Date: April 27, 2023
Fellowship Application: Identifying and Developing Mathematical Talent among Youth
From: Iris Vrioni

To the review committee:

This cover letter accompanies my fellowship application. I am a fifth year PhD candidate at the University of Michigan with research interests in labor, education, and empirical industrial organization. I am advised by Professor Basit Zafar, Professor Ying Fan, and Professor Zach Brown. One strand of my research, which includes two papers in my dissertation, is related to the design of higher education markets. The second strand of my research focuses on education and gender, and in particular, the study of the representation of women in top-talent labor and education markets.

The project for which I am applying for fellowship support aims to understand the role of supervisors and their beliefs in the discovery and promotion of talent in women of highest mathematical ability. I use the Putnam Competition as my setting, where, as I describe in the project proposal, I have found a unique way to measure supervisor beliefs about talent and I test the extent to which these beliefs are heterogeneous along gender lines. In my project, I then aim to evaluate how beliefs of supervisors affect later careers of top-talent women.

I have obtained approval from the Briscoe Center for American History at UT-Austin, where the Putnam archives are stored in physical copies, to access and digitize 40 years of confidential Putnam competition records for the period 1977-2016, subject to a Data Use Agreement (DUA) that is in progress. The records contain the names, declared gender, colleges, and competition scores for all Putnam participants over the time span of the documents. As soon as the DUA is complete, the Briscoe Center staff will begin digitizing all Putnam records for this project and I plan to make trips to Texas in early summer to help speed up the digitization.

The fellowship and research funds would be tremendously helpful to this data collection effort and would allow me to pay Briscoe interns, travel to Texas, and assemble these novel data. In addition, the fellowship support would allow me to replace teaching time with work on this project in the coming academic year. Perhaps most importantly, I would benefit from the guidance of faculty mentors that work in this area.

Thank you for your consideration,

Iris Vrioni

Gender, Signaling, and Career Outcomes of Top Mathematical Talent:

Evidence from the Putnam Competition

Top-talent labor and education markets are unique: reward is frequently not based on the level of skill, but the ordering of skill within top students. How well talent ordering is observed, in particular in the early careers of highly talented students, may have important consequences on the opportunities and recognition they receive, and in later career output. Supervisors and their beliefs play an important role in talent discovery and promotion, and their effect on the career paths of top-talent youth is not well understood.

This project assembles new confidential data on all participants of the Putnam Mathematical Competition over four decades and utilizes unique features of the competition to make progress on the following questions: (1) Are supervisor perceptions of talent different for women and men of highest ability? (2) Do any such differences affect the career outcomes and output of top talent youth?

To answer my research questions, I have obtained approval to access records from the Putnam Competition, the preeminent math competition for undergraduates in North America, which sits thousands of students from hundreds of colleges each year for an olympiad-style problem-solving contest. The data contain individual and team-level information for all participating students and colleges, including names, declared gender, college team members, all scores and team supervisors.

I use the combined individual and team structure of the competition to measure supervisors' beliefs about student talent and test in the data the extent to which beliefs are heterogeneous along gender lines of both participants and supervisors. The following feature of the Putnam allows measurement of heterogeneity in beliefs: the competition is individual and anyone can participate, but there is a team component in which each college's Putnam supervisor pre-selects its representing team of three members before the competition. Colleges are then ranked by the performance of the pre-selected team. With few exceptions, colleges allow supervisors complete discretion in the selection of the team and encourage them to list the students who they believe to be of highest talent to represent the college. Infamously, supervisors are often wrong about who

they pick. The first goal of the project is to test in the data whether supervisors are differentially wrong about the abilities of women relative to men and whether this heterogeneity varies by gender of the supervisor.

In the second stage I plan to use variation in the gender of supervisor to which students are exposed to estimate the effects of more biased supervisors on the career outcomes of top-talent women relative to men. For this, I plan to link all Putnam participants to graduate school attendance, publications, and patents. Understanding the relationship between early biases in the perception of the abilities of top-talent students and their later outcomes can help motivate policies to improve the dynamics of talent discovery and promotion.

In addition to answering my two immediate research questions, the Putnam data offer an opportunity to answer many more research questions about the presence of women in the ranks of the highest mathematical achievers. I aim to document with the Putnam data the presence and performance of women on this prestigious competition over time, the decisions of marginal women to participate, and to investigate resilience in competitive environments and its role on career outcomes of women of the highest mathematical talent.

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Education

Ph.D., Economics — University of Michigan, Ann Arbor, MI 2018 – 2024 (expected)

Fields — Education, Industrial Organization; Adv. — Prof. Basit Zafar, Prof. Zach Brown, Prof. Ying Fan

B.A., Mathematics and Economics — Macalester College, St. Paul, MN 2015

Honors and thesis in Economics

Papers

How Subsidies Affect Contraceptive Use among Low-Income Women in the U.S.: A Randomized Control Trial, with Martha Bailey, Lea Bart, Vanessa Dalton, Daniel Eisenberg, Paula Fomby and Vanessa Lang; Working Paper

Inequity in Centralized College Admissions with Public and Private Universities: Evidence from Albania; Working Paper

Gender Differences in Signaling Ability at the Top: Evidence from the Putnam Math Competition; In Progress

Price and Quality of Colleges in Systems with Centralized Admissions; In Progress

Fellowships and Awards

Fred M. Taylor Award in Economic Theory — University of Michigan 2022-2023
Outstanding Third Year Paper Award — University of Michigan 2021
Highest Distinction in Macroeconomics Preliminary Exam — University of Michigan 2019
Summer Research Award — University of Michigan 2019, 2020
William Haber Fellowship — University of Michigan 2018 – 2019

Research Experience

Research Assistant to Prof. Martha Bailey — University of Michigan, UCLA 2019-2021
Summer Research Assistant to Prof. Zach Brown — University of Michigan 2020

Professional Experience

Analyst, Senior Analyst — Analysis Group, Chicago, IL 2015 – 2018

Teaching

Introduction to Statistics and Econometrics — University of Michigan Winter 2022
Intermediate Microeconomics — University of Michigan Fall 2020, Fall 2021
Intermediate Introduction to Statistics and Econometrics — University of Michigan 2019

Presentations

ASSA* (2023), Michigan IO Lunch (2021, 2022), Michigan Labor Lunch (2021, 2022)

Personal

Citizenship — Albanian (F-1 Visa)

*by coauthor

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