Research Policy 40 (2011) 539–552

Contents lists available at ScienceDirect

Research Policy

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

Engaging excellence? Effects of faculty quality on university engagement with industry

Markus Perkmann [a,*], Zella King [b], Stephen Pavelin [b]

[a] Imperial College Business School, South Kensington Campus, London SW7 2AZ, UK
[b] Henley Business School, University of Reading, PO Box 218, Reading RG6 6AA, UK

ARTICLE INFO

Article history:
Received 22 January 2009
Received in revised form
24 November 2010
Accepted 13 January 2011
Available online 18 February 2011

Keywords:
University–industry relations
Faculty quality
Collaborative research
Contract research
Academic consulting
Technology transfer
Academic entrepreneurship
Commercialization

ABSTRACT

We investigate how universities' research quality shapes their engagement with industry. Previous research has predominantly found a positive relationship between academics' research quality and their commercialization activities. Here we use industry involvement measures that are broader than commercialization and indicate actual collaboration, i.e. collaborative research, contract research and consulting. We hypothesise that the relationship between faculty quality and industry engagement differs across disciplines, depending on complementarities between industrial and academic work, and resource requirements. Using a dataset covering all UK universities, we find that in technology-oriented disciplines, departmental faculty quality is positively related to industry involvement. In the medical and biological sciences we find a positive effect of departmental faculty quality but establish that this does not apply to star scientists. In the social sciences, we find some support for a negative relationship between faculty quality and particularly the more applied forms of industry involvement. The implication for science policy makers and university managers is that differentiated approaches to promoting university–industry relationships are required.

1. Introduction

Recent policy has encouraged universities to play an active role in the commercialization of academic knowledge (Siegel et al., 2007; Bercovitz and Feldman, 2006), which has raised questions about the compatibility of the 'disinterested' pursuit of science (Merton, 1973), and engagement with industry. Important to this enquiry is how faculty quality relates to industry involvement. Are the universities with the most successful researchers also the ones who work most with industry? Or are the more 'applied' universities more successful at establishing relationships with industry despite their academic standing being lower? These questions are of great relevance for policy-makers who attempt to balance the quality of scientific production with the diffusion of university-generated technologies within the wider economy.

The evidence on these issues is mixed. Attitudinal studies suggest that academics at highly rated research universities tend to be wary of excessive commercial involvement for fear it will undermine their academic productivity and independence (Lee, 1996; Glaser and Bero, 2005). Industry involvement may require specific skills and organizational capabilities that are different from those required to excel in the academic arena (Bercovitz and Feldman, 2008). At the same time, a number of studies suggest that faculty quality is positively related to engagement in patenting and academic entrepreneurship (Geuna and Nesta, 2006; Siegel et al., 2007). In other words, faculty who patent more and act more entrepreneurially are also more prolific academic contributors.

Patenting and academic entrepreneurship, however, are imperfect measures of the knowledge transfer and co-creation occurring during university–industry interactions. Relational forms of involvement, such as collaborative research, contract research, and consulting, are more widespread and seen as more relevant by firms (D'Este and Patel, 2007; Cohen et al., 2002). The insights from patenting and academic entrepreneurship, therefore, cannot easily be generalized. Actual relational involvement with industry may demand more faculty time and dedication than patenting, which may be a by-product of the research. Furthermore, collaboration differs from academic entrepreneurship in that it tends to be informed by research-related rationales, rather than an explicit desire to appropriate the financial returns on academic knowledge (D'Este and Perkmann, 2011). This means collaboration may be more strongly driven by complementarities, achieved by working with industrial partners and pursuing academic research, rather than a single-minded focus on commercial success (Owen-Smith, 2003).

* Corresponding author. Tel.: +44 0207 59 41955.
E-mail addresses: m.perkmann@imperial.ac.uk (M. Perkmann), z.m.e.king@reading.ac.uk (Z. King), s.pavelin@reading.ac.uk (S. Pavelin).

0048-7333/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.respol.2011.01.007

In this paper, we explore how the quality of university faculty is related to their industry engagement via collaborative research, contract research and academic consulting. We contend that university–industry relationships are the outcome of a voluntary matching process (Becker, 1973) between academic and industry partners, shaped by three forces. First, academics' decisions to work with industry are informed by considerations of complementarity with academic research. Second, resource considerations play a role as academics can use the funding gained from industry contracts to supplement grants from public sources. Third, firms are interested in working with high-quality academic researchers because, in addition to seeking project-specific inputs, they are attracted by more generic benefits such as accessing students, 'windows' on emerging technologies, and enhancing their knowledge bases. Relational involvement between universities and industry can be seen, therefore, as a matching process in which partnerships involve academics interested in research complementarity and resources, and firms seeking skilled and competent partners.

