

Stanford SOCIAL INNOVATION^{Review}

Research

How College Admissions Hurt Intergenerational Mobility

By Daniela Blei

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RESEARCH

HIGHLIGHTS FROM SCHOLARLY JOURNALS

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EDUCATION

How College Admissions Hurt Intergenerational Mobility

BY DANIELA BLEI

Raj Chetty, a professor of economics at Harvard University and the director of Opportunity Insights, a Harvard-based research and policy group that analyzes big data, has spent much of his career so far analyzing intergenerational mobility—the extent to which people’s economic outcomes are shaped by their parents’. In a 2011 paper in the *Quarterly Journal of Economics*, Chetty led a group of researchers that examined the effects of kindergarten quality on long-term student outcomes. His team pored over data from Project STAR, a study of 12,000 Tennessee kindergarteners conducted in the 1980s. Among several measures they used to determine success was whether and where students attended college.

By the end of the project, the team had unearthed new research questions—but about college, not kindergarten. Looking at outcomes they were seeing in their own data, they saw an opportunity to explore differences between colleges, especially around access and outcomes for students, two key elements of intergenerational mobility.

A new study by Chetty; John N. Friedman, a professor of economics and international and political affairs at Brown University; Nick Turner, a principal economist at the Federal Reserve; and Emmanuel

Saez and Danny Yagan, both professors of economics at the University of California, Berkeley, has been in the making since the 2011 kindergarten study. Using data based on confidential access to anonymized tax records at the IRS, the group calculated the parental incomes of students at various

researchers found that even minor changes to the college admissions process would boost intergenerational mobility.

To investigate whether differences in preparation at the end of high school explain differences in the fraction of students who attend selective schools, Chetty and his colleagues asked whether two students from different family backgrounds but with the same SAT/ACT scores were as likely to attend a selective school. For example, looking at all students who scored

problem that also needs to be addressed, but about how the admissions department handles those students who do have similar scores.”

Looking at “Ivy-Plus” schools—the eight Ivy League colleges plus Duke University, MIT, Stanford University, and the University of Chicago—the researchers discovered that students who hailed from lower- and middle-class backgrounds were heavily underrepresented. More students came from families in the top 1 percent of earners than from families in the bottom half of the income distribution.

The mobility prospects for low-income students at Ivy-Plus schools are enormous, because graduates have high earning prospects. For low-income students, the team found that admissions departments could shrink intergenerational mobility gaps by more than 25 percent simply by providing need-affirmative preferences—the same types of advantages already afforded to legacy students and athletes. If colleges equalized attendance rates for middle-class students, conditional on test scores, the fraction of students from the so-called missing middle would grow from 28 percent to 38 percent.

“Every year is an opportunity to make an enormous difference,” Friedman says. “The data don’t really point to what people sometimes refer to as the magic age model,” he adds, referring to several studies that have focused on kindergarten or the senior year of high school as critical moments when educational gains are won or lost.



colleges and followed student earnings after graduation.

They asked: What do the data say about intergenerational mobility? What percentage of students at the most selective colleges come from wealthy families? How do the children of low-income families fare in college admissions? What would it take to get them attending more selective colleges at higher rates? Rather than looking only at average incomes, they analyzed the entire distribution to obtain a full and nuanced picture of parental incomes and student earnings after college. The

a 1080 on the SAT, they found that 75 percent from the richest fifth of families attended a selective school, compared with only 51 percent from the poorest quintile of families. This discrepancy between high- and low-income students was not simply a reflection of differences in academic preparation and K-12 educational experiences, they concluded, but something about the processes through which students apply, get admitted, and choose a college.

“We should be able to fix this problem,” Friedman says. “This isn’t about not enough kids scoring a 1080, which is a separate

RESEARCH

“This is the most important—and definitive—recent study about economic inequality in access to selective colleges,” says Sean Reardon, Professor of Poverty and Inequality in Education at the Stanford Graduate School of Education. “It reveals the important role that college admissions practices play in limiting economic mobility—and suggests that changing admissions policies at selective colleges might lead to greater educational and economic equality.” ■

Raj Chetty, John N. Friedman, Emmanuel Saez, Nicholas Turner, and Danny Yagan, “Income Segregation and Intergenerational Mobility Across Colleges in the United States,” *Quarterly Journal of Economics*, vol. 135, no. 3, 2020, pp. 1567–1633.

