Research Policy 43 (2014) 245–260

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

Local context, academic entrepreneurship and open science: Publication secrecy and commercial activity among Japanese and US scientists

John P. Walsh [a,*], Hsini Huang [b]

[a] Georgia Institute of Technology, Hitotsubashi University, and International Center for Economic Research, 685 Cherry St, Atlanta, GA 30332, USA
[b] University College-London, London, UK

ARTICLE INFO

Article history:
Received 1 July 2010
Received in revised form 10 July 2013
Accepted 13 October 2013
Available online 2 December 2013

Keywords:
Academic entrepreneurship
Patenting
Secrecy
Open science
Japan

ABSTRACT

Like the US before it, Japan has adopted a series of policy initiatives designed to encourage the commercialization of academic science. However, such initiatives may also adversely affect "open-science". Based on matched surveys of almost 1000 researchers in Japan and over 800 in the US, the paper examines rates of commercial activity, reasons to patent, and secrecy related to research results. In particular, it examines the extent to which participation in commercial activity is associated with publication secrecy. The results show that patenting rates are higher in Japan, while industry funding is more common in the US. In addition, the overall level of publication secrecy is greater in Japan. And, in both countries, individuals who are commercially active are less likely to share their research results through publication. But, patents are less directly linked to commercial activity in Japan than in the US, and have less impact on academic secrecy. The results suggest that academic entrepreneurship is associated with reduced participation in open science, but that the extent of adverse effects depends significantly on institutional context.

1. Introduction

Academic science has become increasingly entrepreneurial over the last decades with the introduction of science and technology policies designed to strengthen the links between academia and industry (Etzkowitz, 1983, 1998; Slaughter and Leslie, 1997). Recent years have seen significant increases in academic patenting, academics participating in startups, university technology transfer activity and industry funding of university research (Association of University Technology Managers (AUTM), 2004; National Science Board, 2008). However, there is also growing debate about this changing context of scientific work and its effects on the norms and practices of science (Frickel and Moore, 2005; Kleinman and Vallas, 2005; Slaughter and Leslie, 1997). In particular, there is concern that this emphasis on the proprietary side of scientific information may be undermining scientists' participation in the institutions of open science, in particular rapid and complete publication of results and sharing of research-related data and materials (Dasgupta and David, 1994; National Research Council, 2003; Nelson, 2004) While the US was at the forefront of this current wave of academic entrepreneurship, these policy changes are becoming a global phenomenon (OECD, 2003; Nagaoka et al., 2009).

In order to get a clearer sense of the impact of this global trend, and to understand how local institutional contexts may affect participation in open science (Blume, 1974), the paper uses data from a comparative survey of public researchers (those from universities and government labs) in the US and Japan. Furthermore, while much of this work has been done on biomedical researchers, the survey collected data from a broad range of fields, including life sciences, physical sciences and engineering. Using these data, the paper examines the rates of publication secrecy of various forms in science: not publishing, publication delay, and incomplete publishing (Blumenthal et al., 2006). Publication is the heart of the open science system (David, 2003; Garvey, 1979; Merton, 1973), and observing the impact of academic entrepreneurship on publishing behavior provides an important window into understanding how current policies are affecting public science.

The paper begins with a review of recent policy changes in Japan designed to increase commercialization of public research, which suggests that we should observe a convergence in the rates of commercial activity in the US and Japan. This section also highlights some important differences in the institutional context for academic research in Japan and the US, differences that may affect the relation between commercial activity and secrecy in science. The paper then reviews prior research on the impact of commercial

* Corresponding author.
E-mail address: john.walsh@pubpolicy.gatech.edu (J.P. Walsh).

0048-7333/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.respol.2013.10.003

activity on open science and develops a set of hypotheses related to the potential adverse effects of commercial activity in Japan and the US and how these should vary between the two countries as a result of differences in the institutional context. After summarizing the survey design and the sample characteristics, the paper shows the levels of commercial activity and publication secrecy and how these vary by country, field and sector. This is followed by testing of the relations between commercial activity (patenting and industry funding) and publication secrecy and how these vary by country, to show both the impact of commercialization of science on open science and how this varies by institutional context.

The results show that Japanese scientists are even more likely than their American counterparts to have filed for a patent or to have an issued patent. They are also more likely to have a patent licensed. Industry funding, however, is more common in the US. However, although they do more patenting, Japanese scientists are more likely to patent for reasons related to collaboration and to demonstrate results from their research to funding agencies, while US scientists are more likely to patent for acquiring venture capital or licensing income, i.e., US scientists' patents are more directly related to commercialization. The survey also shows that publication secrecy (partial publication and publication delay although not refraining from publishing) is more common in Japan, suggesting that Japanese scientists are more willing to limit their participation in open science. Finally, logistic regression analyses show that, in both countries, patenting is associated with publication secrecy, although industry funding is only significantly associated with publication delay, and only robustly (controlling for patenting) in the US. Furthermore, the impact of patenting on secrecy is greater in the US than in Japan. The paper concludes with a discussion of the implications of these findings for science policy.

