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          Macroeconomics, International Trade, Spatial and Urban Economics

Comprehensive Examinations Completed:
          2019 (Oral): Macro (*with distinction*), Trade
          2018 (Written): Macro, Micro

Dissertation Title: *Essays in Growth and Spatial Economics*

Committee:
          Professor Michael Peters (chair)
          Professor Costas Arkolakis (co-chair)
          Professor Giuseppe Moscarini

Degrees:
          Ph.D., Economics, Yale University, 2023 (expected)
          M.Phil., Economics, Yale University, 2021
          M.A., Economics, Yale University, 2019
          B.A., Economics & Mathematics, Yale University, 2017 (*with distinction*)

Fellowships, Honors and Awards:
          Arvid Anderson Fellowship
          Yale University Doctoral Fellowship
          Cowles Foundation Fellowship
          Phi Beta Kappa
          Summa cum laude
          Tobin Award (outstanding performance in undergraduate economics courses)

Research Grants:
MacMillan Center Pre-Dissertation Research Fellowship ($2,500)

Teaching Experience:
Fall 2019, Teaching Assistant to Prof. Michael Peters, Intermediate Macro (undergrad), Yale
Spring 2020, Teaching Assistant to Prof. Mira Frick, Intermediate Micro (undergrad), Yale
Fall 2020, Teaching Assistant to Prof. Gaurav Chiplunkar, Growth and Macroeconomics (masters'), Yale
Fall 2021, Teaching Assistant to Prof. William English, Central Banking (MBA), Yale School of Management

Research and Work Experience:
Research Assistant to Prof. Costas Arkolakis, Yale University, 2018-2021
Research Assistant to Prof. Giuseppe Moscarini, Yale University, 2018-2021
Research Assistant to Prof. Joseph Shapiro, Yale University, 2015
Research Assistant to Prof. Jonathan Feinstein, Yale University, 2014-2016
Investment Banking Summer Analyst, Macquarie Capital, New York, NY, 2016

Working Papers:

"Right Idea, Wrong Place? Knowledge Diffusion and Spatial Misallocation in R&D"
[Job Market Paper] (November 2022)

"Housing Demand, Inequality, and Spatial Sorting," with John Finlay (September 2022), revise and resubmit, *Journal of International Economics*

"Schooled by Trade? Retraining and Import Competition," with Lucas Conwell (January 2022)

Seminar and Conference Presentations: Urban Economics Association (2022, Washington, D.C), Young Economists' Symposium (2020, UPenn)

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Dissertation Abstract

Right Idea, Wrong Place? Knowledge Diffusion and Spatial Misallocation in R&D [Job Market Paper]

A handful of cities perform most of the research and development in the United States. R&D produces knowledge spillovers which are not internalized by private researchers, and the extent of geographic concentration raises the question of whether R&D inputs are efficiently allocated across cities. Should policymakers favor R&D in certain cities, and if so which ones?

I unpack the rationale for place-based R&D policy through the lens of a spatial growth model. Researchers create new ideas, sell them, and enjoy spillovers from other researchers' ideas. Geography matters if knowledge diffusion across space is imperfect. Imperfect diffusion changes the size of the spillover—the pool of ideas available for learning—and so generates variation in the social returns to R&D. I emphasize a complementary implication: imperfect diffusion introduces variation in the private returns to R&D because barriers to diffusion limit the size of the market for a new idea. The optimal policy subsidizes research in regions with high spillovers relative to profits, rather than simply high spillovers. Even if an idea does not create much profit, it can benefit future researchers. Perfect knowledge diffusion would render an idea's place of origin irrelevant and there would be no efficiency motive for place-based R&D policy.

I turn to patents data to estimate the size of diffusion barriers and back out the social and private returns to R&D across cities. I consider two barriers: one from researcher to researcher, and another from researcher to firm. Prior literature has documented that inventors tend to cite nearby inventors. I put forth new evidence that inventors tend to sell their patents to nearby firms. Patent sales decline more steeply with distance than do patent citations. All else equal, an inventor in Denver is only 20% as likely to sell a patent to a firm in Boston compared to a firm in nearby Colorado Springs. The same inventor is 55% as likely to receive a citation from Boston as to receive a citation from Colorado Springs. My interpretation is that researchers in remote markets earn lower profits for their ideas because they struggle to sell at distance. However, the same ideas are relatively visible to other researchers, who can learn effectively at distance.

The optimal R&D policy reallocates researchers to remote regions which under-innovate in equilibrium. I calibrate a quantitative version of the model to match the observed distribution of wages, production employment, and patenting. The quantitative model matches untargeted R&D employment well. I then implement the optimal R&D allocation with a budget-neutral subsidy and tax on research employment. The policy increases patenting by 2.8% and aggregate consumption by 0.8% in the long run. The gains are purely from reducing misallocation as I deliberately fix aggregate resources devoted to R&D. The policy has negligible effects on regional inequality and between-skill inequality.

Housing Demand, Inequality, and Spatial Sorting, with John Finlay

Skilled and unskilled Americans are increasingly choosing to live in different cities. Why? We propose and assess the quantitative importance of a new explanation: nonhomothetic housing demand translates rising income inequality into diverging location choices. Housing expenditure shares decline with income. A household's skill level determines its income, and therefore its housing expenditure share, its sensitivity to housing costs and its preferences over different locations. The result is spatial sorting driven by differences in cost-of-living between skill groups. Increases in the aggregate skill premium amplify these differences and intensify sorting. To quantify this mechanism, we augment a standard quantitative spatial model with flexible nonhomothetic preferences, disciplining the strength of the housing demand channel using consumption microdata. We find that the rising skill premium can explain 23% of the increase in spatial sorting by skill since 1980.

Schooled by Trade? Retraining and Import Competition, with Lucas Conwell

Retraining is often hailed as a key policy tool to support workers displaced by import competition, yet there is surprisingly little evidence on whether these policies achieve their intended effects. Using administrative data from Germany, a highly open economy with extensive government-subsidized retraining programs, we provide evidence that workers routinely retrain in response to import competition. To quantify the welfare impact of retraining policies, we propose a search model in which heterogeneous workers may choose to retrain while unemployed. Retraining enables workers to change their job-finding rates and their productivity while employed. We find that retraining increases the gains from trade by 7% in the aggregate. Some worker groups gain five times as much, while others gain virtually nothing.