EDUCATION

Science's Diversity Problem

BY DANIELA BLEI

About a decade ago, researchers identified a pernicious phenomenon in corporate America. Despite an abundance of data showing that diversity fosters innovation and drives market growth, historically underrepresented groups—nonwhites and women who diversify labor markets—were not being rewarded for their contributions with the same career advancement and promotional opportunities accorded to white men.

In 2017, when an interdisciplinary team at Stanford University's Knowledge Creation Lab began to reflect on inequality in science careers, they uncovered a similar paradox.

The benefits of diversity for science are well known and even heralded by researchers, and yet many minorities and women struggle to climb the academic ladder to reach tenure and other milestones.

Bas Hofstra, a postdoctoral research fellow at Stanford University's Graduate School of Education, and Daniel McFarland, a professor of education at Stanford who focuses on data-based sociology, led a team that analyzed the trajectories of about 1.2 million doctoral recipients in the physical sciences, social and behavioral sciences, engineering, biology, earth sciences, and humanities between 1977 and 2015. Drawing on US Census data, Social Security Administration data, the ProQuest Dissertations and Theses database, and Web of Science—a large-scale publication database—the team scrutinized metadata (names, advisors, universities, and degrees) and analyzed text, such as dissertation abstracts, for patterns. By following these “structural and semantic footprints,” they could determine doctoral students' rates of innovation and whether these contributions to knowledge translated into successful academic careers.

What they found was troubling. Minority and women researchers had more novel ideas, but these ideas were less likely to be adopted by the scientific mainstream, dominated by a white male majority. This reduced the impact of these ideas, resulting in fewer sought-after academic positions for nonwhites and women.

“When someone enters a particular context with an outsider perspective, they tend to look at things in new ways and to make novel connections between old and new ideas,” Hofstra says. “We know that teams that are more diverse are more susceptible to innovation. But then we see that minorities in science often don't have science careers at the same rate as majority members. If diversity breeds innovation, then why are the people who actually diversify science so underrepresented among professorships and faculty careers?”

Using text analysis methods and, in particular, structural topic modeling, the Stanford team was able to search millions of documents for latent themes to identify substantive, important scientific objects, or concepts, within these texts. This filtering method allowed them to single out doctoral students who linked these concepts in new ways.

“At the heart of our metric are students who combined scientific concepts in ways that hadn't been done before,” Hofstra says. “That is the moment when scientific novelty is introduced. And this is a pretty basic intuition in the philosophy and sociology of science: defining knowledge as a network of ideas or concepts.”

For Sameer Srivastava, a professor at the University of California, Berkeley's Haas School of Business, “The introduction of a method that analytically separates novelty, which is measured based on new linkages between concepts

that appear in a researcher's doctoral dissertation, from impact, which is measured based on how often the novel combinations introduced by a researcher are adopted in subsequent work,” marks “a significant advance over typical approaches to measuring innovation such as citation patterns, which can sometimes be influenced by social dynamics that are unrelated to the actual work product.” The importance of this study, Srivastava notes, is that it “helps to explain the persistence of inequality in scientific careers.”

While addressing disparities in faculty hiring and promotion, the findings challenge basic assumptions about the nature of scientific innovation. “If we look at scientific discovery,” Hofstra says, “it seems that a significant portion of that is guided by attributional biases. What is considered useful innovation is in some way correlated with who introduces that innovation.” Consensus formation is often regarded as one of science's strengths. But “this also turns out to be a weakness,” Hofstra explains. “The majority has more say over what is a scientifically useful innovation than others. And that runs counter to what good science is.”

Hofstra and his team are pursuing follow-up research to investigate the role of mentors, what gets treated as a good innovation, and when and where biases enter into faculty hiring. ■

Bas Hofstra, Vivek V. Kulkarni, Sebastian Munoz-Najar Galvez, Bryan He, Dan Jurafsky, and Daniel A. McFarland, “The Diversity-Innovation Paradox in Science,” *Proceedings of the National Academy of Sciences*, vol. 117, no. 17, 2020, pp. 9284–9291.