2. Theoretical background and hypotheses

2.1. Scientific norms in context

The timely public dissemination of research findings and the unconditional sharing of research materials as an ideal is consistent with the norm of communism described by Merton and others, which prescribes that findings of science are possessions of the community, and that the ownership right of the individual scientist is limited to recognition and esteem (Barber, 1952; Merton, 1973). However, these norms have never been followed perfectly, and the extent of compliance with the norms depends on institutional context (Blume, 1974; Frickel and Moore, 2005; Hackett, 1990). Unwillingness to share can be driven by a concern over scientific competition (i.e., concerns over priority) (Hong and Walsh, 2009; Latour and Woolgar, 1986; Watson, 1968) and by a desire to protect commercial benefits (Cohen and Walsh, 2008; Merton, 1973; Stephan, 1996). Scientific competition is not a new issue among scientists. For example, Galileo and Hooke announced key findings in code, in order to establish priority without disclosing the details of their discoveries (Merton, 1957). More recently, the research team at Cambridge that discovered pulsars delayed publishing its discoveries for six months so that the team could conduct exclusive follow-up investigations (Latour and Woolgar, 1986, p. 22), suggesting that scientific secrecy could be part of the normal process of science due to scientific competition. Mitroff (1974) suggests a tension between the norm of communism and the counter norm of solitariness that emphasizes maintaining control over the uses of one's discoveries. Merton (1973) also argues that communism is under threat from extrinsic motivations such as fame and money and that secrecy is endemic to science.

In addition to underlying tensions between open and proprietary science at the level of the individual scientist, prior work suggests that the context in which scientists operate has important influences on norms and compliance. For example, Hackett (1990) suggests that the structure of scientific norms is determined by such contextual factors as scientific fields, historical periods, and organizational environments. Blume (1974) demonstrates that modern science is highly dependent on the social, economic, and political system of society. Slaughter and Rhoades (1996) argue that government policies have drawn universities into the service of industry to advance national political and economic agendas. Specifically focusing on the recent social context, Frickel and Moore (2005) argue that entrepreneurial norms have spread in universities and facilitated behaviors fundamentally at odds with traditional scientific norms. Glenna et al. (2007) argue that universities have begun to embrace this new role and adopted a more integrated set of values and norms, in contrast to the ideal of science as an autonomous, self-regulating system. Kleinman and Vallas (2005) argue that the two conflicting sets of norms in academia and industry have been increasingly traded across the boundary, and concluded that the adoption of entrepreneurial norms in academia has resulted in scientists' behaviors contradictory to traditional academic values, but more consistent with a proprietary science ethos. Owen-Smith (2003) and Murray (2010) argue that contemporary academic science is increasingly operating in a hybrid space that integrates the norms and practices of industry with the norms of open science. This prior work suggests that scientists are generally committed to a norm of rapid and open dissemination of research results, but that this norm may be vulnerable to changing contexts, in particular, policies that increase linkages between public researchers and industrial proprietary science.

2.2. Growth of academic entrepreneurship

Over the last 30 years, in the US and elsewhere, greater emphasis has been given to university–industry relations (UIRs), and universities and individual scientists have been encouraged to claim their private rights and apply their research outputs to commercial purposes (Etzkowitz, 1998; Glenna et al., 2007; Slaughter and Leslie, 1997; Slaughter and Rhoades, 1996). The US, for example, introduced a series of policy changes designed to encourage commercialization of public science (Slaughter and Rhoades, 1996). One of the most high profile changes was implementation of the Bayh–Dole Act in the US, which encouraged and facilitated universities taking patent rights on publicly funded research and licensing those rights to industry (including exclusive licensing), with the establishment of similar legal frameworks in other developed countries, including Japan (Kenney and Patton, 2009; Mowery and Sampat, 2005).[1]

Responding to these policy reforms, universities have expanded their commercialization infrastructures, including establishing technology licensing offices (TLOs), venture capital programs to support start-up companies, and related intramural regulations clarifying the importance of complying with this new pro-commercialization agenda (Kenney and Patton, 2009; Mowery et al., 2004). The new political and organizational settings have lowered the hurdle for scientists trying to engage in entrepreneurial activities and increased the benefits from entrepreneurial activities. Consequently, a substantial number of scientists have are now engaged in entrepreneurial activities (Slaughter and Leslie, 1997), as shown by various indicators such as the number of university spin-offs, patent applications by universities, technology transfer

[1] Based on a survey of universities, Pressman et al. (2006) note substantial heterogeneity in licensing of DNA patents, including significant shares of exclusive licensing, non-exclusive licensing, and even exclusive licensing to multiple licensees, for example, divided by field of use (Pressman et al. (2006)).