

INNOVATION'S UNSEEN FRONTIER

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Democratizing innovation can harness untapped talent and spur economic growth

Notwithstanding Plato's 2,400-year-old proverb, necessity alone is not the mother of invention. It also requires opportunity. An individual's likelihood of becoming an innovator reflects parental background in terms of income and sociological factors, recent research shows. Highly talented children from disadvantaged backgrounds tend to innovate far below their potential, while children from wealthier or more educated families are much more likely to pursue innovation.

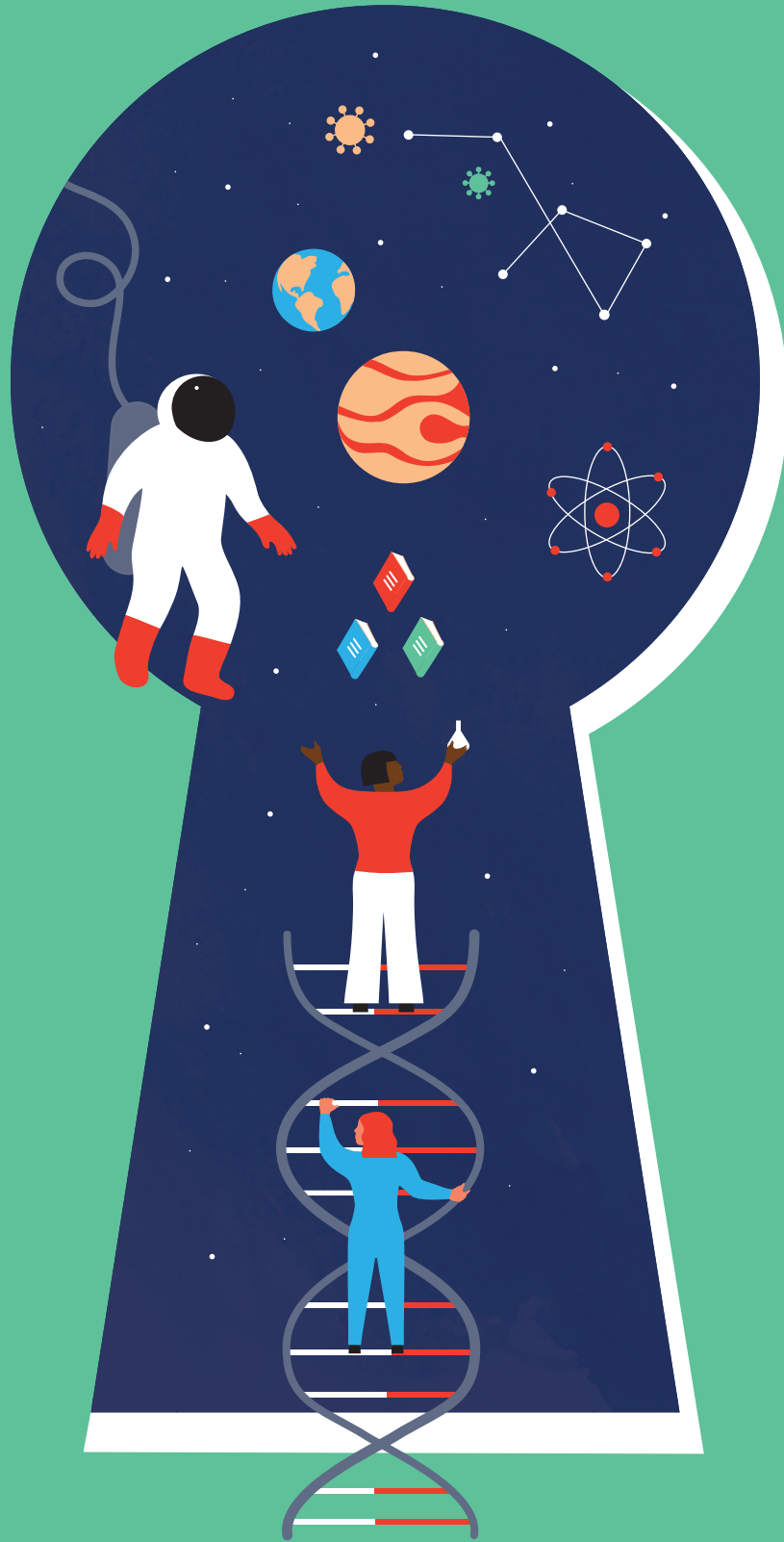
This creates the phenomena of "Lost Einsteins" and "Lost Marie Curies," phrases I coined with researchers Alex Bell, Raj Chetty, Neviana Petkova, and John Van Reenen (2019). Women, in particular, are dramatically underrepresented among innovators everywhere. This is no small matter. The scientific output of future generations worldwide could increase by as much as 42 percent if talented youth

everywhere had equal opportunities to develop their potential, according to Ruchir Agarwal, Ina Ganguli, Patrick Gaule, and Geoff Smith (2023).

Thus, democratizing access worldwide to careers in innovation is a key to expanding long-term growth and narrowing inequalities. By mobilizing a vast pool of untapped talent, we can achieve the higher growth rates necessary for addressing critical challenges like the green transition, public debt sustainability and poverty reduction, and narrowing of gender and intergenerational inequalities. Simple, targeted policies can democratize innovation. The macroeconomic implications are enormous.

Parental backgrounds

My research colleagues and I published a study six years ago on who becomes an inventor in the US. Using 1996–2012 data from the US Patent and Trademark Office, we showed a correlation between



parental income and the likelihood of obtaining a patent (see Chart 1). Among those whose parents' earnings fell below the 80th percentile, there were fewer than four inventors for each thousand people. For individuals whose parents were in the top 20 percent of earners, there were as many as eight patent holders among each thousand people.

