Research summary

The role of patents in open innovation and financing

1. Background

It is well recognized how cash strung young technology-based firms (TBFs) and TBFs with long R&D times have problems in attracting investors and risk capital to meet their investment needs, especially in early stages of technology and business development. The question then arises which role patents play and can play in that context and which role patents play in general. Previous research has more or less found that firms’ main motive to patent is to protect new products, although patents play a secondary if not minor role for profiting from new products compared to other means, such as speed to market and superior production and marketing. Moreover, firms continue to take out patents although most patents are never used, which has been referred to in previous research as “the patenting paradox”. Recent research results of two survey studies and one case study carried out by the authors on these issues are summarized below.

2. Patenting motives, technology strategies and open innovation

The first survey study investigated firms’ motives to patent in general, and more specifically how these motives depend upon firms’ technology commercialization strategies and level of outbound (commercialization) openness in innovation, and how large firms and SMEs differ in these respects. The survey questionnaire probed the importance of in total over 20 motives, divided into five groups (with motives for protection, bargaining, reputation, financing and internal reasons), as well as the importance of various technology strategies, including different forms of open innovation, like collaboration and licensing. The survey questionnaire was sent to the 100 largest R&D spenders among Swedish large firms and the 100 largest R&D spenders among Swedish SMEs and the overall response rate was 46%.

The results showed in line with previous research that traditional protection motives still dominated, although non-traditional motives (such as bargaining and financing motives) in addition have become important, and mostly so for SMEs and firms engaged in open innovation. An increased level of outbound open innovation in general strengthened the importance of protection and bargaining motives, and technology managers in both large firms and SMEs perceived patents as enablers of technology transfer and trade as well as for doing collaborative and joint R&D work with others. In short – more openness in innovation is related to stronger motives to patent. This finding runs counter to the not uncommon allegation that patents may stifle open innovation.

Freedom to operate (FTO) in product and service markets, sometimes referred to as market freedom to operate was the second most important individual motive for large firms and the third most important for SMEs. The related motive to patent in order to block competitors from certain technology areas was the third most important motive for large firms and an important

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motive for SMEs. This motive is related to the freedom of keeping R&D and design options open, i.e. to maintain technological flexibility or what we can also call freedom to operate in R&D. The need for FTO in R&D is probably becoming more important for a number of reasons. Technologies get more complex and products get more multi-technological ("mul-tech" rather than "hi-tech" only), which calls for more R&D to determine technological feasibility and technological readiness and more pre-product (but not necessarily pre-competitive) R&D, in turn increasing R&D costs and innovation times. At the same time many new technologies (like nanotechnologies, 3D-printing and Internet of Things) become generic or general purpose but then usually emerges with an initially uncertain range of gradually emerging applications, requiring additional R&D to explore and exploit. As a result more patenting have to take place before specific product designs can be decided, and the scope of protection of such early stage patents consequently gets less coupled to specific product designs that have to be protected.

The motive to patent in order to create retaliatory power was the fourth strongest motive for large firms as well as for SMEs. This power can be used both to reduce litigation threats from practicing entities (as opposed to patent trolls with neither production, nor R&D), and to increase both FTO and technological flexibility. Strong retaliatory power motives in an industry, like in electronic systems technologies, also tend to increase patenting, in line with a patent portfolio arms race model and the saying “there is no way to fight a patent but with a patent”.

The motives to patent in order to attract external financing in form of private equity and loans and improving the image towards investors were relatively strong among the SMEs. Still the possibilities to use patents for financing purposes are probably underutilized, despite their importance and the widespread recognition of financing needs in innovation, especially for SMEs in early innovation stages. There are many ways and conceivable business models to monetize patents and patent applications in various contractual relationships. Learning moreover takes place among investors, e.g. among venture capitalists who learn how to include patent assets in their due diligence and among customers and suppliers who may supply loans and extend credits, based on strong patent positions. Further research on the role of patents in financing is therefore called for.

This study moreover showed, based on hierarchical multiple linear regressions, that there is not a disconnect between patenting decisions and strategic decision-making as allegedly often has been the case in the past. Protection motives were stronger than bargaining motives and moreover applied to both internal and external technology exploitation strategies. The latter two strategy types may in turn be complementary, especially for large firms selling both products and product technology licenses, making bargaining motives occasionally more consequential to protection motives. The group of bargaining motives are moreover heterogeneous, with motives related to a variety of both technology acquisition and commercialization strategies, which made the results regarding bargaining motives somewhat inconclusive.

