



## Getting the right balance: University networks' influence on spin-offs' attraction of funding for innovation



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### ABSTRACT

Little research has been done on how the relationships of academic spin-off firms with their parent university influence their ability to attract funding for innovation activities. University is undoubtedly important for young spin-offs, not only because it provides knowledge and research facilities, but also because it enables access to financial capital. We drew on a sample of 100 firms in clarifying whether and how the relationship with the university increases the ability of the spin-offs in attracting funding for research and development and to what extent this depends on different network characteristics, such as size, density, strength of ties, and multiplexity. In this study we adopted the model of curvilinearity, derived from ideas on increasing and decreasing returns. We found that all four university network characteristics have a positive relationship with the spin-offs' ability to attract funding. Interestingly, diminishing returns were only identified when it comes to strength of ties and network multiplexity. Accordingly, a relationship tended to be beneficial as long as it was not too strong or too complex. Moreover, the ability to acquire funding tended to increase if the spin-offs develop a well-connected network of university and non-university contacts. The article concludes with some theoretical and practical implications and with suggestions for future research.

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### 1. Introduction

In recent years, there have been increasing efforts to create academic spin-offs from university, especially in North America, the UK, and continental Europe (Wright et al., 2004). University has seen the creation of spin-offs as a way of commercializing the full value of new technology and inventions, as well as an attractive alternative to technology licensing (Franklin et al., 2001; Siegel et al., 2003). This fits into a new or renewed trend in which the role of university is highlighted as a catalyst for economic growth by bolstering regional innovation (Autio et al., 1996; Clarysse and Moray, 2004; Power and Malmberg, 2008; Vincett, 2010). As a place where inventions are created, university is a seedbed for innovative ideas with the potential to be turned by academic spin-offs into marketable products, processes, or services.

Although academic spin-offs are seen as firms with a strong potential for high and rapid growth, they face too many difficulties in obtaining essential resources (Shane, 2004; Siegel et al., 2003). Academic spin-offs suffer from their limited entrepreneurial experience and knowledge as well as their restricted access to markets (Lockett and Wright, 2005). Compared to other start-ups, academic spin-offs face a higher risk related to the presence of technology and innovation in their product or service offering (Vohora et al., 2004; Clarysse et al., 2005). Even worse, academic spin-offs often fail to realize their potential growth due to their inability to obtain funding

to start or continue their innovation activity (Wright et al., 2006; Clarysse et al., 2007). Due to technological and market-related uncertainty and information asymmetries associated with early stage investment, academic spin-offs find it hard to attract 'market-based investment' from investors, venture capitalists, business angels, or banks (Lockett et al., 2002; Moray and Clarysse, 2005). This often happens because academic spin-offs emerge from the university, an environment that has little affinity with commercial activities. For many university researchers, pursuing technology advancement is often more rewarding than exploiting commercial and market potential of the technology. In addition, procedures to evaluate intellectual property and market potential have been poorly developed at most universities (Leitch and Harrison, 2005). With all these limitations, external investors may consider academic spin-offs a less attractive investment proposition. Having only university as their closest partner, it is natural for academic spin-offs to turn to university in their search for funding for innovation (Johansson et al., 2005; Clarysse et al., 2005).

Although many studies have explored institutional support and formal relationships between university and their spin-offs, including contract research, patenting, licensing, access to temporary accommodation and research facilities (e.g. Franklin et al., 2001; Johansson et al., 2005; Landry et al., 2006; Van Burg et al., 2008; Stenberg, 2014), the understanding of the role of university in attracting funding for spin-offs' innovation activities has been

limited. Except for Clarysse et al. (2007) and Wright et al. (2008), there are hardly any studies focusing on the difficulties experienced by academic spin-offs in seeking initial investment. More importantly, the role of university in assisting spin-offs to seek funding has rarely been mentioned. Filling this knowledge gap is important, because most obstacles experienced by spin-offs in the early years have to do with obtaining funding for innovation (Wright et al., 2008). We drew on research in the Netherlands and Norway to address the following research question: To what extent do networks including contacts from universities increase the ability of spin-off firms to acquire funding for research and development activities? And what kind of network characteristics has endorsed this ability? We will provide answers by exploring the different characteristics of networks, including network density, strength of ties, and network multiplexity. As discussed in literature, we argue that the ability of a spin-off to attract funding is influenced by the development of a certain pattern of networks with the parent university. Using sample data on ego-centric networks of academic spin-offs, consisting of university and non-university contacts, we tested several hypotheses constructed in this study.

