April 19, 2023

To whom it may concern,

I am applying for the Identifying and Developing Mathematical Talent among Youth Doctoral Dissertation Fellowship. At the start of the fellowship period, I will be entering the 4th year of the Economics PhD program at MIT. The fellowship would allow me to obtain research funding for my project and connect with other students and faculty interested in developing mathematical talent. During the 2023-2024 school year, I will already be supported by an NSF Graduate Research Fellowship. **Therefore, I would forgo the components of the funding from the Mathematical Talent Fellowship that are already covered by NSF.**

My research focuses broadly on the implementation and effects of policies to improve equity in educational opportunity. In this agenda, I have pursued three primary research projects. In a solo-authored paper, which I presented at the 2032 AEFP annual conference, I study the long-run effects of court-ordered school desegregations on the health of Black Americans. By combining information on the rollout of court orders with individual-level health data from the Health and Retirement Study, I find that desegregation improved health outcomes of Black Americans decades later. In other work, coauthored with Parag Pathak and Christopher Avery, I study the effects of common application systems for secondary schools, using the setting of the Boston charter sector, which moved from a decentralized to common application in 2017. In this project, which I presented at the Fall 2022 NBER Education meeting, we use a structural model to show that a common application does not necessarily enhance equity or improve overall school placements. Finally, along with Amy Finkelstein, Maria Polyakova, and Victoria Udalova, I have used individual-level Census data to study the heterogeneous effects of the COVID-19 pandemic by educational attainment (among other demographics), and decomposed the role of observables in explaining variation across groups. This project is an NBER working paper, which I will present this spring at the NBER Racial and Ethnic Health Disparities meeting.

My proposed fellowship project, co-authored with Jimmy Chin at the University of California, Berkeley, studies the common and controversial policy of educational tracking, in the context of elementary school gifted and talented programs in New York City public schools. Proponents argue that by providing rigorous academic preparation and motivated peers, these programs may address pipeline issues in allowing students from underrepresented groups to access advanced math coursework and specialized STEM high schools. We hope that our project will assess the effectiveness of these policies in accomplishing these goals, as well as tradeoffs with other priorities such as desegregation, generating actionable policy implications. Fellowship funding would be used for research visits to schools, travel for presentations, and research assistance to clean administrative data files.

My references are my two advisors: Professors Parag Pathak (`ppathak@mit.edu`) and Amy Finkelstein (`afink@mit.edu`). Thank you for your consideration.

Sincerely,

Geoffrey Kocks

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Education

Massachusetts Institute of Technology **Cambridge, MA • 2020-present**
Candidate for Ph.D. in Economics

Brown University, 4.0/4.0 GPA; *Magna cum laude* **Providence, RI • 2014-2018**
Bachelor of Science with Honors in Applied Mathematics-Economics
Bachelor of Arts in Hispanic Studies

Academic Publications

1. Racial Disparities In Excess All-Cause Mortality During The Early COVID-19 Pandemic Varied Substantially Across States (with Maria Polyakova, Victoria Udalova, Katie Genadek, Keith Finlay, and Amy Finkelstein). *Health Affairs*, 40(2): 307-316, February 2021.
2. Initial economic damage from the COVID-19 pandemic in the United States is more widespread across ages and geographies than initial mortality impacts (with Maria Polyakova, Victoria Udalova, and Amy Finkelstein). *Proceedings of the National Academy of Sciences*, 117(45): 27934-27939, November 2020.

Working Papers and Works in Progress

1. Heterogeneity in Damages from a Pandemic (with Amy Finkelstein, Maria Polyakova, and Victoria Udalova). *NBER Working Paper #30658*, November 2022.
2. School Desegregation and Long-Run Health. *In progress, draft available upon request*, 2023.
3. Does a Common Application Increase Access? Theory and Evidence from Boston's Charters (with Chris Avery and Parag Pathak). *In progress*, 2023.
4. Tracking and Educational Inequality: Evidence from Gifted Education in NYC (with Jimmy Chin). *In progress*, 2023.

Non-Academic Publications

1. After a Debacle, How California Became a Role Model on Measles (with Emily Oster). *The New York Times*, January 2018.

Research Assistantships

Massachusetts Institute of Technology **Cambridge, MA • June 2018-present**
- Professor Parag Pathak (December 2020-present)
- Professor Amy Finkelstein (June 2018-present)

Brown University **Providence, RI • June 2016-May 2018**
- Professor Emily Oster

Presentations

- 2023: AEFP Annual Conference, NBER Conference on Racial and Ethnic Health Disparities (upcoming)
- 2022: NBER Fall Education Program Meeting

Teaching Experience

Harvard University **Cambridge, MA • September 2021-December 2021**
Teaching Assistant
- GenEd 1079: Why is there no Cure for Health? (Fall 2021; Prof. David Cutler)

Brown University **Providence, RI • September 2017-May 2018**
Teaching Assistant
- APMA 1650: Statistical Inference (Spring 2017, Spring 2018; Prof. Daniel Sanz-Alonso)
- ECON 1620: Introduction to Econometrics (Fall 2017, Fall 2018; Prof. Adam McCloskey)
- MUSC 0021J: Stephen Sondheim and the American Musical (Fall 2017) - course developer

Service and Volunteering

- Reviewer: *AER: Insights* (Excellence in Refereeing Award, 2022)
- Graduate Student Mentor: Application Assistance and Mentoring Program, MIT, 2020-present
- Undergraduate Advisor: Presidential Scholars Program, Brown University, 2017-2018
- In-Class Math Tutor: Central High School and Hope High School, Providence Public Schools, 2015-2017

