从产业效应的角度对上市公司并购高技术企业的绩效研究：

1999 到 2006 年上海和深圳股票市场数据的实证分析

摘要：过去几年里，在中国的传统产业中，越来越多的上市公司选择并购高技术企业。同时，高技术企业也利用这种机遇寻找融资。本文就是要研究这种现象。

首先，我们分析了上市公司并购高技术企业的动机，并用自组织理论分析并购的过程和机制。然后，我们从上海和深圳证券交易所选取 113 个样本用因子分析的方法做出实证研究。通过包含托宾 q 值和排除托宾 q 值的因子分析，我们的分析中就包含了上市公司在并购前后的绩效表现。我们也研究了产业效应对并购绩效的影响。

最后，我们分析了梳理产业周期理论的检测结果，并且得出以下结论：当产业处于成长期和成熟期阶段的时候，并购前后的经营绩效具有显著的差异。我们建议上市公司应该选择并购那些处于成长期和成熟期的高技术企业，这样才有更多的机会获得产业效应。

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Research on the Performance of Public Companies M&A High-Tech Enterprisesfrom the Perspective of Industrial Effect: Positive Analysis of Data ofShanghai and Shenzhen Stock Market from 1999 to 2006

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Abstract：For the past few years, more and more public companies in traditional industries in China merged with or acquired high-tech enterprises. Meanwhile, high-tech enterprises also took advantage of this opportunity to seek financing. This paper is to study this phenomenon.

Firstly, we analyze the motivation of public companies merging with and acquiring (M&A) high-tech enterprises, and the M&A process and mechanism using the Self-Organizing Theory. Then we make a positive analysis of the 113 samples selected from Shanghai and Shenzhen Stock Exchange with factor analysis. Through factor analysis including or excluding Tobin's Q, we comprise the performance of public companies before and after M&A process. We also study the impact of industrial effect on M&A performance.

At last, we analyze the test results combing Industry Cycle Theory and conclude that there are significant differences in business performance between before and after M&A process when the industry is in the growth phase and maturation phase. We suggest public companies choose to M&A the high-tech enterprises which are in the growth phase or maturation phase of the industry cycle so that they could have more chances to gain the industrial effect.

0. Introduction

Figure 1: Scatter diagram of relationship between labor productivity and density of non-agricultural population Figure 2: Scatter diagram of relationship between labor productivity and density of non-agricultural population The research of this paper is based on the above phenomena. With the number of cases about public companies M&A high-tech enterprises continually growing, we should consider whether the profitability improves after the M&A performance. This paper carries out research on the issues that discuss whether post-M&A performance is affected by the different industry environment and industry cycle of the high-tech enterprises and the external economic environment.

In addition, the majority of the past positive analyses of M&A performance `are almost merely based on financial indicators. But public companies M&A high-tech enterprises is a special phenomenon among all the M&A cases. Is it appropriate to assess the impact of M&A process between public companies and high-tech enterprises just by financial indicators? Public companies M&A high-tech enterprises is to improve its profitability as well as to enter a new industry area, achieving industrial innovation. This paper attempts to study the M&A performance of public companies from the perspective of industrial effect and analyze the impact of industrial effect on the post-M&A performance. We hope to obtain some useful revelations.

1. Literature Review

1.1 Review of Research Methods of M&A Performance

M&A performance is M&A formation's factual reflection of economic benefit. It includes financial and non-financial effect. Financial effect is the change in efficiency of the company's business performance caused by the M&A process. Non-financial effect is the change in company's core competence caused by the M&A process. M&A performance of corporations has become a dependent research field. Through the effort of near a century, theorists have created perfect theoretic systems from various perspectives of M&A performance and formed some unique research methods. We summarize them as three main methods.

1.1.1 Event-Study Methodology of Stock Market

Event-study methodology was first put forward by Fama, Jensen and Roll in 1969. It is one of the most commonly used methods in the assessment of M&A performance. Event-study methodology believes the impact on a research object caused by a specific event will manifest the result in form of change of stock price, and its level of impact can be measured with a non-normal return. Before the reform of non-tradable shares, outstanding shares in the stock market merely accounted for 33%. The magnitude of stock price manipulation was severe. The market had been aware of M&A process even before the information was officially released. Speculation was common in the stock market. The price of outstanding shares greatly deviated from the company's factual business performance. Besides, it is not likely for M&A performance to manifest all the impacts shortly after the M&A process. Thus, it is not proper to assess the M&A performance of

Chinese corporations' M&A process only by this single method.

1.1.2 Comparative Analysis of Business Performance

Comparative analysis of business performance is also known as accounting event-study methodology. It is often used for M&A performance's long term assessment. Basing on companies' financial reports and statistics, this method assesses the change in business performance caused by M&A process, with financial reports and data given by the company, vertically comparing profitability, debt paying ability, assets management capability, market share, level of cash flow and other business performance and laterally comparing with enterprises in the same industry. If event-study of stock market concerns price change of company's stock caused by M&A process, then comparative analysis of business performance cares more about changes in financial condition and operation condition caused by M&A. Basing on comparative analysis of business performance, the research of this paper attempts to assess the industrial effect of the M&A process between public companies and high-tech enterprises from the perspective of basic financial indicators and the indicator of Tobin's Q.

1.1.3 Case Analysis

Case analysis is a newly developed method for M&A performance research. This method is to analyze some single case, to seek explanations for the case and observe the dynamic change of the company's performance caused by M&A process and assess the impact of the event on condition that accurate judgment of the impact of M&A process is not possible. Case analysis is actually a unique study method, which traces a specific case and studies the impact of the case.