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A general finding is that patenting motives and how they are linked to various strategies have to be studied more at the level of individual motives rather than at the level of groups of motives. Traditional groupings of patenting motives into protection, bargaining, image building etc. easily disguise important differences among motives within groups, which calls for a more disaggregated analysis. Such analysis in this study revealed for example the importance of external private equity financing in particular among financing motives and the importance of image/reputation building towards investors in particular among image/reputation motives. The second survey study probes the role of patents in financing in more detail, as will be described below.

3. The importance of patents for innovation appropriation and open financing – a new view

The second survey study investigated the role of patents for capturing (appropriating) value from innovation investments or in other words the role of patents in profiting from innovation. Many influential studies on this topic have been conducted in various countries since the 1980s, and have by and large concluded that patents play a minor role for profiting from innovation. However, these previous studies have implicitly more or less assumed away open innovation and mainly looked at in-house creation and marketing of innovative products, processes and services as the main strategy for capturing value from innovation, that is a closed innovation strategy.

The results from our second survey study are based on data from three samples of Swedish TBFs, two from the first survey study described above and a third with 81 responding technology-based start-ups (out of 144 contacted, i.e. with a response rate of 56%), all in all comprising 172 Swedish TBFs. Our results showed that patents widen the range of real options beyond the closed innovation strategy that previous studies mainly had focused on. In fact, without patents firms would focus more narrowly on in-house development, production, and sales of technology-based products and services at the expense of sales of technologies and/or stock for value-capturing as well as for financial purposes. Thus, patenting seems to increase the openness in both innovation and financing. In other words patents enable and induce the use of technology markets and thereby open innovation as well as the use of financial markets and thereby what we can call open financing. This represents a new, non-obvious, and hopefully useful view on the role patents.

The results moreover showed that the importance of patents had a skew distribution with many firms rating patents as very important but with a fat tail of firms rating patents less important. This partly explains the limited importance of patents that previous studies have communicated.

Nevertheless patents do function in the traditional ways as expected, i.e. patents boost R&D, sales and sales margins, although fairly weakly. The impact of patenting is stronger on the other hand regarding boosting enterprise value and financing, especially equity financing. The latter are new roles for patents and they are, according to our empirical results, perceived by technology start-up managers to be more sensitive to patenting than the traditional roles.
Figure 1 illustrates the perceived importance of patenting for the ability of the technology based start-ups to attract equity capital, such as venture capital. The importance of patenting is here judged on the basis of answers to a counterfactual question, assuming (counterfactually) that the start-up would not have used patenting at all. The data can then be interpreted as showing that 69% of the responding start-up firms consider patents important or very important for increasing their ability to attract equity capital.

The results presented in this second study have several managerial implications. Our conceptualization of means for profiting from innovation is important for understanding the wide range of roles patenting (and other means) can play for capturing innovation value and our empirical results show that new roles might eventually be more important than traditional ones as technology markets and new financial markets develop. Moreover, managers need not only to consider if and how a patent can promote an in-house commercialization strategy, but maybe even more importantly if and how a patent can be used to promote innovation collaborations and sales of technologies and equity shares, as well as be used to back different financial instruments. In so doing, the impact upon competitiveness of a wider range of complementary strategies can be strengthened, which might be especially valuable for technology based start-ups who are still in search for viable business models. Thus, while previous research has indicated that especially small firms struggle with benefitting from patenting, this study indicates that they, or at least many of them, after all have much to lose by refraining from patenting. To our knowledge no survey study so far has been done using counterfactual analysis to assess that patents play important dual roles for both financing and profiting from innovation investments.

4. Case of patent portfolio valuation for patent-backed debt financing

The results from the two survey studies call for further research and development of patent valuation tools and patent-backed financial instruments. In a case study (anonymous here) a method was developed for the valuation of a patent portfolio with varying cash flow profiles and varying risk levels for the purpose of securitization in a case of patent backed debt financing. Different investor risk preferences could then be judged and matched with different interest rates. The method can be extended to the more complicated case of patent backed equity financing as well, although further work on this application is needed.

Finally, there is need and scope for further developments of new patent-backed financial instruments, going beyond traditional debt and equity financing, to help start-ups and TBFs more generally to cope with early stage financing. Hopefully our results will help open up an important area for further research.

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