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DESIRE AND TIMING OF STOCK TRANSFERS IN CHINA

Abstract. *This paper develops a theoretical framework to model the desire and timing of stock transfers in China. The framework provides a criterion to determine the strength of participants' desires for stock transfer and an optimal implementation timing of the stock transfer by maximizing the stock transfer gain. We apply the theoretical framework to examine the desire and the timing of stock transfer deals in China between 2007 and 2012. Results show that transferees usually show stronger desire for the stock transfer. Comparisons of the actual and the optimal implementation timing indicate that some stock transfer deals were not efficiently implemented.*

Keywords: *stock transfer desire; stock transfer timing; stock transfer gain; listed companies.*

JEL Classification: G34, G14, C69

1. Introduction

In China, equity transfer refers to the act that a shareholder (usually called the transferor) of a company sells part or all of its shares to a new owner (usually called the transferee). Equity transfer is one of the behaviors of changing the ownership structure of a company. In an equity transfer, the transferor's rights and obligations as a shareholder are also transferred to the transferee at the same time and the transferee therefore becomes a new shareholder of the company. Equity transfer is a general and frequent way for shareholders to exercise their rights and is one of the most successful performances of modern corporate system in China, and is considered as one of the most important achievements of the financial reform in China.

The companies involved in an equity transfer can be of various types, such as state-owned enterprises, unlisted companies, listed companies and so on, while the equity transferred can be of non-stock and stock form. Among all types of equity transfer, the stock transfer that refers to the equity transfer between two listed companies is the most noticeable one. More precisely, in a stock transfer the transferee itself is a listed company and the equity transferred is in the form of publicly traded stocks of another listed company. Through a stock transfer, one

listed company (the transferee) becomes a shareholder of another listed company. According to the "Administrative Measures for the Disclosure of Information of Listed Companies" promulgated by the China Securities Regulatory Commission on December 13, 2006, the existence of an agreed stock transfer deal should be timely and accurately informed and the information of a completed stock transfer deal should be disclosed in details to all investors. On the other hand, the announcement of an agreed stock transfer deal will usually cause abnormal rising in the stock prices of the two companies. Therefore, stock transfers attract more public attention than other types of equity transfer do.

A stock transfer is usually processed as follows. At the very beginning stage of a stock transfer, a general meeting of shareholders of each company will be convened to study the feasibility of the proposed stock transfer and analyze if the purpose of the proposed stock transfer is in line with company's strategic development. If the proposal is approved by majority shareholders, the transferor and the transferee will hold substantive consultations and negotiations to determine the details of the stock transfer, such as the proportion of shares transferred and the implementation time of the stock transfer. Once an agreement is reached, a schedule will be set up to complete the stock transfer.

The motivations for China's listed companies to participate in stock transfers are:

1. Listed companies can achieve scale expansion with low cost through stock transfers. There are two ways for the expansion and growth of a listed company in China, slow endogenous growth through the reinvestments of its accumulations and rapid external expansion through stock transfers. Taking into account the scale economy, the cost of capital, the agent cost and other factors, stock transfer is exactly the way for a listed company to expand with low cost and high efficiency.

2. Stock transfer can optimize the allocation of resources between two companies and improve the ownership structure of the transferor's company. This is because the listed company that buys stocks in a stock transfer usually performs better that the transferor does.

3. Industrial integration can be realized through stock transfers. The reallocation of resources in stock transfers can improve the efficiency of resource utilization, upgrade the industrial structure, extend the industry chain and hence enhance the profitability of companies involved in the stock transfer.

4. Shareholders of both companies can obtain stock transfer gain through a stock transfer deal. A stock transfer can improve the profitability of involved companies because of the scale expansion, reallocation of resources and optimization of ownership structure through the stock transfer. As a result, the market value of both companies will increase through the stock transfer, which yields the stock transfer gain for shareholders of both companies.

Desire and Timing of Stock Transfers in China

China's stock market has become more standardized and mature than ever since the completeness of the share-trading reform[1] in 2007. Stock transfers between listed companies have become increasingly popular in China's stock market in recent years. Currently, industries involved in stock transfers in China include all areas of economy, such as real estate industry, machinery manufacturing industry, retail business and so on. However, it is reported that there were more than 90% of stock transfer proposals that could not be completed because of inconsistent desires of the shareholders of the two companies for the stock transfer. Even in those completed stock transfer deals, whether or not the maximization of stock transfer gain was achieved is still worthy further study.

