

# Research on the Impact of Timing Financing on M&A Performance: The Intermediary Effect Based on Financing Efficiency

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**Abstract:** Timing financing theory holds that when listed companies are overvalued, they will increase equity financing. Different from previous studies, this study explores the mechanism of timing financing theory in China from the perspective of financing efficiency. Through the empirical study of M & A cases of Listed Companies in China from 2007 to 2018, it is found that the timing financing behavior that increasing equity financing when overvalued reduces the positive impact of equity financing on M & A performance. Further research found that the mediating effect of the financing efficiency exists, that is, the timing financing behavior does not increase listed companies' financing efficiency, so it can not help listed companies create value through M & A.

**Keywords:** Timing Financing Theory; equity financing; M&A performance; financing efficiency

## 1. Introduction

M & A is one of the most important investment methods of listed companies (Li, 2020)[1], whether financing can be obtained at a lower cost and whether sufficient funds can be obtained directly affect M & A performance. At present, the mispricing of the stock market caused by inefficient capital market has attracted more and more attention from scholars. A large number of empirical evidences show that the window period when the stock price of listed companies deviates from the fundamentals has become one of the important considerations for companies to make investment and financing decisions. Stein's (1996) timing financing theory holds that companies can make use of window opportunities caused by market irrationality to arrange financing decisions rationally[2]. Shleifer & Vishny (2003) extended the influence of timing financing theory from the perspective of M & A[3]. They believed that companies whose stock prices were overvalued would purchase assets by issuing shares or exchange shares to reducing financing costs and achieving limited arbitrage.

What kind of impact will the overestimation of M&A companies bring to M&A performance? Scholars have not reached a consistent conclusion on this question. Moreover, there are few researches on the influence mechanism of stock mispricing on M&A performance( Luo & Yang,2019)[4]. This paper explains the impact of stock

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mispricing on M & A performance from the perspective of financing efficiency. Many studies in China have confirmed that equity financing can increase M & A performance. However, the paper found that overestimation of listed companies will reduce the positive impact of equity financing on M & A performance. This conclusion provides evidence for the timing theory of China's capital market, and enriches the research of equity financing on M&A performance.

In terms of financing efficiency, the degree of marketization and property rights system in developed capital market is relatively sound, so there are few studies on financing efficiency( Shen, 2017; Yin et al., 2018)[5][6]. But due to the constraints of institutional environment, corporate governance level and financing in China's capital market, the financing efficiency is generally low (Zhang et al., 2017)[7]. Therefore, different from foreign research, this study explains the impact of corporate mispricing on M&A performance from the perspective of financing efficiency. It is found that the reason for overestimation reduces the positive impact of equity financing on M&A performance is that overestimation reduces financing efficiency, which in turn reduces M&A performance. It means the mediating mechanism of financing efficiency on the influence of overvaluation on M&A performance is established. The research on the impact of financing efficiency on timing financing is more in line with the background of China's capital market, and it also expands the mechanism research scope of the impact of mispricing on M&A performance.

At present, the single financing method is the main problem of M & A financing in China, mainly self-owned funds. In the future, with the formal implementation of the new securities law in China's capital market and the gradual relaxation of equity financing channels, the proportion of equity financing will increase, and the market timing behavior will be more extensive and common. Therefore, studying how to reasonably use capital market valuation deviations, reduce financing costs, improve financing efficiency, and achieve better M&A performance is of great practical significance.

## **2. Theoretical analysis and research hypothesis**

Since 1990s, the most important research direction of financing has been the impact of market mispricing on corporate financing decisions (Huang & Ritter, 2005)[8]. According to behavioral corporate finance theory, inefficient market condition is an important factor in managers' financing decisions, that is, companies will choose financing strategies based on the degree of deviation between stock prices and fundamentals.

The first influential theory that the capital market affects corporate financing choices is Stein's (1996) timing financing theory. By constructing a rational capital budget analysis framework under the irrational capital market, Stein (1996) found that mispricing in the stock market will affect the companies' equity financing costs, so companies can choose financing methods based on market valuation deviations<sup>[2]</sup>. When the stock price is higher than fundamentals, companies will choose equity financing. Otherwise, companies will choose debt financing or repurchase shares. Then the market timing financing has been confirmed, Alti (2006), Hovakimian (2006) and Kayhan & Titman (2007) all considered that companies have market timing behaviors when issuing securities[9][10][11]. Vagenas (2020) believes that companies with overvalued stock prices prefer to use share-based payments, and ultimately achieve the

goal of arbitrage from high-valued stocks[12].

