



Turning scientific and technological human capital into economic capital: the experience of biotech start-ups in France

Catherine D.F. Corolleur, M. Carrere, V. Mangematin*

UMR GAEL, INRA, Université Pierre-Mendès-France, BP47, 38040 Grenoble Cedex 9, France

Received 1 May 2003; accepted 1 January 2004

Available online 19 March 2004

Abstract

This paper examines how scientific and technological (S&T) human capital is transformed into financial capital through the creation of firms by scientists. The analysis is based on a database describing the positions held by 132 founders from 62 French biotech SMEs. It shows that star scientists engage in highly risky but also valuable firms. Less famous scientists must develop their human capital rather than valorising a stock. The paper concludes by pointing to three paradoxes concerning the commitment and compensation scheme of star scientists and the managerial position of less known scientists.

© 2004 Elsevier B.V. All rights reserved.

PACS: O32; M13; J24

Keywords: Biotechnology; SMEs; Scientist; Founder; Technological transfer; Human capital

1. Introduction

The aim of this paper is to analyse how scientists transform their scientific and technological (S&T) human capital into financial capital through the creation of start-up companies. It highlights a paradoxical situation: renowned scientists are only partially involved in start-ups as they keep their position in academia. Financial investors base their decision of investments on the involvement of high reputation scientists within the firm but they have to face a high asymmetry of involvement between financial investors and star scientists who invest intangible capital (knowledge, network, etc.).

Based on newly created ventures, this paper is not able to analyse the performance of the firms contrary to previous research which studied the linkages between start-ups' performance and the composition of their founder networks (Baum et al., 2000) or the influence of entrepreneurs' resources on the life expectancy of the firm (Shane and Stuart, 2002). Both of these sets of research focus on firm performances. Other research focuses on the mechanisms for transferring technology: technological spill over (Cohen et al., 2002) from the public sector research on industrial R&D and the pathways through which the effects are excised (Mowery et al., 2001); impacts of public sector research on firm creation (Autant-Bernard et al., 2002; Colyvas et al., 2002; Swann et al., 1999).

This paper benefits from these results. It focuses on the individual strategies to make money by

* Corresponding author. Tel.: +33-4-76-82-56-86;

fax: +33-4-76-82-54-55.

E-mail address: vincent@grenoble.inra.fr (V. Mangematin).

commercialising science via firm creation. Technology transfer through human capital mobility has been recently investigated. It includes hiring of trained researchers to develop a specific research programme or technology (Almeida and Kogut, 1999) as well as firm creation by scientists (Zucker et al., 1998). S&T human capital is defined as the sum of scientific and technical and social knowledge, skills and resources embodied in a particular individual (Bozeman et al., 2001).

Scientists tend to engage in research because they enjoy the challenge. They are also careful about their reputation and sometimes try to valorise their discoveries. Public policies in favour of commercialisation of science (Bayh-Dole act in 1980 in US, Loi Allègre in France in 1999) as well as the emergence of new opportunities based on knowledge-based industries has led to a new wave of firm creation by scientists. Recent years have seen experiments by star scientists (Stephan, 1999; Zucker and Darby, 1999) as well as those less well known in firm creation (Mangematin et al., 2003). Success stories of star scientists who create fast growing star-up like Greg Venter have been emphasised. Meanwhile, other scientists are creating small firms which remain small. Different pathways to valorise S&T human capital through firm creation seem to exist. Do scientists with different levels of S&T human capital set-up different kinds of firms? Do they occupy different positions within the firm (Chief Executive Officer, scientific advisors, etc.)? Do their positions in the public sector research (tenure, non tenure, diploma and experience) influence the pathway by which they valorise their S&T human capital? Section 2 analyses different ways of technology transfer through human capital mobility, depending on their position within academia, on their level of human capital to be transferred and on their position within the firm after its creation. In Section 3 we examine the cases of 132 founders who created 62 new biotechnological firms (NBF) in France. Human capital is estimated by initial training, position in academia and on-the-job training (experience). Returns on human capital are estimated by the position within the firm. Section 4 discusses the determinants of two individual trajectories according to the renown of the scientists, to their position in academia and to their involvement in firms.

2. The role of human resource mobility in technology transfer in state-of-the-art technologies

Biotechnology is a new industry that is knowledge-based and predominantly composed of new small firms that have close ties with university-based scientists. These start-ups play a particular role in industrial organisation as they provide a link between large firms and academic organisations. Scientific and technological production requires a circulation of knowledge (Winter, 1987). Leonard-Barton (1995) argues that knowledge transfer requires various mechanisms of communication such as the transfer of people when the level of codifiability is low. The more knowledge is tacit, the greater the variety of modes of transfer: articles, patents, and also temporary or permanent personal mobility, joint ventures, etc. (Mangematin and Nesta, 1999). Because tacit knowledge is embodied in individuals, it is more likely to be diffused within the organisation than outside of it. Almeida et al. (2002) show that multinational firms transfer knowledge across countries more effectively than alliances because they are able to mobilise key persons. Even within the firm, tacit knowledge is sticky and does not flow easily unless the individuals possessing it also move (Szulanski and Jensen, 2001). When knowledge is difficult to separate from those who produce and possess it, because it is tacit, hiring people from other organisations is a way of transferring otherwise immobile knowledge. The phenomenon of post doctoral illustrates the importance of human mobility in circulating knowledge. It is a way for young scientists to acquire specific tacit knowledge and know-how developed in a given organisation. Hiring skilled people is also a way for an organisation to acquire critical knowledge. The mobility of experienced scientists not only provides a one-time technology transfer of information, as is often the case in technology licensing; it also facilitates the transfer of competencies, permitting further knowledge building (Kim, 1997), especially because experienced people bring their own networks into the firm.

Knowledge transfer between universities and firms occurs when university-based scientists found a firm with the explicit goal of developing knowledge created in their university lab. From an individual point of view, the decision to become an entrepreneur is generally considered in human capital models as a means

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات