp regression discontinuity design as a sample selection problem.
- Implemented new inference procedure for weak identification.
  - Constructed two-step identification-robust confidence sets for linear IV regressions proposed by Professor Andrews; programmed this procedure as a new package in Stata.

MIT Economics Department *Winter 2016*

Research Assistant to MIT Economics Professor Nikhil Agarwal Cambridge, MA

- Investigated entry patterns for dialysis centers in the US since 2001.
  - Constructed a database of basic information and quality measures for dialysis centers from the Dialysis Facility Compare website; visualized entry and exit of dialysis centers in ArcGIS.
  - Explored regional characteristics that might be correlated with dialysis center profitability; summarized recent changes in Medicare's reimbursement policy for dialysis.

National Bureau of Economic Research (NBER) *Summer 2014 - Summer 2015*

Research Assistant to MIT Economics Professor Heidi Williams Cambridge, MA

- Investigated how patents shape research investments in the US pharmaceutical industry.
  - Constructed a database of administrative records from the US Food and Drug Administration (FDA) and other sources; developed algorithms for parsing archived documents.
  - Examined US pharmaceutical regulations to identify opportunities to use econometric techniques.

Independent Research-Economics *Spring 2013*

Research Project, Supervised by Professor Robin McKnight Wellesley, MA

- Conducted empirical research on the regional variation in Medicare utilization for the past 15 years.
  - Estimated the impact of Medicare eligibility on insurance coverage and health care utilization at a Census region level based on evidence found in the Medicare Expenditure Panel Survey.
  - Designed a regression discontinuity model to differentiate the increase of utilization in preventive, acute and elective health care caused by Medicare eligibility.

Completed PhD courses

Course #	Course Title	Year
14.121-14.124	Microeconomic Theory I-IV	2015-2016
14.451	Dynamic Optimization Methods	2015
14.452	Economic Growth	2016
14.453	Economic Fluctuations	2016
14.454	Economic Crises	2016
14.381	Statistical Method in Economics	2015
14.382	Econometrics	2016
14.384	Time Series Analysis	2016
14.385	Nonlinear Econometric Analysis	2016
14.387	Applied Econometrics	2017
14.271	Industrial Organization I	2016
14.273	Adv Topics in Industrial Organization	2017
14.282	Organizational Economics	2016
14.283	Adv Topics in Organizational Economics	2017
14.461	Labor Economics I	2015
14.471- 14.472	Public Economics I-II	2016
18.125	Measure Theory and Analysis	2016
18.175	Theory of Probability	2016

Heidi L. Williams
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To whom it may concern:

It is my great pleasure to write to recommend **Liyang (Sophie) Sun** to participate in the NBER Conference on Measurement and Tracking of SWB for Aging Research.

Sophie is currently a 3rd year PhD student in economics at MIT, where I am one of her advisers; her fields are econometrics and public economics. Sophie has one strong completed paper in econometrics (joint with a fellow graduate student at MIT). However, most of her current project ideas are focused in public economics topics that will benefit from her skills in econometrics but be substantively focused on economic questions as opposed to primarily being focused on making econometric contributions. Specifically, Sophie's current plan – as described in her cover letter for this application – is to analyze a natural experiment in the Health and Retirement Survey (HRS) in which some individuals were randomly assigned medical screening (and information about their screening results) in order to learn about how health information affects subjective well-being, subjective expectations, and economic behavior. While this project is still in its very early stages, her basic tabulations of the experiment look promising that this analysis could develop into a very interesting series of papers. Given this agenda, I think Sophie would very strongly benefit from the opportunity to attend this conference.

Sophie worked with me as a full-time research assistant prior to starting graduate school. She applied to work with me while she was an undergraduate at Wellesley College, where she was supported by a four-year, full-tuition scholarship. Sophie earned a perfect 4.0 GPA in a double economics and mathematics major, including A's in linear algebra, abstract algebra, differential equations, real analysis, and topology. Sophie came to me extremely highly recommended from the Wellesley faculty, including one particular economics faculty member who has taught at Wellesley for nearly 20 years who wrote to me that Sophie was among the very best students he had ever worked with.

Sophie's research assistant work with me was nothing short of remarkable. Research (at least for me) never goes more quickly than I expect. But with Sophie, it did. Whereas I was hoping to have the data construction completed and preliminary empirical results together by June 2015, she completed this and more by the end of September 2014. She painstakingly put together the required datasets with extreme care and precision, and always exercised extremely good judgment on when to ask me questions. When it came to working on data analysis, without any guidance from me she would clearly see what things were most important to do first – e.g. first do a rough cut on "x" to see whether it looked promising, before doing a more time-consuming merge to do "x" perfectly. She showed excellent judgment and a real ability to work independently.

Since starting as a PhD student at MIT, Sophie has been working through our first two years of coursework – both core classes and field courses in labor economics, public finance, econometrics, industrial organization, and organizational economics. She has been pursuing research assistant work with two other faculty members at MIT, and my understanding is has been very successful in both of those endeavors.

To summarize: Sophie is a very strong student. She is incredibly bright, insightful, hard working, and has shown promise to excel in a career in economics research. On a personal level, she is extremely modest, mature, and a pleasure to spend time with. I very much hope that you will decide to give her the opportunity to attend this conference!

Please don't hesitate to reach out if you have any questions about Sophie's application.

Heidi Lis Williams

Associate Professor, MIT