Yan Li[1], Ying-bo Li[2]

OVERSEAS M&A OF CHINESE HIGH-END EQUIPMENT MANUFACTURING

The article analyzes whether overseas M&A of Chinese high-end equipment manufacturing industry create wealth effect or not. The event-study method is used here. The results show that in a month before and after the announcement, the wealth effect is positive, but during the two years after the announcement, M&A have a negative impact on shareholders' equity and financial performance. The factors influencing wealth effect include vertical M&A, cultural distance, institutional distance and the firm size.

Keywords: *overseas M&A; wealth effect; high-end equipment manufacturing; China.*

Ян Лі, Інбо Лі

ЗАКОРДОННІ ЗЛИТТЯ ТА ПОГЛИНАННЯ КИТАЙСЬКИХ ВИРОБНИКІВ ВИСОКОКЛАСНОГО ОБЛАДНАННЯ

У статті проаналізовано ефект багатства від закордонних злиттів та поглинань, проведених китайськими виробниками висококласного обладнання. В аналізі застосовано метод вивчення подій і його результати виявили, що ефект багатства є позитивним за місяць до оголошення про злиття (поглинання) і ще місяць після нього. Однак протягом двох років після злиття (поглинання) спостерігається негативний вплив на прибуток власників та фінансові показники в цілому. Фактори, що найбільше впливають на ефект багатства, – це вертикальність злиття (поглинання), культурна відстань, інституційна відстань та розмір компанії.

Ключові слова: *закордонні злиття та поглинання; ефект багатства; виробництво висококласного обладнання; Китай.*

Форм. 5. Рис. 8. Табл. 3. Літ. 11.

Ян Ли, Инбо Ли

ИНОСТРАННЫЕ СЛИЯНИЯ И ПОГЛОЩЕНИЯ КИТАЙСКИХ ПРОИЗВОДИТЕЛЕЙ ВЫСОКОКЛАССНОГО ОБОРУДОВАНИЯ

В статье проанализирован эффект богатства от зарубежных слияний и поглощений, проведённых китайскими производителями высококлассного оборудования. В анализе применён метод изучения событий и его результаты показали, что эффект богатства позитивен за месяц до объявления слияния (поглощения) и месяц после него. Однако в течение двух лет после слияния (поглощения) наблюдается негативное влияние на прибыль собственников и финансовые показатели в целом. Факторы, наиболее влияющие на эффект богатства, – это вертикальность слияния (поглощения), культурное расстояние, институциональное расстояние и размер компании.

Ключевые слова: *зарубежные слияния и поглощения; эффект богатства; производство высококлассного оборудования; Китай.*

Introduction. FDI outflow from China has increased dramatically in the recent years. In 2014, outward FDI from China reached to 123.12 bln USD, 14.2% up from 2013, making it the 2nd largest source of capital outflow in the world (Statistical bulletin of China's outward FDI, 2014). The main channels for outward FDI (OFDI) are greenfield investment and M&A. According to (Deng, 2007), M&A seems to be the first choice of emerging economies, because it can implement strong control over overseas subsidiaries in order to guarantee the acquirers' strategic motive.

[1] Shandong Normal University, Shandong Province, China.
[2] Tsinghua University, Beijing, China.

© *Yan Li, Ying-bo Li, 2016*

In all M&A from China, the cases from equipment manufacturing companies have received much attention, especially those in high-end equipment manufacturing industry (HEMI). HEMI is one of the 7 Chinese strategic emerging industries (the state council's decision on speeding up the cultivating and developing strategic emerging industry, 2010, No. 32) and it is supported by government to "go global" in order to strengthen competitiveness in the world (Ministry of Industry and Information, 2012). But the ultimate goal of overseas M&A for companies is to get returns, so in this paper we plan to investigate whether this kind of M&A creates the wealth effect or not for acquirers and what factors influence this effect.

Recent research and publications analysis. A considerable contribution to the studies on wealth effect from M&A has been made by many, however the conclusion is not conclusive. For example (Alexandrou et al., 2014; Du et al., 2015; Jory et al., 2015; Ning et al., 2014) suggested M&A have positive wealth effect for acquirers, whereas (Agrawal et al., 2001; Nogata et al., 2011) found it otherwise. The inconsistent results perhaps come from two reasons: on the one hand, the research objects are different. Some aimed at developed countries, others focus on developing ones. On the other hand, many factors mediate the wealth effect, such as culture distance (Buckley et al., 2012), vertical M&A or horizontal M&A (Andreou et al., 2012), large shareholders control (Craninckx et al., 2015) and state ownership (Du et al., 2015) etc.

