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Equity in Innovation: Trends in U.S. Patenting and Inventor Diversity

Scholars, policymakers, and administrators have expressed interest in who participates in America’s innovation ecosystem—the constellation of people, institutions, and enterprises engaged in research and the development of new products and services. They argue that barriers for different groups to participate in the innovation ecosystem negatively impact U.S. technological competitiveness.

Recent academic scholarship has shown that factors such as limited access to a quality STEM education, mentorship, exposure to inventive activity, and limited financial resources can negatively impact a person’s likelihood of participating in the innovation process.

Since patents are widely recognized as an important measure of innovation, trends in U.S. patenting activity may assist policymakers in assessing current sources of innovation and identifying potential inequities that may limit future U.S. technological and economic leadership. (For more information on patents and innovation policy, see CRS Report R47267, *Patents and Innovation Policy*, by Emily G. Blevins.)

This In Focus covers recent trends in U.S. patenting data, highlighting potential geographic, socioeconomic, racial, and gender-based disparities in patenting activity; summarizes possible economic implications stemming from such disparities; and presents selected policy options and related considerations for Congress.

The Geography of U.S. Patenting

As measured by utility patents, the largest component of patenting, innovative activity is not currently distributed evenly throughout the country. Analyzing the “geography of U.S. patenting,” the *2022 Science and Engineering Indicators* report, published by the National Science Board, found that areas of high patenting intensity in the United States (measured by the patent owner’s location per 1,000 residents) are primarily concentrated along the coasts, in Texas, and in parts of the Great Lakes and Rocky Mountains (**Figure 1**).

The report also found that, in 2020, 41.6% of U.S. counties had zero patents granted to people residing in that county, and the top three counties for patenting intensity were Santa Clara in California, followed by Schenectady and Westchester in New York.

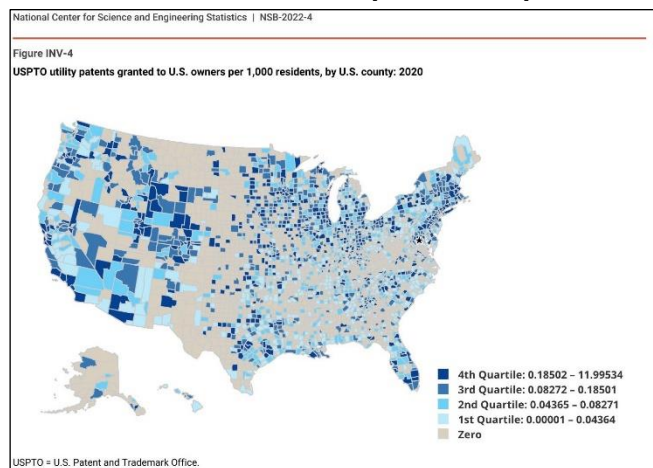
The Diversity of U.S. Inventors

In addition to regional differences, studies have demonstrated that patenting activity in the United States varies according to an individual’s gender and race, as well as socioeconomic background.

Gender

Patenting activity in the United States is currently distributed unevenly among men and women. Recent analysis by the U.S. Patent and Trademark Office (USPTO) found that men are much more likely to be named as an inventor on a patent than women. According to 2019 data, the share of patents issued to women was 12.8%, and the share of patents issued to teams with at least one woman named as an inventor was 22%.

Figure 1. USPTO Utility Patents Granted to U.S. Owners Per 1,000 Residents, by U.S. County: 2020



Source: National Science Board, National Science Foundation, *Invention, Knowledge Transfer, and Innovation. Science and Engineering Indicators 2022*, NSB-2022-4, 2022, at <https://ncses.nsf.gov/pubs/nsb20224/>.

Race

Discrepancies in patenting activity exist along racial divides within the United States as well. By comparing 2018 patenting data with other public records to determine inventor characteristics, one study concluded that White Americans were around three times more likely than Black Americans to become inventors. A 2010 study found that during the period from 1970 to 2006, Black inventors in the United States were granted 6 patents per million people, compared to the overall rate of 235 patents per million people.

