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A Study on Comprehensive Scoring Model for Related Party M&A performance of Listed Companies

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ABSTRACT

Related Party M&A of Chinese listed companies have some unique problems, so become a hot issue of universal concern of economists. This paper starts with the existing research results of the relationship between M&A behavior and the performance of listed companies at home and abroad, and builds a comprehensive scoring model based on principal component analysis method. This paper selects 100 listed companies that implemented related party M&A in 2011 from Shanghai and Shenzhen Stock Markets, and eventually establishes a comprehensive model which used for the seven main components and applied to calculate the score through empirical analysis of 13 performance indexes and date from these listed companies. The final comprehensive score results showed that the performance of Chinese listed companies that have implemented related party M&A decreased significantly in the M&A year, a year later there was a slight recovery. This suggests that indeed there are many improper operations in the related party M&A behavior of Chinese listed companies, which dampen the operating enthusiasm of the small shareholders and the majority of employees, resulting in a decline in performance after related party M&A.

KEYWORDS

Listed companies; Related party m&a; Corporate performance; Comprehensive score; Principal component analysis.



INTRODUCTION

M&A behavior tends to promote the performance of listed companies in other countries. But for our country, related party M&A in many cases not only fail to improve their performance, but also lead to declining in corporate performance, in which the reasons sparked widespread concern of economists.

In other countries, the research on the relationship between M&A behavior and the performance of listed companies started very early, and formed a more systematic theory until the end of the last century. Schwartz studied on the merger behavior of more than 200 listed companies in the UK based on the relevant data of the late 1960s to the 1970s. He found that M&A behavior can promote to improve total assets yield of the original listed companies^[1]. Jensen divided M&A behaviors into horizontal M&A, vertical M&A and mixed M&A. He found that horizontal M&A and vertical M&A can contribute to improve the corporate performance, but mixed M&A behavior may make the corporate performance decline through study on M&A behavior of nearly 300 listed companies^[2]. Bruner made an empirical analysis on the relevant data from the statistics on the American 50 merger behaviors. His findings suggest that M&A of listed companies have a significant promoting role in improving corporate performance^[3]. Bae compared with more than American 10 M&A activities, and found: listed companies can get more than thirty percent of unexpected incomes through M&A, which is the key to improve corporate performance after M&A^[4]. Joh's study is similar to Bell, he concluded that: listed companies can obtain at least ten or more percent of abnormal return rate through M&A, thus contributing the acquiring firm to obtain higher profits^[5].

Compared to the study of foreign scholars, study of domestic scholars on the relationship between M&A behavior of listed companies and corporate performance is later. Fang Hong carried out research on more than 300 M&A behavior of listed companies in Shenzhen and Shanghai Stock Markets, and found that shareholders wealth of acquiring firm was increased significantly through M&A behaviors, but shareholders wealth of acquired company had no exact performance^[6]. Yewang Zhou analyzed nearly 60 M&A behavior of listed companies selected in Shanghai and Shenzhen Stock Markets from 2000 to 2002, he concluded that: the M&A behavior had a serious negative impact on acquiring firm, resulting in a decline in corporate performance^[7]. This shows the diametrically opposite results with the conclusion of Fang Hong. Dongqin Zhu found that M&A behavior is similar to tunneling behavior, not only does not improve the corporate performance, but also bring huge economic losses to the small shareholders, through empirical analysis of M&A behavior of listed companies within the five years since 1998^[8]. The study of Weixing Cai is similar to Jason. According to the relevant data of M&A behaviors of Chinese listed companies, he found that the horizontal merger can enhance the performance of listed companies within a certain range. Other forms of M&A behavior have no significant impact on corporate performance^[9]. Lijun Wu investigated the performance of listed companies in different years before and after M&A, she found: the performance of listed companies was improved in the M&A year, but later, the performance showed a clear downward trend, which showed that the M&A behavior has a negative effect on the performance of Chinese listed companies in the long-term^[10]. Conclusions of many other domestic scholars also show that M&A behavior on the performance of Chinese listed companies shows a reaction.

In this paper, on the basis of previous research results, a study specifically for related party M&A of Chinese listed companies, by comparing the annual performance before and after M&A, with the comprehensive scoring model based on principal component analysis, to explore the relationship between related party M&A and the performance of listed companies.

THE COMPREHENSIVE SCORING MODEL BASED ON PRINCIPAL COMPONENT ANALYSIS

To study the relationship between m&a of listed companies and corporate performance, it is bound to need multiple annual data and the data of listed companies. These data for the purpose of this article studies how the credibility and effectiveness, data reliability was tested by Cronbach coefficient analysis method, data validity by KMO measure inspection and Bartlett ball inspection.