1.2 Review of Positive Analysis of M&A Performance

Chinese and foreign scholars have made wide and in-depth researches on M&A based on the above research methods. Mueller's(1980) research found that in Belgium, Germany, Britain and the U.S, the business performance of the acquirer and target company both improved, but cases in France, Sweden and Netherland showed the opposite results. Herly, Pulepu and Rubuck's(1992) studied the 50 largest M&A cases in the U.S during 1979-1984. They found that these companies' return on assets greatly improved after the industry adjustment. However, Agrawal, Jaffe's(1992) research's conclusion was the opposite. After investigating 937 M&A cases in the U.S, Agrawal and Jaffe came to a conclusion: 5 years after the M&A, an average of 10% of wealth was lost. Franks and Harris (1989) studied 1800 M&A cases during 1955-1985. They found that shareholders of target companies obtained an average of 25% returns but shareholders of the acquirer obtained a near-to-zero return. Synthesizing 13 research papers' results, Jensen and Rubuck (1984) draw a conclusion that a successful merger and acquisition dealing respectively brought an excessive return of nearly 20% and 30% to the shareholders of target companies, but shareholders of the acquirer could not obtain a notable excessive return in merger dealings, and they could only obtain a 4% excessive return in acquisition dealings. Bruner (2002) made a comprehensive analysis of 130 classic research papers published in 1971-2001 and also came to a

conclusion that the return on equity of target companies was far higher than that of the acquirer. The stock price of target companies usually had a substantial rise, yielding an excessive return of 10%-30%, when that of the acquirer was unclear, even had a negative tide. Though there are differences in research method, sample selecting, standard for business performance assessment, and the conclusions of the impact of M&A process, most researches especially that based on a large scale of samples come to conclusions that M&A process is able to produce value for the target company but would hardly exert the same impact on the acquirer.

Many Chinese scholars also made a great amount of positive analyses of public companies' M&A performance. Because the stock market in China is not normative enough, the stock prices are usually not very tightly related to the companies' business performance. Hence, Chinese scholars tend to measure the impact of M&A process on the basis of financial data. Tan Xiangqiu

(1999) did a research on the 198 cases of reshuffle of enterprises at Shanghai Stock Exchange in 1997 and established a post-assets-reshuffle performance assessment system which includes main business profit margin, return on equity, assets-liabilities ratio, main business vivid rate and other five indicators. The conclusion of this research is that corporations that merge and expand will lead to a business performance decline, public companies that transfer its equity will make improvement on business conditions, public companies that strip off non-performing assets, sell equity and replace assets will make considerable improvement on business performance. Wang Yuetang (1999) did a classification on the 172 cases of single assets-reshuffle before May, 1985 from the perspective of related parties' relationship. His research shows that related parties' assets-reshuffle is more likely to manipulate financial reports than non-related parties' and related parties' assets-replacing rate is much higher than non-related parties', though their performance is not necessary better than that of non-related parties'. Lu Guoqing (2000) made a comparison between the different types of assets-reshuffle of companies at Shanghai Stock Exchange in 1999, which comes to an conclusion that assets-reshuffle will greatly improve the public company's business performance, especially for the companies that do not have a good business performance. It also shows that differences in reshuffle type will lead to a great difference in business performance. Assessing by return on equity, mergers in an assets-stripping plus M&A, or equity transfer of the largest shareholder plus assets-stripping and M&A will produce the best performance. Pure M&A ranks the second best. Assets-replacement and equity transfer without real reshuffle do not improve companies business performance, even worsen companies' financial conditions. Feng Genfu, Wu Linjiang (2001) did a research on the 201 cases of M&A during 1995-1998, which analyzes the general performance of companies' M&A process with a comprehensive assessment method based on financial data, and made a comparative analysis of three different types of M&A(vertical, lateral and mixed) and studied the relationship between the largest shareholder's proportion before the company went public and M&A performance. The conclusion of their research is: in general, public companies' M&A performance has a tide that firstly ascends and then descends; different M&A types yield different performance in different

time periods; there is a positive correlation in the short run between the largest shareholder's proportion before company goes public and company's M&A performance. Yuan Hongqi and Wu Xingyu (1998) made a positive analysis of cases of company reshuffle during 1997. The research makes a comparison on four accounting indicators before and after the reshuffle and finds that company's earnings per share, return on equity and return on investment all had some gain in weight in total income after the reshuffle, but assets-liabilities ratio decreased, indicating that these changes in accounting indicators are related to reshuffle types and the relationship between the two sides of reshuffle. Sunzheng and Wang Yuetang (1999)'s research conclusion on the same samples is: business performance had great improvement after reshuffle, but no relations between change in business performance before and after the reshuffle and the relationship between the two sides of reshuffle. Reviewing the researches on public companies M&A performance in China, we can find that it is common to assess M&A performance from the perspective of financial indicators with comparative analysis, discovering the differences between different types of M&A. This paper's research uses the achievements of the above related researches and develops analysis of M&A performance mainly from the perspective of financial indicators as well as the indicator of Tobin's Q, which is a comprehensive reflection of a company's financial conditions and its stock price. Hence, the research method of this paper can be considered as a compositive method of event-study method of stock market and comparative analysis of business performance.

1.3 Review of Researches on Public Companies M&A High-Tech Enterprises in China

There are not many researches on public companies M&A high-tech enterprises in China. Lin Ping, Jiang Xiangdong (2000) made an analysis of public companies' marriage with high-tech enterprises by investigating M&A cases, pointing out that public companies take over high-tech enterprise by purchase of equity of non-public high-tech enterprise and include the enterprise into the company's development programs by the advantages of abundant cash flow and advanced system; or public companies would purchase all the equity of the high-tech enterprise or purchase part of the equity but not become a controlling shareholder.

Chen Xiaoyun, Lin Haiying (2001) selected 145 public companies in 1999 as samples and made a positive analysis of performance after public companies had entered high-tech industries. They classified public companies in traditional industries entering high-tech industries into four groups: 1. Public companies are reverse merged by high-tech enterprises; 2. Public companies M&A high-tech enterprises; 3. Public companies constitute or as members to constitute high-tech enterprises; 4. Public companies in traditional industries enter high-tech industries by participating in venture capital. The results of the analysis reveal that: the general performance of public companies has some improvement after they enter high-tech industries; the difference in path of entering a high-tech industry would yield a considerable difference in the change in performance of public companies; the type of high-tech industry does not cause an obvious difference in change in performance of public companies.

