ERICA KATAYAMA CHUANG
University of California, San Diego

January 26, 2023

National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

Re: NBER Innovation Research Boot Camp 2023

Dear NBER Innovation Evaluation Committee:

My name is Erica Chuang, a current third year PhD student at the University of California, San Diego (UCSD) Department of Economics. I am writing to express interest in attending the 2023 NBER Innovation Research Boot Camp.

My research focuses on environmental and natural resources economics – in particular, the role that innovation plays in food production and the reduction of environmental damages. Several of my dissertation chapters will have an important innovation component, so I am looking forward to learning about the latest research in the economics of innovation and how I may be able to apply those tools and insights to my own work, should I be accepted.

Dr. Mark Jacobsen, Professor of Economics at UCSD and Research Associate at NBER, will be writing a recommendation letter on my behalf.

Please feel free to contact me if you have any questions.

Sincerely,

Erica K. Chuang

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La Jolla, CA 92093
+1 (818) 257 8093
erchuang@ucsd.edu

ERICA KATAYAMA CHUANG
University of California, San Diego

CURRICULUM VITAE

EDUCATION

Ph.D.	Economics, University of California, San Diego, 2025 (Expected)
M.P.I.A.	International Environmental Policy and International Economics, School of Global Policy and Strategy, University of California, San Diego, 2014
B.A.	International Studies – Economics, University of California, San Diego, 2011

PEER-REVIEWED PUBLICATIONS AND BOOK CHAPTERS

Montgomery, Mark M., Jessie Pinchoff, **Erica K. Chuang**. "Cities and their environments". *International Handbook of Population and Environment* (2022), pp. 349-374. Springer, Cham.

Stephanie R. Psaki, Barbara S. Mensch, Lauren Woyczynski, Nicole A. Haberland, **Chuang, Erica K.** "Policies and interventions to remove gender-related barriers to girls' school participation and learning in low-and middle-income countries: A systematic review of the evidence." *Campbell Systematic Reviews* 18, no. 1 (2022): e1207.

Mensch, Barbara S., Nicole Haberland, Erica Soler-Hampesjek, Jean Digitale, Natalie Jackson Hachonda, Nachela Chelwa, Pamela Nyirenda, **Erica K. Chuang**, Lisa Polen, Stephanie R. Psaki, Nkomba Kayeyi, Michael T. Mbizvo. "The effect of an e-reader intervention on literacy and non-verbal reasoning: GirlsRead! Zambia." *Journal of Development Effectiveness* 13, no. 3 (2021): 247-275.

Chuang, Erica, Pascaline Dupas, Elise Huillery, and Juliette Seban. "Sex, lies, and measurement: Consistency tests for indirect response survey methods." *Journal of Development Economics* 148 (2020): 102582.

Chuang, Erica K., Barbara S. Mensch, Stephanie R. Psaki, Nicole A. Haberland, and Meredith L. Kozak. "PROTOCOL: Policies and interventions to remove gender-related barriers to girls' school participation and learning in low-and middle-income countries: A systematic review of the evidence." *Campbell Systematic Reviews* 15, no. 3 (2019): e1047.

Psaki, Stephanie R., **Erica K. Chuang**, Andrea J. Melnikas, David B. Wilson, and Barbara S. Mensch. "Causal effects of education on sexual and reproductive health in low and middle-income countries: A systematic review and meta-analysis." *SSM-Population Health* 8 (2019): 100386.

Mensch, Barbara S., **Erica K. Chuang**, Andrea J. Melnikas, and Stephanie R. Psaki. "Evidence for causal links between education and maternal and child health: systematic review." *Tropical Medicine & International Health* 24, no. 5 (2019): 504-522.

WORKING PAPERS

Pinchoff, Jessie, Barbara Mensch, Stephanie Psaki, **Erica Chuang**. "How does climate variability affect schooling in low income settings? Why current measures are insufficient to fully answer this question." (2019).

Psaki, Stephanie R., Barbara S. Mensch, **Erica K. Chuang**, Andrea J. Melnikas. "Evidence for causal links between education and maternal and child health, sexual and reproductive health, and malaria: a systematic review." (2017). PROSPERO: CRD42017073224.

Wykstra, Stephanie, **Erica K. Chuang**. "Data Curation and Code Checks: What, Why and How?" *SSRN* (2015): http://dx.doi.org/10.2139/ssrn.2694763.

