The Stock Market Reaction to the Disclosure of R&D Expenditure in Chinese Companies

Hao Lei*, Xueyuan (Adrian) Liu
Economics and Management School
Wuhan University, China
***EMAIL: leihaowhu@gmail.com**

Abstract: In order to strengthen the competitiveness in world market, the Chinese government takes many measures to promote technical research and innovation. One of the most important financial incentives is tax abatement for authenticated high and new technology companies. The purpose of this paper is to investigate how the market responds to the identification of hi-tech company by the government. Our finding is that the market responds positively to the tax abatement but not to the disclosure of intensive R&D expenditure.

Keywords: High and New Technology Company, R&D Expenditure; Event Study; China

I. Research Background

Although China is called "world factory", Chinese manufacturers are weak in product innovation capability and core competence. An important reason is that Chinese companies invest little resource in technology innovation. R&D expenditure accounts for 1.54% of GDP in 2009, and R&D investment from private sectors takes only about 60% to 70% in total amount. Chinese companies invest less than 1.5% of their revenue each year according to many sources of government statistics. This rate is very low compared with companies in developed countries.

In order to strengthen the competitiveness in world market, Chinese companies need to enhance independent innovation ability, increase investments in technological R&D, master a host of core technologies in some key fields and possess a number of independent Intellectual Property Rights. The Chinese government takes many measures to promote technical research and innovation. Financial stimulation is offered to encourage companies to increase R&D expenditure. For example, in 2008 the new Enterprise Income Tax Law allows an enterprise deduct additionally R&D expenditure in the calculation of the taxable income amount. More importantly, the new tax law gives tax abatement to high and new technology companies. The income tax for hi-tech enterprises is cut to 15% instead of 25% for other enterprises.

So who can benefit from the tax abatement? In April 2008, the central government issued a rule for the identification and designation of high and new technology enterprises. To be certified as high and new technology company, a company needs to meet several conditions including R&D expenditure and product type. Annual R&D expenditure should account for more than 6% of revenue for companies with revenue less than 50 million RMB, and 4% of revenue for those with revenue in between 50 and 200 million. For companies with revenue more than 200 million, annual R&D expenditure should account for more than 3% of revenue. Furthermore, the certified company must belong to the industry fields supported by central government. These fields include: electronic information technology, biological and new pharmaceutical technology, aviation and aerospace technology, new material technology, high technology service, new energy and energy saving technology, resource and environmental technology, and the adoption of high and new technology for transformation of traditional industries.

II. Research Question

The emphasis and encouragement of technology innovation from the government raises the question of whether the market respond positively on hi-tech companies and their R&D activities. Previous studies suggest that investors view R&D expenditures as investments that are expected to produce future benefits. Sougiannis indicate that firms' market values are positively related to R&D expenditure [1]. Chan found that changes in market values are positively related both to innovations in R&D expenditures and to announcements related to R&D activity [2].

However, companies are not obliged to record their R&D expenditure in financial statements in China. And companies seldom report their R&D expenditure. So we do not know how much does a company invest in R&D each year. We do not know the effect of R&D expenditure on profit of the company.

The identification of hi-tech company by the government gives companies a chance to improve their public image as a promising company with advanced technology. Furthermore, the announcement of hi-tech authentication reveals new information about a company's R&D expenditure which is higher (from 3% to 6% of revenue) than expected (less than 1.5% on average). According to the Efficient Market Hypothesis, the stock price should respond quickly to this information.

The purpose of this paper is to investigate how the market responds to the identification of hi-tech company by the government, and find reasons of why it happens.

III. Research Methodology

We use the event-study methodology to estimate the market reaction. This methodology provides a rigorous approach to estimate the market reaction to announcements [3][4].

The event in our research is the announcement by a company of its hi-tech authentication from governments. This announcement has two major meanings. One is that the company is a hi-tech company authenticated by the government, and thus can enjoy enterprise income tax abatement from 25% to 15%. Another meaning is that the company has intensive investment in research and development activity. So we must analyze carefully how the market respond to this event.

We randomly choose 40 companies listed in Shanghai and Shenzhen Stock Exchanges. They belong to different industry sectors including machinery, pharmacy, petrochemical, textile, metalwork, beverage, and etc. These companies are identified as hi-tech companies in the period between October 2008 and February 2009. The event day (day 0) in our research is the date the company announced its certification of hi-and-new technology company by the government. We use dates between -115 and -16 as estimation period, and dates between -15 and 15 as event period. The reason we choose 15 days before announcement as beginning of event period is because there is usually 15 days of Public notice and objection period for authentication by the government.

We use market model to compute the expected return in the event period. The market return is the Shenzhen Component Index. It is commonly known that Shenzhen index is more closely to the average market return than the Shanghai index.