Cronbach coefficient analysis is a kind of typical structural reliability analysis method; the concrete mathematical formula is shown below.

$$\alpha = \frac{K}{K-1} \left(1 - \frac{\sum S_i^2}{S_T^2} \right) \quad (1)$$

Validity analysis mainly through KMO readings and Bartlett sphericity test worth the validity of the conclusion. If KMO values greater than 0.7, and Bartlett sphericity test value is lower than 0.05, it shows that statistical data with high availability.

In statistical analysis, if the original statistical variable is overmuch, it can cause the statistical work hard, and then you need to adopt principal component analysis (pca) to extract the main ingredients, simplify the subsequent data processing. Set the statistical work, a total of n original variables, each original variable can be expressed as a linear combination of the principal component form, as shown in formula (2).

$$\begin{cases} Z_1 = a_{11}F_1 + a_{12}F_2 + \dots + a_{1m}F_m + U_1 \\ Z_2 = a_{21}F_1 + a_{22}F_2 + \dots + a_{2m}F_m + U_2 \\ \dots \\ Z_j = a_{j1}F_1 + a_{j2}F_2 + \dots + a_{jm}F_m + U_j \\ \dots \\ Z_n = a_{n1}F_1 + a_{n2}F_2 + \dots + a_{nm}F_m + U_n \end{cases} \quad (2)$$

In type, F_i said each principal component variables, U_j said each variable personality components, a_{ij} said principal components in the different variable load coefficient, all a_{ij} combine to make the load matrix, as shown in formula (3).

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1m} \\ a_{21} & a_{22} & \dots & a_{2m} \\ \vdots & \vdots & & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nm} \end{bmatrix} \quad (3)$$

At this time, we can judge the size of each load coefficient of load matrix A, to determine the contribution of each principal component for each variable, by omitting the secondary components to reduce the calculation burden of follow-up. Each variable after the selection will form the comprehensive evaluation model based on principal component. This model is also mathematical model for the following empirical research in this paper.

THE EMPIRICAL ANALYSIS ON THE M&A BEHAVIOR EFFECTS ON CORPORATE PERFORMANCE OF LISTED COMPANIES

Variable selection

An empirical analysis in this paper is, with the aid of comprehensive scoring model for listed companies perform a year before M&A, the M&A performance of that year, a year after the M&A, determine the rise and fall of performance comprehensive score. So, choose what variables as a listed company performance characterization, became the basis of empirical analysis.

Performance evaluation of listed companies generally include profitability level, debt level, development level and operation level, etc., we selected a total of 13 variables as the basis of empirical analysis from these aspects, as shown in TABLE 1.

TABLE 1 : Based variable on performance evaluation of listed companies

Level indicators	secondary indicators	variate	Calculation basis
profitability	Business yields	P1	Business net income/business revenue
	net assets yield	P2	Net income/net worth
	Return on total assets	P3	Net income/net balance
	Single stock yields	P4	Net income/total number of shares
	Single strand cash profit ability	P5	Net cash flow/total number of shares
debt levels	Debt service quick ratio	P6	(current assets - inventory)/total liabilities
	A sinking current ratio	P7	Total current assets/liabilities
	Company's debt ratio	P8	The total debt/total assets
development level	Single stock net assets increase rate	P9	The current value of single value/the previous single shares - 1
	Operating earnings growth	P10	(the current operating income - operating income of the previous period)/business income of the previous period
	Net profit growth rate	P11	Net income of the previous period (the current net income, net income of the previous period)
operating level	Inventory turnover	P12	Operating income/total inventory
	Total asset turnover	P13	Operating income/average total assets

Obtained the variable after the basis of empirical analysis, we selected the 2011 implementation of the 100 listed companies of M&A from “listed companies in china mergers and acquisitions, asset restructuring research database”, in accordance with TABLE 1 variables of implementation of the 2010, 2011, 2010 annual statistics. Specific data as shown in TABLE 2.