The goal of this article is to investigate the shareholder wealth effects of overseas M&A for Chinese HEMI. Specifically, we assess the impact of M&A announcements on stock price performance of Chinese acquiring firms by using the dataset of 23 deals announced between 2010 and 2014. What's more, the influence factors are also explored.

Research methods. The event study method is used here. It mainly involves the following steps:

1. Selecting the estimation window and the event window. In terms of the estimation window selection, in order to obtain more steady conclusions, the estimation window is set (-180, -31)[3], and the event window is (-30, 30) with a reference to relevant research.

2. Calculating the cumulative abnormal returns (CAR). Firstly, using the market model to calculate stock returns, that is:

$$R_{i,t} = \alpha_i + \beta_i \times R_{m,t} + \delta_{i,t}, \quad (1)$$

where $R_{i,t}$ is the rate of returns of stock i at time t; $R_{m,t}$ is the rate of returns of market portfolio at time t; t is every day in the estimation window.

Using α_i and β_i from (1) to predict the normal returns $R^*_{i,T}$ in the event window, we then calculate the abnormal returns $AR_{i,T}$ of stock i every day in the event window, that is

$$AR_{i,T} = R_{i,T} - R^*_{i,T} = R_{i,T} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{m,T}), \quad (2)$$

where T is every day in the event window; $R_{i,T}$ is the real stock returns of stock i every day in the event window, then

[3] The length of estimation window in such cases is usually 252 trading days or a calendar year, or at least 126 days.

$$CAR_{i,T} = \sum_T AR_{i,T} = \sum_T [R_{i,T} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{m,T})]. \quad (3)$$

After getting the *CAR*, we get the test statistics J_1:

$$J_1 = \frac{CAR}{\sqrt{Var(CAR)}} \sim t(N-1). \quad (4)$$

The null hypothesis is the assumption that the average of *CAR* is 0, and the hypothesis of preparation is the opposite.

Key research findings. First of all, we locate high-end equipment manufacturing enterprises using 3 standards:

1. The main business includes one or several areas of aviation equipment, satellite and its application industry, railway traffic equipment, marine engineering equipment, intelligent manufacturing equipment. Among them, the sub-industry of intelligent equipment manufacturing industry contains intelligent instrument and control system, key components and universal machine parts, intelligent special equipment, high-grade numerically-controlled machine, and automatic production line (Ministry of Industry and Information, 2012);

2. The operating income from HEMI accounted for more than 30% of the total operating income in 2014;

3. We exclude the listed companies with ST, *ST, S*ST, or with incomplete data in the last 5 years. After these steps, we initially got 100 high-end equipment manufacturing listed companies.

Then, searching for the enterprises in the Zephyr (the database of global M&A) we take into account the following conditions: 1) transaction types are merger and acquisition; 2) at least one of the originators is business entity of Chinese mainland in each transaction; 3) target companies must be registered outside mainland China, also excluded are the enterprises registered in the British Virgin Islands, the Cayman Islands, the Independent State of Samoa, the Republic of Mauritius and Barbados and other "tax havens"; 4) the pace of trade is "finished"; 5) define trade date from January 1, 2001 to December 31, 2014. The results show that 531 enterprises satisfy these conditions.

Finally, by matching the high-end equipment listed companies and overseas M&A, we get 21 companies and 23 samples, the results are shown in Table 1.

Figures 1–3 respectively show the sub-industry distribution, regional distribution and ownership in the sample. It can be seen that the sample contains all the sub-industries of HEMI, the geographical area under study includes 11 major provinces, and the distribution of ownership is similar to the overall distribution of Chinese OFDI. For this reason, it can be said that the samples representative.

After determining the sample, we analyze short-term and long-term wealth effects. As to the short-term effects, Figure 4 show the Average Real Returns (ARR) and Average Predicted Returns (APR) of the companies 30 days before and after the announcement. They both show obvious wave shape and there is no big difference between ARR and APR. The increase of short-term wealth effect is not obvious after M&A.

The cumulative abnormal returns (CAR) are shown in Table 2. We can see in time of [-1,1], [-2,2], [-20,20] and [-30,30], the average CAR obtained by the shareholders of the acquirers is 0.0002, 0.011, 0.014 and 0.033 individually, with a growing trend.

