Overseas Listing Decisions of Chinese Firms: Based on the Maximization of Controlling Shareholders' Returns

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DOI: https://doi.org/10.30210/JMSO.202503.015

Submitted: Jul, 06, 2025 Accepted: Sep, 08, 2025

ABSTRACT

We construct a firm value model and a controlling shareholders' expected returns model to analyze the trade-off decision of whether to list in developed overseas markets. We identify a threshold level of net cash flow as the key decision criterion: when a firm's net cash flow exceeds this threshold, controlling shareholders' expected returns increase, making overseas listing advantageous; otherwise, the firm should avoid listing overseas. The threshold rises with a higher net cash flow multiplier, weaker investor protection, and lower capital cost for unlisted firms, but decreases with a lower net cash flow multiplier, stronger investor protection, higher capital cost, and greater compliance cost for firms listed overseas. Further analysis shows that overseas listing decisions aimed at maximizing controlling shareholders' returns also enhance minority shareholders' returns and overall firm value. We develop a quantitative framework for overseas listing decisions from the perspective of controlling shareholders and offer insights for policymakers and practitioners in cross-border capital markets.

Keywords: Overseas listing, Controlling shareholders, Maximization of expected returns, Threshold level of net cash flow

1. Introduction

With the accelerating integration of global capital markets, a growing number of Mainland Chinese firms have been listed in international capital markets [1,2]. According to the WIND database, as of January 2022, a total of 1,591 Mainland Chinese firms are listed overseas. Of these, 1,213 firms, approximately 76.24% of the total, are listed on the Chinese Hong Kong stock market. Further, 279 firms, accounting for 17.54% of the total, are listed on the U.S. stock market, and 63 listings, accounting for 3.96% of the total, are listed on the Singapore stock market. The remaining markets, such as Japan, the UK, Germany, and so on, account for about 2.26% of the total. These firms span a wide range of industries, from finance to machinery manufacturing and even energy. They exhibit strong operational growth and have attracted significant attention from international investors. Therefore, overseas-listed Mainland Chinese firms are significant parts of the international capital markets. However, affected by the COVID-19 pandemic and the short-selling event of Luckin Coffee, Mainland Chinese firms have made timely adjustments to their listing decision and slowed down the speed of overseas listing in accordance with the changing and uncertain economic situation. Due to lower trust from U.S. investors towards Mainland Chinese firms and stricter regulatory oversight of overseas-listed firms, China concept stocks set off an upsurge of secondary listing on the Chinese Hong Kong stock market, which maintains access to international capital while expanding financing channels [3,4]. Additionally, China has established both the Sci-Tech Innovation Board and the Beijing Stock Exchange and promoted a registration-based IPO system. This multi-level capital market structure places greater emphasis on the growth of firms, attracting many high-quality, technological, and innovative-driven firms. Given these significant changes in both domestic and international capital markets, should Mainland Chinese firms still pursue overseas listing?

Under the conditions of China’s transition economy and emerging capital market, control concentration is highly pronounced among Mainland Chinese firms. Accordingly, the controlling shareholders of these firms possess both the ability and the authority to make overseas listing decisions based on their own expected returns. Extant research provides several arguments as to how overseas listing contributes to different levels of expected returns of controlling shareholders by affecting equity earnings and private benefits. On the one hand, investment frictions–including tax barriers, information asymmetry, and foreign ownership restrictions–hinder foreign investment into local capital markets, thereby segmenting domestic markets from international markets [5,6]. Overseas listing is significantly associated with financial development indices, such as stock trading and financing by local equity markets [7]. Listing in developed overseas markets not only helps counter the adverse effects of market segmentation [8], thereby increasing investor recognition [9] and enhancing stock liquidity [10,11], but also allows firms to significantly reduce their cost of capital by adapting to the corporate governance framework of the host country [12], which in turn facilitates the pursuit of potentially profitable projects [13]. Consequently, compared with non-overseas listed firms, overseas-listed firms exhibit great capital-raising ability at a lower cost and earn benefits at a higher level [14,15]. Additionally, overseas listing enables firms to access foreign product markets, enhance brand recognition, and boost overseas sales. These benefits collectively improve profitability and strengthen equity returns for controlling shareholders [16]. Moreover, overseas listing bonds firms to stronger legal and regulatory hurdles [17,18], which in turn improves firm credibility and prestige [19,20], optimizes corporate governance [1,21,22], and incentivizes more efficient dividend policies that reduce inefficient investments [23,24]. This, in turn, reduces the misuse of cash flow and increases the net cash flow multiplier [24]. Eventually, the firm’s enhanced access to lower-cost external financing and higher net cash flow multiplier leads to the creation of firm value and the improvement of controlling shareholders’ equity earnings [4,25,26,27,28].

