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The study of the performance of manufacturing enterprises cross-border M&A in China based on super-efficiency DEA

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ABSTRACT

In this paper, the author put an empirical study in the performance of Cross-border Mergers and Acquisitions in the manufacturing enterprises in application of DEA. The results show that, overall, cross-border mergers and acquisitions failed to significantly improve our manufacturing enterprises' performance. Based on this, the paper proposes the corresponding countermeasures from the corporate level.

Key words: DEA; Manufacturing enterprises; Cross-border Mergers and Acquisitions; Performance

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INTRODUCTION

In terms of Micro-performance Evaluation, western scholars mainly adopt the event study method and accounting research method in the study of Cross-border Mergers and Acquisitions. Event study method is proposed by FFJR (Fama, Fisher, Jensent and Roll) in 1969. [1]Considering the M & A as a single event, the method determines the date of a merger announcement as the center of the "event period", and then applies the cumulative abnormal return method to examine the merger event announcement effect on the price fluctuations of the stock market. However, accounting research method mainly uses information on the financial statements and accounting data to conduct the compared study on the change of the operating performance before and after the M & A, judged by profitability, solvency, asset management situation, the main business conditions (such as market share and sales) and operating cash flow level performance indicators. Although Western countries have advanced the study of the performance of Cross-border M&A for a very long time, H. Kiyma, TK. Mukherjee (2000) still think that academic circles reach no consensus on the point of Performance Improvement as a result of Cross-border M&A due to the national, industrial and other factors. Domestic scholars also mainly limited the methods to event study and accounting research in the micro-performance study of cross-border M&A and make numerous conclusions.[2] The paper apply the super-efficiency DEA model to analyze changes in the cross-border M&A performance of manufacturing enterprises in China, pursuant to analyze whether the takeover will help improve business performance.

DEA (Data Envelopment Analysis, referred to as the DEA), is a new interdisciplinary research field of mathematics, operations research, mathematical economics and management. Andersen proposed a super-efficiency evaluation model in 1993 which makes effective decision making units are also able to compare the efficiency between the high and low.[3]

1 Samples, Indicator selection and data processing

1.1 Samples selection

This study chooses the manufacturing as the object of empirical research, and selects the listed companies in the manufacturing industry clubbed by the China Securities as the empirical research samples. The selection criteria are: (1) A-shares of listed companies which implemented cross-border mergers and acquisitions from January 1, 2001 to December 31, 2006. (2) If the company's cross-border M & A event occurs more than one time in the current year, only once can be accounted throughout the year. (3) In the year the M&A come to pass the enterprises do not show

abnormalities in the financial position or other terms and receive special treatment (ST). (4) Excludes indicators incompletely and exists clearly abnormal data. Screened in accordance with the above conditions, we access 24 sample companies totally.

Because the impact of M&A on the performance has a time lag, this article gathered M & A cases from the year 2001 to the year 2006, and study-window years including the total of 6 years, that is, two years before the M&A year, the current M&A year, and three years after completion of the M&A.

1.2 Indicators selection

DEA method requires the number of decision making units at least more than the number of input and output indicators. In order to fully reflect the performance change of the manufacturing enterprises after the cross-border M&A, this paper selects the original five input and output indicators as follows:

The original input indicators:

(1)The cost of total assets named X1; (2) (The main business costs + the main business taxes and surcharges) named X2; (3) (Operating expenses + administrative expenses + financial expenses) named X3. The original output indicators: (1) Main business income named Y1; (2) Net profit named Y2.

1.3 Data sources and processing

1.3.1 Data sources

The empirical part of the paper require the large amount of data to support, and the original data collection work is mainly done through the wind database, at the same time for data integrity, we also passed through "jvchao" information network, the China Securities Journal, Shanghai Stock Exchange Web site, the Shenzhen Stock Exchange website, and other professional websites to supplement and perfect.

To meet the requirements of the empirical research, the above raw data collected is the balance sheet, income statement and other financial data of listed manufacturing companies in 1999-2009, and the acquisition the required input and output indicators in the model nee to do dimensionless processing of the original data.