TABLE 2 : 100 listed companies implementing the year before M&A performance appraisal data (2010)

variate	company number	minimum	maximum	average	variance
P1	100	-0.119	2.231	0.131	0.191
P2	100	-0.068	0.517	0.139	0.107
P3	100	-0.047	1.802	0.081	0.127
P4	100	-0.252	4.287	0.512	0.612
P5	100	-4.698	10.011	0.635	1.307
P6	100	0.168	6.723	1.001	0.913
P7	100	0.233	8.299	1.522	1.182
P8	100	0.041	0.848	0.526	0.168
P9	100	-79.271	175.417	1.618	15.072
P10	100	-0.882	150.173	1.689	11.577
P11	100	-2.671	242.576	4.132	23.098
P12	100	0.001	144.327	9.587	18.687
P13	100	0.003	8.773	1.023	0.933

TABLE 3 : 100 listed companies of M&A performance appraisal data (2011)

variate	company number	minimum	maximum	average	variance
P1	100	-0.029	1.788	0.127	0.155
P2	100	-0.018	0.469	0.116	0.087
P3	100	0.001	0.321	0.042	0.049
P4	100	-0.047	2.512	0.421	1.981
P5	100	-2.298	25.398	0.672	2.342
P6	100	0.068	32.271	1.133	2.776
P7	100	0.113	37.817	1.621	0.186
P8	100	0.019	0.918	0.541	0.157
P9	100	-3.312	1.017	0.107	1.207
P10	100	-0.742	7.701	0.315	1.479
P11	100	-1.023	21.088	0.436	3.098
P12	100	0.047	136.071	8.780	13.685
P13	100	0.048	8.031	0.906	0.912

TABLE 4 : 100 listed companies of M&A performance appraisal data (2012)

variate	company number	minimum	maximum	average	variance
P1	100	-0.009	0.829	0.113	0.131
P2	100	0.002	0.527	0.121	0.096
P3	100	0.001	0.268	0.054	0.058
P4	100	-2.047	2.197	0.461	1.214
P5	100	0.087	5.201	0.910	0.817
P6	100	0.108	6.112	1.076	1.097
P7	100	0.057	9.102	1.417	0.175
P8	100	-1.213	0.786	0.551	4.004
P9	100	-0.568	49.172	0.658	1.102

P10	100	-1.075	10.793	0.291	1.274
P11	100	1.328	174.826	1.655	2.012
P12	100	0.077	173.001	9.120	15.685
P13	100	0.081	9.031	0.857	0.779

Compared with 2010, 2011, 2012 of the 100 listed companies mergers and acquisitions performance situation can be seen: in 2010, business yields of 0.131, net assets yield of 0.139, rate of return on total assets is 0.081, single strands of 0.512; in 2011, business yields of 0.127, net assets yield of 0.116, rate of return on total assets is 0.042, single strands of 0.421, four indexes compared with 2010 all showed a trend of decline, instructions in mergers and acquisitions of listed companies in corporate performance occurs obviously decreased; in 2012, business yields of 0.113, net assets yield of 0.121, rate of return on total assets is 0.054, single strands of 0.461, the three indexes recovered than in 2011, after the three indexes recovered than in 2011, one year after the merger and acquisition of listed company corporate performance recovered.

The index comparison, unable to accurately explain the performance of listed companies change before and after m&a. To this end, we use this article mentioned in the second quarter of comprehensive scoring model for further empirical analysis.

(2) The empirical analysis

In front of the principal component analysis for comprehensive evaluation model, we first analyzed the reliability, KMO measure and Bartlett sphericity test, the results from 2010 to 2012, 13 indicators of Cronbach coefficient over 0.7 in these three year, prove the credibility of the statistical data; in these three year, 13 indicators of KMO measure inspection coefficients were more than 0.8, Bartlett sphericity test were less than 0.05, which proved the availability of statistical data. These job description data in TABLE 2 to TABLE 4 can be used as a principal component analysis.

In this way, we in SPSS principal component analysis can get the original principal component load expression in 13 variables as shown in TABLE 5.

TABLE 5 : 13 principal component variables expression getting in the SPSS

variate	principal components						
	F1	F2	F3	F4	F5	F6	F7
P1	0.161	-0.128	-0.089	-0.388	0.432	-0.012	-0.278
P2	0.231	0.227	-0.171	-0.027	-0.077	-0.176	0.162
P3	0.317	0.088	-0.084	-0.072	0.061	-0.084	0.041
P4	0.214	0.199	-0.201	-0.038	-0.148	0.051	0.133
P5	0.029	0.228	-0.058	0.072	-1.208	0.632	-0.227
P6	0.213	0.217	0.159	0.162	-1.998	0.162	0.063
P7	0.214	0.201	0.174	0.057	-2.157	0.113	0.091
P8	-0.189	0.192	-0.130	0.009	-2.135	-0.047	0.244
P9	0.047	0.191	0.329	0.042	0.130	-0.401	0.158
P10	-0.154	0.234	0.254	0.029	-0.128	0.423	-0.201
P11	0.257	-0.035	0.401	0.043	0.061	-0.135	0.044
P12	-0.119	0.056	0.029	0.431	0.472	0.361	0.801
P13	0.021	0.029	-0.083	0.521	-0.172	-0.235	-0.234

