Innovation Policy and the Economy, Volume 13
Edited by Josh Lerner and Scott Stern

There is an active debate regarding the implications of technological change for economic policy and the appropriate policies and programs regarding research, innovation, and the commercialization of new technology. This debate has only intensified as policymakers focus on new sources of innovation and growth in light of the continuing economic downturn and the associated focus on enhancing employment and growth. Innovation Policy and the Economy provides an ongoing forum for the presentation of research on the interactions among public policy, the innovation process, and the economy. Papers in this volume include a consideration of the complex set of innovation policy challenges that arise in managing publicly funded research, an examination of the increasingly visible role of philanthropic funding for science, a look at the increasingly contentious issue of public funding of growth-oriented entrepreneurship, and two papers that turn their attention to the evaluation of recent federal policy changes as the result of the America Invents Act and the America Competes Act.

Josh Lerner is the Jacob H. Schiff Professor of Investment Banking at Harvard Business School, with a joint appointment in the finance and entrepreneurial management units, and a research associate of the NBER. Scott Stern is the School of Management Distinguished Professor of Technological Innovation, Entrepreneurship, and Strategic Management at the Massachusetts Institute of Technology Sloan School of Management and a research associate and director of the Innovation Policy Working Group at the NBER.

NBER Innovation Policy and the Economy series

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This volume is the thirteenth annual volume of the National Bureau of Economic Research (NBER) Innovation Policy and the Economy (IPE) group. The appreciation of the importance of innovation to the economy has increased over the past decade. There is an active debate regarding the implications of technological change for economic policy and the appropriate policies and programs regarding research, innovation, and the commercialization of new technology. This debate has only intensified as policy makers focus on new sources of innovation and growth in light of the continuing economic downturn and the associated focus on enhancing employment and growth.

The IPE group seeks to provide an accessible forum to bring the work of leading academic researchers to an audience of policy makers and those interested in the interaction between public policy and innovation. Our goals are as follows:

- to provide an ongoing forum for the presentation of research on the impact of public policy on the innovative process;
- to stimulate such research by exposing potentially interested researchers to the issues that policy makers consider important;
- to increase the awareness of policy makers (and the public policy community more generally) concerning contemporary research in economics and the other social sciences that usefully informs the evaluation of current or prospective proposals relating to innovation policy.

This volume contains revised versions of the papers presented in the group’s meeting in Washington, DC, in April 2012.

The first paper considers the complex set of innovation policy challenges that arise in managing publicly funded research. Pierre Azoulay, Joshua Graff Zivin, and Gustavo Manso build on a stream of recent research that evaluates different aspects of the National Institutes of
Health (NIH) extramural funding system. They focus on two issues that have increasingly come into focus over the last few years: the aging of the scientific workforce and the impact of alternative incentive systems on scientific productivity. The paper first presents new evidence about the interaction between an older scientific workforce and NIH funding: while prior research has documented the fact that the average age of NIH recipients is increasing (a theme that was also noted by Benjamin Jones in volume 11: “As Science Evolves, How Can Science Policy?”), the authors demonstrate that the probability of receiving one’s first NIH grant has been declining over time. In other words, changes in the age distribution of NIH funding recipients is not simply a function of the aging of the scientific workforce but seems to reflect an additional effect in which younger researchers are finding it more difficult to become established as researchers through the NIH extramural grant system. They focus in particular on two alternative incentive systems that might be adopted by research funders: short-term project-based funding that provides support for a small number of years and is focused on the completion of a project whose scope and deliverables are described in advance and longer-term researcher-based funding in which researchers are provided long-term incentives (and appropriate resources) to hit “home runs” (the precise details of which might be hard to articulate at the time the grant is made). Azoulay and coauthors compare these two systems by comparing researchers who receive the highly prestigious Howard Hughes Medical Investigator Awards (which offers funding and incentives broadly in line with the researcher-based funding model) with a group of researchers whose research quality is highly similar to that of the HHMI award winners but who were not selected for the program. The results are striking: while HHMI awardees do not produce more papers, the papers they do write are much more likely to be high-impact, involve a high degree of scientific novelty, and also are more likely to be “failures.” In other words, HHMI awardees are much more likely than a comparable group of scientists to be involved in high-risk/high-reward science than those who receive funding through the NIH extramural program. While the authors are cautious in interpreting their empirical findings, they do suggest that their findings imply that the NIH would advance its stated objectives by taking a more “scientific” approach to the management of scientific research, including the adoption of an explicitly experimental approach.

Fiona Murray then considers related issues in her examination of the new sources of philanthropic funding for science. While philanthropy has always played an important role in scientific research funding, the
role of philanthropists has become increasingly visible with the tightening of public-sector budgets and increased fund-raising efforts by universities. There has been very little systematic analysis of “the New Funders” or how these new sources of funds are affecting the rate and direction of scientific research. Murray steps into this gap by first documenting the extent and nature of this funding: scientific philanthropy now accounts for nearly $7 billion of research funding on an annual basis (including specific grants and endowment income) and accounts for nearly 30% of the annual research funds at leading research universities. From a theoretical perspective, it is unclear whether private philanthropists will focus funds on research that is at a more basic or more applied stage (and indeed there is significant heterogeneity in the motives and direction of private philanthropic efforts). Murray documents, however, that a significant fraction of new philanthropic funds are narrowly targeted at translational medicine and at top research universities. The direction of research is being shaped, for better or worse, by the desires of a relatively small number of individuals whose approach to resource allocation at the scientific frontier is entirely different from that of the archetypal federal funding agency. It is important for public funders to keep in mind this new source of funding as they consider priorities for federal expenditures going forward. Some of these innovative private efforts may also be important models for public funders.