1.3.2 Dimensionless processing of the original index data

The selected original input and output indicators in this paper have different dimensions, and there are still some negative data in the original data (such as net profit), so the linear programming problem is difficult to find the solution if we directly substituted the data into the DEA model. In addition, in order to eliminate the impact on the results owing to large gaps of the same indicators of different companies and thus conduct the effectively DEA analysis, we need to divided the original data into a dimensionless normalized interval according to certain functional relationship to ensure that the wire solving of the linear programming problems. There are many dimensionless ways of indicators at home and abroad, but the more common one is the efficacy coefficient method, which is to apply multi-objective programming principle to define satisfied value and not-allowed value for each index. Satisfied value as upper limit and not-allowed value as Lower limit, we calculate the value of the gap between the satisfaction value and each index, and thus converted into the corresponding evaluation scores. When we evaluate the cross-border M&A performance of manufacturing industry, we use the general scope of the efficiency coefficient of the range, which is [60,100]. Calculated as follows:

$$\begin{matrix}\max\limits_{1\leqslant i\leqslant n} Z_{ij}=a_j \\ \max\limits_{1\leqslant i\leqslant n} Z_{ij}=b_j\end{matrix} Z'_{ij} = 60 + \frac{Z_{ij} - b_j}{Z_{ij} - a_j} \times 40, Z'_{ij} \in [60, 100]$$

a_j is the maximum of the j item

2 Empirical results of the study of manufacturing enterprises' cross-border M&A

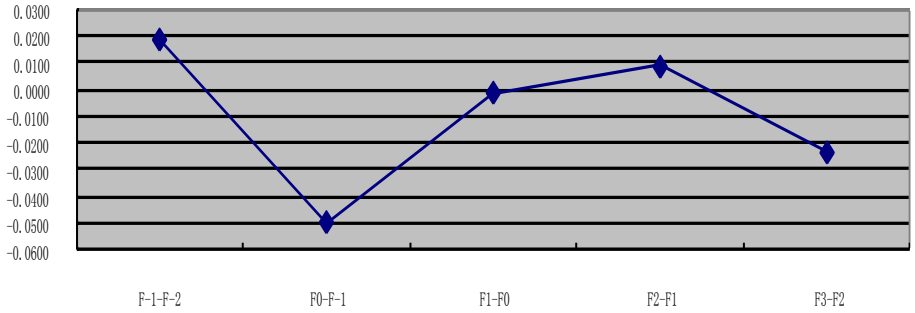
According to the relevant steps, we measure out the performance value of all the samples before and after M&A. According with the performance value, we do analysis of changes in the performance of manufacturing enterprises as in table1:

Table 1：the difference analysis between the overall sample performance

F	F-1-F-2	F0-F-1	F1-F0	F2-F1	F3-F2	F3-F-1	F3-F0	F3-F1
Mean	0.0194	-0.0503	-0.0008	0.0091	-0.0230	-0.0658	-0.0154	-0.0146
Sig.(2-tailed)	0.592	0.147	0.940	0.629	0.117	0.043	0.312	0.336
Significance	No	No	No	No	No	No	No	No
Positive rate	45.83%	41.67%	50.00%	58.33%	20.83%	33.33%	33.33%	37.50%

Note: (1) F difference represents the different performance of the samples in different years
(2) Average on behalf of the arithmetic value of the performance difference, of which positive and negative value represent corporate performance improvement and decline
(3)Positive ratio represents the value of the number of enterprises with positive F difference divided by total number of samples

Figure 1：performance difference Chart



As can be seen from Table 1, the positive ratio of F difference of the performance in the current year of manufacturing enterprise M&A was 41.67%, down from the previous year before M&A, while the mean difference of 0.0195 the previous year before M&A fall to -0.0503 in the current year. It can be seen, most companies' performance in the current year of M&A have a greater rate of decline, and this may be due to the huge transaction costs of manufacturing enterprises in China consumed in the process of cross-border M&A. Specifically: The situation of Our small-scale manufacturing enterprises and the imperfect capital market makes the parent company's cash flow tight and to take on greater liabilities tight Risk when they implement the cross-border M&A because of paid in cash and shortage in stock exchange, in addition, a variety of M&A effect with a time lag can not appear in the same year, and at the same time the company is making a huge cost which is difficult to digest, so the resulting deterioration in the performance measure will be quickly reflected in the indicators.

