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The market for patents in Europe

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Abstract

By using the PatVal-EU dataset we find that the most important determinant of patent licensing is firm size. Patent breadth, value, protection, and other factors suggested by the literature also have an impact, but not as important. In addition, most of these factors affect the willingness to license, but not whether a license actually takes place. We discuss why this suggests that there are transaction costs in the markets for technology. The issue is important because many potential licenses are not licensed suggesting that the markets for technology can be larger, with implied economic benefits.

JEL classification: D45; O32; O34

Keywords: Licensing; Patent scope; Complementary assets; Firm size; Markets for technology

1. Introduction

The importance of technology licensing has long been recognized by the managerial and the industrial economic literature. Early studies on licensing, especially in the industrial economic tradition, emphasized its implications for the diffusion of technology, the duplication of research, and product market competition (e.g. Shephard, 1987; Rockett, 1990; Gallini, 1984). Recently, there has been a revived interest in this topic in the managerial and technological literature. A natural reason is that technology licensing has increased considerably worldwide during the 1990s (e.g. Athreye and Cantwell, 2005) following a greater emphasis of company strategies on technology exchange through arms-length market transactions, strategic alliances, or cross-licensing agreements (e.g. Grindley and Teece, 1997; Rivette and Kline, 2000; Arora et al., 2001; Hall and Ziedonis, 2001; Arora and Merges, 2004; see also OECD, 2005, and The Economist, 2005).

This paper focuses on two issues. First, there is a fairly extensive literature highlighting several theoretical determinants of technology licensing. Yet, because of the limited availability of comprehensive data, practically no study has been able to provide in a single paper a broad empirical assessment of the theoretical factors that affect licensing as suggested by the literature. Second, existing studies have not been able to disentangle the determinants of the propensity to license vis-à-vis the actual occurrence of a licensing event. This is important because, as we shall see below, there is a fair share of patents that the owner would like to license but which are not licensed. These technologies may be of small or

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no economic value. Hence, they may have no demand. Alternatively, there could be transaction costs or other impediments to technology trade. If so, the markets for technology could be larger than what we observe. Since there are many unused patents, this could enhance the use of technology, and produce benefits associated with a greater utilization of technologies that would otherwise be under-exploited.

The PatVal-EU data (PatVal for short) enable us to achieve both goals. PatVal is described in detail in Giuri et al. (2007), also published in this issue. It is based on a survey of the inventors of 9017 European patents granted at the European Patent Office (EPO) between 1993 and 1998. The inventors were located in France, Germany, Italy, the Netherlands, Spain and the United Kingdom. A unique feature of our survey is that it provides information about whether the patent was licensed or not, and if not whether the inventor thought that the applicant was willing to license it. This information is usually largely unavailable, especially at the scale of this study. Furthermore, we combine the PatVal data with additional variables at patent and firm levels by drawing on other EPO datasets and on the Who Owns Whom dataset on the corporate structure of parent companies and their subsidiaries. We can then perform a comprehensive analysis of the determinants of patent licensing at the micro-level.

We divide our analysis into two steps. We first run a probit estimation of the probability to license a patent where we ignore the question of the propensity to license and focus on actual licensed patents. This is to show some plain results without the complications of the more elaborate structure of our second estimation. We discuss the main theoretical propositions in the literature on the determinants of technology licensing, and empirically test them in the same regression model. We corroborate the main theories and findings of the literature about the role of patent protection, complementary assets and the nature of knowledge. Moreover, we provide new evidence. We find that licensed patents are: (a) broader in scope; (b) correlated with measures of their economic value; (c) more likely when they are owned by smaller firms. Existing empirical studies on technology licensing rely on small samples, and focus on specific industries like computer, semiconductors, and chemicals (e.g. Grindley and Nickerson, 1996; Grindley and Teece, 1997; Hall and Ziedonis, 2001; Cesaroni, 2003; Fosfuri, 2004; Kollmer and Dowling, 2004). The cross-sector studies by Anand and Khanna (2000) and Arora and Ceccagnoli (2006) are closer to the breadth of our work. However, we employ a richer set of explanatory variables.

In our second step we estimate a Heckman-selection model. We look at the determinants of the choice to license a patent and, given that the applicant is willing to license, at what determines whether the patent is actually licensed. PatVal itself provides the motivation for this analysis. While about 11% of the PatVal patents are licensed, for another 7% the owner was willing to license but did not, which suggests that the market for patents could be almost 70% larger. This links to another important issue about patents, viz., that many of them are not used. Some of them are not used for strategic reasons ("blocking" patents, e.g. Hall and Ziedonis, 2001). But others are not used because the owner does not have the resources, or the incentives, to invest in them. For example, a survey conducted by the British Technology Group (1998) revealed that 67% of US firms own technologies that they do not use. Similarly, Rivette and Kline (2000) show that large firms are repositories of unused patents.

While strategic patents are unlikely to be licensed in any case, an active market for technology can encourage the use of "sleeping" patents (Rivette and Kline, 2000; Palomeras, 2003). As noted earlier, these patents may not be of value, and hence have no demand. Alternatively, there could be transaction costs or other barriers to technology trade that prevent this potential market from being realized. Our analysis can shed light on this issue. By estimating the determinants of licensing given that the owner wants to license, we can find which factors encourage or discourage actual licensing. We can then understand the nature of these impediments, and how and whether they can be removed. Of course, markets for technology are unlikely to eliminate all the unused patents, but they can contribute in reducing them. As a matter of fact, some assessments have suggested that there was a notable untapped market for technology in Europe around the end of the 1990s (Arora et al., 2001).

To anticipate our key results we find that there is room for increasing the actual rate of technology licensing. We show that practically all the determinants of licensing proposed by the literature (protection, generality, value, etc.) affect the willingness to license. This suggests that the technology suppliers know the characteristics of the patents that are likely to be sold. By contrast, only a few of these characteristics affect the conditional probability of an actual license. For example, we found that proxies of the value of patents or their generality do not affect the conditional probability of licensing. If they did, the reasons why a licensable patent was not licensed could simply be that the patents were not valuable or general enough, and hence had limited demand. If instead, the suppliers select more valuable or general patents for licensing, the pool of licensable patents is less discrimi-