Tian Zengrui, Yu Haiyan, Si Chunlin (2004) demonstrated the M&A performance from the

perspectives of M&A being the important source of public companies' new profit growth point and public companies' financing ability and the dilemma of exit of venture capital in China. They pointed out that public companies M&A innovational enterprises was beneficial to both sides and also the realistic option for venture capital to exit.

We can see that researches especially positive analyses of public companies M&A high-tech enterprises are relatively few in China. Many researches mainly concentrate on qualitative analysis and paradigmatic analysis. Thus it is necessary to make some quantitative analysis of public companies M&A high-tech enterprises and reveal some theoretic rules and offer strategic advices.

2. Positive Analysis of Chinese Public Companies M&A High-Tech Enterprises

2.1 Model Description

The basic idea of the model of this paper is from Feng Genfu and Wu Linjiang(2001)'s theory of factor analysis. They selected four financial indicators of public companies, including main business income/total assets, net income/total assets, earnings per share, return on equity, and less the average level of the entire industry of the last year respectively in order to eliminate the impact of the prosperous condition of the industry. On this basis, they made a factor analysis to acquire the common factors and let the variance contribution rate of each factor denote the weight, and multiply the weight by the factor's score and add them up to construct the comprehensive scoring function. By this method, they are able to compress these four indicators into one comprehensive score. Fan Conglai, Yuanjing (2002) used the same method but different financial indicators to assess the M&A performance. They adopted the performance assessment system from the assets-reshuffle identification indicators system put forward by Tan Xiangqiu, Ti Yuntao and Qiangli (1999) which includes four financial indicators: earnings per share, return on equity, main business profit margin and ratio of returns on total assets. Though there are differences in financial indicators selection, the computation models they adopted are the same. The synthetic score model is as follows:

$$Fi=\alpha i1Yi1+\alpha i2Yi2+\alpha i3Yi3+\alpha i4Yi4$$

Fi is company i's synthetic score of performance, αij is factor j's variance contribution rate of company i, and Yij is the score of factor j of company i.

This paper's research is to make a positive analysis of the change in performance and industrial effect before and after the M&A process from the selected M&A cases between public companies at Shanghai and Shenzhen Stock Exchange and high-tech enterprises during 1999 and 2006 based on the above models, and to analyze the industrial effect's impact on M&A performance.

2.2 Sampling, Indicator Adoption and Source of Data

2.2.1 Sampling

We classify the industries in which the high-tech enterprises situate into three groups: electronic information industry group, biomedical industry group and the third industry group which includes new energy industry, new material industry and space technology industry.

Samples in this paper come from Financial Terminal Wind 2007. The path is: news center--company announcement--stock--major issues--controlling shares & holding shares. To guarantee an objective and just results, we have made some adjustments to the samples. The adjustment principles are as follows:

Industry in which target enterprises situate should be one of the three groups mentioned.

Acquirer should obtain the dominant status in the target company.

Extremely abnormal value should be removed.

New public companies should be removed from that year's samples.

According to the above principles, we have selected all the 113 qualified cases from January 1st, 1999 to December 31st, 2006. Details are listed in APPENDIX I.

2.2.2 Indicator Adoption and Computation Method

This paper's positive analysis is based on the above model, but has a different research target and a critical difference in choosing the financial indicators. Because we attempt to study the impact of industrial factor on M&A performance and include the industrial effect into the assessment of M&A performance, we choose four financial indicators that include Tobin's Q, earnings per share, return on equity, main business profit margin to constitute the synthetic score model.

Principles for time division for computation of indicators' value are as follows:

When the announcement occurred during January 1st and September 30th, the computation method is: each pre-M&A indicator's data comes from the end of last year(December 31st, annual financial report), each post-M&A indicator's data comes from the end of the year(December 31st).

When the announcement occurred during September 30th and December 31st, the computation method is: each pre-M&A indicator's data comes from the end of last year(December 31st, annual financial report), each post-M&A indicator's data comes from the end of the next year(December 31st).

The reason to make a time division in such a manner is to leave enough time for public companies and high-tech enterprises to complete their integration so that accuracy of positive analysis can be guaranteed.

All the post-M&A values of Tobin's Q, RPS, return on equity and main business profit margin are listed in APPENDIX II.

2.2.3 Method and Data Processing

In order to compare the impact of industrial effect on public companies M&A performance, this paper is to establish two synthetic score models on the basis of factor analysis, among which one includes Tobin's Q and the other does not and then compare the two models. To examine the impact of industrial effect on public companies' M&A performance, we can develop the research

into the following aspects:

1. Positive analysis of M&A performance of all selected samples.
2. Positive examination of samples that are divided into two groups by time period.
3. Positive examination of M&A in different industrial groups.

   The procedure of processing the synthetic score function is as follows (taking test on total samples as example, other processes are similar):

4. Establish the matrix of original data. Establish two matrixes X1, X2 of original data based on the selected 113 samples. X1 chooses earnings per share, return on equity and main business profit margin to establish matrix of original data X1=[Xij]113×3; X2 chooses Tobin's Q, earnings per share, return on equity and main business profit margin to establish matrix of original data X2=[Xij]113×4.
5. Standardize each indicator's data. Because of the difference in each indicator's dimension, it is necessary to standardize the data in order to smooth out erratic changes. SPSS-Factor automatically standardize the data matrix when processing the data.
6. Remove data's multicollinearity.
7. Factor analyze the indicators, acquire the common factors, and then rotate the matrix to make the factor variables more explicable.
8. Let the variance contribution rate of each factor denote the weight, and multiply the weight by the factor's score and add them up to construct the comprehensive scoring function. Both factor analysis and T-test are completed by SPSS(SPSS version: 13.0).

