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The Effect of Voluntary Patent Disclosures

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Abstract. A firm's voluntary patent disclosure is important to reduce the level of information asymmetry and to announce the success of innovative activities to the stock market. In Korea, the patent disclosures were changed from mandatory to voluntary after the Capital market integration act of Korea which was executed on February 3, 2009; therefore, in terms of strategic management, this leaves firms to continue using patent disclosures in their own way. Previous studies, however, have only focused on evaluating the granting of patents but not on the importance of disclosing them to the public. To emphasize the activity of patent disclosure this study investigated the difference between the market reactions to the firms' patent disclosure activity. This study is one of the first studies to empirically demonstrate the effectiveness of disclosures with both disclosed and non-disclosed patents samples. Using event study methodology, we examine whether the stock market reacts to voluntary patent disclosures or not. The results show that, in case of KOSDAQ-listed companies, there is a statistically significant positive reaction 'only' to the firms who disclosed their patents. These empirical findings show that firms can use voluntary disclosure of patents to manage their stock prices strategically. This study can help managers recognize the importance of disclosure activity, and it indicates that managers should try to announce the success of their research and development investment by disclosure actively and strategically.

Keywords: Innovations, Business information management, Voluntary disclosures, Patent disclosure, Market reaction, Event-study methodology.

1. Introduction

Since Schumpeter(1939)[1] claimed that technology is an endogenous phenomena rather than the result of external shocks, innovation has long been considered a crucial activity for a firm's survival and their market power. Indeed, many previous studies have revealed that innovative activities and research and development(R&D) related to disclosures affect the market value of the firms[4], [6], [8], [16], [17]. Especially since patents have been a useful indicator of a firm's innovative capability and market competitiveness, patent statistics are recognized as the indicator that easily conveys the information of firm's R&D activities to external investors[5]. Also, several studies have found that voluntary disclosures alleviate the information asymmetry between managers and investors[15], [21].

Hence, it is reasonable to expect that investors could consider patent disclosure as important information for funding. Many studies show that holding granted patents and their disclosure positively influence a firm's value[2], [3], [20]. Previous studies, however, have only focused on the value of patents or only disclosed patent so that they may show the value of granted patents but are limit in determining the value of patent disclosure itself. In Korea, as Capital Market Integration Act(CMIA) was passed in February 2009 with the aim to deregulation and protection of investors on financial market, the disclosure regulation framework was changed significantly and patent disclosures were converted from mandatory to voluntary. With this huge change in disclosure regulation, it is really important to determine whether firms should announce the granting of patents or not. Thus, among innovation-related disclosures, this study focuses on patent disclosure as a successful performance of R&D and examines the relationship between patent disclosure activity and the market value of a firm.

The structure of this study is as follows: Section 2 provides literature review and motivates our hypotheses. Section 3 provides the data source, and describes the sample selection used in this study. In section 4, we describe the empirical results. Section 5 summarizes and concludes the paper.

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2. Theoretical Development

2.1. Patent Disclosures

The innovation-relevant financial data required to be disclosed in financial reports is only periodic R&D expenditures of firms. It is missed, however, the information about the nature of a firm's innovative activities and output[12]. By comparison, patents have been used as an indicator of a firm's innovative activities' outcome, and they also provide a legal technology monopoly.

There are also several reasons to investigate the patent disclosures. First, while leading nonfinancial information is strongly related to stock prices[10], patent disclosures are relatively infrequent and unpredictable[20]. Second, there is value-raising effect on firms which have the patents. Connolly et al(1988)[3] showed that, in the case of Fortune 500 companies, each increase of unexpected patents raise firm-value approximately 5 million dollars. Third, patent disclosures are readily identifiable in event time so they can facilitate disclosure-relevant studies[20]. Therefore, patent disclosure is suitable to test the effectiveness of voluntary disclosures.

2.2. Voluntary Disclosures

Unlike mandatory disclosure, voluntary disclosures have the effect of reducing information asymmetry [15], [21]. Many studies have investigated and found that voluntary disclosure frequency is negatively related to the dispersion of analysts' earnings forecasts [13], [18], [21] and it is positively related to the number of analysts following a firm[15], [21], [25]. For this reason, companies have been encouraged to voluntarily disclose patents through government's systems more and more. Therefore, we expect stock markets to reward firms that voluntarily disclose (in our case, the patent disclosure). Thus, we anticipate that if firms disclose granted patents, the market naturally reacts to the announcements.

2.3. Firm size and Voluntary Disclosures

Firm size has long been used as a proxy for information asymmetry [14], [23], and studies have documented that the information asymmetry is greater in smaller firms[7], [24]. Moreover, Im et al(2001)[16] proved that the small companies can leverage the consequence of innovation investment and have greater rewards from investments than larger firms. Consequently, the effectiveness of patent disclosure is thought to be high on small firms and its vitalization is more needed in case of smaller firms at this point. In Korean stock market, small firms have a tendency to be listed in the KOSDAQ market.

2.4. Theoretical Model

According to the literature, the granting of a patent is positive news to the market[3], [5]. The patent disclosure, however, is not obligatory in Korea. If there is no significant difference whether a patent is disclosed or not, firms may not have to make much effort to disclose their patents. Hence, the expectation is as follows:

H1: Stock prices react positively to the voluntary disclosed patents.

H2: Stock prices do not react to the non-disclosed patents.