Ngo, Thoai D., **Erica K. Chuang**, Ryan Max, Matthew Quaife. "The Effectiveness of Microcredit Programs on Improving Economic Welfare: A Systematic Review and Meta-Analysis of Randomized Controlled Trials (Protocol)." (2015). Hosted on Open Science Framework (OSF).

CONFERENCE PAPERS AND PRESENTATIONS

Montgomery, Mark, **Erica Chuang**. "Does Urban Expansion Threaten Biodiversity? Evidence from India." Population Association of America 2020 Annual Meeting. Washington, DC, 2020. [Oral Presentation; Cancelled due to COVID-19]

Pinchoff, Jessie, Barbara Mensch, **Erica Chuang**, Anja Tolonen, Stephanie Psaki. "How does climate impact school attendance in developing settings? An exploratory analysis from Siaya County, Kenya" Population Association of America 2020 Annual Meeting. Washington, DC, 2020. [Oral Presentation; Cancelled due to COVID-19]

Mensch, Barbara S., **Erica K. Chuang**, Stephanie R. Psaki. "Gender-related barriers to girls' school participation and learning in low and middle-income countries: A systematic review of the evidence." Population Association of America 2020 Annual Meeting. Washington, DC, 2020. [Oral Presentation; Cancelled due to COVID-19]

Mensch, Barbara S., Nicole Haberland, Erica Soler-Hampesjek, Jean Digitale , Natalie Jackson Hachonda, Nachela Chelwa, Pamela Nyirenda, **Erica K. Chuang**, Lisa Polen, Stephanie R. Psaki, Nkomba Kayeyi, Michael T. Mbizvo. "The effect of an e-reader intervention on literacy and non-verbal reasoning: GirlsRead! Zambia." Population Association of America 2020 Annual Meeting. Washington, DC, 2020. [Oral Presentation; Cancelled due to COVID-19]

Mensch, Barbara S., Nicole Haberland, Erica Soler-Hampesjek, Jean Digitale , Natalie Jackson Hachonda, Nachela Chelwa, Pamela Nyirenda, **Erica K. Chuang**, Lisa Polen, Stephanie R. Psaki, Nkomba Kayeyi, Michael T. Mbizvo. "The effect of an e-reader intervention on literacy and non-verbal reasoning: GirlsRead! Zambia." Research on Improving Systems of Education

(RISE) Conference, Center for Global Development. Washington, DC, 2019. [Oral Presentation; Non-Presenting Author]

Psaki Stephanie R., Barbara S. Mensch, **Erica K. Chuang**, Andrea J. Melnikas. "Correlation or causation: What is the actual relationship between education and health?" CIDR Seminar Series, Baruch College. New York, NY, 2018. [Oral Presentation; Presenting Author]

Psaki Stephanie R., Barbara S. Mensch, **Erica K. Chuang**, Andrea J. Melnikas. "Evidence for Causal Links Between Education and Maternal and Child Health, Sexual and Reproductive Health, and Malaria: A Systematic Review." Population Association of America 2018 Annual Meeting. Denver, CO, 2018. [Oral Presentation; Non-Presenting Author]

REFEREE SERVICE

Journal of Economic Theory (JET), PLOS One, World Bank Economic Review (WBER)

HONORS AND AWARDS

2021-2023 *Summer Graduate Research Fellowship*, University of California, San Diego

2020 *Regents Fellowship*, University of California, San Diego

2013 *Pacific Economic Cooperation Fellowship*, University of California, San Diego

RESEARCH EXPERIENCE

2022-present *Graduate Student Researcher*, University of California, San Diego, La Jolla, CA
Collaborator: Dr. Renee Bowen

2021 *Research Associate*, ECS, New York, NY (Remote)
Southwest Fisheries Science Center (SWFSC)
National Oceanic and Atmospheric Administration (NOAA)
Collaborators: Dr. Dale Squires, Dr. Stephen Stohs

2017-2020 *Study Coordinator/Data Analyst*, Population Council, New York, NY
Collaborators: Dr. Barbara Mensch, Dr. Stephanie Psaki, Ms. Nicole Haberland, Dr. Mark Montgomery, Dr. Jessie Pinchoff

2016-2017 *Senior Research Analyst*, Innovations for Poverty Action, New York, NY
Supervisor: Dr. Pascaline Dupas

2013-2014 *Graduate Student Researcher*, University of California, San Diego, La Jolla, CA
Supervisor: Dr. Gordon Hanson

TEACHING EXPERIENCE

2021-2022 *Graduate Student Teaching Assistant*, University of California, San Diego, La Jolla, CA

2014-2016 *Senior Research Analyst*, Innovations for Poverty Action, New Haven, CT and New York, NY

2012 *Graduate Student Teaching Assistant*, University of California, San Diego, La Jolla, CA

COMMENTARIES

Chuang, Erica, Jessie Pinchoff, Stephanie Psaki. "How natural disasters undermine schooling." *The Brookings Institution.* January 23, 2018.