Some scholars in China have found that market mispricing does play an important role in equity payment(Sun & Wei,2021)[13]. Specific to China's capital market, although there are many financing options available, the financing methods that meet the company's financing needs are very limited. Companies generally have a funding gap in China. That's because companies have low efficiency in the allocation of credit funds, and there are many restrictions on equity financing. This study believes that although timing financing can help listed companies to alleviate the financing constraints, but due to the imperfect internal governance of most listed companies in China, such as the absence of major shareholders or the high ownership concentration, the management lacks strategic M & A motivation, and the timing financing often has a certain degree of blindness. Therefore, the study conjectures that the timing financing will cause companies to deviate from the optimal capital structure and reduce the financing efficiency of listed companies, so it will not help increase M & A performance. So we assume that:

**H1:** Timing financing will not help listed companies increase M&A performance.

**H2:** Timing financing affects M&A performance through reducing financing efficiency.

### 3. Research Design

#### 3.1 Sample selection and data source

The M&A samples and their financial data come from CSMAR and Wind. There are 5,616 A-share M&A samples in 2004-2018. Because the impact of M & A lasts for 3 years, so only retain the case with the largest scale of M & A within 4 years; Considering that split share structure basically ended in 2006, so delete M & A cases before 2006; Delete financial institutions; Delete debt restructuring, asset replacement and asset divestiture cases; Delete ST and \* ST companies.

#### 3.2 Variable definition

##### 3.2.1 Company mispricing

In this study, we use the method of Rhodes-Kropf et al. (2005)[14] to decompose  $M/B$ :

$$M/B = (M/V) * (V/B) \quad (1)$$

Taking the logarithm on both sides, let  $\log M = m$ ,  $\log V = v$ ,  $\log B = b$ , the equation is converted into:

$$m - b = (m - v) + (v - b) \quad (2)$$

$(m-v)$  is the deviation between market value and intrinsic value, that is the company's valuation deviation;  $(v - b)$  is the deviation between intrinsic value and book value, that is the internal growth opportunity of the company. According to the literature, the deviation between market value and intrinsic value may come from the company level or the industry level. Equation (2) is transformed into:

$$m_{i,t} - b_{i,t} = [m_{i,t} - v(\theta_{i,t}; \alpha_{j,t})] + [v(\theta_{i,t}; \alpha_{j,t}) - v(\theta_{i,t}; \alpha_j)] + [v(\theta_{i,t}; \alpha_j) - b_{i,t}] \quad (3)$$

$v(\theta_{i,t}; \alpha_{j,t})$  represents the estimated value of the firm  $i$  in year  $t$  based on the estimation coefficient  $\alpha_{j,t}$  of the industry  $j$  in year  $t$ ;  $v(\theta_{i,t}; \alpha_j)$  represents the estimated long-term value of the firm based on the estimation coefficient  $\alpha_j$  of the long industry  $j$ .

Therefore,  $[m_{i,t} - v(\theta_{i,t}; \alpha_{j,t})]$  represents the mispricing at company level;  $[v(\theta_{i,t}; \alpha_{j,t}) - v(\theta_{i,t}; \alpha_j)]$  represents the mispricing at industry level;  $[v(\theta_{i,t}; \alpha_j) - b_{i,t}]$  represents the firm's growth opportunities.

This study selects the mispricing at company level, that is  $[m_{i,t} - v(\theta_{i,t}; \alpha_{j,t})]$ . So we need calculate the estimated value of the firm  $i$  in year  $t$   $v(\theta_{i,t}; \alpha_{j,t})$ , regress the following equation by year and industry:

$$m_{it} = \alpha_{0jt} + \beta_{1jt}b_{it} + \beta_{2jt}\ln(NI)_{it}^+ + \beta_{3jt}I_{(<0)}\ln(NI)_{it}^+ + \beta_{4jt}LEV_{it} + \beta_{5jt}LEV_{it}^2 + \varepsilon_{it} \quad (4)$$

$m_{it}$  is the market value of firm  $i$  at the end of year  $t$ , expressed by the logarithm of the sum of the equity market value and the bond market value;  $b_{it}$  is the logarithm of the total book assets of firm  $i$  at the end of year  $t$ ;  $(NI)_{it}^+$  is the net profit after non-recurring profit and loss deduction where  $NI$  is positive only;  $I_{(<0)}$  is dummy variable, if  $NI$  is negative,  $I_{(<0)}$  is 1; otherwise,  $I_{(<0)}$  is 0.  $LEV_{it}$  is the financial leverage of company  $i$  in year  $t$ , which is (total assets - shareholders' equity) / total assets.

