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Location choice of academic entrepreneurs: Evidence from the US biotechnology industry

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ABSTRACT

Where knowledge-based firms are located is important because entrepreneurship, firm creation and innovation are typically associated with regional economic development, wealth creation and increased employment. In this paper we examine where academic entrepreneurs locate their firms. We begin by developing a theoretical model that examines the location choice of the academic entrepreneur within the standard utility maximization theory. Academic entrepreneurs are assumed to maximize their utility by allocating their efforts between academic and entrepreneurial pursuits which, in turn, determine their future streams of income and end-period wealth. Optimal allocation turns out to be a function of both personal and external factors that condition the relevant payoffs and such factors can be empirically observed. We then use several candidate explanatory variables to examine those factors that may influence the firm location choice for 187 biopharmaceutical firms started by 275 academic entrepreneurs in the US. From our empirical analysis we find that location-specific factors such as proximity to certain knowledge assets and to the funding venture capital firms, affect the firm location choice of academic entrepreneurs. Nevertheless, entrepreneur-specific characteristics, such as their age, seem to dominate the choice of firm location.

1. Executive summary

Where firms choose to locate is important since entrepreneurial activity and firm creation are associated with regional economic development, increased employment and wealth. In recent years increased attention has been paid to the location of high technology firms as technical innovation and clusters of innovative firms have become engines of economic growth. Because many innovative firms have been spawned from research universities, the location of university spinoffs and the role of academic entrepreneurs that start them are of interest.

Partially prompted by the limited treatment in the academic entrepreneurship literature, in this paper we develop a theoretical model and examine the location choice of the academic entrepreneur within the standard utility maximization theory. The academic entrepreneur is assumed to maximize her utility by allocating her effort between academic and entrepreneurial pursuits which, in turn, determines her future streams of income and end-period wealth. Our theoretical model shows that the optimal allocation is a function of both personal and environmental factors that condition the relevant payoffs of entrepreneurial

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efforts, and that such factors can be empirically observed. Guided by our theoretical model and prior literature we then specify and measure a set of factors that could have influenced the firm location choice of 187 venture-capital backed biopharmaceutical firms started by 275 academic entrepreneurs in the US. We show that using an ordered logit model to examine these choices is both theoretically consistent and empirically relevant.

Based on this empirical model, we conclude that proximity to knowledge assets, (e.g. a medical school), as well as access to capital markets (e.g. through proximity to the funding venture capital firms), affect the location choice of academic entrepreneurs. Nevertheless, we also conclude that the influence of entrepreneur-specific characteristics, such as her age and professional experience, dominates the choice of firm location in our sample. In particular, we find that academic entrepreneurs at later stages of their career are considerably more likely to start their firm away from their academic homes.

Our findings, therefore, suggest that a deeper understanding of the location choice of firms spawned by universities may require more research and increased attention to the characteristics and incentives of the academic entrepreneurs that establish them. Our findings may, thus, be relevant to the ongoing debate about policies designed to create "entrepreneurial" local environments. While broad capital investments in local research infrastructure may help to attract new firms, our results suggest that the personal characteristics of academic entrepreneurs as well as the various incentives they face may be equally important for the creation of local firms.

2. Introduction

Where firms choose to locate is important since entrepreneurial activity and firm creation are associated with regional economic development, increased employment and wealth (Autio and Renko, 1998; Gordon and McCann, 2005). In recent years increased attention has been paid to the location of high technology firms as technical innovation and clusters of innovative firms have become engines of economic growth (Doeringer and Terkla, 1995; OECD, 2007). Because many innovative firms have been spawned from research universities, the location of such firms and the role of academic entrepreneurs that start them have also attracted some attention (Audretsch et al., 2005; Markman et al., 2004; Powers and McDougall, 2005; Zucker et al., 2002). Academic entrepreneurs are defined as university faculty that engage in entrepreneurial activity in order to exploit knowledge that originates at the university and is sometimes formally assigned to it through patents or other forms of intellectual property rights[1] (Di Gregorio and Shane, 2003; Lockett et al., 2005; Louis et al., 1989; Stuart and Ding, 2006).

Some of the firms started by academic entrepreneurs locate close to their academic institutions but many do not. The factors that drive this location choice, however, have been previously examined by very few studies and even then mostly indirectly. Zucker et al. (1998) observed that some US biotechnology firms had been started by academic scientists and examined whether such observation could be generalized. While the authors did not specifically identify the academic entrepreneurs or their firms in their analysis, they used aggregate data to test whether the density of preeminent scientists in different US regions predicted a high density of biotechnology startups. Their results, indeed, revealed a strong association between the location of star scientists and the birth of nearby biotechnology firms. Audretsch and Stephan (1996) examined the location choice of certain US biotechnology firms that were affiliated with academic scientists. A few of the affiliated scientists were founders of the firms but most were members of advisory boards and other consulting bodies. In this context, Audretsch and Stephan (1996) analyzed the probability that the firms and their affiliated academic scientists were located in proximity to one another. They found that the specific role of the scientist in the affiliated firm and her personal characteristics were important determinants. Firms and affiliated scientists were more likely to be located in proximity if the scientists were preeminent or they were the firm founders rather than members of advisory and other boards. Audretsch and Stephan also found that older academic scientists were more likely to have links with biotechnology firms that were not geographically bound. Finally, Egeln et al. (2004) examined how regional characteristics (e.g. urbanization and localization economies) as well as certain firm attributes (e.g. size, industrial sector) prompted academic spinoffs in Germany to locate close to or at a distance from their affiliated universities. They found that larger academic spinoffs, especially in knowledge intensive industries, were more likely to locate farther away while smaller spinoff firms using the university's infrastructure tended to locate closer to the parent institution. Spinoffs were also attracted to regions with strong urbanization economies but localization economies did not influence their location choice. Egeln et al. (2004), did not identify the academic entrepreneurs and did not examine their influence on the firm location choice.

The location of high technology firms is a longstanding topic of interest in the literature. Given that, the lack of attention to the location choice of academic entrepreneurial firms is curious; academic spinoffs appear to be numerous and strong economic performers (Dahlstrand, 1997; Mustar, 1997; Shane, 2004). According to the annual surveys of the Association of University Technology Managers (AUTM), in 2012 some 700 academic spinoffs were created in the US alone and the number of such spinoffs has been growing steadily over time. Furthermore, Audretsch et al. (2013) found that almost 13% of the 9000 scientists that had received grants from the US National Science Foundation from 2005 to 2012 had started a new firm and concluded "…that university scientist entrepreneurship is considerably more prevalent than would be indicated by the data compiled by the AUTM". There is also growing evidence that academic spinoffs are durable (e.g. Wobbekind et al. (2012)) and their high

[1] While academic spinoffs often originate from patented inventions they may also start on "a body of unpatented expertise" (pp 2. Perkmann et al., 2013; Shane, 2004)).