But the t-test is not significantly different from zero. It suggests that M&A of HEMI in China have not created significant positive shareholder wealth effect, and CAR is negative in [-5,5] and [-10,10]. The result is consistent with the conclusion of (Hong, 2012). The reason why the short-term wealth effect is not obvious may be that there is information leakage before the event, so the reaction of the stock price tends to be dull.

Table 1. **Overseas M&A casesin HEMI,** *authors'*

Acquirer (stock number)	Date of announcement	Target company (country)
Shenyang Machine Tool Co.Ltd (000410)	2010-12-07	Schiess (Germany)
Zoomlion Heavy Industry Science And Technology Co.,Ltd. (000157)	2008-04-02	Intesa Sanpaolo (Italy)
Avic Electromechanical Systems Co., Ltd. (002013)	2012-02-28	CRH (UK)
Guangxi Liugong Machinery Co.,Ltd.(000528)	2010-11-18	HSW (Poland)
Navinfo Co., Ltd. (002405)	2011-01-15	Mapscape (Holland)
	2012-05-29	Group Geomatics PCI (Canada)
Anhui Zhongding Sealing Parts Co., Ltd. (000887)	2008-06-24	AB (USA)
	2009-09-19	MYE (USA)
	2010-03-04	Sea crossing International Co., Ltd. (Japan)
	2011-07-23	Copper (USA)
	2012-10-17	Acushnet (USA)
Sany Heavy Industry Co.,Ltd (600031)	2012-01-31	Putzmeister (Germany)
	2012-07-24	Intermix GmbH (Germany)
Shanghai Mechanical & Electrical Industry Co., Ltd. (600835)	2009-02-27	Huawei Trading Co. Ltd. (Hong Kong)
	2012-10-30	Gauss International, Ltd. (USA)
Citic Offshore Helicopter Co., Ltd. (000099)	2008-08-28	Eurocopter (France)
Shantui Construction Machinery Co., Ltd. (000680)	2007-03-27	Gehring (Germany)
	2008-10-21	Topy Industries, limited (Japan)
Yantai Moon Co., Ltd. (000811)	2010-04-23	Samshin Limited (Korea)
Jiangsu Nonghua Intelligent Agriculture Technology Co., Ltd. (000816)	2007-12-12	Fargo International LLC (USA)
Qinchuan Machine Tool & Tool Group Share Co., Ltd (000837)	2003-11-15	UAI (USA)
Sinopec Oilfield Equipment Corporation (000852)	2011-09-20	Hijet (USA)
	2011-11-05	OPS (Germany)
Mesnac Co., Ltd. (002073)	2011-12-02	Davian (USA)
	2012-01-13	Wealthy Star (France)
	2012-07-28	P&D Technologies (France)
WisesoftCo., Ltd. (002253)	2011-02-11	Flight Safety International (USA)
Yantai Jereh Oilfield Services Group Co., Ltd. (002353)	2012-09-21	Deer Garden Resources, Ltd. (Canada)
Beijing Supermap Software Co., Ltd. (300036)	2010-06-19	SuperMap (Japan)
China Spacesat Co., Ltd. (600118)	2008-06-03	Thales (France)
Shanghai Zhenhua Heavy Industries Co., Ltd (600320)	2010-08-11	Friede Goldman United (USA)
Zhuzhou Times New Material Technology Co., Ltd (600458)	2011-01-12	Vossloh (Australia)