On the other hand, listing in developed overseas capital markets subjects firms to stricter information disclosure requirements [29] and to a more rigorous regulatory, legal, and reputation environment [17,30,31]. To mitigate litigation risk, overseas-listed firms adopt effective measures that enhance visibility and address reputation concerns [32], broaden their investor base [33], and boost competitiveness. These efforts, in turn, foster better corporate social responsibility (CSR) performance [34,35], higher market value, and a more transparent information environment

[31,36,37]. Within this context, overseas listing also helps reduce the information asymmetry between controlling and minority shareholders [37] and then limits the ability of controlling shareholders to extract private benefits of control. Besides, the overseas listing is considered a strategic tool [27]. Once listed overseas, firms typically exhibit reduced controlling shareholders' fund occupation, as enhanced corporate governance mitigates the negative relationship between the separation of control rights and cash flow rights [38]. Doidge et al. [39] document that developed capital markets with stronger investor protection are likely to reduce agency costs between controlling and minority shareholders. Controlling shareholders of overseas-listed firms typically experience lower control premiums compared to their domestic counterparts [40]. Consequently, their ability to extract private benefits of control is significantly constrained [41,42]. In summary, the above arguments suggest that overseas listing is positively correlated with equity earnings of controlling shareholders, while having a negative effect on private benefits of control.

However, existing studies primarily focus on firm-level benefits such as enhanced financing capacity, improved corporate governance, and increased market value, while paying insufficient attention to the decision-making logic of controlling shareholders in overseas listing. In particular, there is still a lack of systematic research on how controlling shareholders balance the relationship between equity earnings and private benefits of control in overseas listing decisions. Moreover, few studies have developed a quantitative analytical framework that integrates firm-specific traits (i.e., net cash flow multiplier and capital cost) with external institutional factors (i.e., investor protection and overseas listing compliance cost) to explain the overseas listing choices of controlling shareholders. Therefore, we aim to investigate two important issues: (1) What are the overseas listing decision models in which controlling shareholders trade off equity earnings against private benefits of control? (2) How do controlling shareholders decide whether to list in a developed overseas capital market?

Within the domain of the controlling shareholder perspective, we first construct both the firm value model and the controlling shareholders' expected returns model for firms that remain non-overseas listed and for firms that are overseas listed. Then, we compare the expected returns of controlling shareholders in two cases, analyze the influencing factors of overseas listing decisions, and verify the rationality of conclusions using a Matlab simulation. We obtain some interesting and useful results. First, there is a threshold level of net cash flow as a decision criterion used by controlling shareholders to determine whether to list overseas. When the net cash flow is greater than the threshold, the expected returns of controlling shareholders increase, so the firm should list in the overseas market. Otherwise, the firm will not list overseas. Second, when the firm keeps unlisted overseas, the threshold level of net cash flow increases with a higher net cash flow multiplier, weaker investor protection, and lower capital cost. When the firm takes an overseas listing, the threshold level increases with a lower net cash flow multiplier, stronger investor protection, and higher capital cost and overseas listing compliance cost. The further analysis shows that the overseas listing decisions aiming at maximizing controlling shareholders' expected returns enhance both the expected returns of minority shareholders and the overall firm value.

We contribute to the existing literature in the following significant ways. First, by constructing the expected returns model of controlling shareholders and suggesting that controlling shareholders use the threshold level of net cash flow to compare their expected returns, our findings shed light on the varying effects of firm-specific traits (i.e., net cash flow multiplier and capital cost) and external environment (i.e., investor protection and overseas listing compliance cost) on the overseas listing decision. Our conclusion enriches the literature on overseas listing decisions. Second, we provide direct evidence that overseas listing decisions from the perspective of controlling shareholders will benefit both minority shareholders' returns and firm value. The findings offer a novel theoretical lens for understanding the dual governance effects of overseas listing. Third, we provide background information on investor protection, capital cost, and overseas listing compliance cost regarding Mainland Chinese firms' overseas listing. Through theoretical derivation and simulation analysis, the influence mechanisms of these factors on the threshold level of net cash flow are quantified, which has a certain reference value for Mainland Chinese firms.

The remainder of this paper is organized as follows. Section 2 gives the mathematical parameters and assumptions of the model. Section 3 constructs the firm value model and the controlling shareholders' expected returns model. Section 4 analyzes the trade-off mechanism and performs a Matlab simulation. Section 5 takes further analysis. Section 6 elucidates the conclusions.

2. Parameters and Assumptions

The WIND database reveals that Mainland Chinese firms primarily list overseas on three developed capital markets: the Chinese Hong Kong stock market, the U.S. stock market, and the Singapore stock market. With the context of Mainland China's economy and environment, we define parameters and develop assumptions as follows.

(1) Controlling shareholders choose overseas listing to maximize their expected returns, which comprises both equity earnings and private benefits of control.

(2) Let $t_j(j \geq 0)$ denote any time point. At time t_j, controlling shareholders should decide whether to list in an overseas market, which is characterized by the level of investor protection of θ_h, at time $t_j + 1$. If the firm does not list overseas, the level of investor protection is θ_f. Existing literature demonstrates that when firms list in more developed overseas markets, they become subject to stricter local investor protection regulations, which limit insiders' ability to expropriate other investors [6,17,30,42]. Thus, the level of investor protection in Mainland Chinese capital market is expected to be lower than that in the developed overseas capital market, that is, $0 < \theta_h < \theta_f < 1$.

