

DATA EVANGELIST

*Chris Wellisz profiles **Raj Chetty**, who is reshaping the study of social mobility with big data*

Archimedes, the ancient Greek mathematician, had his eureka moment after stepping into his bathtub. Raj Chetty's came while he was taking a shower.

"I imagined this map, and I was thinking it would be really interesting to draw this map of what opportunities for upward mobility look like based on where you grow up," recalls Chetty, a professor of economics who recently moved from Stanford University to Harvard.

The colorful map that eventually emerged was based on income records of 40 million children and their parents. In shades of red and yellow, it shows huge geographic disparities in social mobility across the country. If you grew up in Charlotte, North Carolina, to parents in the bottom fifth of the income distribution, your chances of reaching the top fifth are just 4.4 percent. In San Jose, California, the odds are almost three times greater.

The map illustrated a 2014 paper titled "Where Is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States." It was the starting point for a series of studies that have shaped the public conversation about inequality, opportunity, and race. In one, Chetty and his coauthors showed that moving to a lower-poverty neighborhood in childhood significantly improves earnings and college attendance rates in adulthood. In another, they explained why income disparities between blacks and whites persist for generations. And in a widely cited study that casts doubt on the American dream, they found that rates of upward mobility have declined dramatically since 1940.

Cutting edge

In some cases, Chetty's work strikes out in new and unexpected directions. In others, it confirms earlier studies by sociologists or specialists in early-childhood education. Either way, what gives it such impact is his innovative use of massive data sets, which has put him on the cutting edge of a trend that's transforming the field.

"Big data has been revolutionary in applied microeconomics," says Emmanuel Saez, a frequent collaborator who teaches at the University of California at Berkeley. "Raj has been in the vanguard of this movement."

For Chetty, big data promises to bring economics closer to the certainties of the natural sciences. The hope is that economists will have a greater impact on public policy by presenting evidence that's convincing

enough to bridge the ideological divide, especially at the local government level, where partisan rancor is less intense.

"He zealously preserves his ideologically neutral stand," says David Grusky, a Stanford sociology professor who has worked with Chetty. "He wants the data to speak, and let the chips fall where they may."

Grusky describes Chetty as a relentless investigator who roams widely through relevant literature, regardless of the discipline, and tests every conceivable hypothesis as he works toward a conclusion. "He considers it an abject failure if there's ever a question coming from an audience that entails an analysis he hasn't already undertaken."

Speaking to audiences, on campus and off, is something Chetty does frequently in his role as evangelist for big data. He cultivates contacts with journalists and makes his articles available online, along with easy-to-understand summaries, which has helped attract widespread coverage of his work in publications including the *Atlantic*, the *Economist*, and the *New York Times*.

"If what we're doing is important for the world, we should make it accessible to the world," Chetty explains.

Spreading the gospel

Analyzing huge data sets is labor-intensive and costly. So together with two collaborators, Harvard University's Nathaniel Hendren and Brown University's John Friedman, Chetty formed the Equality of Opportunity Project, a mini think tank that rustles up grant money and employs more than a dozen college graduates as research assistants. The pre-docs, as they are called, spend two years working full-time before moving on to PhD programs at places like Berkeley and Harvard, where they spread the Chetty gospel.

Among them is Sarah Merchant, a Yale University graduate who worked on a 2018 study on the impact of race on economic opportunity, based on tax records covering almost the entire US population from 1989 to 2015. The study showed that the income gap between blacks and whites is sizable and persists for generations, and that it is driven entirely by differences in wages and employment between black and white men, rather than women. It found that the black-white gap is much smaller for black boys who grow up in neighborhoods with lower poverty rates, low levels of racial bias among whites, and high rates of father presence among low-income blacks.

“It was evident to me growing up how different our opportunities and experiences were, just by pure chance.”

“Racial disparities have been a large part of the American conversation since forever,” says Merchant, who spent a month diving into the vast sociology literature on the subject. “But we haven’t had a narrative validated by such a large data set. That was really exciting.”