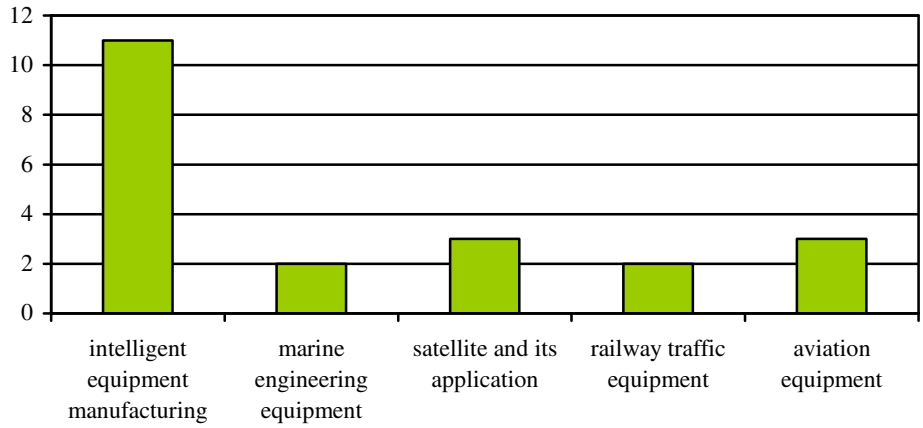

Figure 1. **Sub-industries in the samples,** *authors'*

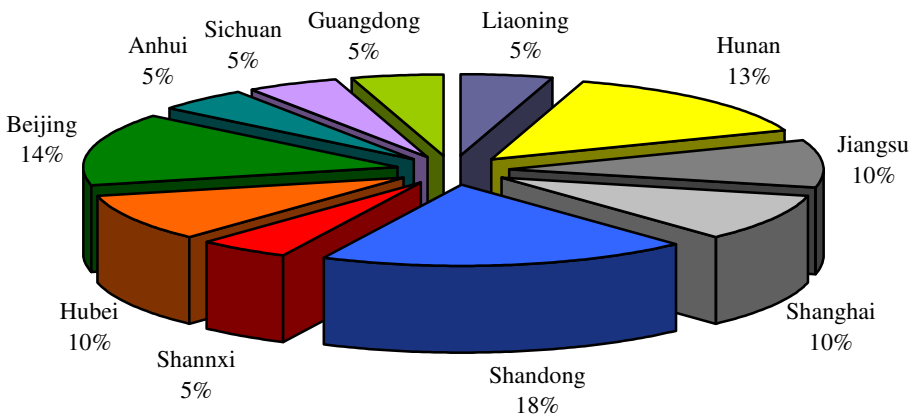

Figure 2. **Regional distribution in the samples,** *authors'*

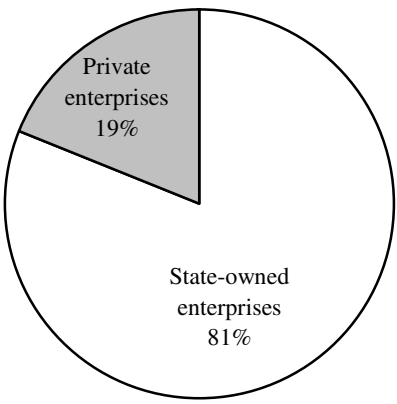

Figure 3. **Ownership forms in the sample,** *authors'*

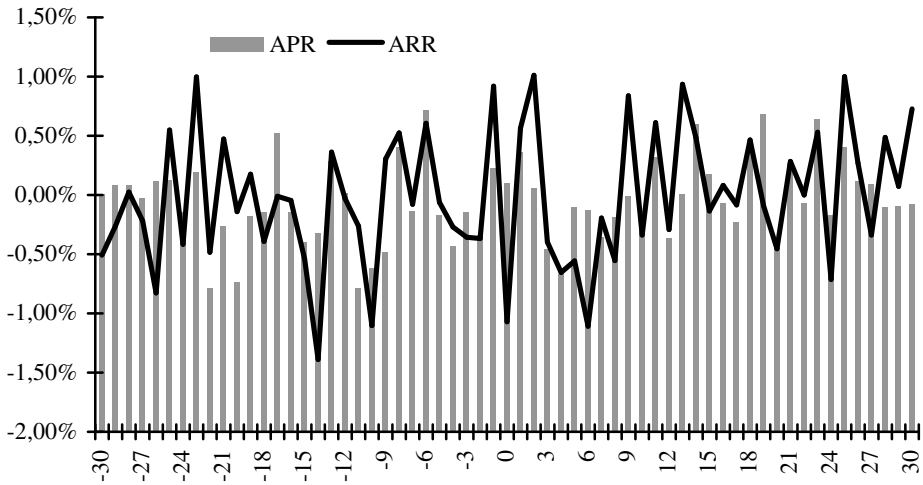

Figure 4. **ARR and APR in the short time,** *authors'*

Table 2. **CAR in the short time,** *authors'*

Event window	minimum	maximum	average	standard error	t-test
CAR (-1,1)	-0.118	0.125	0.0002	0.061	-0.210
CAR (-2,2)	-0.132	0.141	0.011	0.064	0.470
CAR (-5,5)	-0.372	0.248	-0.004	0.128	0.130
CAR (-10,10)	-0.528	0.269	-0.017	0.172	0.080
CAR (-20,20)	-0.697	0.447	0.014	0.260	0.170
CAR (-30,30)	-0.801	0.465	0.033	0.311	0.260

As to the long-term wealth effect, we used two years after the announcement as the long-term event window. Figure 5 shows the Average Abnormal Return (AAR, equals to ARR minus APR) of 1 to 24 months after the announcement. It can be seen clearly that the acquirers' abnormal returns begin to rise after the announcement, reach the peak in the second month, then begin to decline and fluctuate. By comparing the area above and below the 0 axis, we find the area below is larger.