Generally speaking, whether or not a stock transfer can be successfully accomplished depends on the desires for the stock transfer of the two companies[2], while the amount of stock transfer gain relies largely on the implementation timing of the stock transfer. In this paper, we focus on the desire and the timing of stock transfers. To the best of our knowledge, it is the first study dedicated on this issue.

Most of relating literature mainly focuses on the desire and the timing of mergers and acquisitions (M&A) between listed companies in developed capital markets. Moeller et al. (2003) examine the gain of shareholders of acquiring firms by studying the cross-sectional variation in the announcement returns of M&As. Lambrecht (2004) analyzes the timing of M&A motivated by economies of scale and show that firms have incentives to conduct M&A in periods of economic expansion since market power strengthens the firms' desires of M&A. Morellec and Zhdanov (2005) develop a dynamic model of M&A based on the stock market valuations of firms involved in M&A, where the timing of M&A is determined by solving option exercise games between bidding and target shareholders. Following the innovative work of Morellec and Zhdanov (2005), Alvarez and Stebecka (2006) design a real options model to determine the timing and the distributions of surplus of M&As; Hackbarth and Morellec (2008) develop a real options framework to analyze the behavior of stock returns in mergers and acquisitions, in which the timing and terms of M&As are endogenous and result from value-

[1] Before the Share-trading reform, there are two different types of stock issued for listed companies, state-owned non-tradable stocks and publicly traded stocks, because of the special historical reasons and special evolution of China's stock market. Shareholders of these two types of stock have the same rights except for the shareholding cost. State-owned shareholders' shareholding cost is much lower than that of general shareholders, which causes serious injustice and affects the development of China's stock market. The Share-trading reform is to convert the state-owned non-tradable stocks into publicly tradable stocks. In order to obtain the trading right, the state-owned shareholders usually choose to pay the consideration to the shareholders of tradable stocks. Stock transfer activity starts to become common after the share-trading reform in 2007.

[2] More precisely, the desire here refers to the desire of the shareholders of a listed company.

maximizing decisions; Thijssen (2008) analyze the optimal and strategic timing of M&As motivated by synergies and risk diversification using a real option model; Hackbarth and Miao (2012) construct a real options model to study the timing and returns of M&As in oligopolistic industries. Kastrinaki and Stoneman (2007) develop an empirical model of M&A timing and illuminate the dynamics of merger activity. Cai et al. (2011) find significant differences in the desires of bidding and non-bidding firms of M&A. Gorbenko and Malenko (2012) investigate the interaction between the means of payment, premiums in M&A and M&A activity.

M&A is essentially different from the stock transfer since an M&A deal merges two companies into a new company. However, there exist similarities between the stock transfer and the M&A by stock acquisition. Existing literature, especially the real options framework of M&A, provides useful references for our study. In this paper, we design a dynamic model based on the real options framework to theoretically analyze the desire and the timing of stock transfers. Our model is able to address the following questions in a stock transfer. Which company shows stronger desire for the stock transfer than the other company does? When is the optimal implementation timing of the stock transfer such that the stock transfer gain is maximized?

We apply our model to investigate the desire and the timing of all stock transfer deals disclosed in China stock market between 2007 and 2012. For each of the stock transfer deals, we first compare the strength of two companies' desire for the stock transfer and then examine if the stock transfer was implemented at the optimal timing.

The remainder of this paper is organized as follows. Section 2 provides details of our model, including the modeling of stock transfer desire and stock transfer timing. Section 3 applies our model to study the stock transfer deals in China stock market. Section 4 concludes.

2. Theoretical Framework

In this section we develop a dynamic model to analyze the desire and timing of stock transfers between listed companies. We first give assumptions of our model and then provide details of our model.

2.1. Assumptions

With appropriate terms and timing, both the transferee and transferor should have incentives to participate in the stock transfer. In a stock transfer deal, this scenario will not happen that one side shows strong desire for the stock transfer and the other side is passive, hesitant and even opposed to the stock transfer. Therefore, we have the first assumption that there should be no significant difference in the desires of both companies in a stock transfer deal.

A stock transfer can optimize the allocation of resources and improve the ownership structure of involved companies, which results in the increase in the market value of both companies. The stock transfer gain of a company is therefore determined by the changes in its stock price. In order to maximize its stock transfer

gain, a company will seek for an optimal timing to implement the stock transfer. Therefore, we have the second assumption that a listed company implements the stock transfer when its stock transfer gain is maximized.

