Early Clarification of Patent Rights and Innovation: An Empirical Study of Information Provisions and Post-Grant Oppositions (*)

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A probabilistic patent, namely a patent with a significant possibility of invalidation, can hamper the innovation-enhancing role of the patent system. For example, it may allow a patentee-licensor to command a disproportionately strong power over licensees. A probabilistic patent may also fail to effectively promote the investment by a patentee-manufacturer for developing the invention. A third party may be able to reduce the problems of probabilistic patents substantially through post-grant oppositions and thereby promote innovation. This study examines such possibilities, based on the experiences of the post-grant opposition system in Japan from 1996 to 2003. We find that patents subject to post-grant oppositions are less likely to be denied validity later in infringement-related cases, meaning that third party contributions in the early stage help grant stable patent rights. Moreover, the early clarification of patent rights through post-grant oppositions promotes innovation by the patentee (as well as third parties) when the patent survives as well as by third parties when the patent is overturned.

I Introduction

There is growing concern over the deterioration of patent examination quality in major patent offices globally. The rapid expansion of patent applications as well as efforts to issue patents early have increased the burden on patent offices in the search of relevant prior art and in the evaluation of its application. This in turn has made ensuring the quality of patent examinations an increasingly challenging task. In this context, third party contributions to patent offices have increased in importance. Third parties can supply information that helps identify prior art for patent examinations and can correct wrong decisions by the patent office early in the process.

Patent examiners can make two types of errors: wrong rejections and wrong grants. The first type is likely to be corrected early since the applicant will have a strong incentive to seek a reassessment of the evidence if the judgment is based on wrong grounds. The second type is more difficult to correct since a third party has to take actions and they may not always have a strong incentive to do so. In particular, challenging the patent may put the challenger in a disadvantageous position if it happens to be valid, while invalidity may help all potential users of the technology equally (Farrell and Shapiro, 2008). In this context, the system of post-grant oppositions as well as third party observations, which do not require the disclosure of the identity of a challenger, may help avoid the error of wrong grants. Moreover, the post-grant opposition system may contribute to innovation by promoting the early clarification of patent rights. This study examines the latter point, based on the experience in Japan.

II Probabilistic Patents and Their Consequences

A probabilistic patent (Lemley and Shapiro, 2005), namely a patent with a significant possibility of invalidation, can hamper the role of a patent system in enhancing innovation. As argued by Lemley (2001), however, uniformly improving the quality of patent examinations could simply be a matter of increasing social costs because many granted patents have no value. Further, probabilistic patents may be inconsequential when there is no free rider problem in challenging the validity, no "collusive settlement" between the owner of a patent and the current (or potential) imitator, and no significant cost for developing and/or protecting the patent. In such circumstances, economically valuable invalid patents are weeded out in patent oppositions as well as in patent litigation proceedings and the royalty rate is determined in accordance with the probability of invalidation. Thus, the expected revenue for the patentee does not change even if the validity is clarified beforehand. The licensee is also not significantly affected since it faces the same expected royalty.

However, as clarified by Farrell and Shapiro (2008), weak patents (patents with a high probability of

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invalidity) can command relatively high royalties in comparison with strong patents when there exists significant free riding in the invalidation. In this case, a probabilistic patent hampers innovation by discouraging the use of technologies in the public domain and leading to a distortion of the innovation incentive.

Farrell and Shapiro (2008) focused on the case of no significant sunk cost for developing the invention and where the patentee is specialized in licensing. However, in reality, most inventions are created and developed by vertically integrated firms. In this context, a probabilistic patent can hamper innovation by the patentee by reducing the incentive for incurring the sunk cost necessary to develop the invention. If the status of invalidity is clarified beforehand, the patentee-developer can choose to incur the sunk cost of developing the invention only if the patent protection is valid. If, however, there remains a considerable probability of invalidation, the firm cannot selectively invest.

Therefore, overcoming the problem of probabilistic patents remains high on the policy agenda and a third party is expected to contribute substantially to reducing these problems and promoting innovation.

III Post-Grant Oppositions and Third Party Observations in Japan

We focus on two types of third party contributions in Japan: the third party observation system and the post-grant opposition system. The third party observation system for pre-grant applications was introduced in 1970 when the system of the automatic disclosure of patent applications within 18 months was introduced. Any person (including anonymous applicants) can submit the documents covering the publications relevant to the patentability of the pending patent application for free. The submitted information is conveyed to the applicant and made publicly available. Third parties can receive feedback on whether this information was used in the notice of reasons for refusal if they so desire. Following the abolition of the post-grant opposition system in 1996, the third party observation system has been expanded to cover all patents throughout their lifespan; that is, post-grant third party observations were newly instituted. However, the post-grant third party observation system is not particularly popular since re-examination will not be conducted on an ex-officio basis, unlike under the post-grant opposition system. Thus, this should allow us to exclude the presence of post-grant third party observations from our research; pre-grant third party observations are hereafter called third party observations.

