Haoyu Sheng

PhD Candidate · Economics

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Education

Brown University *Providence, RI*

Ph.D Candidate in Economics *2020 - Present*

M.Sc in Computer Science *2022 - Present*

- Research Areas: Macroeconomics, Monetary Economics, Production Networks, Machine Learning.

Williams College *Williamstown, MA*

B.A. in Computer Science and Economics with Highest Honors *2016 - 2020*

Working Papers

"Unemployment in a Production Network," with Finn Schüle

Abstract: Modern economies feature rich production linkages and labor specialization. We model a production network economy with sectoral and occupational unemployment by incorporating matching between job-seekers and employers in segmented labor markets. In our model, productivity shocks in upstream sectors affect production in other sectors directly through intermediate goods production and indirectly through labor markets. Because different sectors can hire the same occupations, changes in labor demand in one sector affect the number of available workers for other sectors. This changes hiring costs and, therefore, output and unemployment across the network. Our matching setup also uncouples wages from labor productivity. We define wages to be rigid if they adjust less than the network-adjusted marginal labor productivity, a condition general enough to encompass flexible wage assumptions in network-less economies. We find that, under rigid wages, output and unemployment respond more to shocks than in a frictionless economy. We apply our model to analyze the joint impact of labor force participation declines and energy shocks in the post-Covid U.S. economy. Our model generates realistic responses: a modest decline in output, a pronounced decrease in unemployment, and relative price increases in energy-intensive sectors and their downstream sectors.

"Gender and Tone in Recorded Economics Presentations: Audio Analysis with Machine Learning," with Amy Handlan

Abstract: This paper measures seminar dynamics using a replicable, scalable, machine-learning approach and finds a gender-tone gap in economics presentations. We train a deep convolutional neural network to impute labels for gender, age, and tone-of-voice. We apply this to recorded presentations from the 2022 NBER Summer Institute to measure tone at a high frequency, which allows us to provide novel results on how economists interact with each other in talks. We find that female economists are more likely to speak in a positive tone and less likely to be spoken to in a positive tone, even by other women. We find that male economists are significantly more likely to sound angry or stern compared to female economists. Overall, we conclude that gender biases in economics presentations exist across fields and presentation formats.

Published Papers

"When Rooks Miss: Probability through Chess," with Steven Miller and Daniel Turek
The College Mathematics Journal, 2021

"Assessing Post-hoc Explainability of the BKT Algorithm," with Iris Howley and Tongyu Zhou
2020 AAAI/ACM Conference on AI, Ethics, and Society (AIES'20), 2020

"Knowledge Distillation for Recurrent Neural Network Language Modeling with Trust Regularization," with Yangyang Shi, Mei-Yuh Hwang, and Xin Lei
ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2019

Research Assistance

2021-2022 Research Assistant for Professor Amy Handlan, Brown University
2021 Research Assistant for Professor Pascal Michaillat, Brown University
2019 Research Assistant for Professor Kenneth Kuttner, Williams College

Teaching Assistance

Spring 2022 Machine Learning, Text Analysis, and Economics (Undergraduate), Professor Handlan, Brown University
Spring 2020 Game Theory (Undergraduate), Professor Rai, Williams College
Fall 2019 Global Macro Instability and Finance (Undergraduate), Professor Phelan, Williams College
Fall 2017, Spring 2019 Intermediate Micro (Undergraduate), Professors Rai and Sheppard, Williams College

Honors and Awards

2023 Bravo Center Research Award, Brown University
2022 - 2024 Open Graduate Education Fellowship, Brown University
2020 Graduate Fellowship, Brown University
2019 Carl Van Duyne Prize in Economics , Williams College
2018 Class of 1960 Scholar in Computer Science, Williams College
2018 Class of 1960 Scholar in Economics, Williams College

Presentations and Workshops

2023 ASSA CSWEP, Brown Macro Breakfast, WEAI, Midwest Macroeconomics Meetings
2022 Brown Macro Breakfast, NBER Behavioral Macro Bootcamp, NBER Heterogeneous-Agent Macro Workshop

Other Experiences

2022-2023 Organizer of the Brown Macro Breakfast, Brown University
Fall 2018 Computer Science Research Assistant for Professor Iris Howley, Williams College
Summer 2018 Research Intern, Mobvoi AI Lab
Summer 2017 Summer Quant Analyst, Hutchin Hill Capital

Skills

Programming Languages Python (pandas, numpy, nltk, tensorflow, pytorch, and librosa), Java, Javascript, R, C++