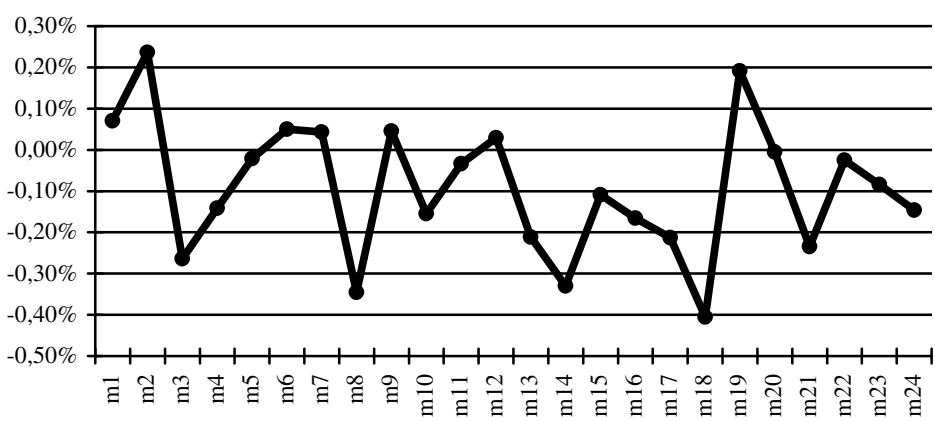

Figure 5. **AAR in the long time,** *authors'*

We investigate CAR of the first and second year after the announcement, and find that both average CAR are negative, and both are significant at the 1% level. This shows that M&A create negative returns to investors in 2 years after the event.

Table 3. **CAR in the long time,** *authors'*

Event window	minimum	maximum	average	standard error	t-test
CAR (0,360)	-1.519	1.099	-0.072	0.644	-16.560
CAR (361,720)	-1.593	0.370	-0.296	0.473	-92.560

Then we do the robust analysis for the short- and long-term results. It is not enough to analyze the wealth effect using only the event study method, because there are stock price manipulations at the second markets and insider trading cases. When M&A occurs, investors may believe that the stock price will be manipulated to rise and would take the follow strategy regardless the companies' performance, so there may be significant abnormal returns at the second markets, even though the performance did not improve. Taking the above reasons into account, this paper also uses the accounting research methods to study the Earnings Per Share (EPS), Returns On Equity (ROE) and Tobin's Q of the listed companies before and after the announcement[4]. In particular, Tobin's Q is calculated as:

The average stock price of a year x total number of capital stock at the end of the year + corporate debt at the end of the year) / total assets at the end of the year.

Figure 6 shows that the performance of acquirers is significantly improved before the announcement, while there is a continuous decline in two years after the M&A.

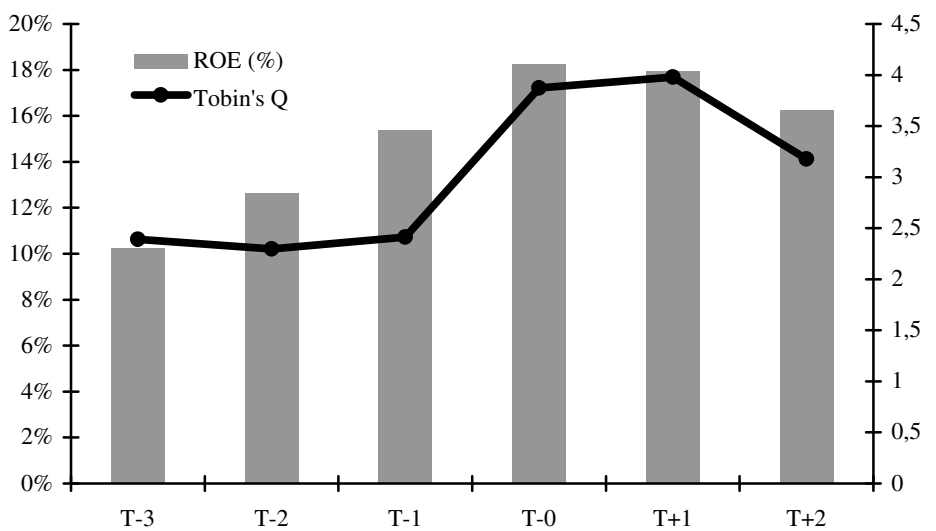

Figure 6. **Robust analysis of M&A performance based on the accounting method,** *authors'*