We also focus on the post-grant opposition system introduced in 1996 and used until 2003. In Japan, the original opposition system was provided as pre-grant procedures that would allow any party to challenge a patent within three months of the date of the publication of the examined and approved application. Parallel with the abolition of the Kokoku system, namely the system of publishing oppositions, the Japan Patent Office changed its opposition regime from pre-grant to post-grant. In the post-grant opposition system, any person can challenge a grant decision of the patent office within six months of the registration for a small procedural fee. This challenge prompts the patent office to re-examine its decision. In 2004, post-grant opposition was abolished when the invalidation trials system was opened to any person in order to unify the invalidation system in Japan.

In 1995, the number of information submissions was around 1,000; however, owing to the revisions to the opposition system mentioned above, this figure increased sharply in 1996 and 2004 to reach over 7,000 by 2005. The rapid growth in third party observations in 1996 was driven by their becoming the only option available for those who want to challenge a target patent application before it is granted. Further, the abolition of post-grant oppositions in 2004 enhanced the incentive for the submission of observations since invalidation trials often take a long time and cost more, while personal appearance is also required.

The annual number of information submissions amounts to around 2% of those applications requested for examination (around 5,000 in 2003 with 240,000 examination requests, around 7,000 in 2005 with 400,000 examination requests). The patent applications that receive information submissions have significantly higher rejection rates (57% vs. 42%), while around 2% to 3% of the grants are subject to post-grant oppositions with significant proportions nullified (22% in 1996 to 35% in 2003).

IV How Post-Grant Oppositions and Third Party Observations Work

There are three important related questions in analyzing a probabilistic patent: (1) which patent (application) is more likely to be challenged by information provisions, post-grant oppositions, or invalidation trials; (2) how effective is such a challenge and which patent (application) is more likely to not qualify as a patent; and (3) how do third party contributions toward the early clarification of the patent right promote innovation? As far as the author is concerned, extant research focuses on the first issue (or both the first and the second issues), with the exception of Galasso and Schankerman's (2015) research.

Harhoff and Reitzig (2004) focused on the determinants of post-grant oppositions in Europe in the fields of biotechnology and pharmaceuticals. Lanjouw and Schankerman (2001, 2004) focused on the first issue in the context of invalidation suits in the United States. In Japan, Nakamura, Shinbo and Nagaoka (2011) found that

while the share of the patent grants subject to opposition is relatively small, patents with high technical qualities and high patenting value are targeted, as these would develop strong exclusionary powers once granted. Further, Nakamura (2010) reported that a similar tendency is observed as for third party observations in Japan.

A patent grant is also less likely to be reversed when the technical quality of the underlying invention is high, when there are more oppositions, and when more third party observations are made. Further, Nakamura (2013) found that patents that are not nullified by oppositions are likely to survive if invalidation trials are filed after the opposition takes place, suggesting that the opposition system contributes toward ensuring the stability and reliability of patent rights.

With regard to the third issue, Galasso and Schankerman (2015) analyzed the effect of patent rights on cumulative innovations, exploiting invalidation data. Their focus was on the blocking effect of the patent right. Thus, the impact on cumulative and/or complementary inventions by the patentee when the patent survives oppositions and strengthens the stability of the patent right is not taken into account. The novelty of our research is that we examine the extent to which such a challenge early in the patent grant process contributes to the stability of the patent right and to innovation by both the patentee and the outsider.

V Effects of the Early Clarification of Patent Rights: Evidence from Post-Grant Oppositions in Japan

1 Estimation Model

The early clarification of patent rights may promote innovation both by (i) enhancing follow-up and/or complementary inventions by the patentee if the patent survives despite oppositions and (ii) enhancing follow-up competitive investments by third parties if the patent is overturned early. To verify this hypothesis, we use inventor citation data, which cover not only prior art as recognized by the inventor but also those embodied in the descriptions for a patent application.