Income

Income levels have also been shown to impact patenting rates. Linking de-identified data on 1.2 million inventors based on information contained in patent records with income tax records, a 2017 study found that individuals from high-income families were around nine times more likely to eventually file a patent than individuals from low-

income families and almost four times more likely to file a patent than those from middle-income families.

Potential Impacts on Innovation and the Economy

Does the diversity of inventors have any bearing on the capacity of the U.S. innovation ecosystem? Some studies suggest that the barriers underrepresented populations face accessing the innovation ecosystem (including advanced training and education, research and development funding, and venture capital) have a dampening effect on innovation. Some scholars have asserted that when significant numbers of potential innovators with unique perspectives on societal challenges and issues do not participate in the innovation process, a number of potential original and beneficial solutions are lost.

Some economists argue that the stakes of ignoring equity within the patent system are high for the U.S. economy. One Michigan State University economist has asserted that attempts to promote innovation by narrowly focusing policies on ensuring strong property rights ignore other important factors that impact the preconditions for innovation, such as societal inequities and even threats to physical safety, which may be experienced more acutely by various demographic groups within society. Additionally, she argued that these factors limit the economic effects of innovative activity. Some studies have estimated that closing the gender and racial patenting gap could result in a two-percentage-point increase of the U.S. gross domestic product per capita.

Others argue that factors contributing to economic growth are complex and that it may be impossible to quantify any potential economic impacts stemming from reducing patenting inequities.

Selected Issues in Patent Policy and Considerations for Congress

Congress could consider changes to U.S. patent policy to promote greater diversity in the innovation ecosystem.

Collecting Biographical Data from Inventors

The ability to develop potential policy solutions aimed at increasing the diversity of those participating in the innovation ecosystem may be restricted, in part, by the absence of data. Currently, USPTO does not request or track demographic information from patent applications. Such data may be helpful to policymakers in assessing the existence or scope of potential inequities embedded in the patent system and offer insights into possible solutions.

Introduced during the 117th Congress, S. 632 and H.R. 1732 would both require USPTO to request that inventors provide demographic information (defined as including gender, race, and military or veteran status), on a voluntary basis, with each patent application submitted to the agency. Congress may consider whether to require USPTO to request such information.

Strengthening Regional Patenting Resources

Based on the observed regional disparities in patenting activity, some have called for federal initiatives that focus

on improving regional innovative capacity throughout the United States. Proponents of such an approach argue that doing so would not only lead to a more diverse innovation ecosystem but could also drive economic growth and higher living standards more uniformly across the country. The CHIPS and Science Act (P.L. 117-167) directs a number of federal agencies and departments to create regional innovation hubs and programs to spur development in under-resourced regions.

Others have argued that policy reforms related to patent administration are needed to address geographic disparities in patenting activity, such as increasing USPTO outreach efforts to regions with low patent rates. H.R. 8697, introduced during the 117th Congress, would direct USPTO to establish a satellite office in the Southeast region and increase outreach to underrepresented groups to increase their participation in the patent system.

Increasing Inventor Diversity

Congress may also wish to consider how changes to USPTO's patent examination process might increase the diversity of U.S. inventors. For example, a 2022 report described the impact on patenting success rates of a USPTO pilot program, which provided extra guidance to pro se patent applicants (applicants who lack legal representation, often due to the associated costs). Data from a randomized control trial showed that participation in the pilot increased the likelihood that first-time U.S. women applicants would receive a patent by 23.5 percentage points.

Congress might consider directing USPTO to make the pilot program permanent or to expand it to study the impact of receiving additional guidance and information on the success rates of pro se applicants from racial, ethnic, and socioeconomic backgrounds with comparatively low patenting activity.

Federal Policy Coordination

Closing the patenting gap would likely require a coordinated effort across the federal government. For example, entities such as the USPTO and Small Business Administration administer important policies and programs that seek to encourage broader participation in the invention and commercialization process. Congress may wish to consider whether adequate coordination currently exists between these different federal entities in order to ensure that policies work in concert.

To that end, Congress might consider directing the White House Office of Science and Technology Policy to assess the efficacy of ongoing federal efforts to increase diversity, equity, and inclusion within the U.S. patent system and to develop metrics and benchmarks for tracking federal progress toward creating a more diverse innovation ecosystem.

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