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Ph.D., Economics, Yale University, 2019 (expected)
M.Phil., Economics, Yale University, 2016
M.A., Economics, Yale University, 2015
M.A., Economics, Paris School of Economics, 2013
M.Eng., Mechanical Engineering, Tsinghua University, China, 2011
B.Sc., Ecole Polytechnique, France, 2008

Fellowships, Honors and Awards:
MacMillan International Dissertation Research Fellowship, 2017
American Foundation for Paris School of Economics Scholarship, 2012
The Distinguished International Students Scholarship, Chinese Scholarship Council, 2008

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Research Grants:

Washington Center for Equitable Growth Doctoral Grant, 2018

Teaching Experience (at Yale College):

Fall 2014, Teaching Assistant to Profs. A. Tsyvinski & S. Roach, Debates in Macroeconomics
Spring 2015, Teaching Assistant to Prof. A. Tsyvinski, Introduction to Macroeconomics
Fall 2016, Teaching Assistant to Prof. M. Peters, Intermediate Macroeconomics
Spring 2016, Teaching Assistant to Prof. A. Tsyvinski, Introduction to Macroeconomics
Fall 2017, Teaching Assistant to Prof. R. Fair, Introduction to Macroeconomics

Research and Work Experience:

Research Assistant to Prof. E. Saez, University of California, Berkeley, 2016-2017
Research Assistant to Prof. F. Guvenen, Yale University, 2015-2016
Research Assistant to Prof. A. Casella, Columbia University, 2012

Working Papers:

"Automation Threat and Wage Bargaining," (November 2018), *Job Market Paper*

Works In Progress:

"Benchmarking Algorithms," with Fatih Guvenen and Tatjana Kleineberg, (2018)

"Data matching Using Optimal Transport: Theory and Application to Income data," (2018)

Seminar and Conference Presentations:

QMUL Economics and Finance Workshop, Queen Mary University of London, June 2018
Transatlantic Doctoral Conference, London Business School, May 2018
Search and Matching Conference (Poster), University of Cambridge, May 2018

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Dissertation Abstract

Chapter 1: Automation Threat and Wage Bargaining, [Job Market Paper]

There is a growing concern in the public debate that machines might soon replace workers in many tasks. Mirroring these concerns, the economics literature has so far focused on the impact of the adoption of automation technologies on the labor market. Yet, technology adoption is a slow process. For example, there are only two more industrial robots per thousand workers in the United States today relative to 1995. In this paper, I investigate an additional channel through which automation affects the labor market, even when adoption is low. In particular, if firms and workers bargain over wages, the mere possibility of automating a job improves the fallback position of the firm, which allows it to negotiate lower wages.

To analyze the impact of this "automation threat," I develop a search and matching model with wage bargaining, where firms search for both workers and automation technologies. A firm that finds a technology can threaten to automate the job instead of keeping the worker, and has a higher outside option during the wage bargaining process. Thus, the possibility of automating improves the bargaining outcome of the firm and lowers the wage of the worker. The model delivers two predictions: (1) a higher probability of finding an automation technology reduces the average wage, and (2) the bargaining power of the workers amplifies this effect. Intuitively, when workers have no bargaining power, they receive their reservation wage independently of the outside option of the firm. Once bargaining power increases, workers receive a positive share of the surplus which depends on the outside option of the firm.

To take the model to the data, I assume that the labor market is occupation-specific and that the probability of automation varies by occupation. This allows me to use the variation across occupations to test the predictions of the theory. I use data from the 2013 Current Population Survey to identify the impact of the automation threat on wages. To measure the automation potential of an occupation, I use a technological index of automatability based on the task content of occupations and technological advances as of 2013, and built by Frey and Osborne (2017).

I regress individual wages on the automatability index of the worker occupation, controlling for individual characteristics and the change in occupational employment in the labor market. In line with the theory, the automation index has a negative and significant association with wages. The effect is large: an increase of one standard deviation in the automatability index decreases wages by about 10 percent. Importantly, this effect is robust to the inclusion of measures of routine intensity and offshorability of occupations.

To test the second prediction of the theory, I use the union membership rate within a local labor market as a measure of workers' bargaining power. The interaction of the automatability index with the union density in the labor market has a negative association with wages, which indicates that union density amplifies the impact of the automation threat on wages.

Finally, as a placebo test, I show that the association between the automatability index and wages weakens going back in time and is insignificant in 1970. This is expected since occupations were less likely to be under the threat of automation in earlier decades.

These results suggest that, even if only a small number of firms automate, new automation technologies may still have a large effect on the labor market.

Chapter 2: Benchmarking Algorithms, with Fatih Guvenen and Tatjana Kleineberg
We benchmark seven global and three local algorithms by comparing their performance and speed in optimizing difficult objective functions. We apply the algorithms to optimize a small suite of multidimensional test functions that are commonly used to benchmark algorithms in computational mathematics. To understand optimizers' performance in applications that are common to economics, we apply the same optimizers to maximize the objective function of a GMM estimation problem that targets 297 moments to estimate 7 parameters. Our results show that the reliability and speed of all algorithms vary substantially depending on the dimensionality and characteristics of the problem. Experimenting with different algorithms can therefore be very helpful. We find that StoGo and Tiki-Taka Algorithm (Tiktak) are most reliable and computationally efficient in the optimization of test functions. For the economic estimation, the most reliable and efficient algorithms are Multi-Level Single-Linkage and Tiktak.

Chapter 3: Matching Data with Optimal Transport: Theory and Application to Income Data
Researchers in economics would often benefit from combining information from distinct datasets, for example using records from an administrative source and from survey data. This is necessary to estimate the joint distribution of variables not jointly observed in one dataset. Methods commonly used in the literature have important limitations: either they discard information by reducing the dimensionality of the matching, or they do not preserve the multivariate distributions of the variables imported form each dataset. This is especially problematic for studies using the combined dataset to construct measure of inequality. This paper details a statistical matching method using optimal transport theory that does not suffer from these drawbacks. Using data from the Current Population Survey and the IRS Public Use Files, I compare this approach to other methods. I show that the synthetic dataset built with the optimal transport matching method presents higher measures of income inequality.