2.2. Modeling desire and timing of stock transfer

We use Company B to denote the company (transferee) that gets stocks in a stock transfer and the company whose stock is transferred is denoted by Company T. Let S_B and N_B be the stock price and the number of shares of Company B respectively, hence the market value of company B is $N_B S_B$. For Company T, let S_T and N_T denote its stock price and number of shares, and then its market value is $N_T S_T$. Let $\omega \in (0,1)$ be the proportion of shares that are transferred.

We assume that stock prices, S_B and S_T, evolve according to the following stochastic differential equations:

$$dS_B(t) = (\mu_B - \delta_B)S_B(t)dt + \sigma_B S_B(t)dW_B(t), \quad (1)$$
$$dS_T(t) = (\mu_T - \delta_T)S_T(t)dt + \sigma_T S_T(t)dW_T(t), \quad (2)$$

where μ_B and μ_T are the return rates of S_B and S_T, respectively, $\delta_B > 0$ and $\delta_T > 0$ are the dividend rates of S_B and S_T, respectively, $\sigma_B > 0$ and $\sigma_T > 0$ are the volatilities of S_B and S_T, respectively, and $W_B(t)$ and $W_T(t)$ are Wiener processes. The correlation coefficient between $W_B(t)$ and $W_T(t)$ is equal to $\rho \in (-1,1)$.

Without loss of generality, we assume that $S_B > S_T$ in the analysis below.[3] We consider the stock transfer premium that refers to the increase in the total market value of two companies due to the stock transfer. The stock transfer premium is determined by the prices of two companies' stocks and therefore can be represented as a function of S_B and S_T. Furthermore, the difference between two companies' stock prices also affects the amount stock transfer premium. The larger the price difference is, the more the stock premium is. Regarding this, we define the stock transfer premium, denoted by $C(S_B, S_T)$, as follows:

$$C(S_B, S_T) = \alpha_B N_B(S_B - S_T) + \alpha_T N_T(S_B - S_T) - \omega N_T S_T, \quad (3)$$

where $\alpha_B > 0$ and $\alpha_T > 0$ are constant parameters, measuring the sensitivity of Company B's and Company T's market value change to the stock price difference, respectively, and $\omega N_T S_T$ refers to the cost of stock transfer that is equal to the

[3] This condition is not necessarily required to be true. We can have similar derivations in the case if $S_B < S_T$.

value of shares transferred. Therefore, the total market value of two companies after the stock transfer is given by

$$A(S_B, S_T) = N_B S_B + N_T S_T + C(S_B, S_T). \tag{4}$$

We focus on Company B first and consider the ratio of Company B's market value to two companies' total market value after the stock transfer. This ratio can be used to determine the stock transfer gain of company B. Assume that the ratio is λ and then the stock transfer gain of Company B is

$$G_B(S_B, S_T) = \lambda A(S_B, S_T) - N_B S_B. \tag{5}$$

According to (5), stock prices at implementation time of the stock transfer determine the stock transfer gain of Company B. In order to maximize its stock transfer gain, Company B needs to choose an optimal implementation timing of the stock transfer, and the optimization problem of Company B is given as follows:

$$O_B^m(S_B, S_T) = \sup_{T_B} E\{e^{-rT_B}[\lambda A(S_B(t_B), S_T(t_B)) - N_B S_B(t_B)]\} \tag{6}$$

where r is the risk-free interest rate and T_B is the implementation timing of the stock transfer for Company B. Let

$$O^B(S_B, S_T) = E\{e^{-rT_B}[\lambda A(S_B(T_B), S_T(T_B)) - N_B S_B(T_B)]\}.$$

According to Ito's Lemma and the geometric Brownian motions given in (1) and (2), we have

$$\begin{aligned} dO^B(S_B, S_T) &= O^B_{S_B}(S_B, S_T)dS_B + O^B_{S_T}(S_B, S_T)dS_T \\ &+\frac{1}{2}[\sigma_B^2 O^B_{S_B S_B}(S_B, S_T)(dS_B)^2 + 2O^B_{S_B S_T}(S_B, S_T)dS_B dS_T \\ &\qquad +O^B_{S_T S_T}(S_B, S_T)(dS_T)^2] \\ &= O^B_{S_B}(S_B, S_T)dS_B + O^B_{S_T}(S_B, S_T)dS_T \\ &+\frac{1}{2}\begin{bmatrix}\sigma_B^2 S_B^2 O^B_{S_B S_B}(S_B, S_T) + 2\rho\sigma_B\sigma_T S_B S_T O^B_{S_B S_T}(S_B, S_T) \\ +\sigma_T^2 S_T^2 O^B_{S_T S_T}(S_B, S_T)\end{bmatrix} dt. \end{aligned} \tag{7}$$