Regress formula (4) by industry and year, then get the estimated value of company  $i$  in year  $t$ :

$$\widehat{m}_{it} = \widehat{\alpha}_{0jt} + \widehat{\beta}_{1jt}b_{it} + \widehat{\beta}_{2jt}\ln(NI)_{it}^+ + \widehat{\beta}_{3jt}I_{(<0)}\ln(NI)_{it}^+ + \widehat{\beta}_{4jt}LEV_{it} + \widehat{\beta}_{5jt}LEV_{it}^2 \quad (5)$$

The estimated value estimated by formula 5 only includes company-specific factors, not industry valuation deviation, so the residual term  $\varepsilon$  of the model is the valuation deviation caused by company factors (Misping<sub>it</sub>):

$$\text{Misping}_{it} = m_{it} - \widehat{m}_{it} \quad (6)$$

### 3.2.2 M & A Performance

This paper uses EVA (Economic Value Added) to measure M & A Performance. Compared with the traditional financial indicator, it considers the capital cost, which can more measure whether an investment truly creates value for the enterprise (Zuo & Lv, 2014; Zhao & Li, 2017) accurately[15][16]. This paper chooses  $EVA_1$ ,  $EVA_2$ ,  $EVA_3$  to represent the M & A performance within three years after M & A.

Learn from the methods mentioned in *Market Value Management Theory* by Shi and Liu (2008)[17]:

$$EVA = [ROIC - WACC] * IC \quad (7)$$

ROIC means Return on Invested Capital; WACC means Weighted Average Cost of Capital; IC means Investment Cost. Both ROIC and IC can be obtained directly in the financial statements. WACC can be obtained through Formula (8).

$$WACC=K_D \cdot (1-T) \cdot D / (D+E)+ K_E \cdot E / (D+E) \tag{8}$$

$K_D$  means debt interest rate, this paper uses the 3-5 year bank loan interest rate;  $T$  is the income tax rate at the end of each year;  $K_E$  means the cost of equity that uses CAPM(Formula (9)) to measure.

$$K_E=R_f + \beta(R_m - R_f) \tag{9}$$

$R_f$  means risk-free rate, this paper uses one year bank deposit interest rate in the year of M&A.  $\beta$ means risk coefficient,  $R_m$  means market return rate, that Shanghai Composite Index at the end of each year in this paper.

3.2.3 Financing Efficiency

Based on the research of financing efficiency factors by Wang et al. (2016)[18], this study selects DEA-Malmquist index to calculate the intertemporal financing efficiency change. The financing efficiency in the year of M & A is defined as the dummy variable Fiance0. Take 1 for the total factor production change (Tfpch) is greater than 1 in the year of M & A, it indicates that the financing efficiency has increased compared with the year before M&A, otherwise 0.

3.2.4 Control Variables

The study also controls other related variables such as YAER and INDUSTRY. The definitions and explanations of all variables are as follows:

Table 1. Description of main variables

Type	Name	Operational Definition
Dependent Variables	M & A Performance	$Eva1_i, Eva2_i, Eva3_i$ mean in the first, second and third years after M & A respectively, take logarithm;
Independent Variables	Mispricing	Define continuous variable to measure the extent of mispricing: $Conmisp=m_{it}-\widehat{m_{it}}(m_{it}-\widehat{m_{it}})$ , See formula 6 for details); Define dummy variable Highmisp, take 1for $m_{it}-\widehat{m_{it}} > 0$ , otherwise 0; Take data from the year before M & A;
Mediating Variables	Financing Efficiency	Selects DEA-Malmquist index to calculate the intertemporal efficiency change of M & A company's financing. Take 1 for the total factor production change (Tfpch) is greater than 1 in the year of M & A, otherwise 0.
Control Variables	Equity Financing	Take 1 for equity financing, otherwise 0;
	Property	Take 1 for state-owned enterprises in the year before M & A, otherwise 0;
	Listing Board	Take 1 for listing on the main board, otherwise 0;
	Profit	Average main business profit margin in three Years before M & A;
	Capital Structure	Average asset-liability ratio in three Years before M & A;
	Operating Capacity	Average total asset turnover rate in three Years before M & A;