These hypotheses are summarized in Fig.1

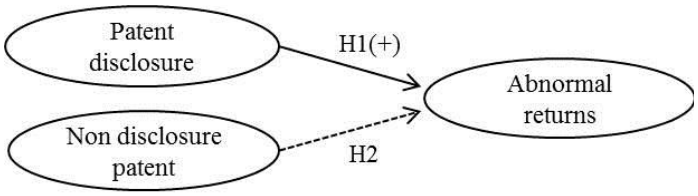

Fig. 1: Research model

3. Research Method

3.1. Sample

Based on the literature, the efficiency of patent announcement is expected to be high for small firms. In Korea, smaller firms tend to be listed on the KOSDAQ market, thus, we sampled patents and their disclosures by KOSDAQ-listed firms.

The total patent data of KOSDAQ-listed firms are collected from February 4, 2009 to June 2012 using Korea Intellectual Property Rights Information Service(KIPRIS) which is patent office's search program contains information concerning all patents granted in Korea. This work was very tedious and labor intensive. Then we matched the data with information from the Korea Exchange(KRX) which is a corporate e-disclosure system to distinguish disclosures and non-disclosures.

After the matching process, we analysed the data using the event study method to investigate the stock market's reaction to two different activities that disclosing or not disclosing. The Stock price data is obtained from DataGuide which is a well-known program providing economic data in Korea.

Stocks, designated as administrative issues, warning on investment or issued by deleted or unfaithful disclosure corporations, were ruled out the sample objects. Among the remaining objects, over 8,600 non-disclosed patents with the patent office and 2,500 voluntarily disclosed patents after CMIA, a total of 1,699 non-disclosed patents from 367 companies, and a total of 1,142 voluntary disclosed patent from 253 companies were selected as our sample based on the following sampling criteria:

- Only granted patent disclosures were included
- Events for which we could not get stock information on the DataGuide were excluded.
- Observations which overlapped during the window period were eliminated.
- Multiple disclosures on the same day were excluded. Chaney et al(1992)[8] reported that announcement of the introduction of multiple products leads to a more positive stock return than those announcing a single product, therefore, if we includes the events of more than two disclosures in a day, there could be a differential market reaction to multiple and single disclosures.
- Disclosures which might be confounded by any other types of announcements(e.g. dividends, earning announcements, capital increase without consideration, equity offerings, etc.) around the announcement period were excluded[16], [20].

3.2. Event Study Methodology

The event study methodology is powerful tool for management researchers in examining consensus estimates of future benefit streams[11]. This is well accepted and has been used to assess the financial impact of many kinds of firm's actions[9].

In this study, we employed the event study method to investigate the market impact of patent disclosure activity by firms. Based on the literature, we use a 4 day (0, +3) event window and a 200 day (-201, -2) estimation period. These periods are illustrated in Fig.2

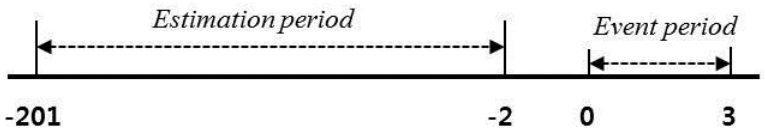

Fig. 2: Estimation and event period

4. Results

We estimated the cumulative abnormal returns(CARs) for both the voluntarily disclosed patents and non-disclosed patents using the STATA program. This program was run to estimate the CARs and testing whether they were different from zero.

Table 1. Market Response to Disclosure/Non-disclosure of patent

window period	Disclosure (n=253)		Non-disclosure (n=367)	
	Coefficient Estimates	t-statistics	Coefficient Estimates	t-statistics
(-5, 0)	0.00605	0.89	0.00729	1.29
(-2, 0)	0.00598	1.34	0.00387	0.99
(-1, 0)	0.00539	1.66*	0.00155	0.52
(-1, 1)	0.00945	2.31**	0.00221	0.62
(0, 1)	0.00739	2.23**	0.00232	0.81
(0, 3)	0.01004	1.75*	0.00027	0.06
(0, 5)	0.00945	1.22	0.00235	0.38

**, * indicates statistical significance at the 0.01 and 0.1 level, respectively

The CARs, observed for both the samples and the test consequences for significance of the effect, are presented in Table 1. The results indicate that the CARs of the firms who were voluntarily disclosing patents are positive and significant at the event windows that (-1,0), (-1,1), (0,1) and (0,3). This confirm that the significant effect of disclosures lasts for 4 days from the disclosure day. In contrast, there is no effect on the event of the non-disclosed patents for all estimation window lengths as we expected. Also, the result shows the price reaction before the disclosure day which is the signal of information leakage, and similar conclusion is revealed by Brunnermeier(2005)[19] who examined the existence of effect of information leakage.

5. Conclusion

Previous researchers have studied announcements of innovation activities with multiple perspectives to understand their consequences[16], [22]. On the other hand, the studies related to the announcement of granted patents are relatively fewer than others. In addition, those studies seem to implicitly assume that there is an effect of disclosure activity because they only use samples of firms who voluntarily disclose patents then concluded that the market recognize the patent value [20].

For giving evidence and emphasizing the importance of disclosure activity, this study samples both non-disclosed patents and disclosed patents, and examined stock market reaction to disclosure activity using event study methodology. The results show that stock prices react positively and significantly to voluntary patent disclosures, additionally, if firms do not disclose their patents, they could not earn excess return even though they got patents.

The Korean government has been encouraging firms to voluntarily disclose their private information [21]. This study contributes to managers recognize the importance of voluntary patent disclosures, thereby supporting the existing patent system. We further examine the factors influencing this effect with cross-sectional regression models.

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