[4] Prior researches on long-term performance generally adopted the comparison of 3 years before and after the M&A, but the time span is not so long in this paper. Because the definition of HEMI is put forward in 2010, so this paper compares 3 years before and 2 years after M&A.

The results can partially explain why long-term CAR is negative. Because CAR is the sum of AR, and AR is calculated by real returns (RR) minus predicted returns (PR) (equation (2)).The parameters (α and β) used to measure PR are fitted by the data of the previous one year of the M&A announcement which is the highest in the research time (Figure 6) which results in PR being higher and CAR being lower.

The empirical results and the accounting research methods are in agreement here. We draw the convincing conclusions: in a month before and after the announcement, the average abnormal returns are positive, but they are not significant; and during the two years after the announcement, M&A have a negative impact on shareholders' equity and financial performance.

Further we will explore what factors influence short- and long-term performance. We define the relevant influence factors as follows:

1. State ownership (state). Unlike using the dummy variables in the previous studies, we use the proportion of state-owned property to measure the index.

2. Institutional distance (inst). Using the International Country Risk Index of the Heritage Foundation to measure this index which is the average of democratic accountability system government stability, investment environment, corruption, law and order, bureaucracy and economic conditions. For the countries involved in this paper, we compare all the subindicators of the target countries with that of China, and then calculate the average number. The time is set as one year before M&A. Data comes from http://epub.prsgroup.com.

3. Cultural distances (cult). The calculation is according to (Hofstede, 1980, 1993). He proposed 5 known cultural dimensions: individualism and collectivism, power distance, uncertainty avoidance, male and female, long-term and short-term orientation. Based on that (Kogut and Singh, 1988) put forward the cultural distance measurement index KSI, taking China for example, that is:

$$CD_J = \sqrt{\sum_{i=1}^{4} \frac{(I_{ij} - I_{ic})^2}{V_i}}, \tag{5}$$

where CD_J is the cultural distance between the host countries and China; I_{ij} is the cultural value of i dimension in host countries; I_{ic} refers to the cultural value of i dimension in China; V_i refers to the variance of cultural value of i dimension. Relevant data come from the sixth World Value Survey released on 18th April 2015 (http://www.wvsevsdb.com).

4. Firm size (size). Measured by the logarithm of total assets.

5. Vertical M&A (vert). We define M&A types by the method of (Andreou et al., 2012). If enterprises acquire complementary assets, such as key technologies, the vert is 1, otherwise 0.

6. Proportion of large shareholders (top10), measured by the proportion of top 10 shareholders.

We treat short- and long-term CAR as dependent variables, and conduct the regression analysis using the OLS method. Considering the length of this article, we only identify the factors that have a significant impact on CAR in the short- and long-term, Figures 7 and 8 respectively.

From Figures 7–8 we can see that the influence factors can only effect in a limited time period rather than the whole time. For example, in the short-term CAR

can be well explained in [-7,7], [-10,10], [-11,11], [-27,27], [-3,3], [-28,28], [-29,29] and [-30,30]. And in the long-term the influence factors are very important in 2 months, 12 months, 20 months and 21 months after the M&A.