(3) Let C_0 (C_0 >0) be the net cash flow of firms at time t_j. C_0 can be used as a capital input contributing to the increase of future earnings. The expected net cash flow produced by per net cash flow at time t_j is defined as the expected net cash flow multiplier, where E_h (E_h >0) and E_f (E_f >0) separately represent the expected net cash flow multiplier for non-overseas listings and overseas listings. Overseas listing serves as a valuable mechanism for firms to obtain returns and attract investors. To increase the attractiveness of overseas listing, controlling shareholders have strong incentives to protect firm reputation [19,20], attain low-cost external financing, and invest in profitable projects [4,13,43], all of which can enhance firm profitability [15]. Thus, the assumption

implies that the expected net cash flow multiplier of overseas-listed Mainland Chinese firms is higher than that of non-overseas listed firms, that is, $E_f > E_h$.

(4) Let β (1/3<β<1) be the percentage of shares held by controlling shareholders. To simplify the model and focus directly on the impact of overseas listing, β is assumed to be an invariant constant, thereby eliminating potential confounding effects from ownership changes or share dilution. Let P_h and P_f be the probability that controlling shareholders extract private benefits of control when the firm keeps unlisted overseas and lists in the overseas market, respectively. The lower investor protection of less developed capital markets facilitates controlling shareholders to extract more private benefits of control. With the stronger control power, the probability is higher in non-overseas listed firms. Thus, the probabilities of controlling shareholders obtaining private benefits of control under both conditions are formulated by $P_h = \beta(1-\theta_h)$ and $P_f = \beta(1-\theta_f)$, respectively. Let φ_h (0< φ_h <1) and φ_f (0< φ_f <1) be the proportion of private benefits of control to the firm value of non-overseas listed firms and overseas-listed firms, respectively.

(5) Let V_h and V_f denote the firm value when the firm keeps unlisted overseas and lists in the overseas market at time t_j+1, respectively. Since controlling shareholders extract private benefits of control before profit distribution, their equity earnings can be formalized as $P_h\beta(1-\varphi_h)V_h + (1-P_h)\beta V_h$ when the firm remains unlisted overseas, and $P_f\beta(1-\varphi_f)V_f + (1-P_f)\beta V_f$ when the firm lists in developed overseas markets.

(6) We use the discounted cash flow model to measure V_h and V_f. Let $r_h (0 < r_h < 1)$ and $r_f (0 < r_f < 1)$ be the capital cost when a firm keeps unlisted overseas and lists overseas, respectively. Overseas listing helps dismantle barriers to foreign investment, thereby expanding the investor base and reducing capital cost [14]. In contrast, the Mainland Chinese market–dominated by retail investors–exhibits higher volatility and greater sensitivity to rumors and insider information, resulting in higher capital cost to compensate investors' expectations [44]. Thus, we assume that $r_f < r_h$.

(7) For firms listed in markets with stronger investor protection, higher transfer costs for controlling shareholders to extract private benefits of control occur to compensate for the loss of minorities [39]. Thus, in the case of non-overseas listing and overseas listing, the proportion of private benefits of control transfer cost to firm value can be expressed as $k_h = \frac{1}{2}b\theta_h(\varphi_h)^2$ and $k_f = \frac{1}{2}b\theta_f(\varphi_f)^2$, respectively, where b (b >0) is an invariant constant.

(8) Overseas listed firms bear not only ongoing costs such as annual listing fees imposed by the stock exchanges and regulatory bodies, and trading costs, but also indirect costs, which include auditing and disclosure costs, and agency costs [14]. Together, these are referred to as overseas listing compliance costs, denoted as C_L (C_L >0).

Table 1. Definitions of model parameters

Variable	Definition
t_j	Any time point $t_j (j \geq 0)$.
θ_h, θ_f	The level of investor protection in the Mainland Chinese capital market (non-overseas listing) and developed overseas markets (overseas listing), respectively.
C_0	Net cash flow of a firm at time t_j.
E_h, E_f	Expected net cash flow multiplier under non-overseas listings and overseas listings, respectively.
β	The percentage of shares held by controlling shareholders.
P_h, P_f	Probabilities of controlling shareholders extracting private benefits of control under non-overseas and overseas listings, respectively.
φ_h, φ_f	Proportions of private benefits of control to firm value under non-overseas and overseas listings, respectively.
V_h, V_f	Firm values under non-overseas and overseas listings at time t_j, respectively.
r_h, r_f	Capital cost for non-overseas and overseas-listed firms, respectively.
k_h, k_f	Proportions of transfer cost for extracting private benefits of control to firm value under non-overseas and overseas listings, respectively.
C_L	Overseas listing compliance cost.

Source: By authors.

3. Models Setup

The concern of controlling shareholders at time t_j is to decide whether to implement the overseas listing decision at time $t_j + 1$. In this section, to model the trade-off, we construct both the firm value models and the expected returns models of controlling shareholders in the cases that firms keep a non-overseas listing and take the overseas listing. And then, we compare the two maximum expected returns of controlling shareholders.

