



Knowledge Creates Markets: The influence of entrepreneurial support and patent rights on academic entrepreneurship



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ABSTRACT

We use an exogenous change in German Federal law to examine how entrepreneurial support and the ownership of patent rights influence academic entrepreneurship. In 2002, the German Federal Government enacted a major reform called Knowledge Creates Markets that set up new infrastructure to facilitate university-industry technology transfer and shifted the ownership of patent rights from university researchers to their universities. Based on a novel researcher-level panel database that includes a control group not affected by the policy change, we find no evidence that the new infrastructure resulted in an increase in start-up companies by university researchers. The shift in patent rights may have strengthened the relationship between patents on university-discovered inventions and university start-ups; however, it substantially decreased the volume of patents with the largest decrease taking place in faculty-firm patenting relationships.

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1. Introduction

Based on the belief that academic research is an important driver of economic growth and the perception that academic institutions should have an entrepreneurial mission beyond teaching and research, policymakers are increasingly interested in stimulating entrepreneurial behaviors among academic researchers. The idea is to change the incentives researchers face so that entrepreneurial choices are more attractive. Numerous policy levers are available including tax policies, employment policies, subsidies, entrepreneurial education, and intellectual property (IP) policies.

In the area of IP policies, the United States has become the de facto leader. In 1980, the Bayh–Dole Act facilitated institutional ownership of inventions discovered by researchers who were supported by federal funds. Many observers credit the Bayh–Dole Act with spurring university patenting and licensing that, in turn, stimulated innovation and entrepreneurship (The Economist, 2002; OECD, 2003; Stevens, 2004). With this success, the Bayh–Dole Act has become a model of university IP policy that is being debated and emulated in many countries around the world including Germany, Denmark, Japan, China, and others (OECD, 2003; Mowery and Sampat, 2005; So et al., 2008).

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But how do intellectual property rights (IPRs) influence the incentives for university researchers to form start-up companies? Perhaps surprisingly, this question has not received much attention in either the theoretical or empirical literatures. From a theoretical point of view, [Damsgaard and Thursby \(2013\)](#) examined the mode and success of commercialization under an individual ownership system (i.e. the academic inventor keeps the patent rights) and a university ownership system. In a number of cases, their model shows less faculty entrepreneurship (i.e. fewer faculty start-ups) under university ownership. Using survey and case study evidence, [Litan et al. \(2007\)](#) and [Kenney and Patton \(2009\)](#) argued that conflicting objectives and excessive bureaucracy make university ownership ineffective and suggest an individual ownership system may be superior. In a follow-on study looking at technology-based university spin-offs, [Kenney and Patton \(2011\)](#) found suggestive evidence that an individual ownership system is more efficient for generating spin-offs.¹

In this paper, we use an exogenous change in German Federal law to examine how entrepreneurial support and the ownership of patent rights influence academic entrepreneurship.² The new German policy strengthened the institutional and financial support for academic start-ups and fundamentally changed who owns the patent rights to university-discovered inventions. Prior to 2002, university professors and researchers had exclusive intellectual property rights to their inventions. This “Professor’s Privilege” allowed university researchers to decide whether or not to patent and how to commercialize their discoveries. After 2002, universities were granted the intellectual property rights to all inventions made by their employees and this shifted the decision to patent from the researchers to the universities.

Based on a novel researcher-level panel database that includes a control group not affected by the IP policy change, we find no evidence that the new infrastructure resulted in an increase in start-up companies by university researchers. The shift of patent rights to the universities not only changed the ownership distribution, but also impacted the volume of patents on university-discovered inventions. The policy reform may have strengthened the relationship between patents on university-discovered inventions and university start-ups (i.e. increased the marginal impact of university-owned patents on university start-ups); however, it substantially decreased the volume of patents with the largest decrease taking place in faculty-firm patenting relationships. By displacing so many faculty-firm relationships, our evidence suggests the policy reform probably decreased overall university technology transfer.

The remainder of the paper is as follows: the next section reviews the German policy reform, develops our conceptual background using the literature and states the hypotheses to be tested. The third section describes the empirical identification strategy and introduces the data. [Section 4](#) discusses the econometric results and the fifth section concludes.

2. Background and Hypotheses

In 2002, the German Federal Government introduced a major reform called Knowledge Creates Markets to stimulate technology transfer from universities and other public research organizations to private industry for innovation and economic growth. The program was largely a reaction to the “European paradox” ([European Commission, 1995](#)). At that time, policymakers believed that Germany had one of the world’s leading scientific research enterprises, but was lagging the United States in terms of technology transfer and commercialization. The new program addressed four broad areas of science-industry interactions including the processes and guidelines governing knowledge transfer, science-based new firms, collaboration, and the exploitation of scientific knowledge in the private sector.

One part of the Knowledge Creates Markets reform created new institutions with new financing to facilitate the movement of university research to the private sector. Unlike most of Germany’s public research organizations (PROs),³ German universities had little experience undertaking technology transfer activities, and only a few universities maintained professionally managed technology transfer offices (TTOs) ([Schmoch et al., 2000](#)). The government established regional patent valorization agencies (PVAs) that were supported with a budget of 46.2 million EURO ([Kilger and Bartenbach, 2002](#)). Universities were free to choose whether to use the PVAs’ services or not. To date, 29 PVAs serve different regional university networks and employ experts specialized in these universities’ research areas. The PVAs support the entire process from screening inventions, finding industry partners, and determining fruitful commercialization paths, including the formation of faculty start-up companies.

While the PVAs were intended to fill a void in the institutional structure supporting commercialization of university research, the reform also called for the expansion of Federal subsidies to university-specific TTOs. Among other initiatives, the legislation included vocational training for university and PRO administrative staff on intellectual property and

¹ In a recent working paper, [Astebro et al. \(2016\)](#) compare entrepreneurship between the Bayh–Dole system in the U.S. and Sweden’s faculty ownership system. Their analysis finds that Swedish academics are twice as likely to enter entrepreneurship, but average earnings deteriorate for academic entrepreneurs in both countries after founding a new company.

² Academic entrepreneurship is defined as the formation of a new company in which the university researcher is part of the founding team. This includes all university researcher start-ups – those that license university technologies and those that do not license ([Toole and Czarnitzki, 2007](#); [Kenney and Patton, 2011](#); [Czarnitzki et al., 2015](#)).

³ In addition to universities, Germany’s research enterprise includes other public research institutions that have many branches in a variety of different scientific disciplines. For instance, the Fraunhofer Society has 59 institutes in Germany with about 17,000 employees, the Max Planck Society has 76 institutes with about 12,000 employees. The Leibniz Association employs 16,100 people in 86 research centers. The Helmholtz Association has about 30,000 employees in 16 research centers.

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