Cousins less fortunate

At 39, Chetty has a boyish appearance and earnest demeanor that belie achievements including a MacArthur Foundation fellowship (also known as a “genius grant”) and the John Bates Clark Medal, awarded each year by the American Economic Association to the economist under the age of 40 deemed to have made the biggest contribution to the field.

His interest in social mobility stems from his country of birth, India, where poor but ambitious families could afford to send only one child to college. His parents were the lucky ones: his father became a PhD economist and his mother, a doctor. Raj attended an elite private school. His cousins weren’t as fortunate.

“It was evident to me growing up how different our opportunities and experiences were, just by pure chance,” Chetty says.

Chetty’s family left India for the United States when he was 9, and he was struck by the stark contrast in the standard of living between the two countries. At 17, he was valedictorian of his graduating class at the University School of Milwaukee.

While initially drawn to the sciences—his two sisters are biomedical researchers—Chetty couldn’t imagine life in a laboratory, so he opted for economics. “I always liked math and statistics,” he says. “I wanted to do something that would have an impact on the world.”

He was admitted to Harvard College and—unusually for an undergraduate—worked as a research assistant to Martin Feldstein, also a winner of the John Bates Clark Medal. Chetty graduated in just three years and earned his PhD in another three.

After a teaching stint at the University of California, Berkeley, he returned to Harvard where, at age 29, he became one of the youngest-ever tenured professors of economics. He moved to Stanford in 2015. He and his wife, Sundari, a stem-cell biologist, have a young daughter.

Friedman, a Harvard classmate and now a collaborator, remembers Chetty as “somebody who was focused on the big, important questions.”

But Chetty was frustrated by the sparsity of data available for empirical, as opposed to theoretical, work. Small sets of data, he felt, were overly amenable to varying interpretations, depending on assumptions and the methodology. “It all felt a little fragile,” he says.

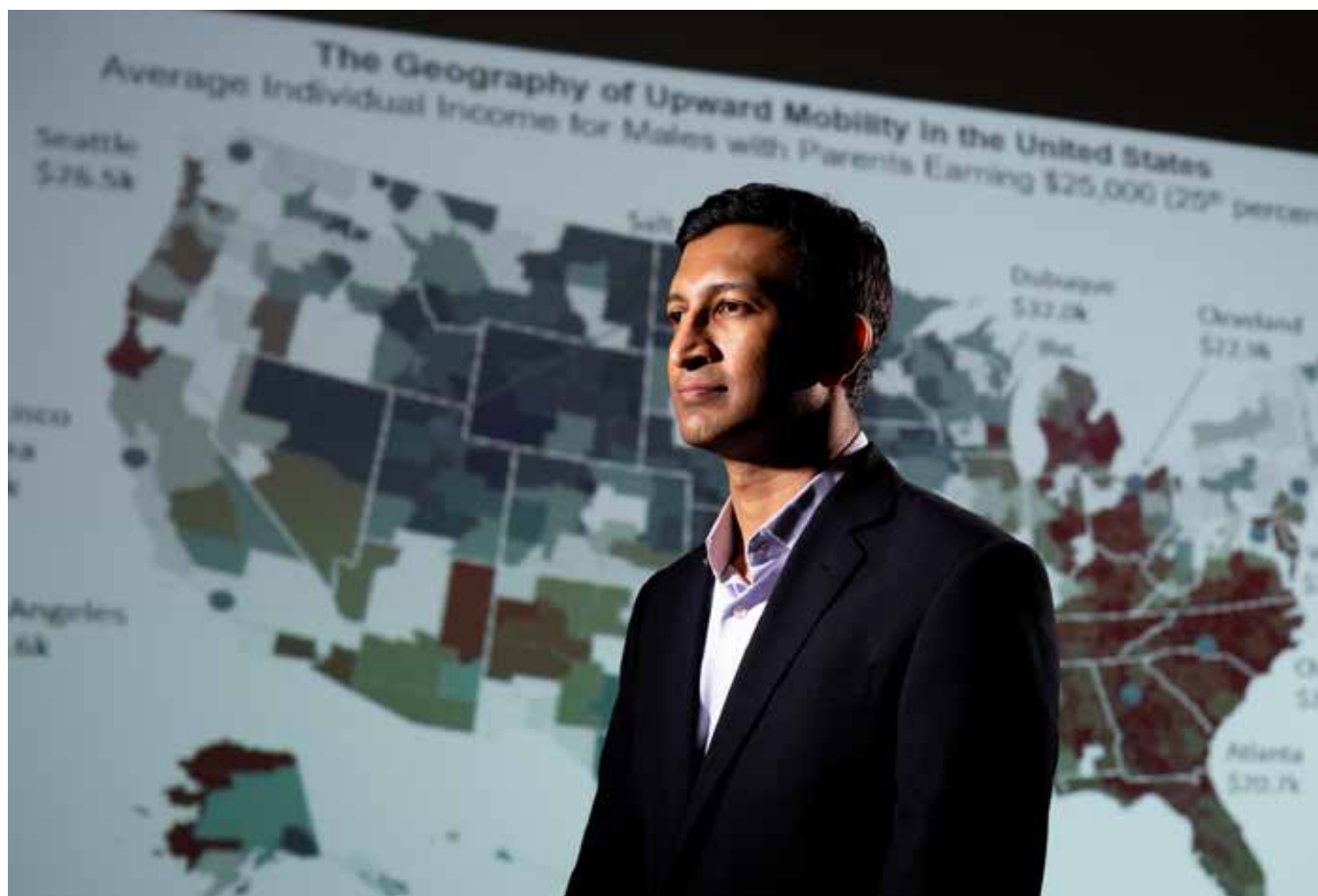
“I had the sense that I wanted to do things graphically,” he continues. That way, “you’re not imposing the assumption that there is linear relationship or a quadratic relationship. You’re just saying, ‘Let’s plot the data and see what we get.’”