In the first year after the cross-border M&A, the average of T difference of M&A enterprises is -0.0009, though still negative, but greater than the increase in the current year of the M&A, while positive rate increased to 50%. This shows that the M&A began to play it across the positive effects after the sample companies experienced a certain transition period, which is mainly because Chinese manufacturers' products mainly serve the low-end customers for a long time bringing about the lack of competitiveness in the international market and the difficulty to enter the high-end market. After the cross-border M&A, the manufacturers can get their overseas subsidiaries brand, technology and sales channels in the short time, fast at both ends to extend the industrial chain and to achieve rapid access to high-end market.

In the first two years after the cross-border M&A, the performance of nearly 60 percents of sample business has increased, but the increase has slowed and the growth rate was not as significant as in the first year after M&A. In the third year after M&A, the average of F difference becomes negative, and positive rate is only 20.83%, which shows that manufacturing performance drops quite quickly, and the rate of decline speed is greater than the rise in the second year after M&A. The reasons may be as follows: ①M & A will have to pay the excessive costs causing the lack of adequate post-operation which led to operating cash flow deterioration;②China's manufacturing enterprises to participate in the cross-border mergers and acquisitions is a short time, so its inexperienced cross-border M&A and lack of long-term cross-border M & A strategic layout, can not support the long-term development after the enterprises M&A; ③Sometimes the acquisition targets are bankrupt enterprises, so our enterprises have to assume its huge debt; ④In view of the great cultural and economic differences between the Western countries and China, our manufacturers need to pay more high cost than in the domestic M&A events to integrate with the culture, management, organizational restructuring, personnel changes and other issues between the parent company and its Subsidiaries.

If the performance of the third year after the M&A lower than the performance of the previous year before the M&A is taken as a measure of the failure, only 33.33% of the company has improved their performance, and the

performance of about seventy percents of the manufacturing enterprise has declined. F0-F-1 is not statistically significant while F3-F-1 is significant, which means that the sample companies fail to integrate in the three years after M&A.

Suggestion

To sum up, Chinese manufacturers are not effectively to improve their performance through the cross-border M&A activity. Based on the conclusions, we focused on the enterprise level to make the following recommendations:

(1) The use of appropriate financing payments. In the implementation of M&A, the enterprises often need to consume a lot of money, including a large transaction amount of the M&A implementation, and many require additional costs borne by the acquiring party, the large number of inherited type of debt burden transferred to M&A enterprises after the use of "bearing debt type " M&A, a large number of reserve funds needed after the end of enterprise integration for business development to promote investment in. The huge capital investment is likely to fall Chinese Manufacturing Enterprises into financial difficulties of a shortage of funds or a huge debt, so to select the appropriate mode of financing in the M&A process is essential. In our case collected, most of the business takes cash payment and its sources of funding are mostly bank loans. The financing of a single party to the enterprise has brought about tremendous business risk and financial risk: cash payments as resulting in the shortage of working capital and a large number of bank loan rate lead to the growth up of corporate assets and liabilities rate, financial costs surged, increasing financial risk. At this stage, Chinese enterprises can take the way of "cash + convertible", so they can not only to some extent get rid of the limit of M&A funds size to reduce the risk and debt pressures, but also ensures the number of its own shares, thus guaranteeing the right to control and speak. [4]

(2)Strengthen the post-merger integration. It's a decisive factor in the success or failure of the M&A strategy whether the company has succeed in integrate the acquisition of resources with the original integration of resources after the M&A activity to achieve synergy (1 + 1>2). As Bruce Wasserstein (1998) made it clear that the success of M & M Enterprises is not just rely on the ability to create value, and in greater reliance on the integration after M&A. Cultural integration is the biggest challenge facing the parent company, so the culture of the acquiring party should normally be used to promote strategies to alleviate this type of cultural conflict. That is, through the mutual penetration and merging between the two companies they gradually eliminate the antagonism in the beginning of M&A, and in the attitude of seeking common ground and they should consciously promote different cultural orientation and establish cultural diversity awareness, and through training and learning to adjust their values to adapt to different Culture, they can gradually complete the shaping of a new corporate culture.

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