

The Productivity Gains of Innovation Clusters

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Enrico Moretti, *The Effect of High-Tech Clusters on the Productivity of Top Inventors*, NBER Working Paper No. 26270 (Sept. 2019), available at [NBER](#).

Why do inventors increasingly locate near each other in metropolitan technology hubs like the Bay Area, Seattle, or Boston, despite the high costs of living in these areas? Just ten cities accounted for a remarkable 70% of computer science inventors in 2007. A [leading view](#) has been that “agglomeration economies” make researchers inside these innovation clusters more productive, although measuring this effect is difficult. In his [new working paper](#), economist Enrico Moretti examines the location of U.S. patent inventors over time to estimate just how large these productivity gains are: If inventors were distributed uniformly across the United States, Moretti estimates that their overall patenting rate would decline by 11%.

I like this paper (lots) not because the result is counterintuitive—quite the opposite. Rather, in a field with so many [barriers to real empirical progress](#), it is worth celebrating work that attempts to rigorously understand what factors actually affect innovation. And Moretti’s work on the geography of innovation has important lessons for law and policy scholars, including about the importance of looking outside IP for evidence-based innovation policies and the complex connection between innovation and growing wage inequality.

Moretti motivates the productivity effect of innovation clusters by examining the rapid collapse of Kodak in 1996, which led to a nearly 50% decline in the Rochester technology cluster. By 2007, patenting by the average non-Kodak and non-photography inventor in Rochester had declined by 20% relative to the typical inventor in other cities. In his main analysis, Moretti studies this effect for all U.S. patents filed between 1971 and 2007, classified into five technology areas—semiconductors, computer science, biology and chemistry, other engineering, and other science—and assigned by the inventors’ addresses into 179 “economic areas” covering the United States. As he notes, there are limitations to this data; for example, citation-weighted patent counts are imperfect proxies for innovation (particularly in [computer science](#)), and he only has observations for inventors in years when they patent. But having an enormous dataset with worker-level measures of both productivity and location allows Moretti to go beyond prior work in studying the productivity effect of agglomeration.

Using different empirical methodologies and robustness checks (such as separately examining effects on inventors who stay in a city while its cluster size changes, and using models based on instrumental variables), Moretti estimates how patenting productivity varies with cluster size. For example, the average computer scientist moving from the median cluster (Gainesville, FL) to 75th percentile cluster (Richmond, VA) has a 12% increase in patenting, with no evidence of a “pre-trend” that would predict this productivity increase before the move. And a Bay Area computer scientist patents 23% more than they would in an average cluster. Furthermore, Moretti finds that the patenting gains for large clusters outweigh the losses for small clusters, which is why smoothing out the distribution of inventors would lead to an overall decline in U.S. patenting by 11%.

This work has at least three lessons for legal scholars. First, scholars who care about innovation should pay attention to geography. Some do, of course; Camilla Hrdy has [excellent articles](#) on incentives for local innovation clusters, for example. But we still generally teach our students that IP law is the most important tool in the innovation policy toolkit, despite continued empirical uncertainty about whether stronger patent laws even increase aggregate research investments. Policymakers may have a more demonstrable effect on innovation by focusing on legal institutions affecting where people live—including laws affecting land use, taxation, and immigration.

Second, Moretti's work highlights how innovation policy can't escape discussions of inequality. This is not just an issue of IP reflecting a choice in [how to allocate access](#) to knowledge goods; IP and other innovation incentives also reflect transfers to innovative firms and individuals, and the returns to patenting are distributed unequally. In addition to persistent [disparities by race, gender, and socioeconomic class](#), the geographic distribution of patents is increasingly concentrated in metropolitan areas and near research universities and is correlated with a region's economic health. As Moretti explains, clustering is "important for overall production of innovation in the US" but also "may exacerbate earning inequality across US communities." Colleen Chien tackles this issue in a [terrific new working paper](#), in which she argues that the history of U.S. patenting supports both an optimistic view of increasing innovation and a pessimistic view "that the innovation pie has become increasingly unevenly distributed and centered on immigrants and coastal elites." There is no easy solution, but more widespread acknowledgement of the problem is a first step.

The third lesson is the flip side of the second: just as innovation scholars shouldn't ignore inequality, scholars and policymakers concerned about inequality should recognize that trying to lure tech firms to distressed cities with economic incentives likely comes with a real efficiency tradeoff. Greater improvements for both innovation and equality might be made, for example, by [seeding promising tech hubs with federal funding](#), or by focusing on the land use policies that are currently limiting growth in places like the Bay Area. These policies wouldn't just help tech workers: in [earlier work](#), Moretti has concluded that "for each new high-tech job in a city, five additional jobs are ultimately created outside of the high-tech sector in that city," and has argued that the federal government should provide greater relocation assistance to unemployed workers. Of course, that assistance is only helpful if there is actually affordable housing to relocate to. In January, for the third year in a row, the California Senate [rejected a bill](#) meant to stimulate housing production. California's inability to increase the supply of housing is not just a failure for Californians facing homelessness and housing instability—it is also a failure for U.S. innovation. And based on Moretti's work, policymakers have at least a rough quantitative measure of how much more productive researchers can be when they are able to locate in Silicon Valley and other technology clusters.

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