Define the delta-hedging portfolio:

$$\Pi = O^B(S_B, S_T) - O^B_{S_B}(S_B, S_T)S_B - O^B_{S_T}(S_B, S_T)S_T,$$

then we have

$$d\Pi = dO^B(S_B,S_T) - O^B_{S_B}(S_B,S_T)dS_B - O^B_{S_B}(S_B,S_T)S_B\delta_B dt \\ -O^B_{S_T}(S_B,S_T)dS_T - O^B_{S_T}(S_B,S_T)S_T\delta_T dt. \tag{8}$$

Substituting (7) into (8) yields

$$d\Pi = -O^B_{S_B}(S_B,S_T)S_B\delta_B dt - O^B_{S_T}(S_B,S_T)S_T\delta_T dt \\ +\frac{1}{2}\begin{bmatrix}\sigma_B^2 S_B^2 O^B_{S_BS_B}(S_B,S_T) + 2\rho\sigma_B\sigma_T S_B S_T O^B_{S_BS_T}(S_B,S_T) \\ +\sigma_T^2 S_T^2 O^B_{S_TS_T}(S_B,S_T)\end{bmatrix}dt.$$

Since $d\Pi = r\Pi dt$, then we have

$$r\left(O^B(S_B,S_T) - O^B_{S_B}(S_B,S_T)S_B - O^B_{S_T}(S_B,S_T)S_T\right)dt \\ = -O^B_{S_B}(S_B,S_T)S_B\delta_B dt - O^B_{S_T}(S_B,S_T)S_T\delta_T dt \\ -\frac{1}{2}\begin{bmatrix}\sigma_B^2 S_B^2 O^B_{S_BS_B}(S_B,S_T) + 2\rho\sigma_B\sigma_T S_B S_T O^B_{S_BS_T}(S_B,S_T) \\ +\sigma_T^2 S_T^2 O^B_{S_TS_T}(S_B,S_T)\end{bmatrix}dt,$$

which yields the following partial differential equation:

$$rO^B(S_B,S_T) = (r-\delta_B)S_B O^B_{S_B}(S_B,S_T) + (r-\delta_T)S_T O^B_{S_T}(S_B,S_T) \\ +\frac{1}{2}[\sigma_B^2 S_B^2 O^B_{S_BS_B}(S_B,S_T) + 2\rho\sigma_B\sigma_T S_B S_T O^B_{S_BS_T}(S_B,S_T) \\ +\sigma_T^2 S_T^2 O^B_{S_TS_T}(S_B,S_T)]. \tag{9}$$

Define $R = S_B/S_T$, then we have

$$O^B(S_B,S_T) = S_T O^B(S_B/S_T,1) = S_T O^B(R) \tag{10}$$

and

$$O^B_{S_B}(S_B,S_T) = O^B_R(R), \tag{11}$$

$$O^B_{S_T}(S_B,S_T) = O^B(R) - RO^B_R(R), \tag{12}$$

$$O^B_{S_BS_B}(S_B,S_T) = O^B_{RR}(R)/S_T, \tag{13}$$

$$O^B_{S_BS_T}(S_B,S_T) = -RO^B_{RR}(R)/S_T, \tag{14}$$

$$O^B_{S_TS_T}(S_B, S_T) = R^2 O^B_{RR}(R)/S_T. \quad (15)$$

Substituting (10)-(15) into (9) yields the following ordinary differential equation:

$$\frac{1}{2}(\sigma_B^2 - 2\rho\sigma_B\sigma_T + \sigma_T^2)R^2 O^B_{RR}(R) + (\delta_T - \delta_B)RO^B(R) - \delta_T O^B(R) = 0. \quad (16)$$

The stock transfer is implemented at T_B and let $R_B = S_B(T_B)/S_T(T_B)$, and then the stock transfer gain of Company B at time T_B is given by

$$O^B(R_B) = \lambda A(R_B, 1) - N_B R_B. \quad (17)$$

Solving the ordinary differential equation in (16) subject to the condition in (17), we have

$$O^B(R) = [\lambda A(R_B, 1) - N_B R_B](\frac{R}{R_B})^\eta, \quad (18)$$

where η is the positive root of the following quadratic equation:

$$\frac{1}{2}(\sigma_B^2 - 2\rho\sigma_B\sigma_T + \sigma_T^2)\eta(\eta - 1) + (\delta_T - \delta_B)\eta - \delta_T = 0. \quad (19)$$