In the third essay in this year’s volume, Josh Lerner focuses squarely on an increasingly contentious area of innovation—public funding of growth-oriented entrepreneurship. While governments throughout the world are attempting to stimulate entrepreneurship in their regions (often through direct funding of entrepreneurial ventures), the results of this funding are highly uneven. While the imprint of public-sector involvement is visible in essentially all of the world’s leading regions (Silicon Valley, Singapore, Tel Aviv), it is nonetheless true that a review of the policy impact of such efforts often seems to be a “boulevard of broken dreams.” Lerner highlights both the conceptual and practical issues that have bedeviled this area: ignorance of (or simply ignoring) the realities of the entrepreneurial process (and eliding the difference between small companies and growth-oriented young companies), the importance of designing programs that allow for significant learning and experimentation in the market, and the setting of incentives that allow public funds to complement rather than substitute for private financing. Given that it is likely that public efforts to promote growth-oriented entrepreneurship are likely to become more rather than less important in the future, it is important for policy designers and
implementers to consider the history of past efforts when considering their own programs. Evidence-based policy making in this area is more likely to facilitate the development of firms that reinforce local comparative advantage and take advantage of unique local resources that can nonetheless serve significant market needs. Undertaking a more analytical approach to such programs is likely to enhance their political and economic viability over the long term.

Our final two papers turn their attention to the evaluation of recent federal policy changes as a result of the America Invents Act (addressing patent reform) and the America COMPETES Act (addressing a suite of policy initiatives aimed at enhancing US competitiveness). On patent policy, Mark Lemley provides a timely synthesis of an emerging body of empirical evidence about the impact of the operation of the patent office on the effectiveness of the intellectual property rights system. Lemley begins by noting the dilemma facing the US Patent and Trademark Office (PTO): while the Patent Office is held up for scrutiny (even mockery) when “bad patents” are asserted in the context of litigation, any procedure that would significantly enhance the level of review for each patent would lengthen the time it takes patents to be reviewed and would entail that much resources were devoted to the many patents that have little economic or legal impact. In light of the America Invents Act (which both includes substantive changes to patent law and enhances the flexibility of the PTO in areas such as fee setting), Lemley considers the likely impact of different types of additional reforms. These include those that can be implemented directly by the PTO and others that would require a change in law. On the one hand, Lemley argues that a number of the most heralded provisions of the America Invents Act—such as restricting the ability of Congress to divert patent fees to general revenue or the ability of PTO to choose its own fee-setting structure—may be helpful on the margin but are unlikely to get at the root of the problem. Instead, Lemley focuses on a number of more substantive potential initiatives, including changing the organization of the examination process (e.g., a “second pair of eyes” or offering more salient incentives for examiners) and facilitating a better process of information discovery at a much earlier stage of the process (i.e., effectively implementing a postgrant opposition review system). At a minimum, Lemley argues, the patent system will continue to have to balance the resources that are expended at the examination stage with the inevitability that contentious grants of intellectual property will ultimately be adjudicated within (or in the shadow of) the court system and that the enhanced scrutiny through litigation must be accounted for when considering the impact of changes in the practices of the patent office itself.
In the final chapter in this year’s volume, Jeff Furman tackles a more diverse set of policy initiatives that arose from the passage (and reauthorization) of the America COMPETES Act. Both the 2007 American COMPETES Act and its 2010 reauthorization were initially passed with great fanfare as an (increasingly rare) example of bipartisan legislation that might significantly enhance prospects for American economic and innovation performance. These acts included authorization for a wide range of potentially important programs and initiatives to significantly enhance American investment in science and engineering (particularly in the physical sciences), facilitate the commercialization of new technologies (particularly in areas such as clean energy), and increase the ability of the federal government to experiment with a range of alternative mechanisms for encouraging and supporting the innovation process (e.g., through the use of prizes). Despite this promise, Furman documents a very significant gap between the broad objectives and authorizations included in the America COMPETES Act and the actual funding levels that have been realized. Many of the most ambitious (but costly) programs—such as those that encouraged investment in graduate training in science and engineering—have been scaled back or abandoned in the face of budgetary concerns, and even less costly endeavors have been associated with a low level of follow-through. While a number of initiatives do seem to have gained traction (e.g., the use of prizes), any aggregate assessment of the America COMPETES Act must contend with the gap between its initial promise and the realized funding and activity levels. This lack of follow-through is particularly troublesome given that the act was largely bipartisan in nature and had support from the policy, business, and innovation communities.

Together, these essays continue to highlight the important of economic theory and empirical analysis in innovation policy analysis. While the issues involved are undoubtedly difficult, the chapters in this year’s volume continue to suggest that contemporary research in economics informs the evaluation of current and prospective innovation policy alternatives.

Josh Lerner and Scott Stern

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