3.1 Firm Value Models

3.1.1 Value of non-overseas listed firms

The net cash flow is C_0 at time t_j. If a firm is not listed overseas, its expected net cash flow multiplier will be E_h. Then the net cash flow and its present value at time $t_j + 1$ will be $E_h{}^i C_0$ and $\frac{E_h{}^i C_0}{(1+r_h)^{i-1}} = \left(\frac{E_h}{1+r_h}\right)^i (1+r_h) C_0$, respectively. The firm value at time $t_j + 1$ will be $V_h = \sum_{i=1}^{\infty} \left(\frac{E_h}{1+r_h}\right)^i (1+r_h) C_0$.

Obviously, if $\frac{E_h}{1+r_h} \geq 1$ with $i \geq 1$, then $V_h = +\infty$ and is inestimable. Hence, we can only discuss the case of $\frac{E_h}{1+r_h} < 1$, i.e., $E_h < 1 + r_h$ for the value of non-overseas listed firms, which is developed as Equation (1).

$$V_h = \sum_{i=1}^{\infty} \left(\frac{E_h}{1+r_h} \right)^i (1+r_h) C_0 = \frac{E_h (1+r_h)}{1+r_h - E_h} C_0 \tag{1}$$

where E_h and r_h are the expected net cash flow multiplier and the capital cost of the non-overseas listed firm, respectively. C_0 is the net cash flow at time t_j.

3.1.2 Value of overseas listed firms

Similarly, if a firm is listed overseas, the net cash flow and its present value at time $t_j + 1$ will be $E_f{}^i C_0 - E_f{}^{i-1} C_L$ and $\frac{E_f{}^i C_0 - E_f{}^{i-1} C_L}{(1+r_f)^{i-1}} = \left(\frac{E_f}{1+r_f} \right)^{i-1} (E_f C_0 - C_L)$, respectively. Thus, the overseas-listed firm value at time $t_j + 1$ will be $V_f = \sum_{i=1}^{\infty} \left(\frac{E_f}{1+r_f} \right)^{i-1} (E_f C_0 - C_L)$. If $E_f C_0 - C_L < 0$, V_f will be less than 0. Meanwhile, if $\frac{E_f}{1+r_f} \geq 1$ with $i \geq 1$, then $V_f = +\infty$ and is inestimable. Therefore, we can only discuss the case of $E_f C_0 - C_L > 0$, i.e., $C_L < E_f C_0$, and the case of $E_f < 1 + r_f$ for the value of overseas-listed firm, which is developed as Equation (2).

$$V_f = \sum_{i=1}^{\infty} \left(\frac{E_f}{1+r_f} \right)^{i-1} (E_f C_0 - C_L) = \frac{1+r_f}{1+r_f - E_f} (E_f C_0 - C_L) \tag{2}$$

where E_f and r_f are the expected net cash flow multiplier and capital cost of the overseas-listed firm, respectively. C_L is the overseas listing compliance cost.

3.2 Models of Controlling Shareholders' Expected Returns

3.2.1 Controlling shareholders' expected returns of non-overseas listed firms

Under the condition of keeping the firm unlisted overseas, if controlling shareholders extract private benefits of control with the probability of P_h at time $t_j + 1$, their expected returns will be the sum of private benefits of control $\left(\varphi_h - \frac{1}{2} b \theta_h \varphi_h{}^2 \right) V_h$ and the equity earnings $\beta (1 - \varphi_h) V_h$. Otherwise, a probability of $1 - P_h$ happens that controlling shareholders fail to extract private benefits of control, so that their expected returns only comprise equity earnings βV_h. Thus, the expected returns function of controlling shareholders who decide not to list overseas at time t_j+1 is given by Equation (3).

$$\pi_h = P_h\left[\left(\varphi_h - \frac{1}{2}b\theta_h{\varphi_h}^2\right)V_h + \beta\left(1-\varphi_h\right)V_h\right] + \left(1-P_h\right)\beta V_h \tag{3}$$

where P_h is the probability of controlling shareholders attaining private benefits of control in the case of keeping non-overseas listing; φ_h is the proportion of private benefits of control to the value of non-overseas listed firms; θ_h is the investor protection of the domestic market; V_h is the value of non-overseas listed firms, and b (b >0) is exogenous.

For a given shareholding proportion of controlling shareholders β and value of non-overseas listed firms V_h, we need to decide the optimal φ_h, denoted as ${\varphi_h}^*$, to maximize the expected returns of controlling shareholders, which is computed by Equation (4).

$$\pi_{h\max} = \max\left\{P_h\left[\left(\varphi_h - \frac{1}{2}b\theta_h{\varphi_h}^2\right)V_h + \beta\left(1-\varphi_h\right)V_h\right] + \left(1-P_h\right)\beta V_h\right\} \tag{4}$$

Taking the derivative of π_h with respect to φ_h, we obtain ${\varphi_h}^* = \frac{1-\beta}{b\theta_h}$. Then, we adopt ${\varphi_h}^* = \frac{1-\beta}{b\theta_h}$, $P_h = \beta\left(1-\theta_h\right)$, and $V_h = \frac{E_h\left(1+r_h\right)}{1+r_h-E_h}C_0$ to calculate the maximum expected returns of controlling shareholders in non-overseas listed firms, which is shown as Equation (5).

