Who are the stars? Evidence from a sample of UK academic inventors.

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Extended Abstract

The exploitation of university inventions has been one of the major concerns of policy makers in Europe and in the US over the past 30 years. The protection and exploitation of intellectual assets is considered vital for sustainable competitive advantage and economic growth, and following the Bayh-Dole Act of 1980, governments across the world have implemented similar regulations enabling universities to exploit their inventions (OECD, 2003). As a consequence, the number of patents, licenses, university spin-outs and science parks has increased dramatically (Siegel et al., 2007; Verspagen, 2006; HEFCE, 2009).

However, there is a great heterogeneity in the extent to which academics engage in commercialization of their research. Recent papers have shown that their distribution is highly skewed and that the majority of academics never patent (Agrawal and Henderson, 2002; Lissoni et al., 2008; Azoulay et al. 2009; Goldfarb et al., 2009). Even amongst academic inventors the majority file only one patent. Breschi et al. (2008) examining the patenting activity of Italian academic inventors find that 60.2% of professors in their sample signed one patent and only 8.6% more than five. A similarly skewed distribution had already been found for firm inventors. Narin and Breitzman (1995) found that patenting follows a Lotka (1926) distribution and that the most prolific inventors are even more productive than Lotka's Law predicts.

There is empirical evidence that such productive individuals are very important for technological advancement (see Gay et al., 2008). Zucker and Darby (1996, 1998, 2002), for instance, have repeatedly pointed out the role of star scientists for firm success. They showed that firms collaborating with academic stars produce more innovations and grow more rapidly than other firms. Also firm internally Rothwell (1992) identified certain key individuals that contribute most to a firm's success. The most productive inventors are producing patents of greater value and thus contribute most to their firm's performance (Ernst et al., 2002; Gay et al., 2008).

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Key performers additionally exert a positive effect on their peers. In a recent paper Azoulay (2010) find strong evidence for a positive effect of academic stars on the publication records of their co-authors. Similarly, academic inventors can have a positive signalling effect for their colleagues. They may act as role models and thereby trigger more commercial activity (Bercovitz and Feldman, 2008; Goktepe-Hulten, 2008; Stuart and Ding, 2006). Gay et al. (2008) have indeed shown that prolific company inventors are part of larger teams and could hence generate positive spill-over effects.

In view of the continuous focus of policy makers on the successful appropriation of research and the importance of star scientists or key actors for the advancement of knowledge, this paper wants to identify those factors that lead to persistent academic invention activity. It aims to investigate the characteristics of single and persistent academic inventors and their patents and wants to establish whether attributes of the university, of the researcher, or of the patents are important for a persistent participation in the patenting process. First evidence by Bercovitz and Feldman (2008) showed that for researchers at two medical schools in the US, single and persistent disclosers appear to respond to different stimuli. It did not, however, take into account whether a disclosure was successfully turned into a patent, or the characteristics of the invention. We aim to add to their analysis by including these factors and further, aim at investigating in more detail what can be learned from "star" inventors about necessary policies to encourage single inventors to patent more persistently.

We use a sample of 622 academic inventors in the UK from the from the KEINS/CID. Academics were classified based on the number of granted patents as *single* or *persistent inventors*. We further identify those academic inventors that have had all their patent applications at the EPO rejected (*unsuccessful inventors*). Using cross-sectional ordinal probit models we estimate a researcher's propensity to belong to one of these groups based on institutional, personal and invention based characteristics.

In our sample, we end up with 622 British academic inventors who are responsible of 1622 patents, up to year 2002. Among them, 1376 have been applied for when the inventor was working in university, while the remaining 246 while he was working in a company before moving to the university.

The 25% (150 scientists) of most productive inventors have applied for more than 3 patents, while the 47% (291 scientists) have only one patent application.

Preliminary results show that controlling for age and intrinsic quality of the inventors, first patent characteristics and the presence of an commercialisation oriented environment at the initial stage of the career seem have an important effect on the probability to become a persistent inventors.