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Success factors of university-spin-offs: Regional government support programs versus regional environment



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ABSTRACT

In recent years entrepreneurship research has increasingly interpreted new firm emergence in the light of the context the potential or real founder is living and working in. This is especially true for university spin-offs, a type of new firms that gives rise to great hopes for policymakers and technology transfer institutions. The aim of this paper is to analyze what is more influential: specific characteristics of the regional environment of the spin-off founder or public programs to support university spin-offs. Based upon a unique data set covering 11 years of data collection we were able to apply a control group approach with two different government support programs in two regional contexts. The results based upon ordinal regressions suggest that the regional context in which an individual starts a firm, has an impact on start-up success, but the fact that he/she had received government support has a lesser impact. To summarize: site specific factors matter, government support programs per se do not.

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1. Introduction

1.1. The determinants of university spin-offs: government policies vs. the regional context

1.1.1. Motivation, aims and structure

University spin-offs are potentially very important for an industrialized countries whose basic research at universities is strong as such spin-offs are potentially the most efficient way to transfer new technological knowledge into business, i.e., into new products and services. This is also true for a country like Germany traditionally strong in technical and engineering fields and some of the natural sciences (see [Commission of Experts for Research and Innovation \(efi\), 2013](#)). Germany is less strong, however, in the transfer of this scientific potential to economic potential (from invention into innovation), i.e., the knowledge transfer potential of universities is significantly underexploited in relative terms. This is particularly unfortunate as Germany has for a considerable time suffered not only from a general entrepreneurship deficit relative to comparable industrialized countries (see [Sternberg et al., 2013](#), for the most recent country report Germany of the Global Entrepreneurship Monitor (GEM)), but also from a qualitative deficit, i.e., among high-growth firms, so-called gazelles, in particular (see [Commission of Experts for Research and Innovation, 2013](#)).

Governments therefore have a fundamental interest in increasing the number and quality of university-spin-offs. Not only the federal government, but also the governments of many of the federal states (which in Germany are responsible for public universities) and the universities themselves have created support programs. The universities can use science parks or university business incubators not only to increase their income, but also to brush up their image ([Yang et al., 2009](#)).

These players do not always share the same goals when supporting university spin-offs, but there are essentially two goals that dominate from the regional perspective – and this regional perspective is the focal point of this paper: the improved exploitation of universities' transfer potential (knowledge transfer) and regional economic growth through new technology-based companies that span-out of a university and that may grow at a later stage. In this paper we speak of such a university spin-off firms if the idea for their new product was generated while the inventor/innovator was employed at a university and if the transfer (innovation) is performed by the same person who generated the idea during dependent employment, and in a new company. This definition reflects the opinion of the majority of the scholars (including, e.g., [Markman et al., 2004](#); [Degroof and Roberts, 2004](#); [Lawton Smith and Ho, 2006](#); [Egeln et al., 2003](#)), but not all of them (e.g., [Druilhe and Garnsey, 2004](#); [Djokovic and Souitaris, 2008](#)).

While the aims of government policies to support entrepreneurship are obvious the role of academic research should not be ignored: it should contribute “to the evidence base for better policy through the application of empirical and theoretical approaches” ([Williams, 2013, 3](#)), see also ([Blackburn and Smallbone, 2008](#)).

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Thus, the aim of this paper is to analyze the impact of federal state government programs to support university spin-offs on the success of those spin-offs. [Shane \(2009\)](#) and [Lerner \(2009\)](#) recently disputed that government policies have, or indeed should even try to have, such an impact. The impact of government policies is compared with the impact the regional context a spin-off is existing in has on this spin-off company. It is not the aim of this paper, however, to evaluate the success of these government programs themselves, nor their intended or unintended effects, their efficiency or effectiveness. The empirical focus of this paper is on Germany, and two German federal states with dedicated government policies to support university spin-offs in particular.

The remainder of the paper is structured as follows. [Section 2](#) gives an overview of research carried out to date into the role of university spin-offs and their universities for regional growth, as well as the relationship between government policies and university spin-offs. [Section 3](#) briefly describes the aims and instruments of the two support programs analyzed and the control group of the so-called entrepreneur association companies (GVUs). [Section 4](#) presents the data base and the methods of the empirical part of the paper. The empirical results and their interpretation are the focus of [Section 5](#), before conclusions are drawn and an outlook on future research with these data sets is given in the final section.

1.1.2. Universities, spin-offs and regional implications

The postulation of the "entrepreneurial university" ([Etzkowitz, 2004](#)) has changed the role of universities within national or regional economies. The interrelationships between universities and the business sector have increased considerably, which has more to do with changes in norms and cultures within universities than with a change in the behavior of business ([Mowery and Sampat, 2005](#); [Varga, 2009](#); [Siegel et al., 2007](#)). Without doubt, the increased significance of start-ups by current or former university academics, graduates or students is one of the most obvious indicators of this cultural change sometimes named as "entrepreneurial turn" ([Goldstein, 2010](#), p. 83). Inventions and therefore economic opportunities are generated at universities which may form the foundation for spin-off start-ups. An entrepreneurial university will not leave the development of such entrepreneurial opportunities to chance, but will actively promote it. This first benefits the university itself. Second, the regional economy may also benefit from the genesis of a "university research-centric cluster" as described by [Patton and Kenney \(2010\)](#) and therefore contribute to the generation of positive effects by universities specialized in certain technologies on the corresponding technological sectors of the regional economy (as demonstrated by [Braunerhjelm, 2008](#), for Swedish universities). This is probable when significant numbers of start-ups are launched in a university region over an extended period, the ideas for which are based on research carried out at the respective university. This knowledge may be transferred via spin-offs by former (or indeed current) academics, graduates or students of the university. This kind of spin-off start-up has the great advantage over patents or other transfer mechanisms that in this case the tacit knowledge of the academics, which is otherwise so difficult to transfer, is indeed transferred – straight into a new company.

The creation of such research-based, university-driven clusters is not a process that can be planned, however, even if it does receive the support of the university. It is much more an evolutionary process, as many empirical studies have shown (see, for example, [Braunerhjelm and Feldman, 2006](#)). In this concept, the specific role of the university is in guaranteeing high-value, (also) application-oriented research which creates principally economic opportunities for entrepreneurial activities, for example in the

form of spin-off start-ups. Universities therefore act as a conduit for knowledge as described by [Patton and Kenney \(2010\)](#) which can be imparted to students in teaching or, in the case of knowledge newly generated within the university, transported to the economy either via patents or scientific publications (in the case of codified knowledge), or via the staffing transfer of scientists (in the case of tacit knowledge).

The process described is not geographically neutral. It is of economic-geographical significance that this knowledge generated at universities can migrate, both locally (within the region of the university) and over considerable distances. The more tacit (person-related) the knowledge to be transferred is, the greater the role of the various types of proximity—not just the geographic kind (see [Boschma, 2005](#)). Empirical analyses have demonstrated the particular significance of geographical proximity, especially in the case of tacit knowledge at universities (see [Audretsch and Stephan, 1996](#); [Zucker et al., 1998](#)). The most efficient form of knowledge transfer from research to business is via people. In this case, the transfer of knowledge between the "transmitter" and the recipient cannot be hindered by any other person or institution. In the case of staffing transfers, the academic takes the knowledge generated at the university with him/her—either into dependent employment at an existing company or by launching a company of his/her own. In contrast to the dependent employment of former university academics, these university spin-offs demonstrate strong geographical ties to the former employer. This can be both well explained in theory (see [Brüderl and Preisendörfer, 1998](#)) and adequately demonstrated empirically (see [Rabe, 2007](#)) with the innovative networks with the university and its scientists/academics which are so important for the entrepreneur. Any employment effects of such spin-off start-ups, if the spin-off survives and grows, will therefore also result in this university region. Spin-offs are therefore potentially a very well-suited instrument of endogenous regional development (see [Sternberg, 2009](#)). It is only logical, therefore, that the local university was the most important institution for several high-tech regions (see [Sternberg, 2010](#); [Etzkowitz, 2004](#) or [Bresnahan and Gambardella, 2004](#)).

Empirical findings on university spin-offs are primarily based upon US and English universities (see [Hsu et al., 2007](#); [Shane, 2004](#); [O'Shea et al., 2005](#); [Lawton-Smith et al., 2005](#); [Markman et al., 2004](#)), although growing academic interest in the mechanisms of such spin-offs can now be observed in other countries ([Bathelt et al., 2010](#); [Rothaermel et al., 2007](#); [Kroll and Liefner, 2008](#)). Surprisingly, however, there are considerable research gaps in terms of studies into spin-off start-ups and their regional and institutional environment ([Patton and Kenney, 2010](#); [Lejpras and Stephan, 2011](#)). The few exceptions deal in particular with the very well-known, highly research-oriented universities such as Oxford/UK (see [Lawton Smith and Ho, 2006](#)) or Stanford (see [Sturgeon, 2000](#)). There is barely any empirical evidence of this nature for German universities and their regions (see, for rare exceptions, [Hemer et al., 2006](#); [Krabel and Mueller, 2009](#)). This is particularly astonishing since there certainly are spin-off start-ups at most German universities. The Centre for European Economic Research (ZEW) estimates that each year between 2001 and 2006 around 2200 professors and 6700 academic employees at universities (including technical colleges) were involved in start-ups in research- and knowledge-intensive sectors (see [Egelin, 2009](#)). In total, in the years 2001 to 2006, this group of individuals launched an average of approximately 6500 companies involving at least one academic/scientist.

In terms of the economic-geographic implications of university spin-offs, the same postulation initially applies as for entrepreneurial activities in general: they are primarily a regional event ([Feldman, 2001](#); [Sternberg, 2009](#)). A glance at the emergence factors of the best-known high-tech regions in the five largest

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