## 2. The influence of university networks in attracting funding

Definitions of academic spin-offs vary widely (Pirnay et al., 2003; Djokovic and Souitaris, 2008; Bathelt et al., 2010). For the aim of this study, we define academic spin-offs as independent firms established with the aim of transforming university knowledge and research into marketable products, processes, and services (Pirnay et al., 2003). The founders of academic spin-offs can be varied, including students, graduates, and academic staff. Academic spin-offs develop products or services based on knowledge created at a university, making them rely heavily on that university as their source of ideas, solutions, and resources (Steffensen et al., 2000; Ndonzuau et al., 2002; Lockett and Wright, 2005; Treibich et al., 2013). In the literature, there is a strong argument that the relationship between university and spin-offs is derived from their shared background and is often characterized by trust and a high degree of informality (Pirnay et al., 2003; Johansson et al., 2005). These ties are unique and difficult to substitute, as they are rooted in a common history, reciprocity, location, and shared knowledge (Johansson et al., 2005). In the start-up process of a new venture, knowledge transfer from university to spin-off may go beyond the technology domain. More personal connections may also be built and add mutual benefits, often after some time, such as in collaborative research and publications, joint teaching, and supervision of graduate students (Schartinger et al., 2002; Hanson et al., 2005; Arza and López, 2011; Perkmann et al., 2011; Van Looy et al., 2011). Aside from the widening of the contents of knowledge transfer from university to spin-offs, other forms of relationships may develop over time, such as the employment of graduates or academics by spin-offs, contract research, and consulting (Schartinger et al., 2002).

In this study, we focus on the impact of being connected to the parent university from the spin-offs' perspective. It is from the university that spin-offs receive their initial and much needed resources, such as access to research facilities, temporary accommodation, knowledge on management, patenting, manufacturing, and practical issues (Felsenstein, 1994; Lindelöf and Löfsten, 2004; Stenberg, 2014). More importantly, the university often provides access to public funding that allows academic spin-offs to develop their invention in the very early stage, for example, from national government or European Union. A funding program such as the pre-seed capital fund in France and University Challenge Fund in the UK have proven to be the most important source of funding for academic spin-offs (Wright et al., 2006). Academic spin-offs may

consider this type of funding more attractive than investment from the capital market. The explanation of a spin-off's decision which investment or funding to select is supported by the pecking order hypothesis (Myers, 1984; Myers and Majluf, 1984; Wright et al., 2006). The theory assumes that any small firm would prefer to use internal investment (investment from family and friends) rather than investment generated from debt or equity (Wright et al., 2006). Among other things, equity is subject to serious adverse selection problems and is often avoided by small firms such as academic spin-offs. External investment by financial organizations is riskier and requires an equity control or stake in the firm. However, internal investment from family and friends is often insufficient and spin-offs need to seek additional capital investment. Compared to academic spin-offs established in the US, the option for external investment from financial organizations, such as venture funds or venture capitalist, is relatively limited for European academic spin-offs (Saetre et al., 2006). In a situation in which the venture capital market is still underdeveloped, we would expect academic spin-offs in Europe to look for different forms of funding from or acquired through the university as an alternative to private investment (Wright et al., 2006). It needs to be mentioned that academic spin-offs that have a strong technology profile, including a favorable patent position, are more attractive to financial organizations and tend to be more successful in acquiring external investment, often independent from the university. To our knowledge these are a small minority of the academic spin-offs.

The role of university in helping spin-offs to access funding for innovation can be distinguished as direct and indirect involvement. Direct involvement means that the university directly provides funding for academic spin-offs. This funding may originate from the government or industry, but it is delivered through university involvement, such as the Valorisation Grant (Technology Foundation STW) in the Netherlands or Knowledge Transfer Partnerships (KTP) in the United Kingdom. In some cases, researchers at university work together with academic spin-offs in submitting grant of funding proposals. In other cases, university researchers provide academic spin-offs with contract research. The indirect role of university can involve promoting the academic spin-offs' image in the eyes of potential investors and funding providers. Like other new start-ups, academic spin-offs are constrained by their limited legitimacy, credibility, and acceptance from external investors and other providers of financial resources (Aldrich, 1999; Stinchcombe, 1965; Lockett et al., 2002; Moray and Clarysse, 2005). Academic spin-offs suffer from their liabilities of newness especially when trying to convince external investors to invest in the development of new technology or product. However, networks with the university can help academic spin-offs in improving reputation and attracting interest from government, industries, and venture capitalists, thanks to the university's good image and excellence in particular research areas (Hanson et al., 2005). The same holds for attracting funding from public sources, such as national research grant and EU Funding (framework programs). In the next section, we investigate the role of networks and how they facilitate the effort to attract funding for innovation.

## 3. Hypothesis development on university networks and spin-offs' ability to attract funding for innovation

To understand the beneficial influence of university networks on academic spin-offs, we lean on the concept of social capital (Putnam, 1995; Lin, 1999). Social capital in its various forms and contexts has emerged as one of the most salient concepts in social science (Lin, 1999), specifically due to the assumption behind social capital that people invest in social relations and expect something in return. Social capital refers to an aggregate of actual or potential resources that are linked to the possession of a durable network of more or

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