PROFESSIONAL MEMBERSHIPS

American Economic Association (AEA), Association of Environmental and Resource Economists (AERE)

OTHER PROFESSIONAL EXPERIENCE

2020-2021 *Graduate Student Grader*, University of California, San Diego, La Jolla, CA

2014 *Graduate Student Researcher*, University of California, San Diego
Policy Design and Evaluation Lab, La Jolla, CA

2013-2014 *Graduate Student Grader*, University of California, San Diego, La Jolla, CA

2013 *Junior Economist*, United States Department of the Treasury, Washington, DC
Europe and Central Asia Desk, International Affairs

ADDITIONAL TRAINING

2019 *Non-Degree Program*, State University of New York, Empire State College, Saratoga Springs, NY
Courses: Linear Algebra, Ordinary Differential Equations, Real Analysis

2018 *External Seminar*, Statistical Horizons, Temple University Center City, Philadelphia, PA
Course: Meta-Analysis

LIST OF PHD CLASSES

- Core Courses
    - Core Microeconomic Theory Sequence (ECON 200A, 200B, 200C)
        - Topics: Consumer Theory, Producer Theory, Decision Theory, General Equilibrium, Game Theory and Mechanism Design
    - Core Macroeconomics Sequence (ECON 210A, 210B, 210C)
        - Topics: Markets and Equilibrium, Discrete and Continuous Time Optimization, Endogenous and Exogenous Growth Models, Asset Pricing, Incomplete Markets, Search and Matching, Real Business Cycles, Money Demand and Output, Monopolistic Competition, New Keynesian Model, Liquidity Traps
    - Core Econometrics Sequence (ECON 220A-ECON220F)
        - 220A: Probability, Sampling, Statistical Theory,
        - 220B: Cross-Sectional Econometrics (Potential Outcomes, Linear Regression, Selection-on-observables, Instrumental Variables, GMM),
        - 220C: Panel Data Econometrics (Causality and Structural EquationsStatic and Dynamic Panel Data Models, Extremum Estimation, Nonlinear Models),
        - 220D: Time Series Econometrics (AR, MA, MLE, VAR, State-Space Models, Markov-Switching Processes, Bayesian Analysis, Structural VAR Bayesian Structural Inference)
        - 220E: Causal Inference (Potential Outcomes, Experiments, Random Inference, Unconfoundedness, Instrumental Variables, Difference-in-Differences, Machine Learning methods including ridge regression, Bayesian non-parametric Estimation)
        - 220F: Second-year paper course, submitted and presented one project proposal and preliminary results, presented a mini lecture on Inverse Almost Ideal Demand System estimation
- Elective Courses
    - Microeconomic Theory:
        - Contract Theory (ECON 204)
            - Bargaining, Contracting in Short-Term Relationships, Mechanism Design with Complete Information, Multi-Stage Production with Messages and Renegotiation, Recursive Methods in Repeated Games, Long-Term Relationships, Relational Contracts
        - Games and Information (ECON 208)
            - Matching Methods, Cheap Talk, Bayesian Persuasion, Communication and Complexity, Supermodular Games
        - Theory of Political Economy (ECON 281)
            - Arrow's Impossibility Theorem, Condorcet Paradox, Spatial Models, Median Voter Theorem, Strategic Voting, Downsian Policy Convergence, Single-Crossing Preferences, Probabilistic

Voting, Political Agency and Electoral Control, Dynamic Political Economy Concepts (Continuing Programs, Redistribution, Power Fluctuations, Reforms, Learning and Policy Making, Endogenous Institutions, Political Economy of Mechanisms)

- Applied and Environmental Economics:
  - Labor Economics (ECON 250A)
    - Experiments, Causality and Identification, Matching Methods, Regression Discontinuity, Selection Bias, Clustered SEs, Difference-in-Differences, Instrumental Variables, Marginal Treatment Effects, Machine Learning, High-Dimensional Fixed Effects
  - Economics of Natural Resources (ECON 266)
    - Externalities, Pollution Regulation, Emissions Markets, Economic Regulation, Non-Market Valuation, Energy Efficiency, Climate Change, Renewables, Structural Econometric Models
  - Topics in Environmental Economics (ECON 267)
    - Environmental Regulation, Pollution and Health, Pollution and Human Capital, Endogenous Exposure to Pollution, Benefits Valuation, Pollution and Development

