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Co-ownership of intellectual property: Exploring the value-appropriation and value-creation implications of co-patenting with different partners

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ABSTRACT

Combining both interview data and empirical analyses at the patent and firm levels, we explore the value-appropriation and value-creation implications of R&D collaboration resulting in the co-ownership of intellectual property (i.e. co-patents). We make an explicit distinction between three different types of co-patenting partners: intra-industry partners, inter-industry partners, and universities. Our findings indicate that the value-appropriation challenges of IP sharing are clearly evident with intra-industry co-patenting, where partners are more likely to encounter overlapping exploitation domains. Co-patenting with universities is associated with higher market value, since appropriation challenges are unlikely to play a role and collaboration may signal novel technological opportunities. Although we find some evidence that co-patenting corresponds to higher (patent) value, patents co-owned with firms are significantly less likely to receive self-citations, indicating constraints on the future exploitation and development of co-owned technologies.

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1. Introduction

The open-innovation paradigm conceives Research and Development (R&D) as an open system where firms can benefit from a variety of collaborative activities with external knowledge partners (Chesbrough, 2003, 2006). Scholars (e.g. Belderbos et al., 2004b; Cassiman and Veugelers, 2006; Chesbrough, 2003; Faems et al., 2005; Laursen and Salter, 2006) emphasize the need for inter-organizational R&D collaboration, which facilitates the synergistic blending of external and internal ideas into new products, processes and systems. At the same time, the appropriation challenges that such open-innovation models entail are being increasingly acknowledged. The more that firms collaborate with external partners, the more difficult it becomes to appropriate the outcomes of such collaborative efforts for the partners involved (Di Minin and Faems, 2013; Henkel, 2006; Chesbrough and Rosenbloom, 2002). Laursen and Salter (forthcoming)

therefore refer to the ‘paradox of openness’, which maintains that creating innovations benefits from openness while commercializing innovations requires appropriability.

In this paper, we focus on co-patenting as a potential window for investigating this openness paradox. In practice, co-patenting implies the joint ownership of collaborative outcomes. Previous research on this particular phenomenon emphasizes the disadvantages of co-patenting. Hagedoorn (2003), for instance, labels co-patenting as a second-best strategy that firms prefer to avoid. Belderbos et al. (2010) find a negative relationship between the share of co-patents in a firm’s patent portfolio and its financial performance.¹ At the same time, these studies provide evidence that co-patenting is no fading trend. The number of co-owned patents in the US increased steadily over time (Hagedoorn, 2003) and the share of European Patent Office (EPO) co-patents in the patent portfolios of R&D-intensive firms remained stable between 1996 and 2003 (Belderbos et al., 2010).

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¹ Fosfuri et al. (2012) on the other hand suggest that co-patenting may be a tool to enhance effective collusion in product markets.

In sum, whereas studies stress the disadvantages of co-patenting, we duly note that co-ownership of intellectual property (IP) remains an empirically relevant strategy for companies developing technology jointly. The purpose of this paper is to explore the role and performance implications of co-patenting in the setting of collaborative R&D activities. In particular, we focus on the potentially different implications of co-patenting with different types of collaborative partner, distinguishing between intra-industry, inter-industry and university partners. We proceed in two steps. First, in order to explore the advantages and disadvantages of IP sharing in collaborative R&D activities, we utilize interviews with 10 IP managers from large organizations engaged in R&D collaboration and co-patenting on an international level. In general, these interviews confirm that co-ownership of IP may indeed restrict firms' ability to fully appropriate the market potential of knowledge derived from collaborative R&D. At the same time, they suggest that the value-appropriation challenges of co-patents heavily depend on the type of partner involved in the collaborative activities. Finally, our interview findings suggest that *ex-ante* negotiations on co-patenting arrangements may have a beneficial impact on the value-creation dynamics in collaborative R&D.

In the second step of our study, we rely on panel data from 164 European, US, and Japanese firms to test some of the insights that emerged from our interviews. Our quantitative analyses show a significantly negative relationship between the share of co-patents with intra-industry partners and the firm's performance—which we measure as market value (Tobin's *q*). Co-patenting with universities is positively related to market value. At the patent level, we observe that co-patents on average tend to receive more patent citations. More detailed analyses reveal a strong negative partial correlation between co-patenting with firm partners and the self-citations of focal firms, whereas a positive correlation is observed between co-patenting and firms' other citations.

