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Scientific yield from collaboration with industry: The relevance of researchers' strategic approaches

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ABSTRACT

While recent research indicates that combining scientific and entrepreneurial activities at the level of academic scientists is feasible, the literature has remained muted on the dynamics behind such successful combinations. Indeed, little is known about how researchers avoid conflicts of commitment and conflicts of interest as well as the so-called 'skewing' of research agendas. This study, in seeking to address this gap in the literature, analyses the relevance of academics' strategic approaches to collaborative projects with industry. Based on survey data collected from engineering professors at two European universities (Politecnico di Milano, Italy; $n = 117$; and KU Leuven, Belgium; $n = 70$), we analyze whether the scientific yield from collaborative projects with industry depends on the degree of proactiveness, selectiveness and novelty of research topics. We observe that the scientific leverage of collaborating with industrial partners is higher when academics pursue a more proactive strategy and are selective. At the same time, our findings reveal that this impact is indirect: selectiveness and pro-activeness influence the amount of financial resources obtained from industrial partners, while the scientific yield itself is contingent on these resources.

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1. Introduction

The role of knowledge and technology transfer processes between public research centers and firms has been widely acknowledged and studied (Etzkowitz et al., 1998; Leydesdorff and Etzkowitz, 1998 for a comprehensive overview, see Rothaermel et al., 2007; Perkmann et al., 2013), leading to a diverse literature.

Research efforts have focused on the role and productivity of technology transfer offices, the role of intellectual property rights, the performance of universities in terms of outcomes (contract research, patent activity, spin-off creation) as well as environmental factors that might hamper or stimulate the entrepreneurial orientation of universities and researchers (e.g., Bozeman, 2000; Baruffaldi and Landoni, 2012; Perkmann et al., 2013).

The role of individual academics in their interaction with firms has received somewhat less attention (for notable exceptions (see

Jensen et al., 2003; Gulbrandsen and Smeby, 2005; D'Este and Patel, 2007). While institutional framework conditions do affect the behavior of academics in terms of engagement in knowledge transfer activities, academics in the majority of European universities still experience considerable degrees of freedom in defining their research agendas, including the choice of potential partners and funding resources for these research activities. Individual-level studies are also highly relevant because firms often approach researchers directly to obtain advice or to initiate specific research projects.

At the level of individual scientists, concerns have been raised about shifts in the academic research agenda toward industry needs, sometimes referred to as the 'skewing problem'. Moreover, the conflicting nature of the normative principles that guide academia and business (e.g., in terms of secrecy and dissemination of results) has, in addition, been advanced as an area of concern, leading to alleged conflicts of interest and conflicts of commitment (e.g., Dasgupta and David, 1987; Florida and Cohen, 1999; Noble, 1977). Empirical examinations show that a combination of scientific and entrepreneurial activities seems feasible in academia and may even yield positive effects. This has been confirmed in various fields and countries. For instance, in Belgium, it was shown that

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involvement in contract research with industry (Van Looy et al., 2004) and involvement in patent activity (Van Looy et al., 2006) were associated with more scientific publications, and there was no evidence of a trend toward a greater number of applied publications at the expense of basic research. Similar results were advanced by Gulbrandsen and Smeby (2005) in a survey of Norwegian professors. Breschi et al. (2005) observed no major trade-off between patenting and publishing, nor did they find evidence of a skewing effect among Italian inventors. Azoulay et al. (2007, 2009) and Meyer (2006) arrived at similar conclusions when studying US life scientists and UK, Belgian and German researchers in the field of nanotechnology. Czarnitzki et al. (2007) studied the publication and patent activity of German researchers. Stephan et al. (2007) looked at a cross-section of over 10,000 US doctorate recipients. Fabrizio and Di Minin (2008) performed a survey and quantitative analysis of US researchers in science and engineering disciplines. All of the above mentioned studies raised doubts about the alleged concerns by pointing to positive relations between scientific and entrepreneurial – mostly patenting – activities.

While the feasibility of combining scientific and entrepreneurial activities appears to be sufficiently supported, the empirical literature on the dynamics behind such successful combinations remains scarce. Little is known about how researchers avoid problems related to conflicts of commitment, conflicts of interest and the skewing of research agendas since aggregated results conceal variation in individual approaches and action strategies, whether successful or unsuccessful. Indeed, a study by Van Looy et al. (2006) showed that a successful alignment is by no means universal among the academics under study. Although, a positive relation between scientific and entrepreneurial activities was observed overall, clear cases of trade-offs were identified on the level of individual researchers. Starting from this latter observation, Callaert et al. (2008) engaged in a qualitative exploration of mechanisms enacted by academics, both in Belgium and Switzerland. They identified several action strategies that were used by entrepreneurial professors to manage their activity portfolios. Selectivity in projects and partners, a proactive approach toward collaboration, and securing topic relatedness between the research and entrepreneurial agendas figured prominently. At the same time, a more systematic – quantitative – analysis of the effect of such mechanisms remains lacking. Our study aims to fill this gap with an analysis of whether certain strategic approaches to collaboration with industry are instrumental in obtaining more scientific yield from collaborative industry–academia projects.