Finally, the present value of Company B's stock transfer gain is given by

$$O^B(S_B, S_T) = S_T O^B(R) = S_T[\lambda A(R_B, 1) - N_B R_B](\frac{R}{R_B})^\eta. \quad (20)$$

The solution of $O^B(S_B, S_T)$ provides several features of interests. First, the optimization problem for Company B is to choose an optimal implementation timing of the stock transfer such that $O^B(S_B, S_T)$ is maximized. According to the first order condition of (20), the optimal implantation timing is given in the form of the ratio of two companies' stock prices:

$$R_B^m = \frac{\eta}{\eta - 1}\frac{\lambda(\alpha_B N_B + \alpha_T N_T + \omega N_T - N_T)}{\lambda(N_B + \alpha_B N_B + \alpha_T N_T) - N_B}. \quad (21)$$

In other words, if the stock transfer is implemented at the time when the ratio of two companies' stock prices is equal to the R_B^m given in (21), then the present value of Company B's stock transfer gain will be maximized. Second, the optimal implementation timing of stock transfer depends on growth rates and volatilities of two companies' stock prices as well as the correlation between risk terms, where these effects on timing are reflected by the factor $\eta/(\eta - 1)$ in (21). If the correlation coefficient (ρ) is fixed in (19), then higher volatilities (σ_B and σ_T)

implies a greater value of $\eta/(\eta-1)$, which implies more uncertainty in the ratio of two companies' stock prices (R_B^m). If volatilities (σ_B and σ_T) are fixed in (19), a higher correlation coefficient (ρ) implies a smaller value of $\eta/(\eta-1)$. Third, the present value of the stock transfer gain consists of two components, where the first component is the stock transfer gain at the implementation timing and the second component, $(R/R_B)^\eta$, can be understood as the stochastic discount factor.

We now consider Company T. Following a similar analysis, we have the present value of Company T's stock transfer gain as follows:

$$O^T(S_B,S_T)=S_T[(1-\lambda)A(R_T,1)-N_T](\frac{R}{R_T})^\eta, \tag{22}$$

where R_T is the ratio of two companies' stock prices at time T_T that is the implementation timing of the stock transfer for Company T. The optimal implementation timing for Company T in the form of the ratio of two companies' stock prices is given by

$$R_T^m=\frac{\eta}{\eta-1}\frac{(1-\lambda)(\alpha_B N_B+\alpha_T N_T+\omega N_T-N_T)+N_T}{(1-\lambda)(N_B+\alpha_B N_B+\alpha_T N_T)}. \tag{23}$$

Company B and Company T will reach an agreement for the stock transfer as long as the present values of stock transfer gain for both companies are maximized at the same time, which implies that the optimal timings of Company B and Company T coincide, i.e. $T_B=T_T$ and $R_B^m=R_T^m$. Let $R_B^m=R_T^m$ in (21) and (23), and we have

$$\lambda^m=\frac{(\alpha_T+\omega)N_T N_B+\alpha_B N_B^2}{(\alpha_B+\alpha_T+\omega)N_T N_B+\alpha_B N_B^2+\alpha_T N_T^2}. \tag{24}$$

λ^m is the equilibrium proportion of Company B's market value in the two companies' total market value after the stock transfer. With this proportion, both companies will have incentives to implement the stock transfer since the stock transfer gains of both companies are maximized. In other words, an equilibrium will be established in the allocation of stock transfer premium between two companies. Let λ^r denote the proportion of Company B's market value in two companies' total market value before the stock transfer. We can analyze Company B's desire for the stock transfer by comparing the value of λ^m and λ^r. That $\lambda^r>\lambda^m$ indicates that Company B just requires a lower proportion in two companies' total market value after the stock transfer, which implies that Company B has a strong desire for the stock transfer. That $\lambda^m>\lambda^r$ implies that Company B's desire for the stock transfer is weak because it needs to get a higher proportion in two companies' total market value after the stock transfer to compensate for the cost of

stock transfer and the potential loss due to risks in the stock transfer. On the other hand, the equilibrium proportion of Company T's market value in the two companies' total market value is $1-\lambda^m$ and the proportion before the stock transfer is $1-\lambda^r$. Similarly, comparing the value of $1-\lambda^m$ and $1-\lambda^r$, we can analyze Company T's desire for the stock transfer.

