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Determinants of Creativity and Innovation — Evidence from Economic History

Petra Moser

Innovation and creativity are the primary source of improvements in human welfare. Yet, due to two major empirical challenges, it is difficult to determine the factors that encourage creativity and innovation. First, modern settings often lack clean experimental variation, because policies designed to encourage innovation adapt in response to lobbying, which makes it difficult to identify causal effects. Second, innovation and creativity are exceedingly hard to measure. For example, patent counts are the standard measure of innovation, but they fail to capture important innovations that occur outside of the patent system, for example in countries without patent laws. Excluding such developments may distort economists’ views on the determinants of innovation.

My research addresses these identification and measurement challenges by exploiting a wealth of historical events that changed intellectual property laws and other policies independently of changes in innovation. In practice, this research approach combines in-depth analyses of historical records with statistical tests of large data sets. For example, I exploit a large amount of credibly exogenous variation in patent policy across countries in the 19th century — before interest groups had begun to lobby for changes in patent policy — to analyze data on innovations with and without patent laws that were exhibited at world fairs. Complementary research uses the Nazi’s decision to dismiss all Jewish scientists to examine the effects of high-skilled immigrant scientists on U.S. innovation. Another project exploits variation in the timing of Napoleon’s military victories to examine the effects of copyrights on Italian opera.

Does Existence of a Patent System Encourage Innovation?

My research addresses a central question in economic history: Has the creation of property rights in ideas encouraged innovation and economic growth? A strong tradition argues that secure property rights built the foundation for the industrial revolution in Britain and the United States. Innovation is, however, a cumulative process and strong property rights for early generations of inventors reduce payoffs for those in later generations. These costs are particularly severe if patents are broad and their boundaries uncertain, so that later generations are continuously at risk of infringing on existing patents. Recent patent wars over smartphones and tablets were explicitly about the timing of patent laws — when politicians moved these issues to the forefront of policy debates, but the underlying tensions are more general. My research exploits historical variation in 19th century patent laws — when countries such as Switzerland and the Netherlands had not yet adopted patent laws or had abolished them for political reasons — to investigate the effects of patent laws on innovation.

To measure effects on innovation, I construct historical data sets to capture innovations that occur within and outside of the patent system. Patent data fail to capture all such innovations, which compromises their use in empirical analyses of the effects of patent laws. To address this

1 Petra Moser is a faculty research fellow in the NBER’s Programs on the Development of the American Economy and Productivity, Innovation, and Entrepreneuship. She is an associate professor of economics at New York University’s Stern School of Business.
2 Moser combines empirical methods from economic history and applied microeconomics to examine the determinants of technological innovation and artistic creativity. She has used historical variation in patent laws to examine how patent policies can influence the rate and direction of technical change, as well as the geography of innovation. Her research also examines the role of human capital — in the form of high-skilled immigrant scientists — on innovation. New projects investigate the effects of copyrights on creativity in literature and music, and explore the link between mental disorders and innovation.
3 Moser received her Ph.D. in economics from the University of California, Berkeley, and an M.A. in international relations from Yale University. As an undergraduate, she studied economics, with minors in politics and European languages, at the University of Tübingen in Germany and as a Fulbright student at the University of Missouri.
4 Moser grew up in a tiny medieval town in Germany, close to the Moselle Valley, where she still enjoys running the local hills. This summer, she and her family moved to Brooklyn, and are excited to explore their new neighborhood, her dog stands and all.

To address this

13 Students leaving school with lesser (or no) degree acquire much less debt as shown by P. Steele and S. Baum, “How much are college students as shown by P. Steel and S. Baum, Student Loan and Repayment: Evidence and Policy,” NBER Working Paper No. 20849, January 2015.
were patented, especially innovative, even though it had European countries, and won a dispro-

As many exhibits per capita as the other system may not be necessary to encourage innovation. In 1851, for

ent system may not be necessary to collect detailed historical data to measure variation in the role of intellectual property rights in encouraging biological innovation, and use field trial data to analyze the effectiveness of the size of patented inventions.