2.3 Positive Analysis

2.3.1 Positive Analysis of M&A Performance of All Selected Samples

This paper makes a factor analysis of each indicator before and after the M&A process to all corporate samples and acquires three common factors Y_1, Y_2, Y_3 and four common factors Y_1, Y_2, Y_3 and Y_4 respectively. Then it educes the two comprehensive scoring functions based on each factor's score and variance contribution rate and compute the comprehensive score of each sample's business performance before and after the M&A process.

The first group: factor analysis of indicators of earnings per share, return on equity and main business profit margin

Before M&A: F0=0.71156*Y1+0.20648*Y2+0.08196*Y3

After M&A: F1=0.61471*Y1+ 0.31631*Y2+0.06898*Y3

The second group: factor analysis of indicators of Tobin's Q, earnings per share, return on equity and main business profit margin

Before M&A: F0=0. 53536*Y1+0.25047* Y2+0.15445*Y3+0.05972*Y4

After M&A: F1= 0.46785*Y1+0.29035* Y2+0.19406*Y3+0.04774*Y4

Each factor's value is listed in APPENDIX III and APPENDIX IV.

TABLE 1: Mean-Test and Ratio-Test of All M&A Samples

F Difference		Quantity of Sample	Percentage of Positive Value	Mean*	Median
F_1-F_0	Group 1 (excluding Tobin's Q)	113	42.5%	-1.96149E-07 (1)	-0.084
	Group 2 (including Tobin's Q)	113	38.1%	2.44698E-07 (1)	-0.13813

Note: 1. F_0 denotes the synthetic score before M&A and F_1 denotes the score after M&A.

2. Percentage of positive value denotes the positive synthetic score

3. Because the number of row is very small, the value is represented in scientific notation. The value in bracket is each year's mean's p value of T-test.

We can see from TABLE1 that score differences of group one's and group two's mean before and after M&A are almost zero. The percentage of positive value of group one and group two is 42.5% and 38.1% respectively, both under 50 percent. Besides, the percentage of positive value of the group that includes Tobin's Q is even lower than that of the group that excludes Tobin's Q. By doing the T-test on synthetic scores of the three-indicator group and four-indicator group, we can see that synthetic differences are very close to zero, which also explains that there is no obvious change in performance after M&A is completed. Generally speaking, it can be considered that M&A is not successful.

Meanwhile, the results of the two assessments of the two data groups (one includes Tobin's Q and the other does not) do not show any notable difference. Unexpectedly, the test result of Tobin's Q group is even lower than that of the non-Tobin's Q group. It seems to have drawn a conclusion that industrial effect exerts no or very little impact which can be ignored on M&A performance,

Consequently, we can reach the following conclusions:

Firstly, generally speaking, there is no obvious change in business performance after public companies M&A high-tech enterprises. Secondly, on the whole, the impact of industrial effect on M&A performance can be ignored, or in other words there shows no industrial effect after public companies M&A high-tech enterprises.

2.3.2 Positive Test on Samples Divided into Two Time Periods -- Further Analysis of Results of Samples' Factor Analysis

The goal of this paper is to study the impact of industrial effect on public companies M&A high-tech enterprises conducts. However, the research results of performance of M&A entireties are disappointing. To obtain further discovery, this paper divides all the samples into two groups by time period. We classify samples in 1999-2000 as the first group and samples in 2001-2006 as the second. There are mainly two reasons for this classification. Firstly, the last decade of the twentieth century is considered as the golden period for the development of high-tech enterprises. But in 2001, as the bubble of global Internet economy burst, the growth trend of high technology

began to slow down. Secondly, year 2001 marks the watershed of the security market in China. From the beginning of 1999 to May 2001, there was a bull market at Shanghai Stock Exchange and Shenzhen Stock Exchange. After May 2001, however, the bear market appeared and was not over until five years later. We hope to obtain further discovery of M&A performance through this classification.

2.3.2.1 Analysis of Test Results of M&A Samples during 2001-2006

The test results of M&A samples during 2001-2006 are shown in TABLE 2:

TABLE 2: Mean-Test and Ratio-Test of M&A Samples during 2001-2006

F Difference		Quantity of Sample	Percentage of Positive Value	Mean*	Median
F_1-F_0	Group1(excluding Tobin's Q)	77	35.1%	-0.09 (0.389)	-0.15098
	Group2(including Tobin's Q)	77	26.0%	-0.10 (0.633)	-0.1737

From the test results, we can see that positive value's percent of group one is 35.1% and that of group two is 26.0%. Either of the mean value is negative, yielding -0.09 and -0.1. The T-test results are 0.389 and 0.633 respectively. The test results that include Tobin's Q are even less ideal than the results that exclude Tobin's Q. Industrial effect did not appear in M&A performance.

Hence, the conclusion should be:

1. M&A performance during 2001-2006 was not obvious.
2. Industrial effect did not appear in M&A performance during 2001-2006.

2.3.2.2 Analysis of Test Results of M&A Samples during 1999-2000

The test results of M&A samples during 1999-2000 are shown in TABLE 3:

TABLE 3: Mean-Test and Ratio-Test of M&A Samples during 1999-2000

F Difference		Quantity of Sample	Percentage of Positive Value	Mean*	Median
F_1-F_0	Group1(excluding Tobin's Q)	36	58.3%	0.20 (0.107)	0.287213
	Group2(including Tobin's Q)	36	63.9%	0.22 (0.082)	0.197271

From the test results, we can see that either group' percentage of positive value is about 60%. The T-test result under 90% confidence interval is 0.107 for group one. Though it is not strictly less than 0.1, it is quite close. So it can be considered that M&A obtained notable performance. The T-test result under 90% confidence interval is 0.082 for group two, which is less than 0.1. So it can be considered that performance after M&A was substantially improved.