Substituting λ^m into (21) or (23) gives

$$R^m = \frac{\eta}{\eta-1}\frac{\alpha_B^2 N_B^2+(2\alpha_B\alpha_T+2\omega\alpha_B-\alpha_B)N_B N_T+(\alpha_T+\omega-1)(\alpha_T+\omega)N_T^2}{\alpha_B^2 N_B^2+\alpha_T\omega N_T^2+(2\alpha_T\alpha_B+\omega\alpha_B-\alpha_T)N_B N_T}. \quad (25)$$

R^m indicates the optimal implementation timing of the stock transfer that is represented as a ratio of Company B's stock price to Company T's stock price. If the stock transfer is implemented at the optimal timing, the stock transfer gains of both companies are maximized at the same time. Let R^r denote the value of the ratio of Company B's stock price to Company T's stock price at the actual implementation time of the stock transfer. By comparing the value of R^r and R^m, the efficiency of stock transfer deals can be examined.

3. Stock Transfer Deals in China

We apply the model described in Section 2.2 to investigate the stock transfer deals between 2007 and 2012 in China. We first provide details of the stock transfer deals and then examine the desire and the timing of each stock transfer deal.

3.1. Data

Although stock transfers have become frequent in recent years, most stock transfer proposals could not be completed in success. Among those successful stock transfer deals, some deals did not disclose full information and some deals were involved with more participants than two listed companies. After careful selection, we obtain 20 stock transfer deals between 2007 and 2012 for the study. Table 1 lists information of each stock transfer deal, including names of the participating companies and the proportion of shares transferred. The industries involved in these stock transfer deals include finance, energy, tourism, chemicals, steel, and electronics.

For each stock transfer deal, we collect the following data[4]: the date of announcement, daily stock prices (closing prices) and dividend payments of two companies within one year prior to the announcement, the stock prices of the two companies on the day of announcement[5], number of shares of two companies and proportion of shares transferred.

[4] Data source: Wind Financial Terminal.

[5] If there is trading suspension for the stock on the date of announcement, the stock price on the date of trading resumption will be used as a substitution.

Table 1. Stock transfer deals of listed companies in China in 2007-2012

Case	Date	Company B (stock code)	Company T (stock code)	ω (%)
1	2007-06-05	Anhui Conch Cement Co. Ltd. (600585)	Anhui Chaodong Cement Co. Ltd. (600318)	19.69
2	2007-11-24	Shenzhen Overseas Chinese Town Co. Ltd. (000069)	Konka Group Co. Ltd. (000016)	45.43
3	2008-02-21	Orient International Enterprise Co. Ltd. (600278)	Shanghai Xin Nanyang Co. Ltd. (600661)	6.56
4	2008-04-12	Petro China Co. Ltd. (601857)	Jinzhou Port Co. Ltd. (600190)	7.91
5	2008-05-06	Shanghai Tongda Venture Capital Co. Ltd. (600647)	Cinda Real Estate Co. Ltd. (600657)	12.07
6	2008-06-16	China Dalian International Co. Ltd. (000881)	Dalian Daxian Enterprises Co. Ltd. (600747)	1.88
7	2008-06-18	Silver Plaza Group Co. Ltd. (600858)	Lushang Property Co. Ltd (600223)	29.84
8	2008-12-04	Hefei Fengle Seed.Co. Ltd. (000713)	Hefei Rongshida Sanyo Electric Co. Ltd. (600983)	33.57
9	2009-01-13	Industrial Bank Co. Ltd. (601166)	Zhang Jia Jie Tourism Group Co. Ltd. (000430)	1.60
10	2009-06-08	Shanghai Feilo Acoustics Co. Ltd. (600651)	SVA Electron Co. Ltd. (600602)	30.07
11	2009-06-16	Neusoft Co. Ltd. (600718)	Chongqing Yukaifa Co. Ltd. (000514)	1.58
12	2010-02-01	Haikou Luoniushan Co. Ltd. (000735)	Hainan Dadonghai Tourism Centre Co.Ltd. (000613)	16.48
13	2010-05-31	NingXia Younglight Chemicals Co. Ltd. (0007635)	Shanghai Chlor-Alkali Chemical Co. Ltd. (600618)	15.53
14	2010-07-28	Ningxia Buliding Materials Group Co. Ltd (600449)	Xishui Strong Year Co. Ltd (600291)	45.00
15	2010-7-31	Xiamen Xinde Co. Ltd. (000701)	Xiamen ITG Group Co. Ltd. (600755)	38.01
16	2010-08-17	Chongqing Dima Industry Co. Ltd. (600565)	Jiangsu Jianghuai Engine Co. Ltd. (000816)	22.44
17	2011-03-31	Guodian Nanjing Automation Co. Ltd. (600268)	Huadian Power International Co. Ltd. (600027)	10.00
18	2011-11-16	Guangdong Electric Power Co. Ltd. (000539)	FSPG Hi-Tech Co. Ltd. (000973)	16.00
19	2011-12-06	Youngor Group Co. Ltd. (600177)	Shanxi Coal International Energy Co. Ltd. (600546)	2.39
20	2012-08-21	Loncin Motor Co. Ltd. (603766)	Shanghai Fenghwa Group Co. Ltd. (600615)	24.37