$${\pi_{h\max}}^* = \frac{\left(1-\beta\right)^2 P_h}{2b\theta_h}V_h + \beta V_h = \left[\frac{\left(1-\beta\right)^2\beta\left(1-\theta_h\right) + 2b\theta_h\beta}{2b\theta_h}\right]\left(\frac{1+r_h}{1+r_h-E_h}\right)E_hC_0 \tag{5}$$

3.2.2 Controlling shareholders' expected returns of overseas-listed firms

Under the condition of choosing overseas listing, the developed overseas market enhances the protection of investors, resulting in a higher θ_f, and imposing stricter supervision on firms. The developed overseas market also reduces controlling shareholders' private benefits of control, leading to a lower φ_f. Similarly, if the controlling shareholders attain private benefits of control with the probability of P_f at time t_j+1, their expected returns are the sum of private benefits of control $\left(\varphi_f - \frac{1}{2}b\theta_f{\varphi_f}^2\right)V_f$ and equity earnings $\beta(1-\varphi_f)V_f$. Otherwise, a failed probability of $(1-P_f)$ contributes to corresponding expected returns being βV_f. Thus, the expected returns function of controlling shareholders in overseas-listed firms at time t_j+1 is deduced as Equation (6).

$$\pi_f = P_f\left[\left(\varphi_f - \frac{1}{2}b\theta_f{\varphi_f}^2\right)V_f + \beta\left(1-\varphi_f\right)V_f\right] + \left(1-P_f\right)\beta V_f \tag{6}$$

where P_f is the probability of controlling shareholders attaining private benefits of control in the case of overseas listing; φ_f is the proportion of private benefits of control to the value of overseas-listed firms; θ_f is the investor protection of overseas market; and V_f is the value of overseas-listed firms.

Likewise, taking the derivative of π_f with respect to φ_f, we obtain the optimal proportion of private benefits of control to the value of overseas-listed firms, denoted as φ_f^*, where $\varphi_f^* = \frac{1-\beta}{b\theta_f}$. Then, we use $\varphi_f^* = \frac{1-\beta}{b\theta_f}$, $P_f = \beta(1-\theta_f)$ and $V_f = \frac{1+r_f}{1+r_f-E_f}(E_f C_0 - C_L)$ to calculate the maximum expected returns of controlling shareholders in the case of overseas listing, which is shown in Equation (7).

$$\pi_{f\max}^* = \frac{(1-\beta)^2 P_f}{2b\theta_f} V_f + \beta V_f = \left[\frac{(1-\beta)^2 \beta(1-\theta_f) + 2b\theta_f\beta}{2b\theta_f}\right]\left(\frac{1+r_f}{1+r_f-E_f}\right)(E_f C_0 - C_L) \tag{7}$$

Lemma 1. *For controlling shareholders, a developed overseas market listing decreases the optimal proportion of private benefits of control to firm value.*

Proof of Lemma 1. *Since* $b>0$, $\frac{1}{3}<\beta<1$, *and* $0<\theta_h<\theta_f<1$, *then* $\frac{1-\beta}{b\theta_f}<\frac{1-\beta}{b\theta_h}$, *i.e.,* $\varphi_f^*<\varphi_h^*$. *Lemma 1 shows that controlling shareholders in firms listed in overseas capital markets with stronger investor protection will experience a lower proportion of private benefits of control to firm value.*

4. The Overseas Listing Decision Analysis and Matlab Simulation

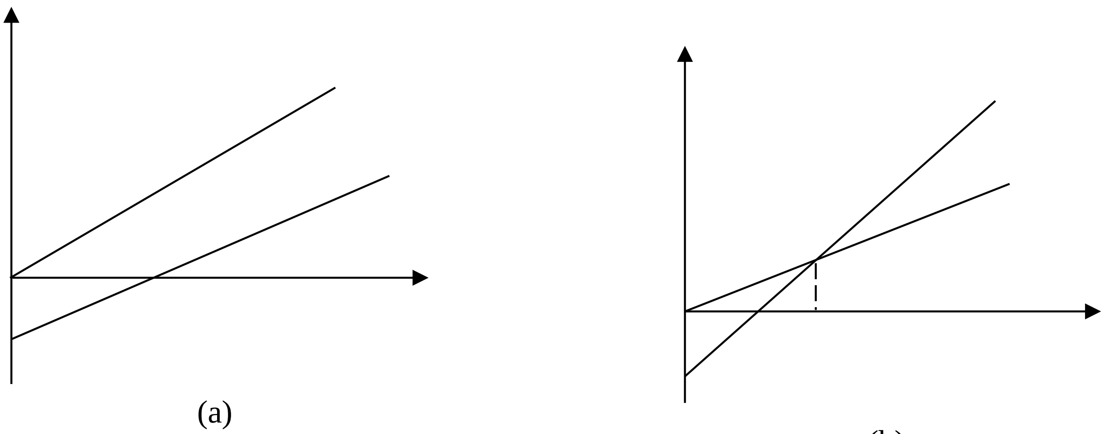
For the aforementioned analysis, controlling shareholders can decide whether to list overseas or not by comparing their expected returns in the cases of overseas listing and non-overseas listing. If the expected returns increase after overseas listing at time t_j+1, that is, $\pi_{f\max}^* > \pi_{h\max}^*$, the overseas listing decision should be implemented. Otherwise, when $\pi_{f\max}^* < \pi_{h\max}^*$, the controlling shareholders will keep the firms unlisted overseas. To judge the expected returns of controlling shareholders, we denote the function of the expected returns when controlling shareholders make the decision as π_{C_0}. Then, $\pi_{C_0} = \max\{\pi_{f\max}^*, \pi_{h\max}^*\}$:

$$\pi_{C_0} = \max\begin{cases} \pi_{h\max}^* = \left[\frac{(1-\beta)^2\beta(1-\theta_h)+2b\theta_h\beta}{2b\theta_h}\right]\left(\frac{1+r_h}{1+r_h-E_h}\right)E_h C_0 \\ \pi_{f\max}^* = \left[\frac{(1-\beta)^2\beta(1-\theta_f)+2b\theta_f\beta}{2b\theta_f}\right]\left(\frac{1+r_f}{1+r_f-E_f}\right)(E_f C_0 - C_L) \end{cases}$$

where π_{hmax} is the maximum expected returns of controlling shareholders when the firm keeps a non-overseas listing. π_{fmax} is the maximum expected returns of controlling shareholders when the firm is listed overseas.

If $\frac{\theta_f(1-\beta)^2(1-\theta_h)+2b\theta_h\theta_f}{\theta_h(1-\beta)^2(1-\theta_f)+2b\theta_h\theta_f} \geq \frac{E_f(1+r_f)(1+r_h-E_h)}{E_h(1+r_h)(1+r_f-E_f)}$, ${\pi_{h\max}}^* \geq {\pi_{f\max}}^*$ is always tenable, then controlling shareholders will keep the firm non-overseas listing. In this case, the graph with net cash flow C_0 at time t_j as the abscissa and the expected returns of controlling shareholders π_{C_0} at time t_j+1 as the ordinate is presented in Figure 1(a).

If $\frac{\theta_f(1-\beta)^2(1-\theta_h)+2b\theta_h\theta_f}{\theta_h(1-\beta)^2(1-\theta_f)+2b\theta_h\theta_f} < \frac{E_f(1+r_f)(1+r_h-E_h)}{E_h(1+r_h)(1+r_f-E_f)}$, the expected returns of controlling shareholders can be shown in Figure 1(b).



(a)

(b)

Figure 1. Function graph of controlling shareholders' expected returns

Source: By authors.

Figure 1(a) is the function graph of controlling shareholders' expected returns in the case of overseas listing (π_{fmax}) and non-overseas listing (π_{hmax}), when $\frac{\theta_f(1-\beta)^2(1-\theta_h)+2b\theta_h\theta_f}{\theta_h(1-\beta)^2(1-\theta_f)+2b\theta_h\theta_f} \geq \frac{E_f(1+r_f)(1+r_h-E_h)}{E_h(1+r_h)(1+r_f-E_f)}$. Note that π_{hmax} is always higher than π_{fmax}. Figure 1(b) is the function graph of controlling shareholders' expected returns in the case of overseas listing (π_{fmax}) and non-overseas listing (π_{hmax}), when $\frac{\theta_f(1-\beta)^2(1-\theta_h)+2b\theta_h\theta_f}{\theta_h(1-\beta)^2(1-\theta_f)+2b\theta_h\theta_f} < \frac{E_f(1+r_f)(1+r_h-E_h)}{E_h(1+r_h)(1+r_f-E_f)}$. Thus, there exists a threshold level of net cash flow C_0^* to help decide whether to list overseas or not.

Lemma 2. *There is a threshold level of net cash flow C_0^* used by controlling shareholders to determine whether to list overseas.*

Proof of Lemma 2. *From Figure 1(b), we can conclude that when the capital cost, net cash flow multiplier, and investor protection meet certain conditions, there exists a threshold level of net cash flow C_0^* to guide the overseas listing choice. When $C_0 = C_0^*$, we obtain ${\pi_{hmax}}^* = {\pi_{fmax}}^*$. Then, the expected returns of controlling shareholders will always be equal in two cases. When $0 < C_0 < C_0^*$, we obtain ${\pi_{hmax}}^* > {\pi_{fmax}}^*$. The controlling shareholders earn higher expected returns by maintaining* *non-overseas listed; hence they keep the firm non-overseas listed. Whereas, when* $C_0 > C_0^*$ *, we obtain* $\pi_{fmax}{}^* > \pi_{hmax}{}^*$ *. The overseas listing decision enables controlling shareholders to obtain higher expected returns, leading to the implementation of the overseas listing decision.*

