

# Why are some university researchers more likely to create spin-offs than others? Evidence from Canadian universities

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Available online 27 October 2006

## Abstract

This paper addresses the following question: why are some university researchers more likely to create spin-off companies than others? In order to explain why university researchers create spin-offs, we draw on the resource-based theory of the firm. The study database consists of 1554 university researchers funded by the Natural Sciences and Engineering Research Council of Canada (NSERC). The logistic regression results suggest that the traditional and entrepreneurial visions of university research complement each other when one looks at the resources mobilized by researchers to launch spin-offs.

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**Keywords:** University spin-offs; Resources; Determinants of university spin-off creation; Natural sciences and engineering

## 1. Introduction

Changes in the economic, social and knowledge environment provide opportunities to develop new or improved products. University research knowledge is increasingly considered as providing a significant number of opportunities to develop new or improved products. There are ever-growing number of publications on the opportunities of knowledge transfer undertaken by universities and university researchers. This literature

approaches knowledge transfer from many perspectives which vary significantly, primarily with respect to the mechanisms of knowledge transfer considered and the units of analysis used to explain knowledge transfer.

The three major forms of mechanisms through which universities and university researchers transfer knowledge are the diffusion of research knowledge through conferences and scientific publications, the training of a skilled labor force, and the commercialization of knowledge. The commercialization of knowledge can itself be considered under many alternative mechanisms, notably through consulting activities, research contracts with industry, patenting and spin-off formation. Spin-off companies from universities and university researchers are the most visible form of commercialization of university research. The interest in academic spin-offs reflects the increasing importance of research knowledge as a strategic resource that creates competitive advantages. The formation of spin-off companies can

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also be considered as the flagship of the commercialization of university research as well as a tangible implementation of the entrepreneurial vision of university research (Fontes, 2003; Clarysse and Moray, 2004; Chiesa and Piccaluga, 2000; Jones-Evans and Magnus, 1998; Roberts, 1991; Carayannis et al., 1998; Smilor et al., 1990; Shane, 2004; O’Shea et al., 2005). Prior studies have contributed to advancing significantly our understanding of university spin-offs. However, while a vast majority of these studies focus on universities as their unit of analysis, very few studies pay attention to resources controlled by individual researchers. Moreover, studies using the individual researchers as their unit of analysis are frequently limited to faculty members in life sciences or in medical schools. To our knowledge, no studies have focused on faculty members from a large variety of research fields and universities of different status. The aim of this paper is to address these shortcomings by investigating the following question: why are some university researchers more likely to create spin-off companies than others? This paper contributes to advancing our knowledge on the determinants of university spin-offs by focusing on the resources accessible to individual researchers of many different research fields operating in various types of universities.

The rest of the paper is structured as follows. In the next section, we present the studies and the empirical findings on the determinants of university spin-offs. Then we examine empirically the determinants that may influence the decision of Canadian researchers to launch spin-offs. Finally, the implications of the empirical findings are discussed in the last section of the paper.

## 2. Literature review

### 2.1. *Prior theoretical and empirical studies of university spin-offs*

#### 2.1.1. *Units of analysis*

Empirical studies on the determinants of university spin-off creation tend to use either macro units of analysis such as the university, or micro units of analysis, such as the individual researchers (Di Gregorio and Shane, 2003). Studies based on the university as the unit of analysis tend to focus on the impact of university policies on spin-off formation (Roberts and Malone, 1996; Degroof and Roberts, 2004; Di Gregorio and Shane, 2003; O’Shea et al., 2005; Lockett et al., 2003; Lockett and Wright, 2004; Nerkar and Shane, 2003).

Empirical studies based on the individual researcher as the unit of analysis examine the propensity of individual faculty members to create spin-offs using character-

istics of resources of the researchers (Levin and Stephan, 1991; Shane and Khurana, 2003; Roberts, 1991; Zucker et al., 1998) and characteristics of their research projects and research findings (Shane, 2001) as predictors of spin-off formation. This paper aims to contribute to the advancement of knowledge by using the individual researcher as the unit of analysis in order to focus attention on resources and other factors that are closer to the individual researcher than the macro-level factors of explanation. Such a unit of analysis is especially appropriate to take into account the impact of the knowledge and skills of the founders of the spin-offs. Furthermore, using the individual researcher as the unit of analysis is also appropriate to better understand the co-existence of the traditional and entrepreneurial visions of university research.

#### 2.1.2. *A process view of spin-off formation*

Prior studies on the formation of spin-offs view these as involving discrete decisions. Ndonzuau et al. (2002) claim that the formation of spin-offs needs to be understood as part of multi-stage processes. Based on their data analysis, they suggest modeling the spin-off process as a four-stage process defined as follows: Stage 1: “to generate business ideas from research”; Stage 2: “to finalize new venture projects out of projects”; Stage 3: “to launch spin-off firms from projects”; Stage 4: “to strengthen the creation of economic value by spin-off firms”. This study focuses its attention on Stage 3 regarding the launching of spin-off firms. To collect the data on this stage, we asked individual researchers to indicate whether or not they had ever attempted personally, or their university on their behalf had attempted, to create a spin-off firm from the results of their research. This question aimed at collecting data regarding the individual initiatives over and beyond the university TTO official records. Such a research strategy provides a more complete picture of spin-off formation than a strategy limited to the number of spin-off firms created through the university TTOs. Using such a strategy enables us to overcome the fact that many university researchers do not report their commercial activities to their TTOs.

#### 2.1.3. *Samples*

A large number of studies on spin-off formation are based on the AUTM surveys, consequently focusing on the university TTOs as their unit of analysis. Many other studies are based on samples of the elite research universities (see Siegel and Phan, 2004, for a review). Some of these studies use the university TTO as their unit of analysis and a smaller number use the individual researcher as their unit of analysis. Most of the studies

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