Hence, the conclusion should be:

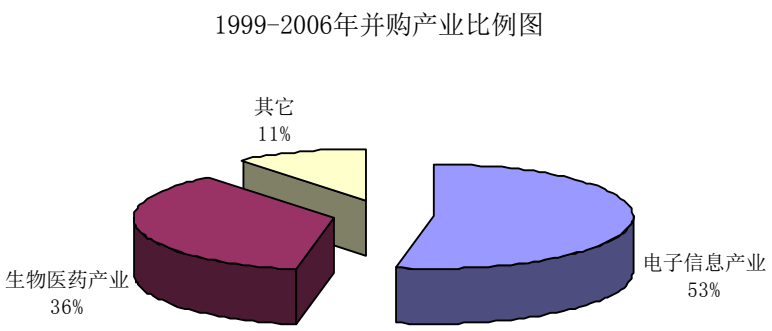
1. Business performance was substantially improved after M&A process during 1999-2000.
2. Industrial effect did appear in M&A performance during 1999-2000.

2.3.3 Positive Analysis of Different Types of M&A

2.3.3.1 3-Indicator Factor Analysis and 4-Indicator Factor Analysis of M&A Performance in Different Industries

This paper classifies M&A samples into three groups by the different industries that target companies belong to: electronic information industries, biomedical industries and other industries. Other industries mainly include new energy industry, new material industry and space technology industry. By analyzing the samples(see CHART 1), we find that electronic information industries accounted for the largest proportion, being the M&A hot spots during that period. Biomedical industries accounted for 36%, also an important target for M&A.

CHART 1: Proportion of Different Target Types during 1999-2006



In this part, data analysis method is the same as that of all selected samples. Each factor's score of all industry types before and after M&A is listed in APPENDIX V. The test results of data analysis are shown in TABLE 4 and TABAL 5.

TABLE 4: Mean-Test and Ratio-Test of Different Types of M&A (Excluding Tobin's Q)

		Quantity of Sample	Percentage of Positive Value	Mean	T-test Value	P Value	Median	Standard Deviation
F_1-F_0	Electronic Information Industries	60	35.0%	-0.0336	-0.317	0.753	-0.18914	0.8216
	Biomedical Industries	41	39.0%	-2.63617E-07	0	1	-0.11897	0.8814
	Other Industries	12	41.7%	2.0625E-07	0	1	-0.0941	0.7291

TABLE 5: Mean-Test and Ratio-Test of Different Types of M&A (Including Tobin's Q)

		Quantity of Sample	Percentage of Positive Value	Mean	T-test Value	P Value	Median	Standard Deviation
F_1-F_0	Electronic Information Industries	60	38.3%	1.82125E-07	0	1	-0.14116	0.7831
	Biomedical Industries	41	39.0%	5.96363E-07	0	1	-0.14709	0.8342
	Other Industries	12	50.0%	8.885E-08	0	1	-0.01142	0.5663

From the results of positive analysis, following conclusions can be drawn:

1. Generally, neither industry type had notable performance change after M&A process.
2. Generally, no notable impact of industrial effect on M&A performance of one single industry type was found.

2.3.3.2 Positive Analysis of Tobin's Q Value in Different Industries

There are no distinct observations from the results of the Mean-test and Ratio-test for the 3-indicator and 4-indicator either including or excluding Tobin's Q. Then we analyze the industrial effect of M&A in different industries only based on the Tobin's Q indicator. The test results are shown in TABLE 6.

From the test results, we can see that mean value of electronic information industries' Tobin's Q value increased by 8.1%, biomedical industries' Tobin's Q value decreased by 13.9% and other industries' Tobin's Q value decreased by 39.2%, indicating that biomedical industries' and other industries' industrial effect substantially declined while that of electronic information industries gained some but not notable improvement. Test results can be concluded as follows:

1. Industrial effect improves after public companies M&A high-tech enterprises in electronic information industries. However, the improvement is not notable.
2. Industrial effect substantially declines after public companies M&A high-tech enterprises in biomedical industries or other industries.
3. In general, industrial effect is better off after public companies M&A enterprises in electronic information industries than enterprises in biomedical or other industries.

TABLE 6: Tobin's Q-Test of Different Industries during 1999-2006

Industry	Quantity of Sample	Before M&A			After M&A			△Mean(%)	Mean of △ Tobin's Q	T-Test
		Mean	Median	Standard Deviation	Mean	Median	Standard Deviation			
Electronic Information Industries	60	3.0557	2.9813	1.2552	3.3030	2.6513	2.2610	8.1	0.2473	0.934 (0.354)
Biomedical Industries	41	2.8964	2.6302	1.5792	2.4933	1.7390	1.7843	-13.9	-0.4031	-1.747 (0.088)
Other Industries	12	2.9257	2.3993	2.4614	1.7777	1.7253	0.5934	-39.2	-1.148	-1.991 (0.072)

2.3.3.3 Positive Analysis of Tobin's Q Value of Electronic Information Industries Based on Different Time Periods

Since industrial effect of electronic information industries improves, then we want to know that whether industrial effect differs in different time periods. Hence, we divide all M&A on electronic information enterprises into two groups by time period and examine Tobin's Q value of the two groups. The test results are shown in TABLE 7.

TABLE 7: Tobin's Q-Test of Electronic Information Industries of Different Time eriods

Time Period	Quantity of Sample	Before M&A			After M&A			△Mean(%)	Mean of △ Tobin's Q	T-Test (under 99% confidence interval)
		Mean	Median	Standard Deviation	Mean	Median	Standard Deviation			
1999-2000	29	3.2560	3.0379	0.984	4.5073	4.1074	2.3944	38.43%	1.2513	2.814 (0.009)
2001-2006	31	2.8682	2.5230	1.456	2.1763	1.9702	1.4102	-24.12%	-0.4031	-1.747 (0.088)

From the test results, we can see that industrial effect during 1999-2000 substantially improved but appeared the opposite during 2001-2006.