When $\pi_{hmax}{}^* = \pi_{fmax}{}^*$, we obtain $\left\{\left[\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}\right]\frac{E_f(1+r_f)}{1+r_f-E_f}-\left[\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}\right]\frac{E_h(1+r_h)}{1+r_h-E_h}\right\}C_0 = \left[\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}\right]\frac{1+r_f}{1+r_f-E_f}C_L$. Letting $A=\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}$, $B=\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}$, then the threshold level of net cash flow C_0^* is given as follows.

$$C_0^* = \frac{A(1+r_f)(1+r_h-E_h)}{A(1+r_f)E_f(1+r_h-E_h)-B(1+r_h)E_h(1+r_f-E_f)}C_L \tag{8}$$

As $C_0 > 0$, it follows that $C_0^* > 0$. Since $b>0$, $0<\theta_h<\theta_f<1$, we obtain $A=\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}>0$ and $B=\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}>0$. And since $E_h<1+r_h$, $C_L>0$, we obtain $A(1+r_f)E_f(1+r_h-E_h)-B(1+r_h)E_h(1+r_f-E_f)>0$.

4.1 The Determinants of the Threshold Level of Net Cash Flow

It has been shown in Equation (8) that the threshold level of net cash flow C_0^* is a function with respect to r_h, r_f, E_h, E_f, θ_h, θ_f, and C_L. In this section, to analyze the influence of various factors on the overseas listing decision of controlling shareholders, we discuss how r_h, r_f, E_h, E_f, θ_h, θ_f, and C_L affect C_0^* respectively.

4.1.1 Influence of the capital cost

r_h and r_f are capital costs when a firm maintains non-overseas listed and lists overseas, respectively. To analyze the influence of the capital cost on the threshold level of net cash flow, we take derivatives of C_0^* with respect to r_h and r_f, which leaves Equations (9) and (10).

$$\frac{\partial C_0^*}{\partial r_h} = -\frac{ABE_h(1+r_f)(1+r_f-E_f)C_L}{\left[A(1+r_f)E_f(1+r_h-E_h)-B(1+r_h)E_h(1+r_f-E_f)\right]^2} \tag{9}$$

As $A=\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}>0$, $B=\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}>0$, $0<E_h<1+r_h$, $0<E_f<1+r_f$, $C_L>0$, then $\frac{\partial C_0^*}{\partial r_h}<0$ is always tenable, that is, C_0^* is a decreasing function of r_h. It shows that the threshold level of net cash flow C_0^* will be lower as the capital cost r_h gets higher. Otherwise, C_0^* will be higher.

$$\frac{\partial C_0^*}{\partial r_f} = \frac{ABE_hE_f(1+r_h)\left(1+r_h-E_h\right)C_L}{\left[A\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-B(1+r_h)E_h\left(1+r_f-E_f\right)\right]^2} \tag{10}$$

As $A=\frac{(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f}{\theta_f}>0$, $B=\frac{(1-\beta)^2\left(1-\theta_h\right)+2b\theta_h}{\theta_h}>0$, $0<E_h<1+r_h$, $C_L>0$, then $\frac{\partial C_0^*}{\partial r_f}>0$ is always tenable, that is, C_0^* is an increasing function of r_f. This means that the higher the capital cost r_f, the higher the threshold level of net cash flow C_0^*. Otherwise, the lower r_f is more likely to contribute to a lower C_0^*.

4.1.2 Influence of the net cash flow multiplier

E_h and E_f represent the net cash flow multipliers when a firm maintains non-overseas listed and when it lists overseas, respectively. Similarly, taking a derivative of C_0^* with respect to E_h and E_f, we obtain Equations (11) and (12).

$$\frac{\partial C_0^*}{\partial E_h} = \frac{AB\left(1+r_f\right)(1+r_h)^2\left(1+r_f-E_f\right)C_L}{\left[A\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-B\left(1+r_h\right)E_h\left(1+r_f-E_f\right)\right]^2} \tag{11}$$

As $A=\frac{(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f}{\theta_f}>0$, $B=\frac{(1-\beta)^2\left(1-\theta_h\right)+2b\theta_h}{\theta_h}>0$, $0<E_f<1+r_f$, $C_L>0$, then $\frac{\partial C_0^*}{\partial E_h}>0$ is always tenable, that is, C_0^* is an increasing function of E_h. The finding suggests that a higher net cash flow multiplier E_h has a greater ability to earn cash flow and tends to have a higher threshold level of net cash flow C_0^*. Otherwise, C_0^* will be lower since the less ability to attain cash flow.

$$\frac{\partial C_0^*}{\partial E_f} = -\frac{A(1+r_f)(1+r_h-E_h)\left[A(1+r_f)(1+r_h-E_h)+B(1+r_h)E_h\right]C_L}{\left[A(1+r_f)E_f\left(1+r_h-E_h\right)-B(1+r_h)E_h\left(1+r_f-E_f\right)\right]^2} \tag{12}$$

As $A=\frac{(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f}{\theta_f}>0$, $B=\frac{(1-\beta)^2\left(1-\theta_h\right)+2b\theta_h}{\theta_h}>0$, $1+r_f>0$, $0<E_h<1+r_h$, $C_L>0$, then $\frac{\partial C_0^*}{\partial E_f}<0$ is always tenable, that is, C_0^* is a decreasing function of E_f. Hence, the higher the net cash flow multiplier E_f for the overseas-listed firms, that is, the more the ability to earn cash flow after listing overseas, and then the lower the threshold level of net cash flow C_0^*. Otherwise, C_0^* will be higher.