Company Growth	Average revenue growth rate in three Years before M & A;
Corporate Governance	Ratio of the number of independent directors to the total number of board members in the year before M & A
Acquisition Size	Ratio of M & A Value to Market Value at the end of the year before M & A;
Rela	Take 1 for the acquirer and the acquiree are related parties, otherwise 0;

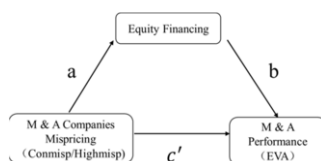
### 3.3 Model construction

$$\text{Eva1}_i/\text{Eva2}_i/\text{Eva3}_i = \beta_0 + \beta_1 \text{Equity Financing}_i + \beta_2 \text{Highmisp}_i * \text{Equity Financing}_i + \beta_3 \text{Controls}_i + \varepsilon_{it} \quad (10)$$

$$\text{Eva1}_i = \beta_0 + \beta_1 \text{Highmisp}_i + \beta_2 \text{Financing Efficiency}_i + \beta_3 \text{Controls}_i + \varepsilon_{it} \quad (11)$$

For H1, we choose OLS model to regress the formula (10).

For H2, we select  $\text{Eva1}_i$  as the dependent variable and select formula (10) and (11) to test the intermediary mechanism of financing efficiency. We refer to the method of Wen and Ye (2014) to test the mediating effect, the mediating effect of M&A financing efficiency is shown in Figure 1 [19].



**Figure 1.** Test of the mediating effect of M&A Financing Efficiency

Path a indicates the impact of the independent variable on the mediating variable; path b indicates the impact of the mediating variable on the dependent variable; path  $c'$  indicates the impact of the independent variable on the dependent variable when consider the mediating variable. If both path a and path b are significant, the mediation effect is significant. If at least one of path a and path b is not significant, use the Bootstrap method to check whether the product of the coefficients is significant.

## 4. Empirical results and analysis

### 4.1 Descriptive statistics analysis

The results of descriptive statistics are reported in Table 2. Through descriptive statistics, it is found that EVA after M & A is increasing year by year, which shows that M & A in China has created value for companies. Highmisp, which is dummy variable that represents the company level mispricing, it's mean is 0.79, which shows that listed companies in China are overvalued. The median of financing efficiency was 0, indicating that more than half of the listed companies' financing efficiency decrease in the year of M&A.

**Table 2.** Descriptive statistics

Variables	N	mean	sd	min	p50	max
Eva1	1948	23.81	1.350	17.90	23.76	29.87
Eva2	1588	23.87	1.460	14.76	23.86	30.24
Eva3	1225	23.93	1.470	18.21	23.86	30.21
Highmisp	2097	0.790	0.410	0	1	1
Conmisp	2097	0.170	4.290	-18.95	1.070	3.180
Equity Financing	2124	0.400	0.490	0	0	1
Financing Efficiency	935	0.420	0.490	0	0	1
Property	2107	0.300	0.460	0	0	1
Profit	2097	10.84	10.96	-11.41	9.020	41.71
Capital Structure	2097	41.02	21.43	1.390	39.66	460.7
Operating Capacity	2097	0.750	0.530	0.0200	0.630	7.290
Corporate Governance	2092	0.370	0.0500	0	0.330	0.710
Acquisition Size	1924	0.210	0.350	0	0.0700	1.690
Rela	2016	0.440	0.500	0	0	1

## 4.2 Empirical result analysis

### 4.2.1 Equity financing, mispricing and M & A performance

Table 3 reports the moderating effect of the company's mispricing on the impact of equity financing on M & A performance, the regression results in Table 3 show that the coefficient of equity financing on the performance within three years after M&A are significantly positive, and equity financing helps increase M&A performance. The result is the same as the conclusions of Chen et al. (2020) that equity financing significantly increases the company's M&A performance[20].

However, after adding the cross multiplication term of overestimation and equity financing, it is found that the cross multiplication term coefficient is significantly negative, indicating that using equity financing when overestimated will reduce the positive impact of equity financing on M & A performance. It may be because when the company is overvalued, the company's managers will cater to the market for financing in order to maintain or increase the stock price, and raise more cheap capital, including equity financing(Jensen, 2005)[21], even if the company has sufficient internal funds(Polk & Sapienza, 2009)[22]. The internal governance structure of most listed companies in China is not perfect. For example, the state-controlled enterprises generally have the problems of the absence of major shareholders or high equity concentration, and the management lacks the initiative power of strategic M & A. Therefore, when the listed company is overestimated, it will conduct inefficient M&A financing out of catering to market motives, which can not help increase M & A performance.