Patent Pools and Compulsory Licensing

If patent laws fail to encourage the development of complementary parts of the same technology, pool members can then license all patents as a package to outside firms. In recent years, pools have formed across many technologies, ranging from tablet computers to diagnostic kits for breast cancer. Yet their effects on innovation are poorly understood. My research with Alessandra Voena provides such evidence by exploiting an exogenous episode of compulsory licensing in 1918, when the United States decided to subject all enemy-owned patents to compulsory licensing. [Figure 3] In the United States, compulsory licensing led to a 20 percent increase in patenting by domestic inventors, who were encouraged to use the innovation rather than pool it. 

Complementary research on incentive prizes, which links exhibits with patents and the records of the Scientific American, shows that the formation of a pool can diversify R&D towards inferior technologies.

Émigré Scientists and U.S. Innovation

Along with intellectual property rights, science and immigration policies are critical levers that help determine innovation. Biographical evidence suggests that German Jewish scientists, primarily emigrés, were an extremely selected sample of intellectual emigres to the United States. By exploiting variation in the timing of the formation of a pool, we also find that the creation of a pool can diversify R&D towards inferior technologies that allow non-members to avoid direct competition with the pool. These effects are particularly severe if pools increase litigation risks for non-members or if they create a system of differential license fees that penalizes small inventors.

Another prominent policy mechanism is compulsory licensing, which allows governments to license for-
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38th Annual NBER Summer Institute

The NBER hosted its 38th annual Summer Institute during a three-week period in July 2015. There were more than 2,600 registered participants, and 512 research presentations. More than 20 percent of those who attended the meetings were first-time Summer Institute participants; roughly one third were NBER affiliates.

Alan Krueger of Princeton University, the past chair of the President’s Council of Economic Advisers and a current research associate, delivered the 2015 Martin Feldstein Lecture, addressing the question “How Tight is the Labor Market?” He explored the challenges of measuring the number of long-term unemployed workers and estimating the extent to which the behavior of these individuals is affected by public policies and labor market conditions. An edited text of his lecture appears earlier in this issue of the NBER Reporter.

A panel discussion during the International Finance and Macroeconomics Program provided a timely opportunity for researchers to assess developments in the Greek financial crisis. Research associates Susan Arthey and Guido Imbens of Stanford University delivered the 2015 Methods Lectures on “Economic Applications of Machine Learning.” These lectures focused both on the econometric issues that arise in estimating machine learning models and on the applications of these models in fields such as industrial organization and health economics. All three of these presentations have been video-taped and posted on the NBER website under the “NBER Videos” tab.

Summer Institute participants represented 440 institutions, an increase of nearly one third from just a few years ago. The Summer Institute is highly decentralized, with 55 distinct meeting sessions organized by 119 different researchers. A complete list of sessions from the 2015 Summer Institute may be found at: http://nber.org/confer/2015/SI2015/SI2015.html

Conferences

International Seminar on Macroeconomics

The NBER’s 38th International Seminar on Macroeconomics took place in Zürich, Switzerland on June 26–27. The seminar was organized by research associates Jeffrey Frankel of Harvard University, Francesco Giavazzi of Bocconi University, Hélène Rey of London Business School, and Kenneth West of University of Wisconsin–Madison. These papers were discussed:

- Tarek A. Hassan, University of Chicago and NBER; Thomas Mertens, New York University; and Tony Zhang, University of Chicago, “Not so Disconnected: Exchange Rates and the Capital Stock” (NBER Working Paper No. 21445)
- Harris Dellas and Dirk Niepelt, University of Bern, “ Sovereign Debt with Heterogeneous Creditors”

- R. Lampe and P. Moser, “Patent Pools and the Direction of Innovation — Evidence from the 19th-century Sewing Machine Industry,” NBER Working Paper No. 17573, October 2013, and in A. Goldfarb, Susan Athey and Guido Imbens of Stanford University delivered the 2015 Methods Lectures on “Economic Applications of Machine Learning.” These lectures focused both on the econometric issues that arise in estimating machine learning models and on the applications of these models in fields such as industrial organization and health economics. All three of these presentations have been video-taped and posted on the NBER website under the “NBER Videos” tab.

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