

How exposure to innovation creates equity among inventors and growth for all

Opportunity Insights

For centuries, inventors have been the pioneers of progress. Policymakers look to harness this potential for economic growth by creating robust ecosystems for innovation and ideas to thrive. Yet, current policies, such as tax cuts and STEM investments, may be targeting the wrong solutions.

Opportunity Insights used new de-identified databases linking patent records to tax and school district records to study the lives of more than one million inventors in the United States.

By tracking these individuals from birth onward, key factors were identified that determine who becomes an inventor (as measured by filing a patent).

The results show that improving opportunity and exposure to innovation among disadvantaged groups may have greater potential to spark an innovative spirit than the traditional policy approaches.

Key Findings:

Large disparities exist in innovation rates by socioeconomic class, race, and gender.

- Children with parents in the top 1% of the income distribution are ten times more likely to become inventors than children with below median income parents.
- White children are three times more likely to become inventors than black children.
- Only 18% of inventors are female. At the current rate of improvement, it will take another 118 years to reach gender parity.

Becoming an inventor relies upon excelling in STEM subjects and having a rich family.

- Children at the top of their 3rd grade math class (measured by test scores), are much more likely to become inventors, but only if they come from high-income families.
- Low-income students who score in the top 5 percent of 3rd grade math tests are no more likely to become inventors than below-average math students from affluent families.
- The gap grows in later grades; by 8th grade, half of the gap in innovation by income can be explained by differences in test scores. Low-income children steadily fall behind their high-income peers over time
- Students from low- and high-income families at the most innovative colleges (e.g., MIT, Cal Tech) patent at relatively similar rates, reinforcing the view that factors that affect children before they enter the labor

market, such as childhood environment and exposure to innovation, drive much of the innovation gap.

Childhood exposure to innovation increases the chance of becoming an inventor.

- Children who grow up in areas with more inventors are naturally more exposed to innovation and are more likely to become inventors themselves.
- Exposure influences not just whether a child grows up to become an inventor but also the type of inventions he or she produces.
- Similarly, children whose parents hold patents in a certain technology class are more likely to patent in exactly that field rather than in other closely related fields.

Exposure matters in a gender-specific manner.

- Women are more likely to invent in a given technology class if they grew up in an area with many female inventors in that technology class. Growing up around male inventors has no impact on women's propensity to innovate.
- Conversely, men's innovation rates are influenced by male rather than female inventors in their area.
- If girls were as exposed to female inventors as boys are to male inventors, the gender gap in innovation would fall by half.

The inventors whose discoveries have the greatest scientific impact earn very high incomes.

- The average patent holder earns approximately \$256,000 per year in his or her mid-forties.
- Individuals who make discoveries that have the greatest scientific impact (the most highly-cited patents) earn more than \$1 million on average per year.
- Women, minorities, and individuals from low income families are as underrepresented among star inventors as they are among inventors as a whole.
- If women, minorities, and children from low-income families invent at the same rate as high-income white men, the innovation rate in America would quadruple.

Policy Implications:

1. Identifying female, minority, and low-income children who excel at STEM in early ages.
2. Increasing overall exposure to innovation in childhood through tailored mentorship programs, internships, or structural changes in schools and neighborhoods. Improving opportunities for disadvantaged children may be valuable not just to reduce disparities in innovation but also to spur greater technological progress and growth.