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Organization[www.elsevier.com/locate/ijio](http://www.elsevier.com/locate/ijio)Application publication or confirmation of grant:  
Which matters more for academic technology  
transfer?Kyriakos Drivas<sup>a</sup>, Zhen Lei<sup>b</sup>, Brian D. Wright<sup>c,\*</sup><sup>a</sup> *Department of Economics, University of Piraeus, Karaoli & Dimitriou 80, Piraeus 18534, Greece*<sup>b</sup> *Department of Energy and Mineral Engineering & the EMS Energy Institute, The Pennsylvania State University, 110 Hosler Building, University Park, PA 16802, United States*<sup>c</sup> *Department of Agricultural and Resource Economics, University of California, Berkeley, Giannini Hall 207, Berkeley, CA 94720-3310, United States*

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## ABSTRACT

We compare the effects of two functions of the patent system – application publication and confirmation of grant – on licensing of academic inventions. Application publication eighteen months after filing significantly increases the license hazard for exclusively licensed patents, and for inventions in the larger of the two major technology groups that we study (chemical, drugs and medical), implying an informational role of publication additional to that of academic publication. For the other major aggregate (computers, communications, electrical, electronic and mechanical), which necessarily includes a high proportion of nonexclusively licensed patents, we find no significant response. Patent grant has a generally insignificant effect on licensing hazard, consistent with efficient contingent pre-grant contracting, which significantly accelerates transfer in important technology fields.

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\* Corresponding author.

E-mail address: [bwright@berkeley.edu](mailto:bwright@berkeley.edu) (B.D. Wright).

## 1. Introduction

Academic patents are generally proofs of concept or laboratory prototypes, basic or “embryonic” in nature.<sup>1</sup> Lacking in-house options for development and commercialization, universities generally must transfer inventions to the private sector, which has reported that academic inventions are important for development of a substantial portion of new industrial products and processes.<sup>2</sup> Speedy technology transfer is crucial for efficient exploitation of most academic inventions (Jaffe, 1989; Berman, 2011). This study asks how two key elements of the patenting process – confirmation of the grant of monopoly rights and publication of information about the invention – affect the timing of such transfers.<sup>3</sup>

Although the anticipated monopoly conferred by the patent constitutes the incentive to negotiate a license and develop the technology (Kitch, 1977), there is reason to question the importance of news of the grant as a stimulus to licensing. In particular, a contract contingent on grant can address ex ante uncertainty about whether a patent will be granted, or whether specific claims will be accepted (Gans et al., 2008).

As “consideration” for the grant, the applicant must disclose to the United States Patent and Trademark Office (USPTO) information about the invention that is valued in law for its contribution to the public stock of disembodied knowledge.<sup>4</sup> To the extent that the mandate is binding, patent applicants apparently believe that it lowers the private value of their inventions. Here, we address a distinct, narrow and less strictly public role of disclosed information: its effects on the timing of licensing, which is the most prevalent means of transfer of patented academic inventions.

For academic inventions in particular, there is reason to expect that publication of information about the invention by the USPTO conveys little information relevant to licensees. Academics have strong incentives to publicize the results of their research quickly via working papers, conference presentations and publication in academic journals, and can do so as early as one year before filing an application without jeopardizing the USPTO novelty requirement for award of a patent. One might expect that potential licensees would often be able to identify inventions of interest and locate their academic

<sup>1</sup> In a survey by Jensen and Thursby (2001, Table 1, p. 243), university technology transfer managers reported that 48% of inventions are “proof of concepts but no prototype” and 29% had only a laboratory-scale prototype.

<sup>2</sup> Hedge and Luo (2017, p. 15) report that nonprofit academic or research institutions or hospitals are licensors of 32% of their sample of very high-value biomedical patents. Surveys by Mansfield (1991, 1998) indicate that academic research substantially aided development of around 18% of new products and processes from major industries.

<sup>3</sup> For an extensive literature review of the market for technology and licensing, see Arora and Gambardella (2010). See Merrill and Mazza (2011) and the references therein for discussions of university patenting.

<sup>4</sup> As the United States Supreme Court put it in 1974: “When a patent is granted and the information contained in it is circulated to the general public and those especially skilled in the trade, such additions to the general store of knowledge are of such importance to the public weal that the Federal Government is willing to pay the high price of 17 years of exclusive use for its disclosure, which disclosure, it is assumed, will stimulate ideas and the eventual development of further significant advances in the art.” *Kewanee Oil Co. v. Bicron Corp.*, 416 US 481.

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