The parameters are estimated by Ordinary Least Square method.

$$E(\hat{R}_{iE}) = \hat{\alpha}_i + \hat{\beta}_i R_{mE} \quad (1)$$

The abnormal return of stock i in the event period AR_{iE} :

$$AR_{iE} = R_{iE} - E(\hat{R}_{iE}) \quad (2)$$

Average abnormal return (AAR):

$$AAR_E = \frac{1}{N}\sum_{i=1}^{N} AR_{iE} \quad (3)$$

Cumulative average abnormal return (CAAR):

$$CAAR(\tau_1, \tau_2) = \sum_{E=\tau_1}^{\tau_2} AAR_E \quad (4)$$

We also calculated the standardized abnormal returns [9]. The formula for the standardized abnormal return of stock i (SAR_{iE}) is :

$$SAR_{iE} = \frac{AR_{iE}}{\hat{S}_i \sqrt{1 + \frac{1}{T_i} + \frac{(R_{mE} - \overline{R}_{mi})^2}{\sum_{j=t_1}^{t_2}(R_{mj} - \overline{R}_{mi})^2}}} \quad (5)$$

Result of the calculation is shown in table 1.

IV.Result and Analysis

As shown in figure 1 and figure 2, the announcement by the company as a high and new technology company has created significant positive abnormal return for investors. The cumulative average abnormal return is about 5% (in between 4% to 6%) during announcement day and 15 days after. Five percent positive return above the market in fifteen days seems a sound investment for investors. Can we conclude therefore that market respond efficiently to R&D investment by companies?

Let us calculate what a company can benefit from the certification of high and new technology company. According to the new Enterprise Income Tax Law, the income tax for hi-tech companies is cut to 15% from 25% for all companies. This would bring 13.3% increase in earnings per share. But these rates are only nominal tax rate. Companies enjoy many tax abatements based on their locations and industry sector. For example, companies in western China may enjoy low tax rates than those in eastern China.

To calculate the real effect of tax abatement for hi-tech companies, we compare the real tax rates of hi-tech companies with those of the control group (table 2). The companies in the control group are those belonging to the same industry but not been identified as hi-tech by the government.

As shown in the table 2, in year 2007 and 2008, tax rates for both hi-tech and non-hi-tech companies are very close. The tax in 2008 decreased for about 3% for both group because the new enterprise income tax law implement in 2008 cuts tax from 33% to 25% for all companies in Chinese territory. In 2009, the real tax for hi-tech company are lower than that of non-hi-tech company for about 3% percent. This could bring about 4.3% increase in earnings per share. But the figure of 3% advantage is calculated one year after a company announced its hi-tech certification. The market

knew at the event time only the 10% nominal tax abatement, and could not infer the real scale of tax cut.

As we said before, the announcement of hi-tech authentication has two major meanings. One is that the company is a hi-tech company and thus can enjoy tax abatement. Another meaning is that the company has intensive investment in research and development activity. Since the tax abatement would bring either 13.3% (counted by nominal tax cut) or 4.3% (counted by real tax cut) increase in earnings per share, we can roughly infer that the stock market reflects (by 5% abnormal return) the benefit of tax abatement for hi-tech companies.

Therefore, we can conclude that the market does not respond significantly to the information revealing the intensive R&D investment by the certified companies: about 3% to 6% of revenue against 1.5% the average companies. The revealing of high R&D investment did not change the company's future profit forecast by the market in the short term.

The reason why the market does not respond significantly might because the Chinese stock is not a efficient market. Although earlier researchers thought Chinese stock market is weakly efficient [5], more recent researches refuted that opinion. There is still debate on the efficiency of Chinese stock market. After all, Chinese stock market has only a history of 20 years. It is still in the early stage compared with the mature markets in western countries.

However, this research is consistent with previous research in western countries showing that investors misreact to R&D activities of companies. Several researches have revealed that market is slow to incorporate the information contained in company decision such as R&D investment. For example, Lev and Sougiannis (1996) , Chan et al. (2001) , and Chambers (2002) report a positive association between R&D investment and subsequent excess returns[6][7][8]. These research concluded that investors understate the earnings of R&D expenditure by companies. In the short term the stock prices of companies do not respond significantly to the information that companies increase R&D expenditures. This would induce significant excessive return from these stocks in the long term.

In conclusion, our research finds that market respond positively to the authentication of hi-tech companies. But this is only because it can bring tax abatement for those companies. The market has no significant response immediately to the disclosure of the information that these companies have higher R&D investment than average firms. This might be caused by the risks accompanying the R&D investment.

Reference

[1] Sougiannis, T. (1994). "The Accounting Based Valuation of Corporate R&D." *The Accounting Review* 69, 44–68.

[2] Chan, S., J. Martin and J. Kensinger. (1990). "Corporate Research and Development Expenditures and Share Value." *Journal of Financial Economics* 26, 255–276.

[3] Brown, S., Warner, J., 1985. Using daily stock returns: the case of event studies. Journal of Financial Economics 14, 3–31.

[4] MacKinlay, A., 1997. Event studies in finance and economics. Journal of Economic Literature 35, 13–39.

[5] Wu Shilong, "Analysis of the efficiency of Chinese Stock Market", 1996, Economics Research Journal,4, 13-19, in Chinese.