3. Results and Further Explanations for Positive Analysis

3.1 Results Summation of Positive Research

From the research above, we can see that 1999-2000 is the golden period for public companies M&A high-tech enterprises. In this period, business performance of public companies remarkably improved after M&A high-tech enterprises and industrial effect exerted great impact on M&A performance. Besides, in this period, choosing electronic information enterprises as target companies would greatly improve public companies' industrial effect.

3.2 Result Analysis of Positive Research -- from the Perspective of Industry Cycle Theory

Why the above conclusions would be drawn? Are there any reasons or laws in it? From the past research we can find that one company's profitability is surely related to its industrial conditions and industry cycle(Xie Chaobin, etc. 2003). The ability to obtain cash flow of one industry and the value to invest capital in it largely depend on the industry cycle. Hence, it is necessary to assess the conditions of industry cycle before investing capital in it. Profitability is low in the industry's elementary phase. Even net loss might occur during this phase. Hence, capital investment should be avoided. During the growth phase, profitability increases rapidly and profit margin is high. During the maturation phase, profitability of the industry is very high. Therefore, the best time to implement venture capital investment and M&A is the industry's growth and maturation phase. When the industry comes to its recession phase, profitability decreases. Hence, it is optimal to quit the industry before the recession phase. This paper intends to use this conclusion to explain the results of the previous positive analysis, so that the inherent laws of public companies M&A high-tech enterprises could be revealed.

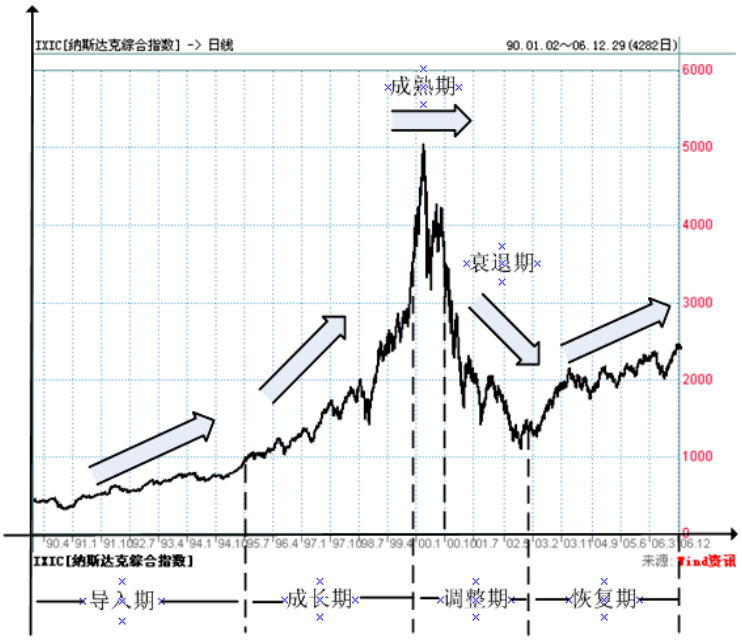
For a certain historical period or a region, each industry, from its first emergence until economically and technically replaced by a new industry, will inevitably go through the four periods of elementary phase, growth phase, maturation phase and recession phase. This is the so-called industry life cycle which determines the development stage of an industry by the increase rate of one industry's weight in all industries. Hence, the life stage of an industry is determined by the development speed of the industry.

Studies have shown that high-tech industries also have the four industrial phases(Geoffrey A. Moore,1991). But high-tech industries have their own characteristics which can be concluded as: 1. Large research and development costs, strict qualifications for human capital and long development cycle require a long elementary period, generally 5 to 10 years or more. 2. On entering the growth period, profitability increases very rapidly, some even has geometric gains. 3. Generally, new industrial effect's level surpasses the former. 4. In high-tech industries, one specific industry considerably differs from another. For example, every phase of the entire cycle of biomedical industry lasts longer than that of electronic information industry, and the maturation phase and recession phase of biomedical industry lasts much longer than that of electronic information industry.

3.2.1 Explanations for the Differences between 1999-2000 and 2001-2006

Associating Industry Cycle Theory with industry investment value and industry cycle, this paragraph analyzes the differences of M&A performance between 1999-2000 and 2001-2006. Since there are so many sub-industries in the entire high-tech industry and both geographic and industrial factors make a difference, no related data at present can define the cycle of the entire high-tech industry. However, NASDAQ Composite Index has long been the weatherglass of the global high-tech industry. Therefore, we use NASDAQ Composite Index to analyze the periodical phenomenon of the global high-tech industry to approximate the movement of industry cycle of the global high-tech industry (especially the electronic information industry since its weight in all high-tech industries is very large) and the high-tech industry in China in the past 20 years and try to offer some explanations for the results of this positive research. We assume the performance of NASDAQ Composite Index approximately reflects the change of global and Chinese industry cycle in the past 20 years (see CHART 2).

CHART 2: Performance of NASDAQ Composite Index during 1990-2006 and the Global High-Tech Industry Cycle



Through the analysis of the performance of NASDAQ Composite Index, the movement laws of industry cycle of high-tech industry during 1990-2006 can be concluded as follows:

1.Period of 1999-1995 can be considered as the elementary phase of high-tech industry. Internet is one typical industry. In 1986, the U.S National Science Foundation contributed to the establishment of the backbone network NSFNET based on TCP/IP Protocol, which connected to several supercomputer centers, universities and research institutes in America, indicating the advent of the world's first network. In the 1990's, with the appearance of Web and browsers, the Internet industry had come to a new development stage. In 1995, NSFNET began to commercially operate, indicating the beginning of the growth period for the Internet industry and global high-tech industries.

2.In the late 1990's (1996-1999), information technology(IT) industry's weight in the entire economy was becoming larger and larger, reaching its peak at the end of the 20th century. According to statistics, IT industry' weight in GDP increase was larger than 80% in the U.S, and 65% in developed countries. Hence, this period could be considered as the growth phase.