We refined the analysis to compare access to careers in innovation for people who had similar math test scores in the third grade. The data showed that children who had lower test scores at that age generally had a smaller likelihood of eventually becoming an inventor, regardless of parental earnings. But among kids who scored at the 90th percentile or higher, those whose parents were in the top 20 percent of earners grew up to include more than twice as many patent holders as those from families with lower incomes.

Parental contributions extend beyond financial support for their children's education and careers in innovation. They also include the transmission of knowledge and aspirations. In Finland, education is entirely free and universally accessible, from kindergarten through doctoral studies. And yet researchers led by the London School of Economics' Philippe Aghion in 2017 found significant disparities in access to careers in innovation that were comparable in magnitude to the disparities found in the United States. This suggests that sociological factors rather than financial constraints play a critical role in shaping these disparities. Role models in childhood create aspirations that influence career choices.

Macroeconomic implications

The macroeconomic costs of untapped talent are staggering. A new model that I developed with Elias Einio and Josh Feng (2023) demonstrates that gender parity in access to careers in innovation could boost productivity growth by 70 percent. For high-income countries such as the United States, this would translate into an annual increase in productivity growth of 2.0 to 3.4 percent (Chart 2). Such a substantial gain would have profound implications for both societal welfare and tax revenue. The researchers' model also shows that bringing the highest-ability children into innovation careers would account for most of the economic gains.

Family background is just as significant as gender in shaping access to careers in innovation. Providing equal opportunities for all individuals in the top 1 percent of the skill distribution, regardless of family background, could increase GDP growth rates by 55 percent. Recognizing the macroeconomic importance of policies aimed at closing these gaps—whether by gender or socioeconomic background—is therefore crucial.

CHART 1

Wasted talent

Children from poorer households are far less likely to become inventors.

(US patent inventors per thousand children)



SOURCE: Bell and others 2019. NOTE: 1980–84 birth cohorts.

CHART 2

Gender gains

Gender parity in access to careers in innovation could raise advanced economies' productivity growth rates to 3.4 percent.

(advanced economy labor productivity, annual growth, percent)



SOURCE: Einio, Feng, and Jaravel 2023. NOTE: Baseline represents 12 percent female inventors.

Direction of innovation

Diversifying the pool of inventors offers another significant advantage. Beyond accelerating the pace of innovation, this could influence its direction. Historical examples suggest that innovators' personal experiences often shape their entrepreneurial vision, which in turn affects the sociodemographic groups that benefit from these innovations. In essence, innovators frequently focus on solving problems they have faced themselves.

For instance, in the late 19th century, the wealthy US socialite Josephine Cochrane invented the "dish washing machine" to protect her fine china, which her household help often damaged during hand-washing. More recently, Christopher Gray drew on his own experience as the son of a struggling single mother to develop the scholarship app Scholly. Gray created the app to help students search for private scholarship opportunities based on criteria such as their major or state of residence. Meanwhile, female entrepreneurs addressing underserved needs are driving a boom in "femtech," or new health technologies benefiting women.

Research findings show that innovators often create products tailored for people like themselves, from medical innovation to mobile apps and consumer packaged goods. For example, innovators from high-income families are more likely to develop products aimed at high-income consumers. They tend to avoid industries that cater to basic needs, such as food, and are more likely to engage in sectors that target luxury markets, like finance. Similar patterns apply to gender and age. These tendencies contribute to purchasing power disparities across different consumer groups.

Policy prescriptions

Growing evidence suggests that promoting innovation requires not only general human capital policies but also targeted initiatives to provide specific exposure to careers in innovation. Bell and others (2019) demonstrate that childhood proximity to inventors increases a person's likelihood of becoming an inventor. Recent randomized controlled trials highlight the importance of mentoring programs and role-model effects on career choices. Breda and others (2023) find that even brief exposure to female role models in scientific fields significantly influences high school girls' choices of undergraduate majors. Their research shows a particularly strong effect on high-achieving 12th-grade girls, who are more likely to enroll in selective, male-dominated STEM programs in college. The gender gap in STEM enrollment narrows significantly after such intervention, the researchers find. Other policies, such as dedicated

funding programs, could also help bridge the talent gap in innovation by gender and socioeconomic background.

A more inclusive education system can also accelerate the diffusion of innovation. Although the Lost Marie Curies agenda focuses primarily on identifying untapped talent for the development of new technologies, it is equally crucial for productivity growth to enhance the diffusion of those that already exist. A better-educated workforce is more capable of adopting new technologies, which means that narrowing the educational achievement gap between sociodemographic groups or local areas can facilitate the spread of innovation while reducing inequalities. Cornell University's Elio Nimier-David showed in a 2023 paper that the creation of new colleges in France during the 1990s expanded access to education and resulted in increased new business formation.

In addition, a crucial issue is democratizing access to innovation careers in low-income countries. Agarwal and others (2023) suggest that lowering immigration barriers and expanding the availability of scholarships for top foreign students from developing economies could make this possible.

The pursuit of innovation and growth does not have to come at the expense of social mobility or gender equality. By unlocking untapped talent and ensuring equitable access to careers in innovation, we can accelerate both technological progress and social advancement. Fostering a diverse pool of innovators is crucial not only for economic growth but also for a more inclusive and prosperous future for all. Democratizing innovation holds as much potential for prosperity as technological revolutions such as generative AI, with far greater benefits for inclusivity and equality. This is the unseen frontier of innovation. **F&D**

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