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To each his own: Matching different entrepreneurial models to the academic scientist's individual needs

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ABSTRACT

This paper presents a comparative case study of academic group leaders, active in three different scientific fields at a leading Swiss technical university. It examines the obstacles that prevent scientists from commercializing their technologies and how they can be reduced. Traditional models of technology transfer assume that scientists prefer either to 'go it alone' and become entrepreneurs (the inventor entrepreneur model) or to let go of their technologies to people interested in their commercialization (the surrogate entrepreneur model). The results of qualitative research suggest that these two models capture the extremes of a continuum populated by a variety of intermediate situations where scientists are unwilling completely to let go of their findings, but also do not want to become full time entrepreneurs. This results in considerable commercial potential that is unexploited. The Founding Angels approach might be a solution to this problem; it is designed for academics in these intermediate situations. The study contributes to the literature on university-industry technology transfer and should be useful for practitioners and scientists interested in maximizing the synergies between academia and industry.

1. Introduction

Starting in the 1980s, changes to funding policies and new, emerging scientific fields have been challenging the traditional relationship between academia and industry to include the transfer of technology from universities (Louis et al., 1989; O'Shea et al., 2005; Shane, 2004). New organizational models and new funding policies have promoted heated discussion between supporters of the norms of open science (based on free publication and wide dissemination of results) and advocates of more direct involvement of universities in the commercialization of technology. Jain et al. (2009) show that academic institutions are geared towards an increasingly active role in the commercialization process, based on the transfer of academic research results from the laboratory to the commercial market, through licensing agreements or spin-offs. University technology transfer has attracted the attention of researchers resulting in a proliferation of studies at different levels of analysis – technology (Sexton and Barrett, 2004; Murray, 2002), university management (Wright et al., 2008; O'Shea et al., 2005; Grimaldi et al., 2011; Rasmussen and Borch, 2010; Lockett and Wright, 2005), departmental influence (Rasmussen et al., 2014; Åstebro et al., 2012; Kalar and Antoncic, 2015), early-stage finance (Wright et al., 2004, 2006; Knockaert et al., 2010) and university–industry relations (Perkmann et al., 2013; Clarysse et al.,

2011b). The literature provides various suggestions for increasing the effectiveness of technology transfer. This article focuses on university spin-off activity rather than licensing or more general cooperation with industry. University spin-offs are defined as new ventures initiated in an academic setting and based on university developed technology (Politis et al., 2012; Rasmussen, 2011; De Coster and Butler, 2005; Vohora et al., 2004).

The paper looks at the individual-level features that might explain scientists' decisions to commercialize their findings. Clarysse et al. (2011a) find that academic scientists' individual-level attributes and experience are key predictors of entrepreneurial engagement. Similarly, other studies emphasize the importance of demographic factors, such as age, gender, seniority and prior experience (e.g. Perkmann et al., 2013; Beckman et al., 2007). In the same vein, studies point to the significance of individual-level economic and psychological attributes as determinants for academic scientists' entrepreneurial intentions (e.g. Goethner et al., 2012; Prodan and Drnovsek, 2010; Huyghe et al., 2016). However, it is surprising that, despite the significance of individual-level characteristics and the attention they have received in the wider entrepreneurship literature, the individual-level differences of academic scientists have been relatively neglected in the academic entrepreneurship literature (Rothaermel et al., 2007; Clarysse et al., 2011a). Building on extant

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work and own qualitative research on individual-level motives and entrepreneurial capabilities, the present paper looks at a consequential aspect of the scientist's entrepreneurial decision: *how* to link academics with existing entrepreneurial approaches. While being open to venturing projects, scientists might have distinct preferences about the nature, type and strength of their engagement in the entrepreneurial endeavour. While some might be keen to become entrepreneurs, others might prefer to cede the rights to their invention and leave its commercialization to full time entrepreneurs, but there is a need for intermediate solutions (Berggren, 2011; Duberley et al., 2007; Stern, 2004; Fritsch and Krabel, 2012).

This paper examines different entrepreneurial models and how they match the idiosyncratic characteristics of a sample of 16 scientists operating within a homogeneous organizational and institutional context; the results are triangulated by interviews with 18 professional experts. The research question addressed in this study is: what individual-level characteristics matter when choosing an entrepreneurial model to transfer scientific findings to industry through a new venture? And, based on these insights, what is the best way to link academics with existing entrepreneurial approaches? The investigation adopts the perspective of the individual academic scientist and starts by examining his/her views and needs regarding the creation of a new venture to commercialize a discovery. Based on the findings, this paper examines three entrepreneurial models. These are the two most common models of Surrogate Entrepreneur (SE) and Inventor Entrepreneurs (IE) and the more recent Founding Angel (FA) model.

The remainder of the paper is structured as follows. Section 2 summarizes the literature on academic scientists' views on and needs in relation to the commercialization of their research results. It offers an overview of existing entrepreneurial approaches to commercializing academic research discoveries through spin-offs. Section 3 describes the research method and Section 4 presents the empirical findings. Section 5 discusses some implications for the literature and policy makers. Sections 6 and 7 conclude by outlining some limitations of the study, and summarizing the main results.