3.Year 2000 to the early month of 2001, the global high-tech industries represented by IT industry was becoming more mature. Electronic information industry deeply changed people's way of production and way of life. Biomedical industry made its real start. New material and new energy became more widely used. Meanwhile, quantities of competitive high-tech enterprises emerged in China. Hence, this period could be relatively considered as the maturation phase.

4.From year 2001, as the bubble of Internet economy burst, global high-tech industry entered a relatively low tide period. People gradually learned to look at high-tech industry anew. Investment into high-tech industry became more rational. Thus, this period could be considered as the recession phase.

It should be put this way: distinct maturation phase and recession phase don't exist in high-tech industries. We can see the two stages as an adjusting period during which higher level of technology would emerge. New technology is not simple renewals, but would take a completely different technical path.

5. As was the case in China, the newly stepped-up government put forward the strategy of "Developing the Country by Relying on Science and Education" on Mar. 3rd, 1998 and hence the wave of high technology began. According to the timetable released by public companies, more than 85% of the traditional public companies connected with high-tech industries began to enter high-tech industries since May, 1998, which was obviously related to the government policy. The wave reached its peak on June, 1999, when one traditional public company would announce to join the high-tech industries everyday and mostly electronic information industries. But as the bubble of Internet economy burst in 2001, the electronic information industries of China (especially software、Internet and new electronic component industries) had relatively entered a recession stage.

6. We can know from the results of 2.3.2, the test results of M&A during 1999-2000 differ greatly from those of 2001-2006. The period of 1999-2000 saw the remarkable achievements and industrial effect Chinese public companies gained from M&A high-tech enterprises. Through the analysis of the industry cycle of the world high-tech industries, we find that year 1999 is the period of rapid growth stage and year 2000 is the maturation stage. Relatively, from 2001 to 2006, the industries had undergone an adjusting stage. This paper uses positive analysis to testify and verify the conclusions on the timing of investment and acquisition that Xie Chaobin and other scholars had drawn. Therefore, it also explains the difference between the two periods.

To conclude, this research can draw such conclusions: We should choose the relative booming period to implement M&A; from the perspective of industry cycle, M&A should be done during the growth and maturation phases, in which an outstanding improvement for business performance and industrial effect will emerge.

3.2.2 Explanations for the Differences of M&A Performance between Electronic Information Industry and Biomedical Industry

This paper tries to explain the M&A differences between electronic information industry and biomedical industry from the perspective of industry cycle theory.

Firstly, we compare and contrast the characteristics of the two industry cycles. Biomedical industry differs from electronic information industry in the following aspects:

1. More time on research and development before finally entering the market. One single biotechnology product takes at least 5 years of research and development. One biomedical product demands even more time. It is mainly because the complexity of the system of biology, which is much more complicated than that of physics or chemistry. Meanwhile, biomedical products, from its developing stage to manufacturing stage, have to go through

base research, application research, laboratory research and conduct research, which are generally applied to high-tech products, and animal experiment, clinical trial phase III, field releasing experiment(phase I, phase II and phase III), scale production, market inspection and other procedures, among each strict and complex technique and safety vetting processes are required. Only by these procedures can the products be put into the market. It varies greatly from the research and development of information technology products which different procedures can be processed at the same time and only take a few months.

2. Large scale of investment. In the U.S, a patented new medicine needs 500 million to one billion dollars from research to final entry into the market. Small biomedical enterprises cannot afford it. Most of them tend to cooperate with large pharmaceutical companies and enjoy part of economic equity based on their techniques. Some raise money by going public, others even sell the half-developed product or the whole enterprise to a qualified investor.

3. Advanced techniques. Every single phase of research and development of biomedical products is technique-concentrated and varies from each other. So it is unlikely to reuse the same methods on different products. A group of both highly theoretically and practically qualified technicians are necessary for the institute.

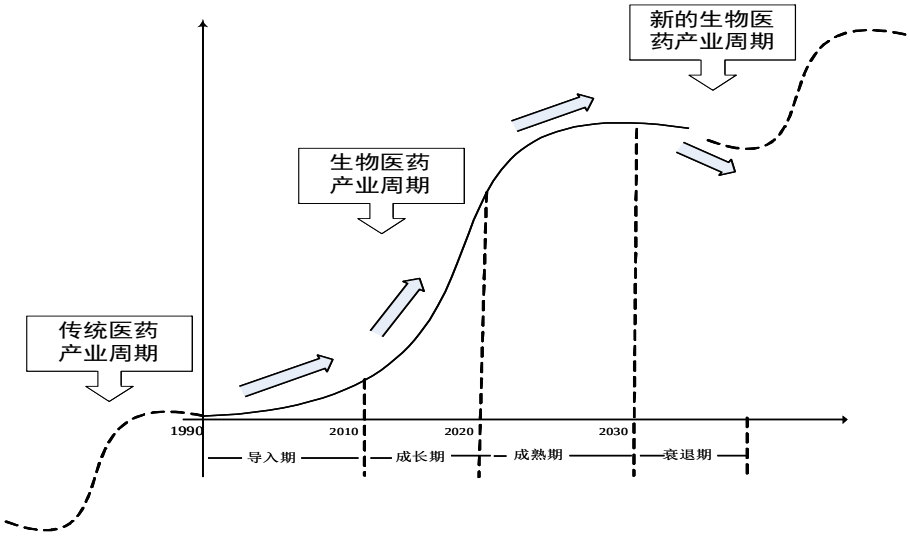
4. Enormous economic benefit. Once a biomedical product such as gene drug is produced successfully, it will bring tens of years' of advantages of low cost and long market life, which undoubtedly come with plenty of profits for the enterprise.