The remainder of the paper is structured as follows: in the following paragraph, we outline the hypotheses derived from the most pertinent literature; then, we introduce the data-gathering strategy adopted for the analyses and the relevant variables, constructs and indicators. A subsequent section covers our main findings, and we conclude by discussing the implications as well as the limitations of our work.

2. Research questions and hypotheses

As previously noted, the feasibility of combining scientific and entrepreneurial activities is adequately supported in different fields, industries, countries and activities (e.g., Van Looy et al., 2004; Stephan et al., 2007). However, some areas of concern remain, relating primarily to the impact of industry-related activities on scientific activities: alleged skewing of research agendas, as well as conflicts of interest and conflicts of commitment (e.g., Noble, 1977; Dasgupta and David, 1987; Florida and Cohen, 1999). Little empirical literature is available on how entrepreneurial academics avoid these issues, how they succeed in combining scientific and entrepreneurial activities, or even how they obtain

leveraging effects between the two activities. The answer to such questions cannot be gathered from aggregated results that hide variation in individual approaches and action strategies, whether successful or unsuccessful. Indeed, Van Looy et al. (2006), in their study of publication performance among academic inventors at KU Leuven (Belgium), showed that the positive relation between patenting and publishing is not a general phenomenon among academics. Although this positive relation was apparent in the overall sample, clear cases of trade-offs were identified on the level of individual researchers. Also, on the level of individual analysis, Callaert et al. (2008) engaged in a qualitative exploration of mechanisms enacted by entrepreneurial academics in Belgium (KU Leuven) and Switzerland (Ecole Polytechnique Fédérale de Lausanne). Among other findings, their study demonstrated that entrepreneurial researchers adopt several principles to deal with potential conflicts. More specifically, they are selective in their choice of project partners and topics, ensuring a sufficient degree of alignment with their ongoing academic research activities. These interviews also highlighted the relevance of collaborative scenarios. In ‘research push’ scenarios (as opposed to ‘industry pull’ scenarios), the researcher initiates the collaboration (as opposed to the industrial partner), allowing him/herself greater freedom in selecting topics and partners for better alignment with his ongoing activities. Finally, entrepreneurial academics indicated that the acquisition of financial resources from entrepreneurial activities provided complementary benefits that could be invested in their ongoing research activities.

The above mentioned observations are based mainly on qualitative evidence. Further validation of the suggested relations between individual-level strategic collaborative approaches and scientific yield would benefit from a systematic analysis based on quantitative data. This is the objective of this study, which relies on an analysis of survey data to establish whether researchers’ individual strategic approaches to collaboration with industrial partners affect the scientific yield of these collaborative projects, i.e., the research output resulting directly from these collaborations.

In particular, we relied on the highlighted literature to identify three strategic approaches used by entrepreneurial professors: (i) securing the appropriate degree of topic alignment between the academic research agenda and collaborative projects; (ii) a proactive approach to collaboration; and (iii) selectiveness in projects and partners. In what follows, hypotheses are formulated for each of the three approaches considered.

First, since many concerns are related to the potential impact of university–industry collaboration on the academic research agenda, we consider topic alignment between collaborative projects and the academic research agenda. The impact of collaboration on the setting of research agendas was indicated by Joly and Mangematin (1996). They stated that, for researchers who grasp the opportunity offered by relations with industry, there is co-determination regarding their scientific themes. One may expect a higher scientific yield in the case of greater topic alignment. In evolutionary thinking, knowledge production is often described as a cumulative, interactive and path-dependent process (Dosi, 1982; Nelson and Winter, 1982) whereby agents tend to draw on knowledge acquired in the past. As Cohen and Levinthal (1990) argued, agents are more likely to understand, absorb and implement external knowledge when it is close to their own knowledge base. Indeed, the arguments are similar to those that posit the presence of absorptive capacities in firms. Much in the same way that firms are better able to acquire and use external knowledge from areas in which they have some prior experience or related knowledge (e.g., Cohen and Levinthal, 1990; Dussauge et al., 2000; Leten et al., 2007), we can expect researchers to perform better if they can leverage their previous or ongoing work. And while one could argue that researchers’ productivity can also benefit from widening the scope

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