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Does Compulsory Licensing Discourage Invention?

Evidence from German Patents after World War I

BY JOERG BATEN, EBERHARD-KARLES UNIVERSTAET; NICOLA BIANCHI, NORTHWESTERN UNIVERSITY; AND PETRA MOSER, NEW YORK UNIVERSITY AND NATIONAL BUREAU OF ECONOMIC RESEARCH

Whether policies that weaken intellectual property rights discourage invention is a subject of intense debate. Basic models indicate that weakening intellectual property rights discourages invention by reducing inventors' ability to recoup investments in research and development. But weaker intellectual property rights can also encourage cumulative (or follow-on) invention by enabling future inventors to build on patented ideas.

A key mechanism to weaken intellectual property rights is compulsory licensing, which allows developing country governments to license foreign-owned patents to local firms *without the consent of foreign patent owners*. Article 31 of the Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS) allows compulsory licensing as a way to mitigate the potential welfare losses from TRIPS provisions that strengthen the patent rights of foreign firms (Bond and Saggi, 2014). Countries such as India, Thailand, and Brazil have used compulsory licensing to provide affordable medicines for HIV and other life-threatening diseases.

Pharmaceutical firms, however, argue that compulsory licensing hurts consumers in the long run by discouraging invention due to “the risk of receiving only a drastically

reduced royalty for the use of their intellectual property, imperiling in turn their ability to develop profitably new treatments and molecules.” In May 2015, for example, the pharmaceutical trade group Alafarbe warned that a compulsory license for Bristol Meyer's HIV drug Reyataz in Peru may cause “serious damage to the country and discourage investment.”

This paper exploits new individual-level data on German patents and a historical episode of compulsory licensing during World War I to examine the effects of compulsory licensing on inventors whose patents are licensed. As a source of quasi-experimental variation, it exploits the U.S. decision in 1918 to make all enemy-owned U.S. patents available for compulsory licensing. The United States authorities confiscated a total of 4,706 German-owned U.S. patents under the Trading with the Enemy Act of 1917 (TWEA); 1,246 of these patents were licensed to U.S. firms. Licenses were nonexclusive and issued “upon equal terms and a royalty basis, to any bona fide American individual or corporation.” Although the exact timing of licensing is unknown, most licenses were issued between 1919 and 1922. Earlier work has shown that compulsory licensing under the TWEA helped trigger an increase in U.S. invention; in fields with licensing, U.S. patents by domestic

inventors increased by an additional 20 percent after 1918. Previous work has, however, been unable to identify the effects on inventors whose patents were licensed, which is essential for understanding the welfare effects of this policy.

To perform this analysis, we have collected new historical data on all German patents for chemicals between 1900 and 1930. These data cover 79,591 patents issued by the German Patent Office across 212 research fields of chemical inventions; 101 of these fields include at least one licensed patent. To investigate firm-level changes in patenting, we match German Patent Office patents with information on German firms: 30,499 patents were assigned to 4,814 firms, and 50 of them saw at least one of their patents licensed under the U.S. TWEA.

Baseline specifications compare changes in German patents after 1918 across research fields that were differentially affected by compulsory licensing in the United States. This difference-in-differences approach allows us to examine the effects of compulsory licensing controlling for unobservable factors, such as reparations and punitive tariffs, which also may have influenced German invention. We also control for patents by foreign inventors as a proxy for changes in demand, scientific breakthroughs, or other factors that may have encouraged patenting in Germany, irrespective of compulsory licensing. This analysis indicates that German inventors began to patent more after 1918 in research fields in which their patents had been licensed. German inventors applied for 2.97 additional patents per year after 1918 in fields with licensing compared with other fields of chemical invention. Relative to a pre-1918 average of this implies a 28 percent increase.

A concern with our baseline results is that U.S. firms may have been more likely to license German-owned U.S. patents in fields in which U.S. demand for invention was high, and German demand for invention may have increased in the same fields. Then, our estimates overstate the increase in invention that is due to licensing. Historical evidence, however, indicates that U.S. firms were most likely to license German-owned patents in war-related research fields, such as dye-

stuffs and explosives, which faced severe problems of excess capacity after the war. Then, our estimates under- rather than overestimate the increase in patenting that is due to licensing. To address this issue, we exploit the fact that the U.S. Alien Property Custodian confiscated all German-owned patents—irrespective of variation in demand—and that only confiscated patents were available for licensing. Alternative estimates based on confiscated patents indicate that our baseline estimates are downward biased.

As an additional test, we use inventors' decisions to pay renewal fees to capture variation in the valuation of patents. This analysis suggests that some of the observed increase in patenting may have been due to an increase in lower-quality, strategic patents. Even for high-quality patents, however, our estimates indicate an additional 17 percent increase in invention in fields with licensing after 1918.

Finally, inventor-level analyses of patenting suggest that firms whose patents had been licensed applied for an additional 0.42 patents per year after 1918 in fields with licensing compared with other German firms. Relative to an average of 0.46 patents per firm, field, and year until 1918, this implies a 91 percent increase. Inventor-level analyses also reveal a substantial differential increase in the number of active patentees in fields with licensing, which indicates an increase in entry. Consistent with theoretical predictions about the link between competition and innovation, we find that the observed increase in patenting was strongest for fields in which preexisting levels of competition were low. Taken together, these results suggest that compulsory licensing may be particularly effective in promoting invention by increasing the threat of competition in fields with low preexisting levels of competition.

NOTE

This research brief is based on Joerg Baten, Nicola Bianchi, and Petra Moser, "Does Compulsory Licensing Discourage Invention? Evidence from German Patents After WWI," National Bureau of Economic Research Working Paper no. 21442, July 2015, <http://www.nber.org/papers/w21442>.