

The Research University, Invention, and Industry: Evidence from Germany 1760-1900*

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September 17, 2019

Abstract

We study the role of higher education in promoting the transition to industrial capitalism where research universities first developed: nineteenth century Germany. We construct novel microdata on invention, scientific activity, and manufacturing by industry across virtually all towns in Germany between 1760 and 1900. Invention, scientific activity, and manufacturing developed similarly in towns nearer to and farther from universities in the 1700s, and then shifted sharply towards universities and began to accelerate in the early 1800s. After 1800, universities increasingly generated breakthroughs in basic science and ideas that could be commercialized in manufacturing. Innovations also diffused spatially from universities: within finely grained knowledge and technological categories, innovations that originated in universities were improved and adopted in manufacturing in other locations, especially after railroads reduced the cost of transportation starting in the 1840s. These shifts in invention and manufacturing reflected changes in German universities and in politics that were precipitated by the Napoleonic invasion of the early 1800s. They provide a canonical example of the role of higher education in promoting growth and structural change.

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