

# RESEARCH SPOTLIGHT

## Raising Innovators

BY SARA HO

Innovation is a major driver of economic growth. Thus, it's no wonder that many economists are researching how to increase the supply of innovation.

In a recent article in the *Quarterly Journal of Economics*, a group of economists characterized the factors that shape who becomes an inventor in the United States. Their findings were twofold. First, children's chances of becoming inventors vary sharply with their characteristics at birth: race, gender, and parents' income. Second, exposure to innovation during childhood affects not only who becomes an inventor, but what type of innovation he or she pursues.

In their analysis, the researchers defined inventors as people who have filed for patents, been granted patents, or both. They linked patent data to federal income tax returns and to school test records. Using this data, they were able to track individuals' characteristics at birth, their math test scores (a proxy for ability), whether they eventually became inventors, and if so, what they invented. The information was anonymized.

Several characteristics appeared highly predictive of children's propensity to become inventors: being white or Asian, being male, and having high-earning parents. To account for the possibility that families of different socioeconomic backgrounds could afford better educational resources and opportunities for their children, the researchers separated the effects by breaking up their sample of children by race, gender, and parental income. Even among children with the same high math scores, those with high parental incomes were still more likely to become inventors than those with lower parental incomes; Asians and whites were still more likely to become inventors than Hispanics and blacks; and men were still more likely to become inventors than women.

In addition, the authors showed that exposure to innovation during childhood had causal effects on who became an inventor and what type of innovation they pursued. In their sample, children whose fathers were inventors were nine times more likely to become inventors themselves. (See "Following in the Family Footsteps," *Econ Focus*, Fourth Quarter 2017.) The authors found similar results even when accounting for the fact that inventors generally had higher incomes than noninventors.

The researchers addressed the question of nature vs. nurture — that is, whether these children might have inherited their propensity to invent. To assess this, the researchers looked at the types of innovations the children

chose to pursue. Inventions are classified into very narrow technology classes; for example, there are separate classes for synthetic versus natural resins. They found that having a father who is an inventor in a given technology class increased a child's probability of inventing in that same class by at least a factor of five. Similarly, children were more likely to invent in the technological class related to the *industry* in which their fathers worked, even if the father himself did not have a patent.

The researchers looked at geographical effects on rates of innovation. Moving a child from an area of relatively low innovation, such as New Orleans, to a place of high innovation, such as Austin, increased his or her probability of becoming an inventor by 37 percent. Furthermore, children were influenced by the technological class they grew up around. Children who grew up in Silicon Valley were especially likely to patent in computers, while children who grew up in

Minneapolis, which has many medical device manufacturers, were especially likely to patent in medical devices. The pattern holds true even if the child became an inventor in a different geographical area than where they grew up.

Children growing up in an area of high innovation may receive direct training, access to networks, or the motivation of having role models around. Regarding the latter, the researchers studied the effects of growing up in areas with higher shares of female inventors. They found that women are significantly more likely to innovate if there were more women innovating in the area where they grew up; they also found similar significant causal effects when they broke the samples down by technological class.

How much do these factors affect the goal of increasing innovation? The researchers considered a scenario in which women, minorities, and children from low-income families invent at the same rate as white men from high-income families; they estimated that there would be 4.04 times as many inventors in America as there are today. In addition, the researchers looked for — and failed to find — evidence that inventors from underrepresented groups had inventions with more citations or higher monetary return. In their view, this means that not only are there fewer inventors from these groups overall, there are fewer highly consequential inventors, whom the authors call "lost Einsteins." Thus, policies that give children from underrepresented groups more exposure to invention could significantly increase innovation in the future. EF

"Who Becomes an Inventor in America? The Importance of Exposure to Innovation." Alex Bell, Raj Chetty, Xavier Jaravel, Neviana Petkova, and John Van Reenen. *Quarterly Journal of Economics*, May 2019, vol. 134, no. 2, pp. 647-713.