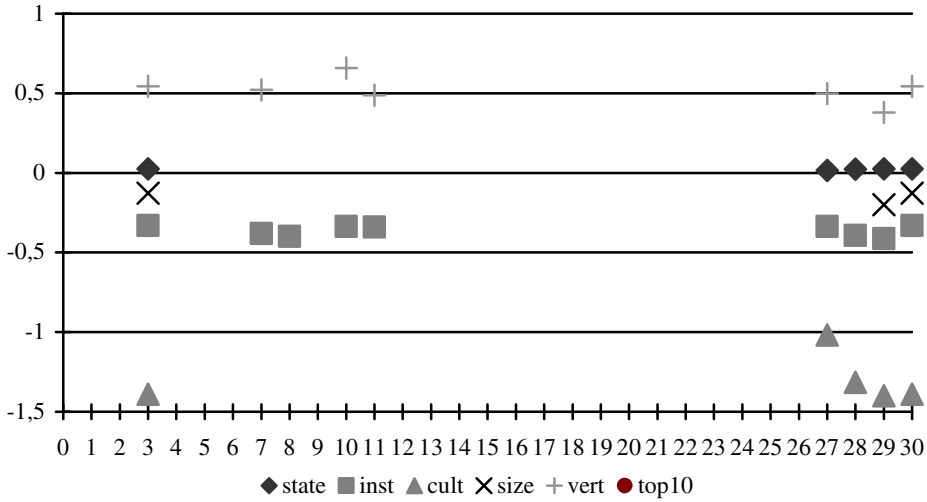

Figure 7. **Significant variables for short-term CAR (30 days),** *authors'*

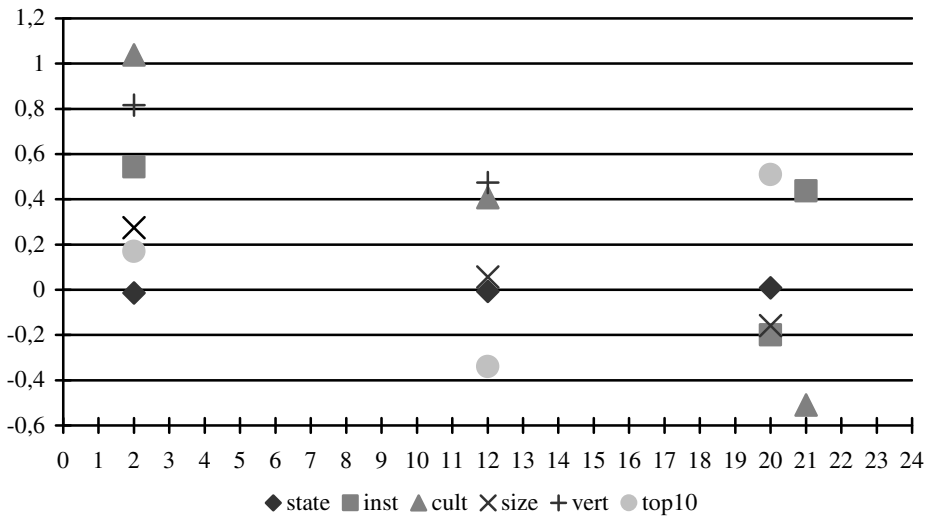

Figure 8. **Significant variables for long-term CAR (24 months),** *authors'*

In detail, vertical M&A (vert) has a significantly positive effect in the short and long term, 0.51 and 0.64 respectively. This confirms the assets-seeking motive of overseas M&A of high-end equipment companies, because vertical M&A is of great benefit to enterprises in acquiring R&D information, market channel or resources to enhance the core competitiveness of the acquirer.

The effect of cultural distance (cult) is negative (-1.28) in the short term, while it is positive (0.31) in the long run. Some scholars have pointed out that cultural differences often result in the failure of integration or lower performance of M&A.

Therefore, there is no positive impact in the short term. However, from the current sample, most high-end equipment companies set their eyes at the markets in Europe and the United States, especially enterprises in Germany with mechanical manufacturing. Although the cultural gap is relatively large, it is in line with overseas M&A of Chinese enterprises, which is more likely to succeed. This should be the reason why cultural distance plays a positive role for long-term performance.

Likewise, institutional distance (inst) has a negative effect (-0.36) in the short term, while it has a positive impact (0.26) in the long run. Most countries with larger institutional distance are developed countries. Although in the short-term there are negative reactions which may be due to concerns about the integration of M&A, but in the long run it still can bring abnormal returns.

The coefficient of firm size (size) also changes from negative to positive, but it is relatively small, -0.016 and 0.057 respectively. According to the hypothesis, the larger is the company, the more blindly it invests. However, in the long run, the larger size – the stronger it responds to risk, the more management experience it has, the more surplus capital it carries on the integration work after M&A, all this having a positive effect on long-term performance.

The coefficient of state ownership (state) is almost close to 0 axis in the long and short term, and it is less than 0.05. Unlike the cultural distance, institutional distance or firm size, it is positive (0.02) in the short term and negative (-0.004) in the long run. According to (Zimo, 2012), the overseas M&A performance of Chinese private enterprises in equipment manufacturing is significantly better than that of the state-owned enterprises. Therefore, in the long run private enterprises may be more able to get the market support.