ERICA KATAYAMA CHUANG
University of California, San Diego

CURRENT AND FUTURE RESEARCH

Innovation is a fundamental component that individuals, firms and governments will need to maximize in order to address the negative effects of climate change and the anthropogenic impacts on biodiversity and ecosystems. While my research is centered on environmental economics, a large part of my research examines the role of innovation in food production, consumer welfare and the reduction of environmental damages. One project that I am currently working on is a bioeconomic model of optimal production of an impure public good. I will use data on Pacific oyster (*C. gigas*) production along the West Coast of the U.S. to calibrate the model. Oysters are filter feeders and are commonly grown in state-leased estuaries and bays, so production of this privately-held good jointly produces public ecosystem services, particularly filtration of excess nutrients (e.g. nitrogen) emitted from nearby agricultural areas. As a result, oyster aquaculture may be able to help address nutrient loading issues in coastal surface water.

A key component of the model is the inclusion of innovations in oyster seed. Research activity in oyster seed occurs at public institutions and some privately-held firms, all primarily funded through public investment. This activity is largely outside of oyster growers, the majority of whom are small. Two major lines of innovation that have occurred thus far are 1) breeding disease resistance, and 2) breeding sterile oysters. Researchers are currently breeding U.S. stocks of oysters with lineages from abroad that are cultivated in warmer waters. This helps with resistance against viruses such as OSHV-1, which are more prevalent in waters that exceed 16°C, and is a climate adaptation strategy for the industry. Sterile oysters, which have an extra chromosome, were developed to reduce seasonality in sales. While these oysters do not have higher disease resistance than non-sterile oysters, they are able to retain their taste and texture year-round because they do not expend energy spawning during the summer (the typical oyster spawning season). These two paths of technical change may pull ecosystem services and private goods production in opposing directions. As oysters live longer, they can filter more water, and can therefore sequester more nitrogen over their lifetimes relative to a more frequent reseeding schedule. Sterile oysters may be able to avoid disease through faster growth, but this implies that total water filtration could be lower relative to non-sterile oysters. One question I want to answer is how different public investment structures, accounting for innovation in seeds, may be able to change optimal production of this impure public good.

Other current and future projects include the role of demand-side shocks in the development of new biopesticides, which are the only pesticides allowed for use in organic farming due to their non-toxicity, and how major changes in storage technology may affect consumer and producer welfare using the invention of the multiplate freezing process and the expansion of frozen food production in the first half of the 1900s as the empirical setting. The latter project may be able to give insight into the welfare implications of employing large-scale battery technology for electricity storage. What I hope to gain out of the NBER Innovation Boot Camp is a better understanding of the most cutting-edge research in the economics of innovation, the current issues experts in this field are wrestling with, and how I may be able to apply some of their tools and insights towards environmental issues.

UNIVERSITY OF CALIFORNIA, SAN DIEGO UCSD

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Mark Jacobsen
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February 2, 2023

Selection Committee
NBER Innovation Boot Camp

Dear Committee:

I am pleased to offer my strongest recommendation to Erica Chuang. Erica is a dynamic and focused student just beginning the dissertation phase of her PhD at UCSD. Her skill in applied research has already placed her in high demand as a research assistant.

A core focus of Erica's projects is innovation, with her main interest involving understanding how innovation gets directed and can therefore be re-directed toward reducing environmental externalities. She is studying oyster cultivation (together with researchers at NOAA's fisheries science center, giving her really nice data and insights into the technical side of the business) and notices that innovation via breeding programs importantly influences the potential for oyster cultivation to clean up ecosystems.

She is also interested in the development of intellectual property in the category of "bio-pesticides" (those allowed for use on organic farms). Finally, she has what I think is a fascinating economic history project looking at the development of improved processes for freezing food and the resultant dramatic shift in the U.S. food supply chain. My own experience working on innovation topics of this sort is limited, making her exposure to the NBER group of especially high value.

I would summarize Erica as being both talented and extremely focused. She stands to gain tremendously from the program and I think would be among the most engaged and involved students in the group: she goes above and beyond to be prepared and to contribute. Erica is just starting out on her dissertation research but I am already optimistic she will be among the best students I've advised. I recommend her for the program without any reservation.

Sincerely,

Mark Jacobsen