**Table 3** The moderating effect of corporate mispricing on the impact of equity financing methods on M&A performance

Variables	(1) Eva1	(2) Eva2	(3) Eva3
Equity Financing	0.460*** (3.68)	0.460*** (3.23)	0.497*** (3.08)
Highmisp*Equity Financing	-0.317*** (-2.66)	-0.376*** (-2.77)	-0.440*** (-2.88)
Property	0.438*** (6.29)	0.461*** (5.69)	0.449*** (4.89)
Profit	0.034*** (10.91)	0.040*** (11.01)	0.038*** (9.08)
Capital Structure	0.019*** (12.09)	0.017*** (9.41)	0.015*** (7.65)
Operating Capacity	0.310*** (4.85)	0.330*** (4.46)	0.403*** (4.82)
Corporate Governance	-0.561 (-1.02)	-1.346** (-2.09)	-0.975 (-1.25)
Acquisition Size	0.696*** (7.07)	0.836*** (7.57)	0.615*** (5.09)
Rela	0.143** (2.16)	0.174** (2.21)	0.136 (1.46)
Constant	21.703*** (49.88)	22.557*** (47.10)	22.759*** (41.30)
Obs	1,702	1,378	1,051
R-squared	0.255	0.263	0.248
Ind	Yes	Yes	Yes
Year	Yes	Yes	Yes

Note: \*, \*\*, \*\*\*, denote significant at the levels of 10%, 5% and 1% respectively; T value is in parentheses; the same below.

#### 4.2.2 M&A company mispricing, financing efficiency and M&A performance

The above research found that using equity financing when overestimated reduces the positive impact of equity financing on M&A performance. The following explores the intermediary mechanism of timing financing on M & A performance from the perspective of financing efficiency. The regression results in Table 4 show that for path a, when M & A company is overestimated, the financing efficiency decreases. For path b, the reduction of merger financing efficiency will reduce the M & A performance, so the overestimation of M & A company will reduce M & A performance. For path c', the overestimation of M&A companies reduces M & A performance. This conclusion supports the research conclusion of Polk and Sapientza (2009) that catering to the market in the long run when overestimated can not help increase value. We find path a and path b are both significant, so the mediating effect of financing efficiency is significant. Therefore, the intermediary effect of financing efficiency exists, that is, the overestimation of M & A companies affects M & A performance through financing efficiency.



Table 4 Test of the mediating effect of M&A Financing Efficiency

Variables	(1)	(2)
	Fiance0	Eva1
Highmisp	-1.003*** (-3.971)	-0.927*** (-6.167)
Fiance0		0.269*** (3.240)
Property	-0.031 (-0.174)	0.294*** (3.302)
Profit	0.008 (0.724)	0.057*** (8.750)
Capital Structure	0.030*** (5.080)	0.025*** (8.218)
Operating Capacity	-0.301 (-1.599)	0.430*** (5.076)
Corporate Governance	0.543 (0.394)	0.409 (0.477)
Acquisition Size	0.406* (1.918)	0.702*** (6.078)
Rela	0.053 (0.321)	0.126 (1.458)
Constant	0.944 (0.753)	21.344*** (25.536)
Obs	859	857
R-squared		0.336
Ind	Yes	Yes
Year	Yes	Yes

5. Research Conclusions and Policy Implications

This study explains the impact mechanism of timing financing on M & A performance. It finds that increasing equity financing when overvalued reduces the positive impact of equity financing on M & A performance. Further research found that the mediating effect of the financing efficiency exists, that is, timing financing of listed companies reduces their financing efficiency, which can not help listed companies create value through M & A<sup>1</sup>.

Chinese companies face the dilemma of single financing channel at present. Therefore, it is necessary for listed companies to identify the mechanism of capital market mispricing affecting M & A performance, give full play to the favorable motivation of market value management, resist the unfavorable motivation of catering

<sup>1</sup> In order to ensure the robustness of the empirical results, we replaced the mispricing proxy variable with a continuous variable, it means defining  $Conmisp=m_{it}-\overline{m}_{it}$  as the mispricing proxy variable. Then regress the model again, the research results are robust. Due to space limitations, it is no longer listed here.

to the market, and realize the synergistic growth of market value and intrinsic value through the combination of M & A and financing. Listed companies should also strengthen the concept of industry-finance integration and realize positive interaction between physical operation and capital operation of listed companies. M & A and financing using market timing should be based on company's overall value growth, and eliminate the high premium acquisition that can not create value.

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