[6] Lev, B. and T. Sougiannis. (1996). "The Capitalization, Amortization and Value-relevance of R&D." Journal of Accounting and Economics 21, 107–138.

[7] Chan, L. K. C., J. Lakonishok and T. Sougiannis. (2001). "The Stock Market Valuation of Research and Development Expenditures." Forthcoming, Journal of Finance.

[8] Chambers, D., Jennings, R., THOMPSON II, R. B. 2002 "Excess Returns to R&D-Intensive Firms", Review of Accounting Studies, 7, 133–158, 2002

[9] Pattel,J.M., 1976. "Corporate forecasts of earnings per share and stock price behavior: Empirical tests", Journal of Accounting Research,14,pp.246-276,

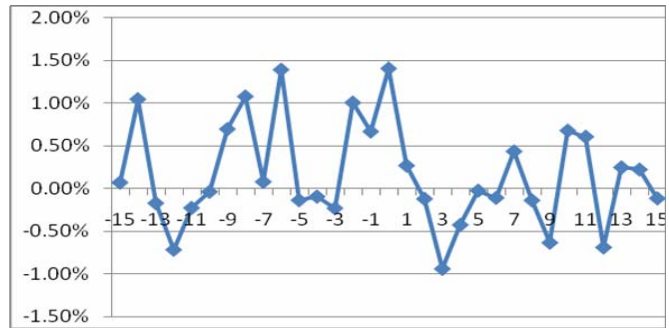

Figure 1 average abnormal return (AAR) in the event period

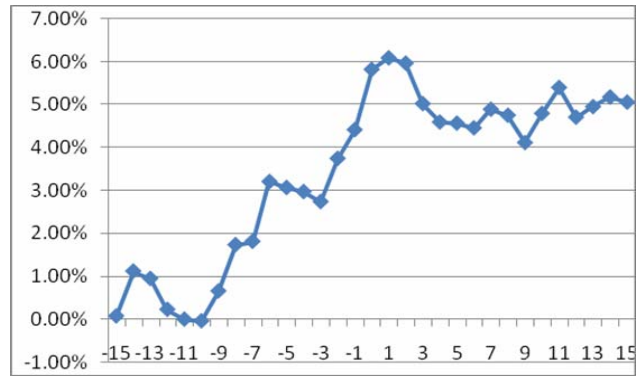

Figure 2 cumulative average abnormal return (CAAR) in the event period

Table 1 standardized abnormal returns in the event period

Event day	total sar (TSAR)	tsar z-statistics	tsar p-value	cumulative tsar (ctsar)	ctsar z-statistic	ctsar p-value
-15	-1.020	-0.160	0.873	-1.020	-0.160	0.873
-14	12.540	1.960	**0.050**	11.520	1.270	0.202
-13	-0.270	-0.040	0.967	11.250	1.020	0.309

-12	-8.120	-1.270	0.204	3.130	0.240	0.807
-11	-3.040	-0.480	0.634	0.090	0.010	0.995
-10	1.760	0.280	0.783	1.850	0.120	0.906
-9	11.790	1.840	0.065	13.640	0.810	0.420
-8	17.470	2.730	**0.006**	31.100	1.720	0.085
-7	2.620	0.410	0.682	33.720	1.760	0.079
-6	20.300	3.180	**0.001**	54.020	2.670	**0.008**
-5	1.200	0.190	0.851	55.220	2.610	**0.009**
-4	-2.020	-0.320	0.752	53.210	2.400	**0.016**
-3	-1.880	-0.290	0.769	51.330	2.230	**0.026**
-2	16.670	2.610	**0.009**	68.000	2.840	**0.004**
-1	10.200	1.600	0.110	78.210	3.160	**0.002**
0	20.350	3.180	**0.001**	98.550	3.860	**0.000**
1	5.590	0.870	0.382	104.140	3.950	**0.000**
2	0.620	0.100	0.923	104.770	3.860	**0.000**
3	-16.220	-2.540	**0.011**	88.540	3.180	**0.001**
4	-5.640	-0.880	0.377	82.900	2.900	**0.004**
5	2.660	0.420	0.677	85.560	2.920	**0.003**
6	-2.970	-0.460	0.642	82.590	2.760	**0.006**
7	6.710	1.050	0.293	89.310	2.910	**0.004**
8	-1.650	-0.260	0.796	87.650	2.800	**0.005**
9	-10.190	-1.590	0.111	77.470	2.420	**0.015**
10	9.350	1.460	0.143	86.820	2.660	**0.008**
11	12.850	2.010	**0.044**	99.660	3.000	**0.003**
12	-7.880	-1.230	0.218	91.790	2.710	**0.007**
13	4.160	0.650	0.515	95.950	2.790	**0.005**
14	3.910	0.610	0.541	99.860	2.850	**0.004**
15	-3.210	-0.500	0.616	96.650	2.720	**0.007**

Table 2 real tax rates of hi-tech and non-hi-tech companies

Year	Average tax rate	
	Hi-tech company	Non-hi-tech company
2007	20.65%	21.51%
2008	17.46%	17.32%
2009	13.94%	17.11%