



## French firms' strategies for protecting their intellectual property

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### ABSTRACT

In attempting to protect their innovations, firms can choose from a range of mechanisms, which may be either non-statutory (trade secrets, design complexity, and lead-time advantage over competitors) or statutory (patent, design registration, trademark, copyright). Yet, little is known about how firms do actually make their choices from among these different appropriability mechanisms. The aim of this paper is to determine how French firms' use of intellectual property protection mechanisms relates to the type of innovation, the characteristics of the market sector in which they operate, the firms' characteristics, and their human resources strategies. Our empirical model draws on four French databases covering the period 2001–2004. Our results show that the choice of a means of protection matters and emerges out of a complex strategy. Our results also reveal that the different statutory and non-statutory means of protection are complementary within their own categories but hardly so between categories.

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### 1. Introduction

The protection of intellectual property (IP) is a much debated and crucial question in economics. Patenting seems to be the most obvious protection mechanism. However, Scherer et al. (1959) and large-scale industry surveys carried out over recent decades (Levin et al., 1987; Cohen et al., 1996, 2000) show that firms improve the conditions for appropriating the returns on their innovations via different channels. These include patenting but also lead-time advantage over competitors and, moving quickly down the learning curve, secrecy, exploiting their reputation and implementing sales and services efforts (Mendonca et al., 2004). The economic literature seeks to identify which channel is the most efficient. It appears that the ranking of these strategies is not constant and varies with the sector in which the firm operates and the nature of the innovations protected. However, few studies have investigated the strategies which lead firms to use one or another of these mechanisms and the potential complementarities among them, as a single firm may use more than one means of protection. In particular, the studies oppose patenting to secrecy while ignoring the other formal or informal means of protection (Arundel, 2001). We note two main exceptions Amara et al. (2008) and Hanel (2008), although the latter fails to take into account the complementarities between the means.

Our study is original in three ways: first we are able to compare the use of seven means of protection: (i) secrecy, (ii) complexity of design, (iii) lead-time advantage (iv) patents, (v) design registration, (vi) trademarks, and (vii) copyright. Second, we test their complementarities by using a multivariate probit model. Finally, we include four types of explanatory variables that are not included together in previous studies. Thus, we test the impact of (a) the type of innovation (product, production method, logistics, support activity), (b) the market sector (demand pull, technology push, number of competitors, R&D cooperation), (c) the firm's characteristics (size, market share, R&D, group membership), and (d) the firm's human resources strategies (employee loyalty, fringe benefits, wages to reduce job mobility).

We analyse the use of protection mechanisms by innovative French firms. The study uses the fourth Community Innovation Survey (CIS4) data to provide empirical estimates of the propensity to choose one protection mechanism rather than another. The R&D database provides information on the stock of firms' research expenditure in 2001. The 2001 Annual Survey of Firms (EAE) provides us with information about the individual characteristics of firms such as size and sector. It also enables us to build indicators as to the number of competitors and market share. The DADS database compiles the annual statements of corporate data (Déclarations Annuelles des Données Sociales, DADS). This database contains information on the total amount of wages and fringe benefits the firm gives to its employees. It thus gives us information about the strategy chosen to secure employee loyalty in 2001.

Our results show that the choice of a means of protection matters and arises out of a complex strategy. Thus, non-statutory means

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of IP protection are mainly chosen by firms that cooperate in R&D and have intensive R&D activities driven by the technology-push process. These firms also develop a human resources strategy to reduce job mobility. The differentiation between secrecy, design complexity and lead-time advantage is based on the type of innovation (e.g. production method vs. support) and the size of the firm. Statutory means of IP protection are more likely to be chosen by firms with a high market share and engaging in external R&D. Our results also reveal that the different non-statutory means of protection are complementary, as are statutory means, within their own categories. However, there is little complementarity between the two categories. Thus, patenting and design registration are independent of secrecy.

The remainder of the paper is organized into five sections. Section 2 discusses the range of choice of protection mechanisms for intellectual property. Section 3 describes the model. Section 4 presents the databases and variables. Section 5 reports and discusses the results. Finally, Section 6 concludes.

## 2. The choice of IP protection mechanisms

### 2.1. The various protection mechanisms

The aim of this section is to show the diversity of the protection mechanisms available since most studies simply oppose patents to secrecy. The characteristics of these different mechanisms suggest that there are complementarities between them rather than any hierarchy among them.