Awards and Honors

- National Science Foundation Graduate Research Fellowship, 2022
- NBER Pre-Doctoral Fellowship in Aging and Health Economics, 2022
- Harvard University Certificate of Distinction in Teaching, Fall 2021
- MIT Castle Krob Fellow, 2020-2022
- Samuel Lamport Prize for Outstanding Honors Thesis in Economics, 2018
- Phi Beta Kappa, 2018
- Fichter Prize for Outstanding Graduate in Hispanic Studies, 2018
- Voss Undergraduate Research Fellowship: Institute at Brown for Environment and Society, 2017
- Research Fellowship: Open Source Macroeconomics Lab, Becker Friedman Institute at the University of Chicago, 2017
- Undergraduate Research and Teaching Award: Brown University, 2016
- Outstanding Winner: Interdisciplinary Contest in Modeling, 2016

Languages and Technical Skills

Technical: Python, Julia, Stata, Matlab, R, SAS, remote sensing, and ArcGIS
Languages: English (native) and Spanish (professional proficiency)

Jimmy Chin and Geoffrey Kocks April 19, 2023

Gifted Education and the Development of Mathematical Talent

Tracking is common in school districts across the United States. Justifications include the ability to identify promising students and provide them with accelerated education, tailoring instruction to student preparation. Parents perceive getting on the "right" track in elementary school as a pathway to elite high schools (Roda, 2015); therefore, elementary school tracking can potentially address pipeline issues by selecting and preparing high-achieving minority students (Plucker et al., 2010; Hoxby and Avery, 2013). Opponents argue that tracking perpetuates inequality and segregation, and may not improve academic outcomes.

We will study the medium- to long-run effects of elementary school tracking on academic achievement, with a particular focus on advanced math coursework and STEM school enrollment. Our context is New York City, where public schools are heavily tracked across all grades. Especially contentious are gifted and talented (G&T) programs, which group students by ability into separate classrooms and schools beginning in kindergarten. In 2022, outgoing mayor Bill de Blasio eliminated the G&T program, only for successor Eric Adams to reinstate and expand it (Shapiro, 2021). Both actions were highly controversial. At the high school level, tracking consists of eight specialized high schools. Six specialize in STEM, and offer advanced math courses such as multivariable calculus.

Our study relies on rich administrative data provided by the NYC Department of Education (NYCDOE). We secured these data through an approved research partnership with the NYCDOE. These data include student-level data on G&T applications, G&T admissions exam scores, enrollment, achievement, and home locations. They cover the population of NYC students and allow us to link students over time. Data from school years 2010-2011 to 2022-2023 allow us to examine 13 cohorts of students beginning in kindergarten. In follow-up work, we plan to examine how tracking impacts college enrollment, field of study, and earnings, and how math performance potentially mediates these effects.

First, we will estimate the causal effects of gifted enrollment on academic achievement (both for mathematics and overall). We will use two sources of quasi-random variation. The first arises from entrance exam cutoffs for G&T eligibility. We will use these cutoffs in a regression discontinuity design. The second arises from lottery-based assignment when programs are oversubscribed. NYCDOE uses the deferred acceptance algorithm (Gale and Shapley, 1962) to assign students to programs, which yields credible instrumental variables for G&T enrollment (Abdulkadiroğlu et al., 2017, 2022). We will then estimate G&T effects on a range of outcomes like secondary school math achievement, STEM secondary school enrollment, and AP calculus enrollment.

Second, we ask how G&T program could be reformed to better identify and develop the ability of promising students. We will build a structural model of school choice (adapting Walters (2018)) that allows us to estimate student preferences for G&T programs and see how changes in program rules impact student learning and school segregation. Policy simulations we will consider include exam- and teacher recommendation-based admissions, affirmative action, universal screening for admissions, and expansions and contractions of the G&T programs. The model will highlight potential trade-offs between effects on student achievement and district-wide school segregation. The options described above are actively debated in NYC and elsewhere, which gives our findings broad applicability.

References

Abdulkadiroğlu, A., J. D. Angrist, Y. Narita, and P. A. Pathak (2017): "Research Design Meets Market Design: Using Centralized Assignment for Impact Evaluation," *Econometrica*, 85, 1373–1432.

——— (2022): "Breaking Ties: Regression Discontinuity Design Meets Market Design," *Econometrica*, 90, 117–151.

Gale, D. and L. S. Shapley (1962): "College Admissions and the Stability of Marriage," *American Mathematical Monthly*, 69, 9–15.

Hoxby, C. and C. Avery (2013): "The Missing" One-Offs": The Hidden Supply of High-Achieving, Low-Income Students," *Brookings Papers on Economic Activity*, 2013, 1–65.

Plucker, J. A., N. Burroughs, and R. Song (2010): "Mind the (Other) Gap! The Growing Excellence Gap in K-12 Education." *Center for Evaluation and Education Policy, Indiana University*.

Roda, A. (2015): *Inequality in Gifted and Talented Programs: Parental Choices About Status, School Opportunity, and Second-Generation Segregation*, Springer.

Shapiro, E. (2021): "De Blasio to Phase Out N.Y.C. Gifted and Talented Program," *The New York Times*, https://www.nytimes.com/2021/10/08/nyregion/gifted-talented-nyc-schools.html.

Walters, C. R. (2018): "The Demand for Effective Charter Schools," *Journal of Political Economy*, 126, 2179–2223.