Besides, as biotechnology deeply reaches to the fundaments of human beings, to the more complicated ethics, laws and current social orders, people tend to have fear and worry towards it like what they have towards genetically-modified foods, cloned animals, cloned humans. Some even worry that whether there will be distinguished different kinds of people containing only dominant genes or inferior genes. Then the former rule the latter, which is suicidal. Although similar problems exist in information technology, but at least it will not devastate the entire human race. Thus, biotechnology faces more social obstacles during its development compared to information technology. As a result, the products take longer time to eventually make its appearance into the market and people's life. However, as long as a biomedical product is proved successful, it is uneasy to be replaced and is also slow to be renewed. It is because a biomedical product is designed to meet a specific requirement. To reflect on industry cycle, the cycle of biomedical industry lasts longer than that of electronic information industry. Moreover, once the biomedical industry reaches its maturation phase, it will remain valid much longer than electronic information industry (as mentioned above) which has shorter maturation phase and shorter recession phase than most of other industries.

A common view has been reached on the movement of industry cycle of biomedical industry (see CHART 3), which believes that biomedical industry began to flourish since 1990 and would remain in the elementary phase of industry cycle until 2010. When it reached year 2010, biomedical industry would enter its growth phase. Its maturation phase will not be reached until

2020.

CHART 3: Movement of Industry Cycle of Biomedical Industry



Information Source: Michael Rosen(2005), Biotech Industry Reaches Midpoint in 50-year Maturation Cycle

However, it is difficult to generalize the characteristics of the movement of industry cycle of electronic information industry. It is mainly because there are too many sub-industries of electronic information industry, which includes integrated circuit, software, mobile telecommunication, Internet, digital audio-video, broadband telecommunication, advanced computing, new electronic components, telecommunication universal services, network and information security, postal services and radio monitoring and other industries. Because electronic information industry has a large weight in the entire high-tech industry and even the entire domestic economy (take the U.S as example, electronic information industry accounted for 46% of GNP in 1967, 50% in 1972, 60% in 1985, 75% in 1990 and 85% in 2000), we use NASDAQ Composite Index which reflects the high-tech industries' general condition to approximate the industry cycle's condition of electronic information industry. The whole industry cycle of the past 20 years can be concluded as: elementary phase: 1990-1995; growth phase: 1996-1999; maturation phase: 2000-2001; recession phase: 2001-2006.

From the test results of 2.3.3, this paper's conclusion is: when considering Tobin's Q alone, public companies business performance improves after M&A high-tech enterprises in electronic information industries, though the improvement is not notable; industrial effect of M&A enterprises in electronic information industries is slightly better than that of biomedical industries or other industries. Moreover, through Tobin's Q test on different time periods on electronic information industries, we can find that industrial effect during 1999-2000 improved substantially when that of 2001-2006 was the opposite. This conclusion is basically the same as the conclusion of the movement analysis of the two industries' cycles, thus further verifying the conclusions in 3.2.3 and explaining the differences between electronic information industry's and biomedical

industry's M&A performance.

CHART 4: Performance of NASDAQ Composite Index and Shanghai Composite Index during 1995-2006

3.2.3 Explanation from the Aspect of the Development Course of Security Market in China

From the aspect of the development course of security market in China, Chinese security market entered a rapidly growing period from May 1999 to May 2001. Shanghai Composite Index rose from 1140 to 2140(as shown in CHART 4). The rapid development of security market laid an ideal foundation for public companies to M&A high-tech enterprises. High-tech concept became the focus of market attention, which produced positive effect on improving companies' business performance and environment. In addition, the rise of the stock price exerted significant influence on Tobin's Q value, which also exerted positive effect on the test results that include Tobin's Q. From the second-half period of 2001, Chinese security market began to enter the bear market which lasted for 5 years. Considering the security market condition and recession of the global high-tech industry, it is not difficult to understand that M&A high-tech enterprises considerably declined both quantitatively and validly. The performance of Chinese security market in the past 8 years is also one of the reasons that cause the results differences of the two time periods of 1999-2000 and 2001-2006.

4. Conclusions and Revelations

This paper studies the phenomenon of Chinese public companies M&A high-tech enterprises

and the impact of industrial effect on M&A performance based on the positive analysis of the 113 M&A cases during 1999-2006. The conclusions of this research are as follows:

1. Through the indicator test including or excluding Tobin's Q on 113 M&A cases, we find that, in general, business performance of public companies did not show notable change after the M&A process no matter industrial effect is concerned or not. Hence, impact of industrial effect on the M&A performance can be ignored. Through the analysis of samples in different industries, in general, no notable change is found in business performance after the M&A process in any of the high-tech industries; no notable impact of industrial effect is found on M&A performance of a specific industry.
2. After dividing samples into two groups by time period, we can see that no notable change is found in business performance after the M&A process during 2001-2006 no matter industrial effect is concerned or not. That is, industrial effect of M&A high-tech companies did not occur. However, industrial effect is found in M&A performance during 1999-2000, which improved business performance of public companies.
3. When only Tobin's Q is concerned, we can see that industrial effect did improve after public companies M&A enterprises in electronic information industry. But the improvement was not notable. Meanwhile, industrial effect declined significantly after public companies M&A high-tech enterprises in biomedical industry or other high-tech industries. Therefore, industrial effect of M&A enterprises in electronic information industry proved to be better than that of biomedical industry or other industries.
4. At last, we combine the Industry Cycle Theory to explain the different test results of M&A performance between period 1999-2000 and period 2001-2006. We believe that business performance of public companies will be greatly improved after the M&A process when the high-tech enterprises are in the growth phase or maturation phase of the industry. Meanwhile, industrial effect will exert positive impact on M&A performance. Circumstances are the same when a specific high-tech industry is concerned.

From this research, we can see that, in general, performance of public companies M&A high-tech enterprises is not satisfactory. The research suggests we should have an objective and clear understanding of M&A process. Not all M&A will be successful, especially as in the case of Chinese high-tech enterprises being the target companies. Because of the immature operation pattern of some high-tech enterprises, the risk to M&A these enterprises is fairly high. Besides, it is better to implement M&A when the high-tech industry is recovering. When choosing the target company, it is necessary to have a clear and accurate judgment of the industry cycle where the target company currently remains. Ensure the target company is in the growth phase or maturation phase of the industry cycle so that possibility to implement a successful M&A is increased.

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