3.2. Parameter estimations

First, using daily stock prices and dividend payments of two companies in each stock transfer deal, we can estimate volatilities of stock prices σ_B and σ_T, dividend rates δ_B and δ_T, and the correlation coefficient ρ. The risk-free return rate is set as the yield of 1-year Treasury bond on the announcement date of each stock transfer deal. Then, according to quadratic equation given in (19), the value of η can be solved for each stock transfer deal.

Second, we need to estimate parameters α_B and α_T in the definition of stock transfer premium given in (3). We calculate the difference in two companies' total market value before and after the announcement of stock transfer deal and take this as the real value of the stock transfer premium. Then, estimate α_B and α_T according to (3) based on the stock transfer premiums. The estimated values of α_B and α_T are 1.182 and 0.015, respectively, which indicates that the market value change of the transferee or the bidding company are in general much more sensitive to the price difference of two companies' stocks in a stock transfer deal.

3.3. Results and Discussion

Table 2 lists the value of λ^m, the equilibrium proportion of Company B's market value in two companies' total market value after the stock transfer, for each stock transfer deal. The value of λ^r, the proportion of Company B's market value in two companies' total market value before the stock transfer, is also listed in Table 2 for each stock transfer deal.

Table 2. Results of stock transfer desires

Case	Stock code	λ^r	λ^m	$\lambda^r > \lambda^m$
1	(600585, 600318)	0.944	0.899	yes
2	(000069, 000016)	0.908	0.629	yes
3	(600278, 600661)	0.472	0.467	yes
4	(601857, 600190)	0.987	0.967	yes
5	(600647, 600657)	0.168	0.167	yes
6	(000881, 600747)	0.617	0.752	no
7	(600858, 600223)	0.730	0.470	yes
8	(000713, 600983)	0.609	0.602	yes
9	(601166, 000430)	0.995	0.985	yes
10	(600651, 600602)	0.496	0.466	yes
11	(600718, 000514)	0.326	0.273	yes

12	(000735, 000613)	0.788	0.760	yes
13	(000635, 600618)	0.883	0.819	yes
14	(600449, 600291)	0.659	0.519	yes
15	(000701, 600755)	0.926	0.901	yes
16	(600565, 000816)	0.494	0.461	yes
17	(600268, 600027)	0.748	0.683	yes
18	(000539, 000973)	0.825	0.774	yes
19	(600177, 600546)	0.371	0.348	yes
20	(603766, 600615)	0.859	0.796	yes

As analyzed in Section 2.2, that $\lambda^r > \lambda^m$ implies that Company B (the transferee) has stronger desire for the stock transfer than Company T does. The results in Table 2 show that λ^r is larger than λ^m for all stock transfer deals except for Case 6. This indicates that in general the transferee in a stock transfer shows stronger desire for the stock transfer than the other side does in China's capital market. In order to complete the stock transfer, the transferees are more active and initiative, and are even willing to complete the deal with lower stock transfer gain than the optimal one. It is also noticed that λ^r is significantly greater than λ^m in some stock transfer deals, for example, Case 2, 7 and 14, which indicates that there exists explicit difference in stock transfer desires of two participants. The underlying reason is that the stock transfer system of listed companies in China is still not very standardized and there exists adverse related party transactions due to system loopholes in these stock transfer deals. On the other hand, there exists the possibility of government interventions in some stock transfer deals.

Table 3 lists the values of R^r and R^m for each stock deals, where R^m indicates the optimal implementation timing of stock transfer which is represented as a ratio of Company B's stock price to Company T's stock price and R^r denotes the actual value of this ratio on the announcement date of the stock transfer deal.