Ownership concentration (top 10) does not play a significant role in the short-term, but the long-term coefficient is significant positive (0.113). While we do not conclude that ownership concentration has negative wealth effect of M&A like in (Xianming, 2014), but in the short term, ownership concentration does not have a significant impact. In the long run, enterprises with high ownership concentration will have more powerful control and more efficient integration after the M&A, thus promoting long-term performance.

Conclusions. In this paper, we use the overseas M&A data of Chinese high-end equipment companies (2006–2012) to study their short-term and long-term wealth effects, using the event study and accounting research methods. The results show that:

First, in the current sample, most of high-end equipment acquirers come from the sub-industry of intelligent equipment. Shandong, Hunan and Beijing are the top 3 provinces (or municipality) where the companies come from. As for ownership, most of acquirers are state-owned.

Secondly, the conclusions of the event study and accounting research methods are in agreement. In a month before and after the announcement, the average abnormal returns are positive, but not significant; and during the two years after the announcement, M&A has a negative impact on shareholders' equity and financial performance.

Thirdly, we chose 6 factors mentioned in the previous study, including state ownership, institutional distance, cultural distance, firm size, M&A types and proportion

of large shareholders, to study their impact on the long- and short-term wealth effects. The results show that: 1) M&A types have the strongest effect and vertical M&A will effectively promote abnormal returns; 2) the effect of cultural distance is similar to that of institutional distance, although negative reactions maybe due to concerns about the integration of M&A in the short-term market, in the long run, they will enhance the competitiveness of acquirers through M&A in developed countries; 3) large enterprises are not recognized by the market in the short term which may be due to the uncertainty of blind M&A, but the ability to respond to risk and resources will promote them to obtain abnormal returns; 4) state-owned background can help the acquirer get abnormal returns in the initial period after the M&A. But in the long run the flexibility of decision-making mechanism help private enterprises get of more abnormal returns; 5) ownership concentration does not play a significant role in the short term but it has positive effect on abnormal returns in the long run.

Acknowledgment. *We would like to acknowledge the funding of the National Social Science Foundation of China (No.15CGL077) and the National Natural Science Foundation of China (No. 15CGL077).*

References:

Alexandrou, G. et al. (2014). Mergers and Acquisitions in Shipping. Transportation Research Part E: Logistics and Transportation Review, 61: 212–234.

Andreou, P.C. et al. (2012). Valuation Effects of Mergers and Acquisitions in Freight Transportation. Transportation Research Part E: Logistics and Transportation Review, 48(6): 1221–1234.

Buckley, P.J. et al. (2012). Host-home Country Linkages and Host-home Country Specific Advantages as Determinants of Foreign Acquisitions by Indian Firms. International Business Review, 21(5): 878–890.

Craninckx, K., Huyghebaert, N. (2015). Large Shareholders and Value Creation throughCorporate Acquisitions in Europe-The Density of The Controlling Shareholder Matters. European Management Journal, 33(2): 116–131.

Du, M., Boateng, A. (2015). State Ownership, Institutional Effects and Value Creation in Cross-border Mergers &Acquisitions by Chinese Firms. International Business Review, 24(3): 430–442.

Hong, W. (2012). The Influence of Petroleum Industry's overseas M&A on the Enterprises Performances – Empirical Research Based on CNPC, SNP and CNOOC (in Chinese). Journal of International Trade, 12: 123–136.

Jory, S.R., Ngo, T.N. (2015). The Wealth Effects of Acquiring Foreign Divested Assets. International Business Review, 24(2): 235–245.

Ning, L. et al. (2014). International Investors' Reactions to Cross-border Acquisitions by Emerging Market Multinationals. International Business Review, 23(4): 811–823.

Nogata, D. et al. (2011). Is Corporate Governance Important for Regulated Firms' Shareholders?: Evidence from Japanese Mergers and Acquisitions. Journal of Economics and Business, 63(1): 46–68.

Xianming, W. (2014). Cross-Border M&A and Enterprise Value: From the Perspective of Asset-Seeking (in Chinese). Economic Management Journal, 1: 45–55.

Zimo, F. (2012). Study on Key Factors for Successful Overseas M&A of Chinese Machine Tool Manufacturers (in Chinese). Journal of International Trade, 1: 155–163.

Стаття надійшла до редакції 15.12.2015.