In econometric testing, we need to address the sample selection problem of opposed patents and the endogeneity of the outcome of the oppositions, both of which depend on the unobserved quality of the opposed patents. We adopt the difference-in-differences approach for this purpose. Then, we assess whether an opposition will be followed by an increase in citations by third parties (PostOtherCites) or by patentees (PostSelfCites). We compare the citation levels predicted from pre-opposition citation levels and the grant lag (defined by the difference between the reference date and the application date) with the time profile of the citation patterns for unopposed patents. Note that we calculate the reference date as the date of the final decision regarding the opposition or grant date + approximately 1.6 years and that we randomly select unopposed patents from the population that were not subject to oppositions. Furthermore, the endogeneity may result from market or technological shock. For example, more market opportunities may result in more follow-on inventions and, simultaneously, more effort for the applicant to avoid invalidation. We employ two econometric approaches to control for such endogeneity: (1) introducing cross terms between very detailed technology sector dummies (approximately 400 IPC subclasses) and grant year dummies and (2) using across-examiner heterogeneity (the "leniency" and/or "work load" of the assigned examiner) to identify the causal effect of patent rights on follow-on inventions.

The sample was constructed as follows. First, we collected patents with post-grant oppositions. Second, matched controls corresponding to the opposed patents were drawn by quota random sampling from non-opposed patents after controlling for the technology field, application year and grant year.

As a dependent variable, we use the number of forward citations by inventors received within the five-year period after the final decision of a post-grant opposition since we believe that this index reflects the number of subsequent inventions by the same patentee and/or by third parties. In the case of non-opposed patents, the five-year window starts from the year after the patent was granted because of the unavailability of the reference date (i.e., the date of the final decision of the opposition).

The two dummy variables indicating the outcome of the opposition procedure are introduced as the main independent variables: the opposition upheld dummy (taking on the value of unity if the patent was nullified by oppositions and zero otherwise) and patent survived dummy (taking on the value of unity if the patent survived after oppositions and zero otherwise). The baseline reference of these dummies comprises non-opposed patents.

2 Estimation Results

The estimation results by OLS are summarized in Table 5-2 in the main body of the paper[1]. The equations include the grant year and IPC subclass dummies as well as the listed firm dummy taking on the value of unity if the patentee is a listed company. All the variables except the dummies are in logarithmic values (1 is added if the value is 0).

PreOtherCites, PreSelfCites and Grant lag have strongly significant coefficients as expected, indicating that they work as control variables for the unobserved heterogeneity in patent quality. According to equation (2) for self-citations, the estimated coefficient of the Patent survived dummy is significantly positive, consistent with our hypothesis that the early clarification of patent rights

enhances follow-up and/or complementary inventions by the patentee for patents that survived. Interestingly, according to equation (1), for citations from third parties, the estimated coefficient of the Patent survived dummy is also significantly positive, suggesting that the early clarification of patent rights enhances inventions by third parties, too. Third parties may engage in more R&D to invent around the patent right affirmed because of strategic complementarities. Note that there is a theoretical possibility that the survival of the patent may discourage competing R&D because the existence of the patent right restricts the freedom of R&D and increases the risk of infringement.

The Opposition upheld dummy has a significantly positive impact on citations by third parties, suggesting that a nullification of the patent spurs them to invest in inventions complementary to the invalidated patents, as expected. As shown in equation (2), it is not significantly negative for the patentee. On the one hand, following the invalidation, the patentee might be forced to cut R&D that is complementary to the invalidated patent. On the other hand, the invalidation may also push the patentee to obtain patents closely related to the invalidated patent in order to make up for the loss of the patent.

To summarize, the survival of the patent affects the patentee and outsiders symmetrically, while the invalidation of the patent affects the patentee and outsiders asymmetrically. The early clarification of patent rights through third party contributions promotes innovation by the patentee (as well as third parties) when the patent survives and promotes innovation by third parties when the patent is overturned.

VI Conclusions

Although a probabilistic patent can hamper the role of a patent system in enhancing innovation, uniformly improving the quality of patent examinations could simply be a matter of increasing social costs (Lemley, 2001). Therefore, third party contributions to patent offices have increased in importance, as is evident in the re-introduction of the post-grant opposition system in Japan in 2014. To add systematic evidence on the role of third party contributions in the patent system, we examined how such contributions are used and analyzed whether the early clarification of patent rights by post-grant oppositions promotes innovation.

By using Japanese patent data, we found that post-grant oppositions can help the patent office avoid the error of the wrong grants of patents. Further, the early clarification of patent rights through post-grant oppositions promotes innovation not only by outsiders, but also by patentees themselves. Our analysis thus supports the re-introduction of an opposition procedure against patents in Japan. To effectively use third party contributions, incentive schemes for the early submission of information (e.g., under anonymity) would be important since a firm may wish to withhold information until future litigation, while ignoring the invalid patent itself.

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[1] The Hausman pretest does not reject the null hypothesis of exogeneity.