To do that, Chetty needed data—lots of it. Not thousands of observations, but millions. US government data sets that large weren’t available to his team, but he found them in Austria and Denmark and wrote a series of papers he felt were more conclusive than his previous work. Then, in 2009, the US Internal Revenue Service agreed to give them access to tax data stripped of information identifying individuals.

Systematic differences

It was the mother lode, and it gave birth to the paper on the geography of intergenerational mobility, which Chetty cowrote with Hendren, Saez, and Berkeley’s Patrick Kline, and that showed markedly different rates of upward mobility across the country. The next step was to figure out why.

One possibility was that there are systematic differences, say in race or income, between the types of people who live in Charlotte as opposed to San Jose. But another, more intriguing, hypothesis was that there’s something special about San Jose that causes upward mobility, so that moving there



as a child would improve your chances of success as an adult.

The way to check was to look at what happens when kids move from one place to another. But Chetty and Hendren couldn't conduct a randomized experiment with actual children. Instead they constructed what economists call a "quasi experiment." By sorting millions of tax records just the right way, they found people who moved between the same two places at different ages and compared their outcomes.

That meant scrutinizing tax records for 5 million children whose families moved across counties between 1996 and 2012. Their finding: every year a child spends in a better environment—as measured by incomes of children already living there—means better earnings as an adult.

"The power of these large data sets is that you can essentially find experiments when you have adequate data if you're creative," Chetty says.

Amassing the data is daunting enough, but analyzing it presents additional challenges. "One also needs to

know how to find the counterfactual to isolate the causal effect," Hendren says. "This combination of big data and knowing how to slice it finely enough to find convincing causal patterns—that's Raj's big strength."

Moving to opportunity

Their conclusion, that there are places that spark opportunity, contradicted an influential study conducted by the US Department of Housing and Urban Development in the 1990s, known as the Moving to Opportunity experiment.