Table 3. Results of stock transfer timing

Case	Stock code	R^r	R^m	$R^m > R^r$
1	(600585, 600318)	1.922	2.080	yes
2	(000069, 000016)	7.620	8.007	yes
3	(600278, 600661)	1.087	1.232	yes
4	(601857, 600190)	2.670	2.844	yes
5	(600647, 600657)	1.827	1.614	no
6	(000881, 600747)	1.194	1.351	yes

7	(600858, 600223)	4.227	4.399	yes
8	(000713, 600983)	1.266	1.609	yes
9	(601166, 000430)	3.286	3.285	yes
10	(600651, 600602)	1.871	1.887	yes
11	(600718, 000514)	1.335	1.425	yes
12	(000735, 000613)	1.232	1.681	yes
13	(000635, 600618)	2.383	2.411	yes
14	(600449, 600291)	2.487	2.496	yes
15	(000701, 600755)	1.393	1.513	no
16	(600565, 000816)	1.040	1.159	yes
17	(600268, 600027)	7.121	7.258	yes
18	(000539, 000973)	0.189	0.201	yes
19	(600177, 600546)	2.298	2.336	yes
20	(603766, 600615)	0.856	0.913	yes

Comparing the values of R^r and R^m in Table 3, we find that there exists big difference between R^r and R^m in some cases. This means that these stock transfers were not implemented at the optimal timing and therefore were not efficient. The low level of marketization of China's stock market and the lack of competitions may lead to the inefficiency of stock transfers. In addition, the leaking of the stock transfer deal prior to the announcement may serve as another reason for the inefficiency of stock transfer deals since stock prices of both companies may have responded in advance to the future stock transfer.

Stock transfer gains of both companies can be maximized if the stock transfer is implemented at the optimal timing. The results in Table 3 show that R^m is larger than R^r in all deals except for Cases 5 and 15. According to the definition in (3), stock transfer premium is an increasing function of the price difference between two companies' stocks, that is, the total stock transfer gains of two companies increases as the value of R^r increases to R^m. This makes it possible for two companies to choose the appropriate implementation timing of the stock transfer as R^r approaching to R^m in order to maximize the stock transfer gains.

4. Conclusions

This paper develops a theoretical framework to model the desire and the timing of stock transfer. In this framework, the optimal implementation timing of stock transfer is determined by maximizing the stock transfer gain and a criterion is provided to analyze the strength of desire for stock transfer.

We apply our model to study the desire and timing of stock transfers in China between 2007 and 2012. Results show that the transferee usually shows

stronger desire for stock transfer than the other side does. Furthermore, some stock transfer deals in China were not efficient since the implementation timing of these stock transfer deals obviously differ from the optimal implementation timing.

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REFERENCES

[1] **Alvarez, L. and Stenbacka, R. (2006),** ***Takeover Timing, Implementation Uncertainty and Embedded Divestment Options***. *Review of Finance*, 10, 417-441;
[2] **Cai, J., Song, M. H. and Walking, R. A. (2011),** ***Anticipation, Acquisitions and Bidder Returns: Industry Shocks and the Transfer of Information across Rivals***. *Review of Financial Studies*, 24 (7), 2242-2285;
[3] **Gorbenko, A. S. and Malenko, A. (2012),** ***Means of Payment and Timing of Mergers and Acquisitions in a Dynamic Economy.*** Available online at: http://faculty.london.edu/agorbenko/GoMaPaper3-2012-10-29.pdf;
[4] **Hackbarth, D. and Miao, J. (2012),** ***The Dynamics of Mergers and Acquisitions in Oligopolistic Industries***. *Journal of Economic Dynamics and Control*, 36 (4), 585-609;
[5] **Hackbarth, D. and Morellec, E. (2008),** ***Stock Returns in Mergers and Acquisitions.*** *Journal of Finance*, 63 (3),1213-1252;
[6] **Kastrinaki, Z. and Stoneman, P. (2007),** ***An Empirical Model of Merger and Acquisition Timing***. Available online at: https://www.eurofidai.org/fr/Kastrinaki.pdf;
[7] **Lambrecht, B. M. (2004),** ***The Timing and Terms of Mergers Motivated by Economies of Scale***. *Journal of Financial Economics*, 72, 41-62;
[8] **Moeller, S. B. and Schlingemann, F. P. and Stulz, R. M. (2003),** ***Do Shareholders of Acquiring Firms Gain from Acquisitions?*** *NBER Working Papers 9523, http://www.nber.org/papers/w9523.pdf;*
[9] **Morellec, E. and Zhdanov, A. (2005),** ***The Dynamics of Mergers and Acquisitions***. *Journal of Financial Economics*, 77, 649-672;
[10] **Thijssen, J. (2008),** ***Optimal and Strategic Timing of Mergers and Acquisitions Motivated by Synergies and Risk Diversification.*** *Journal of Economic Dynamics & Control*, 32, 1701–1720.