Together, these results suggest that, although co-owned technologies may be associated with greater value creation, individual firms may face liabilities in appropriating returns from these technologies and in deploying them in their subsequent R&D and patenting efforts. These liabilities are most pronounced in intra-industry partnerships where a high probability of overlapping exploitation domains for co-owned technologies is present. Our results are consistent with the view that appropriation issues play a more limited role in inter-industry partnerships – where exploitation domains are more likely to differ – and in partnerships with universities, which are less likely to actively engage in (competing) commercialization trajectories.

Jointly, these findings provide a nuanced perspective on the role of co-patents in addressing the openness paradox in collaborative R&D activities. At the same time, we identify important avenues for future research on joint IP ownership in open-innovation settings, emphasizing the need to further explore both the value-appropriation and value-creation implications of collaborative IP arrangements.

In the next section, we turn to existing literature and our interviews to explore the role and performance implications of co-patenting. Our data and methods are discussed in Section 3. Empirical results are presented in Section 4 followed by a discussion in Section 5.

2. Exploring the role and performance implications of co-patenting

A co-patent is a patent owned by two or more assignees. As such, co-patent arrangements are clearly different from other multi-party patent arrangements such as cross licenses, pooled patents,

and patent infringement arrangements.² In the case of co-patents, both applicants have the right to exploit the invention on their own behalf. At the same time, considerable differences between national patent offices can be observed regarding transfer of ownership and license agreements. By default, co-patents in the USPTO imply considerable degrees of freedom for the co-applicants involved: transferring ownership as well as engaging in license agreements does not imply consent from the other owners (35 U.S.C. 262 joint owners³). This means that, if company A and B are co-owners of a patent, company B has the right to license the patent to company C, a potential competitor of company A, without needing the consent of company A (Carlson and Barney, 1999; Paradiso and Pietrowski, 2009). In Europe, however, consent in the case of transferring ownership and/or engaging in license agreements is the rule rather than the exception.⁴ Contractual agreements between partners can complement and alter the default arrangements, in terms of both transfer of ownership and license agreements.

Both legal and management scholars (e.g. Hagedoorn, 2003; Paradiso and Pietrowski, 2009; Merges and Locke, 1990; Fosfuri et al., 2012) have emphasized the complexities that co-patenting entails. At the same time, when inspecting the evolution of co-patenting intensity over time, a steady increase in co-patenting is observed – coinciding broadly with the overall growth rates in patent activity (Hagedoorn, 2003). Thus, the proportion of co-patents remains stable over time (Azzaleo et al., 2012; Belderbos et al., 2010).

To address the constraints placed on internal technology development capabilities, firms rely heavily on collaboration with external partners to jointly develop new technologies (Ahuja, 2000). Because of these complexities, collaborative partners generally prefer to divide the intellectual ownership resulting from collaborative R&D among the partners involved (Hagedoorn, 2003). However, scholars have identified particular circumstances in which partners are likely to adopt joint IP ownership of collaborative R&D outputs. Hagedoorn (2003), for instance, argues that, in certain types of R&D collaboration (i.e. small scale, informal partnerships), it may be very difficult to divide the intellectual property between the partners. In such circumstances, partners are likely to rely on co-patenting as a second-best option. In addition, Teng (2007) argues that, when R&D outputs have the potential to become a core competency for one partner and when a substantial risk exists that the other partner could abuse individually-owned IP for strategic reasons, the concerned partner is likely to prefer joint IP rights to splitting the ownership in two. Finally, Hagedoorn et al. (2003) provide evidence that firms engaged in co-patenting activities in the past are more likely to adopt co-patenting with subsequent collaborative activities.⁵ This latter finding suggests that the learning experience of effectively arranging and managing co-patents makes firms more likely to employ them in subsequent collaborative efforts.

Despite the complexities and challenges of co-patenting, co-ownership of collaborative R&D outcomes occurs in particular circumstances. In order to further explore the role and performance implications of co-patenting, we first conducted interviews

² See Hagedoorn (2003) for a discussion of the legal differences between co-patenting and other multi-party patent arrangements.

³ 'In the absence of any agreement to the contrary, each of the joint owners of a patent may make, use, offer to sell, or sell the patented invention within the United States, or import the patented invention into the United States, without the consent of, and without taking account of, the other owners.'

⁴ AIPPI (2007) summary report: the impact of co-ownership of intellectual property rights on their exploitation.

⁵ Many of our sample firms engage in subsequent patenting over time, confirming the findings by Hagedoorn et al. (2003) that experience is an important determinant of co-patenting.

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