According to the result of principal component analysis, 7 principal components can use the original 13 computing performance appraisal variables, specific as follows:

$$F1 = 0.161P1 + 0.231P2 + 0.0317P3 + 0.214P4 + 0.029P5 + 0.213P6 + 0.214P7 - 0.189P8 + 0.047P9 - 0.154P10 + 0.257P11 - 0.119P12 + 0.021P13$$

$$F2 = -0.128P1 + 0.227P2 + 0.088P3 + 0.199P4 + 0.228P5 + 0.217P6 + 0.201P7 + 0.192P8 + 0.191P9 + 0.234P10 - 0.035P11 + 0.056P12 + 0.029P13$$

$$F3 = -0.089P1 - 0.171P2 - 0.084P3 - 0.201P4 - 0.058P5 + 0.159P6 + 0.174P7 - 0.130P8 + 0.329P9 + 0.254P10 + 0.401P11 + 0.029P12 - 0.083P13$$

$$F4 = -0.388P1 - 0.027P2 - 0.072P3 - 0.038P4 + 0.072P5 + 0.162P6 + 0.057P7 \\ + 0.009P8 + 0.042P9 + 0.029P10 + 0.043P11 + 0.431P12 + 0.521P13$$

$$F5 = 0.432P1 - 0.077P2 + 0.061P3 - 0.148P4 - 1.208P5 - 1.998P6 - 2.157P7 \\ - 2.135P8 + 0.130P9 - 0.128P10 + 0.061P11 + 0.472P12 - 0.172P13$$

$$F6 = -0.012P1 - 0.176P2 - 0.176P3 - 0.084P4 + 0.051P5 + 0.632P6 + 0.162P7 \\ + 0.113P8 - 0.047P9 + 0.423P10 - 0.135P11 + 0.361P12 - 0.235P13$$

$$F7 = -0.278P1 + 0.162P2 + 0.041P3 + 0.133P4 - 0.227P5 + 0.063P6 + 0.091P7 \\ + 0.244P8 + 0.158P9 - 0.201P10 + 0.044P11 + 0.801P12 - 0.234P13$$

In this way, the 100 listed companies in 2010 comprehensive score of performance appraisal, can use the following formula.

$$Q_{2010} = \frac{0.21236F1 + 0.18007F2 + 0.15172F3 + 0.10572F4 + 0.08001F5 + 0.07533F6 + 0.06321F7}{0.86842} \quad (5)$$

Similar to the above, 100 listed companies in 2011 and 2012, the performance evaluation of the comprehensive score can use the following formula:

$$Q_{2011} = \frac{0.24811F1 + 0.17601F2 + 0.13920F3 + 0.10572F4 + 0.08041F5 + 0.06671F6 + 0.05959F7}{0.8754} \quad (6)$$

$$Q_{2012} = \frac{0.22391F1 + 0.16724F2 + 0.13587F3 + 0.10499F4 + 0.08120F5 + 0.06971F6 + 0.06723F7}{0.85926} \quad (7)$$

Using the data in TABLE 2-4 and formula (5) (6) (7), to 2010, 2011, 2012 shares of the listed company performance comprehensive score: 0.002173, 0.001069, and 0.001352. This suggests that the comprehensive scoring method and data statistical evaluation directly consistent conclusion, namely in the implementation of the corporate performance of M&A of listed companies have an obvious decline, and a year after the merger company performance will be improved slightly.

CONCLUSIONS

Chinese listed companies' source for the transformation of state-owned enterprises and other special forms, so the ownership structure of listed companies is unreasonable. In recent years, China launched a large-scale M&A behavior of listed companies, in order to obtain a more reasonable ownership structure and better corporate performance. But in fact, more M&A behaviors of Chinese listed companies belong to related party M&A, namely the merger and recombination of listed companies and its related parties.

To explore what is the effect of corporate performance achieved after related party M&A of Chinese listed companies, we constructed a comprehensive scoring method based on principal component analysis, selected 100 listed companies that have implemented related party M&A in 2011 to carry out research, respectively to calculate corporate performance in 2010 (one year before the M&A), 2011 (the year M&A), 2012 (one year after the M&A).

The process of empirical analysis, we extracted 7 principal components from the initial selection of 13 performance appraisal variables, and the three annual performance comparison results show that the performance of listed companies that have implemented related party M&A decreased significantly in the M&A year, a year later there is a slight recovery. This shows that the implementation of related party M&A of Chinese listed companies still exist many problems, there are also hollowed out minority shareholders, deformity recombination, hostile takeover and other issues, which affect the corporate performance improvement.

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