There are various IP protection methods for different forms of knowledge or different protection strategies.<sup>1</sup> We can distinguish non-statutory means of IP protection from statutory mechanisms (intellectual property rights (IPR)).

#### 2.1.1. Non-statutory protection mechanism

The disadvantages of the disclosure requirement for legal protection and the fact that some knowledge (notably tacit knowledge) cannot be protected by these means lead firms to use non-statutory IP protection mechanisms too. These include (i) secrecy, (ii) product complexity, and (iii) lead-time advantage over competitors.

- (i) Trade secrets cover any information a firm may have – including formulae, devices, methods, techniques and processes – that confers an advantage over competitors lacking that information. For trade secret protection to apply, the general requirement is that reasonable efforts be undertaken to maintain secrecy. However a trade secret offers no protection against independent discovery or reverse engineering.
- (ii) Complexity of products and manufacturing processes may also provide a mechanism whereby firms can appropriate their innovations. Many products rely on the integration of a wide range of technologies, components and systems. The integration between these different technologies often requires thorough knowledge of component technologies and the ability to specify the interfaces between different sub-systems (Brusoni et al., 2001). Firms may therefore rely on the fact that the product requires considerable specialized capital investment and capabilities in manufacturing that are not easily replicated (Utterback, 1994).
- (iii) Finally, firms may choose to maintain a lead-time advantage over competitors. Lead times allow firms to gain a technological edge over the competition for a period of time (Delerue and Lejeune, 2010). This strategy consists in innovating more

quickly than one's rivals. Lead time is usually considered to be the most effective means of capturing and protecting the competitive advantages of process innovations (Harabi, 1995).

#### 2.1.2. Statutory protection mechanisms

Among IPRs, (i) patents, (ii) design registration, (iii) trademarks and (iv) copyright are the most common forms. They protect different forms of knowledge.

- (i) A patent is arguably the strongest form of IP protection. It confers on the inventor the right to exclude others from economically exploiting an innovation (by making it, using it, selling it, and so on) for a limited time.<sup>2</sup> However, the disclosure requirement generates disutilities for the patent holder that may outweigh the monopoly benefits. First, a patent highlights a presumably profitable field of technology. This enables competitors to jump onto a technological trend by conducting further research related to the patented technology. Second, publicly available patent information facilitates reverse engineering of an invention and may thus encourage rival firms to invent around a patent.<sup>3</sup>
- (ii) Design registration gives a legal right which protects the overall visual appearance of a product but does not protect what it is made from or how it works. The visual features that form the design include such things as the lines, contours, colours, shape, texture, materials and the ornamentation of the product which, when applied to the product, give it its unique appearance. You can also register a design showing the ornamentation alone e.g. a pattern to go on a product or a stylized logo. To be registrable, a design must be new and have individual character (this means the appearance of the design must be different from the appearance of other existing designs).
- (iii) A trademark is a sign, word, symbol, or device that distinguishes the goods or services of one firm from those of others. No novelty or originality is necessary, but the main requirement is distinctiveness. Trademarks are valid if they are registered. Protection of trademarks does not have a time limit, provided they are used and renewed periodically.
- (iv) As for copyrights, they protect original works of authorship. Unlike with patents, there is no novelty or usefulness requirement, although there are conditions as to originality (the work has not been copied) and authorship.

The discussion above suggests that there is a wide array of IP protection mechanisms. The economic literature tries to identify whether there is a hierarchy among the different forms of IP protection. The use of patenting versus trade secrecy is the most studied area in the theoretical and empirical literature (Hussinger, 2006; Anton and Yao, 2004; Arundel, 2001; Horstmann et al., 1985). Theoretical models (Harter, 1993; Scotchmer and Green, 1990; Horstmann et al., 1985) focus on the level of invention and identify which IP protection tool is most suitable for a particular innovation. Anton and Yao (2004) show that large inventions are protected primarily through secrecy and small inventions, which are much less imitated, through patents. Levin et al. (1987) and Arundel (2001) conclude that firms prefer secrecy over patenting to protect their IP and also that firms retrospectively consider secrecy more effective than patenting. Levin et al. (1987) show that patents are not the leading mechanism for IP appropriation. Secrecy and learning advantages are more widely used.

<sup>1</sup> Firms also use IP-based strategies increasingly for purposes other than protection against imitation.

<sup>2</sup> For most countries this time period is now 20 years from the date of filing.

<sup>3</sup> These drawbacks were limited in the United States by the use of 'submarine' patents but these no longer officially exist.

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