Our argument is that this matching process plays out differently across academic disciplines. Using a UK dataset, we investigate university engagement in collaborative research, contract research and consulting. We use official quality assessment data derived from the UK Research Assessment Exercise (RAE) to measure the quality of university faculty in various fields. This approach is novel in that we use income data for different types of collaboration across all academic disciplines whereas previous studies have used frequency counts of individual engagement in different types of interactions and/or have been limited to specific disciplines (Louis et al., 1989; D'Este and Patel, 2007).

The paper is organized as follows. First, we review the research on the impact of faculty quality on various types of university technology transfer. We then develop hypotheses on how faculty quality informs industry involvement, taking account of three factors: complementarity between academic and industry work; mobilisation of resources by academics; and partner selection by industry. This leads to specific hypotheses for different disciplinary groups. We exploit data from a UK government survey (HEBCI – Higher Education Business and Community Interaction) of the 164 universities in England, Wales, Scotland and Northern Ireland. We report our results and discuss our findings in relation to the literature, and derive implications for practice.

2. Previous research: faculty quality and engagement in technology transfer

Extant research has explored how faculty quality relates to engagement in technology transfer using two main measures and various levels of analysis from the university to the department to the individual. One frequently used measure is faculty patenting. Both university-level and individual-level analyses show a predominantly positive relationship between faculty quality and involvement in patenting (Coupé, 2003; Geuna and Nesta, 2006; Stephan, 2007; Carayol, 2007; Van Looy et al., 2006; Breschi et al., 2007). Another popular measure is academic entrepreneurship, where again, the evidence seems to indicate a positive relationship between faculty quality and involvement in commercialization activities (Di Gregorio and Shane, 2003; O'Shea et al., 2005). The findings are similar from individual level studies of 'star scientists' (Zucker and Darby, 1996; Lowe and Gonzalez-Brambila, 2007). The literature, therefore, indicates that faculty quality is largely positively related to technology transfer along the two measures referred to above. Academics who generate high numbers of publications in peer-reviewed journals also excel at patenting and academic entrepreneurship.

Table 1
Types of university–industry relations.

Licensing	Contractual assignment of university-generated intellectual property (such as patents) to external organizations
Academic entrepreneurship	Development and commercial exploitation of technologies pursued by academic inventors through a company they (partly) own
Collaborative research	Research jointly pursued by university and industrial partners – commonly with public funding
Contract research	Application-oriented research and development activities carried out by university – commissioned and funded by industry
Consulting	Application-oriented research and development activities or advice provided individually by academics – commissioned and funded by industry

Compiled from several sources: Bercovitz and Feldman (2006), Mansfield (1995), and Louis et al. (1989).

However, compared to alternative modes of interaction (Table 1), patenting and academic entrepreneurship are only moderately important means through which industry appropriates university-generated knowledge (Arundel and Geuna, 2004; Perkmann and Walsh, 2007; Faulkner and Senker, 1994; D'Este and Patel, 2007). Roessner (1993) drawing on survey evidence relating to different interaction channels, finds that US research and development (R&D) executives place the highest value on contract research, followed by co-operative research, with licensing judged as less relevant. According to the Carnegie Mellon Survey on industrial R&D, US R&D executives regard consulting, contract research and joint research as more relevant channels than licensing (Cohen et al., 2002). Similar results pointing to the relatively low importance of intellectual property (IP) transfer were found by a number of other studies (Levin et al., 1987; Klevorick et al., 1995; Mansfield, 1991; Pavitt, 1991; Agrawal and Henderson, 2002; Schartinger et al., 2002; D'Este and Patel, 2007).

In this paper we focus on these relational forms of engagement. For brevity, we use the term 'industry engagement' to refer to collaborative research, contract research and consulting. *Collaborative* (or joint) *research* refers to formal collaborative arrangements aimed at cooperation on R&D projects (Hall et al., 2001). In many cases, the content of this research can be considered 'pre-competitive', and these projects are often subsidized by public funding. *Contract research*, on the other hand, refers to research that is directly commercially relevant to firms and, therefore, is usually ineligible for public support. Contract research is explicitly commissioned by firms and the work is usually more applied than in collaborative research arrangements (Van Looy et al., 2004). Finally, *consulting* refers to research or advisory services provided by individual academic researchers to their industry clients (Perkmann and Walsh, 2008). Consultancy projects are typically commissioned directly by the industry partner and the income derived from them often accrues to individuals although it can be channelled through university research accounts to support research. Studies of academic consulting are hampered by the fact that many consulting activities go unreported (Thursby et al., 2009; Abramovsky et al., 2004). However, a number of both quantitative and qualitative studies suggest consulting is a widespread practice among academic researchers, with most authors finding a positive relationship between faculty quality and consulting engagement (Boyer and Lewis, 1984; Louis et al., 1989; Agrawal and Henderson, 2002).

Industry engagement brings together academics and industry to work jointly on projects, often to complete rather than initiate industry R&D projects (Cohen et al., 2002). The figures for the UK