

Abstract

(論文の内容の要旨)

Title (論文題目)

Beyond protection of invention: Economic analysis on appropriating technology
by patent collateralization and licensing

(発明の保護を超えて：特許担保融資とライセンスに関する経済分析)

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This dissertation provides an economic analysis of alternative appropriation strategies for new technologies, with a focus on the role of patents. Aiming at understanding the value of patents and the market of technology, two strategic uses of patents—collateralization and licensing—are examined using rich empirical data from China (an emerging economy) and Japan (a developed country). Patenting strategy of Chinese firms under policy incentives is also covered.

Existing literature on financing innovation focuses on the signaling effect of patenting, but not on the asset property of patents. In a collateral-backed financing deal involving transfer of ownership, liquidity should be as important as the value of collateral, if not more so. Surprisingly, studies on the management of intellectual property have not effectively examined the concept of liquidity for patent assets. A major blank is a discussion of indicators for patent liquidity despite several studies on patent value indicators. This study separates the concept of patent liquidity from patent value and identifies their influences on propensity to lend with patents as collateral. The value of patents is expressed as the maximum discounted revenue a patent can generate while the liquidity is the probability of finding a buyer who agrees to pay for the value. Drawn from existing studies on patent licensing market, particularly studies on generality, several liquidity indicators are proposed from the perspective of technology generality, technology complexity, and technology competition. Controlling the treatment effect of

firms' willingness to apply for patent-collateralized loans using PSM method, I find that patents with larger family, broader claim scope, more opposition records and simpler but widely applicable patents are more acceptable as collateral. However, a weak positive significance of IPC based on indicators of generality underlines a cautious interpretation of this widely used indicator. This study also proposes technology competition as an indicator of patent liquidity, but empirical result failed to verify this. A limitation of using patent-generate competition is that we cannot distinguish whether the players in the same field are more likely to be potential buyers, or just substitute technology providers. To further understand these problems, it is important to study licensing activities with dataset containing more specified settings of technology supply and demand, which becomes the motivation to study markets for technology using a novel dataset of licensing activities of Japanese firms.

Contrary to sparse studies of patent collateral, patent licensing is a consistently popular topic in economic and management studies. Interestingly, although the theoretical argument of licensing as a strategy often starts from a discussion of value capture, empirical studies terminate at the value capture stage. One reason is that we still lack comprehensive empirical data regarding the performance outcomes of licensing. The survey data of Japanese firms' licensing activities allowed an empirical analysis of determinants of license revenues with a wide coverage of the competition between technology suppliers, technology buyers, IP protection, and contract structure. Most importantly, this study provided empirical support of a theoretical proposition that multiple contracting helps the small technology venture capture more rent from technology transfer. On the contrary, patent protection does not show a significant contribution to license revenue. The results also provide implications on why patents of a fragmental technology field are not more acceptable as collateral, despite that liquidity shall be improved due to market thickness.

In sum, this study contributes to the literature on technology exploitation strategies other than directly profiting from selling patented products. It underlines the value of patents beyond protection of inventions.