2. Background

2.1. Individual-level motives and entrepreneurial capabilities

Much attention has been devoted to analysing how scientists can translate their academic research results into commercial products or services and how universities can facilitate this process. Perkmann et al. (2013) stress the importance of prior experience and social norms such as age, gender, seniority and colleagues with prior commercialization experience. Organizational support is also important for commercialization. While researchers' involvement in the commercialization process tends to be individually driven (Perkmann et al., 2013), Rothaermel et al. (2007) and Clarysse et al. (2011a) note that analysis of individual-level characteristics has been rather neglected in the academic entrepreneurship literature.

Probably the most important individual-level attribute in academic entrepreneurship is the scientist's intrinsic motivation (Lam, 2011) to become entrepreneurially engaged. Jain et al. (2009) highlight that for most scientists in academia, engaging in the business world in parallel with their university activities represents a non-trivial social-psychological challenge related to their specific role in each context. Typically, involvement in a new venture requires some adaptation to their role – an important aspect in discussions on academic entrepreneurship (Huyghe et al., 2014; Ding and Choi, 2011; Hoang and Gimeno, 2010). According to Jain et al. (2009), role changes can be manifested by a shift in activities, an additional workload, and conflicting pressures from the university and industry. These authors point out also that academics often are unwilling to completely abandon 'cherished facets' of their academic role identity when engaging in a commercial project. Academic scientists tend to be mindful of the

consequences of technology transfer and keen to preserve these cherished aspects – although with some adaptations. Jain et al. (2009) conclude that an entrepreneurial approach is needed that would enable the scientist to develop a focal academic role identity alongside a secondary entrepreneurial persona. Such analysis is important since intermediate forms of engagement, relying, for example, on the expertise of entrepreneurs, might compensate for the individual scientist's lack of expertise or adversarial social norms.

Alongside these aspects related to individual-level motivation (Lam, 2011; Hayter, 2015) is another important determinant of engagement in commercialization activity: the presence of three pivotal entrepreneurial capabilities (Rizzo, 2014). Rasmussen et al. (2011, 2014) describe three competencies required to succeed in new venture creation. First, *identification and development of an opportunity*, which are closely linked to opportunity recognition as a prerequisite for new venture creation (Shane, 2000). Due to their business knowledge and experience, external entrepreneurs tend to be better than academics at identifying business opportunities and potential markets (Franklin et al., 2001; Lockett et al., 2005). Second, someone to *champion* the venturing process and attract business and managerial expertise (Visintin and Pittino, 2014; Gupta et al., 2006; Wright et al., 2004; Clarysse and Moray, 2004). Third, the acquisition, combination and organization of the *resources* needed for commercial exploitation of the opportunity. This applies not just to the resources that are directly related to the innovation in question (e.g. technical equipment, human resources, and the financial capital needed to prepare a prototype). Teece (1986) highlights the significance of having access to complementary resources. Complementary resources can be other technologies which the innovation will enhance, or the resources required for further development, manufacturing and distribution of the new product or service. These complementary resources can range from physical capital (e.g. manufacturing machinery, office space, information technology infrastructure) and brand name, to the organizational and tacit knowledge needed to establish the value chain in order to commercially exploit the invention ahead of potential imitators (Teece, 1986; Agarwal and Shah, 2014).

Establishing these three capabilities is a challenge for almost all entrepreneurial founders, but especially for those embedded in the non-commercial environment of a public university (Rasmussen and Borch, 2010) who want to maintain a focal academic role (Jain et al., 2009). Hence, it is surprising that in proposing the IE approach, the academic entrepreneurship literature generally assumes that the inventor of the technology becomes an entrepreneur (O'Shea et al., 2008; Radosevich, 1995; Miner et al., 1992; Freeman and Soete, 1997; Kenney and Patton, 2009). This assumption may be justified by the fact that the IE approach is the most common outcome in practice (Shane, 2004, p. 153; Wasserman, 2012, p. 122 ff.). However, it is possible that a considerable number of commercial opportunities are lost due to the scientists' reluctance to adapt their roles and/or due to the lack of these three entrepreneurial capabilities.

2.2. Approaches involving external entrepreneurs in the transfer of technology from academia

Politis et al. (2012) highlight that in the literature and in practice there is a lack of emphasis on the role that external entrepreneurs could play in facilitating the transfer of technology from academia. There is some preliminary empirical evidence (Lockett et al., 2003; Franklin et al., 2001; Nicolaou and Birley, 2003; Siegel and Phan, 2005; Leitch and Harrison, 2005) suggesting that the involvement of external entrepreneurs might be a very effective and under-utilized mechanism for the commercialization of university-generated knowledge (Politis et al., 2012; Visintin and Pittino, 2014). According to Politis et al. (2012), one advantage of using external entrepreneurs is that they are likely to have easier access to risk capital and strategic alliances as a result of their previous industry experience and business expertise.

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