

# The Local and Aggregate Effect of Agglomeration on Innovation: Evidence from High Tech Clusters

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## **Abstract**

Most industries are spatially clustered and clustering is particularly strong in the high tech sector. In this paper I use longitudinal data on top patenters to estimate the productivity benefits enjoyed by scientists who locate in Silicon Valley-style clusters, defined as city  $\times$  research field. As a measure of worker-specific productivity, I use the number of patents produced in a year. I start by studying the experience of Rochester NY, where the unexpected demise of Kodak resulted in a arguably exogenous negative shock to cluster size in most fields between 1996 and 2007. I find that as an effect, the productivity of non-Kodak inventors declined by 11.2%, after accounting for selection.

My main analysis is based on the universe of US patents 1971-2007. I find that when a scientist moves to a larger cluster, she experiences significant increases in the number of patents produced and the number of subsequent citations. The productivity increase follows the move, and there is no evidence of pre-trends. Using an instrumental variable based on the geographical structure of firms with laboratories in multiple cities, I estimate that the elasticity of number of patents with respect to cluster size is 0.04.

I use my micro estimates to quantify the macro-economic benefits of clustering for the US as a whole. I find significant aggregate efficiency gains from clustering. In a counterfactual scenario where the quality of U.S. inventors is held constant and their geographical location is changed so that all cities have the same number of inventors in each field, the overall number of patents in US would be 9.6% smaller. I conclude that while clustering of high tech industries may exacerbate earning inequality across U.S. communities, it is important for overall production of innovation in the US.

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