The study of 4,600 families living in high-poverty public housing projects in five big cities was a large-scale, randomized experiment involving real people—a rarity in the social sciences. One-third of the families were picked at random and received vouchers to move to lower-poverty areas; another third got vouchers to move wherever they chose; and the rest, the control group, stayed in public housing. The result was disappointing: among families who moved to lower-poverty areas,

Economist Raj Chetty and his map showing the geography of upward mobility.

earnings and employment of older children and adults didn't improve.

Chetty, working with Hendren and Harvard's Lawrence Katz, revisited the study but focused on children under the age of 13. Linking the data with federal tax data, they confirmed the result of the earlier quasi experiment. Children who moved to lower-poverty areas ended up earning 31 percent more than those who didn't. What's more, they were more likely to attend college and live in better neighborhoods and less likely to be single parents.

Greg Russ, who was then head of the Cambridge Housing Authority, in Massachusetts, was bowled over by the study. "It was kind of like being in a dark room with a little bit of light, and then someone turned on all of the lights," says Russ.

Until then, housing administrators like Russ had no conclusive evidence that giving families vouchers to move to lower-poverty areas changed economic outcomes. Most vouchers were being used simply to move from one high-poverty area to another.

Russ went to see Chetty at his Harvard office, bearing a copy of the article, copiously annotated in red ink. Their meeting led to Creating Moves to Opportunity, a nationwide alliance of housing authorities that is giving Chetty and his colleagues access to its data and in turn using their research to test model voucher programs.

Broad appeal

The study is an example of how Chetty's policy recommendations have appeal across the ideological spectrum. Giving families vouchers to move to "areas of opportunity" will generate positive returns for taxpayers in the long run, he argues, because kids who grow up earning more will pay more in taxes.

"From a social point of view, there is kind of a free lunch on the table that you might try to exploit," Chetty says. "We spend a ton of money in the federal government, \$45 billion a year, on affordable housing. But that money is being used in ways that are not as effective as possible in terms of achieving good outcomes for children."

Chetty's team has identified neighborhoods in Seattle that he calls "opportunity bargains"—places that produced good outcomes for kids and are affordable for low-income families. Now they are working on identifying such areas across the entire country.

For Russ, who now heads the Minneapolis Public Housing Authority, that is a breakthrough. "We've

been handing out vouchers since 1976," he says. "But we never handed them out with a map that says, 'Hey, do you know what? If you got them to move just two miles away, you might break the generational cycle of poverty.'"

Chetty's emphasis on equality of opportunity also has broad appeal—unlike redistributive policies intended to make up for unequal outcomes, such as wealth taxes proposed by some economists.

"Things like opportunity bring people together," he says. While inequality is an important issue, it can be divisive, he adds. "But everybody is, in general, in favor of greater equality of opportunity for kids."

California case

Yet Chetty hasn't shied away from controversy. In 2014 he testified as an expert witness in support of a lawsuit brought by a group of minority students against the state. In *Vergara v. California*, the students said their education had suffered because state laws made it difficult to dismiss incompetent teachers, and that minority students were more likely to be assigned to those teachers.

Chetty, drawing on a study he conducted with two fellow economists of 2.5 million New York City students, testified that dismissing the least effective teachers can vastly improve students' earnings in adulthood. He argued in favor of a method of evaluating teachers known as "value added," which measures their impact on student test scores.

The metric aroused fierce opposition from teachers' unions, which argued that scores are affected by a host of nonacademic factors, such as home environment and innate abilities. Chetty said it was possible to strip out the influence of those factors. Jesse Rothstein, a Berkeley economist who testified on behalf of the state, disputed Chetty's methodology. The judge ruled for the plaintiffs, but his decision was reversed on appeal. And while the disagreement persists, Rothstein says, "I definitely think it's been a fruitful debate."

These days, Chetty remains focused on studying how to improve opportunities for children. "We know that environment matters, but what exactly is the recipe for how we generate better outcomes?" he asks. "If we can figure that out, then that has tremendous social value." **FD**

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