4.1.3 Influence of the investor protection

θ_h and θ_f denote the levels of investor protection in the domestic and overseas markets, respectively. Taking a derivative of C_0^* with respect to θ_h and θ_f respectively, we obtain Equations (13) and (14).

$$\frac{\partial C_0^*}{\partial \theta_h}=\frac{\partial C_0^*}{\partial B}\times\frac{\partial B}{\partial \theta_h}=-\frac{AE_h\left(1+r_h\right)(1+r_f)\left(1+r_h-E_h\right)\left(1+r_f-E_f\right)(1-\beta)^2 C_L}{\left\{A(1+r_f)E_f\theta_h\left(1+r_h-E_h\right)-\left[(1-\beta)^2(1-\theta_h)+2b\theta_h\right](1+r_h)E_h\left(1+r_f-E_f\right)\right\}^2} \tag{13}$$

Since $A=\frac{(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f}{\theta_f}>0$, $0<E_h<1+r_h$, $0<E_f<1+r_f$, $C_L>0$, then $\frac{\partial C_0^*}{\partial \theta_h}<0$ is constantly tenable, which means C_0^* is a decreasing function of θ_h. It reveals that when the level of investor protection in the domestic market θ_h gets higher, firms will experience a lower threshold level of net cash flow C_0^*. Otherwise, C_0^* will be higher.

$$\frac{\partial C_0^*}{\partial \theta_f}=\frac{\partial C_0^*}{\partial A}\times\frac{\partial A}{\partial \theta_h}=\frac{BE_h(1+r_h)(1+r_f)\left(1+r_h-E_h\right)\left(1+r_f-E_f\right)(1-\beta)^2 C_L}{\left\{\left[(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f\right](1+r_f)E_f\theta_h\left(1+r_h-E_h\right)-B(1+r_h)E_h\theta_f\left(1+r_f-E_f\right)\right\}^2} \tag{14}$$

Since $B=\frac{(1-\beta)^2\left(1-\theta_h\right)+2b\theta_h}{\theta_h}>0$, $0<E_h<1+r_h$, $0<E_f<1+r_f$, $C_L>0$, then $\frac{\partial C_0^*}{\partial \theta_f}>0$ is constantly tenable, that is, C_0^* is an increasing function of θ_f. It reveals that the higher the level of investor protection in the overseas market θ_f, the higher the threshold level of net cash flow C_0^*.

4.1.4 Influence of the overseas listing compliance cost

C_L is the overseas listing compliance cost of firms per year. Analogously, we take a derivative of C_0^* with respect to C_L to reveal the relationship between overseas listing compliance cost and the threshold level of net cash flow as Equation (15) shows.

$$\frac{\partial C_0^*}{\partial C_L}=\frac{A(1+r_f)\left(1+r_h-E_h\right)}{A(1+r_f)E_f\left(1+r_h-E_h\right)-B\left(1+r_h\right)E_h\left(1+r_f-E_f\right)} \tag{15}$$

Since $A=\frac{(1-\beta)^2\left(1-\theta_f\right)+2b\theta_f}{\theta_f}>0$, $1+r_f>0$, $0<E_h<1+r_h$, then $A\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-B\left(1+r_h\right)E_h\left(1+r_f-E_f\right)>0$. Thus, $\frac{\partial C_0^*}{\partial C_L}>0$ is tenable, which means C_0^* is an increasing function of C_L. The result indicates that the higher the overseas listing compliance cost paid by firms is, the higher the threshold level of net cash flow C_0^* will be.

Comprehensively, the results of derivation imply that the threshold level of net cash flow is increasing with the net cash flow multiplier of non-overseas listed firms getting higher, and the multiplier of overseas-listed firms getting lower. Moreover, the domestic markets where firms experience lower capital cost and weaker investor protection will contribute to a higher net cash flow multiplier, while the developed overseas markets where firms experience higher capital cost and stronger investor protection will contribute to a higher net cash flow multiplier. In conjunction with Figure 1(b), controlling shareholders will implement the overseas listing decision only when $C_0 > C_0^*$. These can help controlling shareholders decide whether to list overseas by predicting the firm's cash flow generation capacity, capital cost, investor protection, and overseas listing compliance cost associated with implementing overseas listing and not implementing overseas listing.

4.2 Matlab Simulation

To test the conclusions of the previous sections, we conduct a simulation using Matlab. Following Tan et al. [45], we identify the initial values and fluctuation ranges of relevant factors (since b and β are constants, only their initial values are set without a fluctuation range), as shown in Table 2. Using Matlab simulations, we then analyze the influence of these factors on the threshold level of net cash flow C_0^*. This numerical simulation serves as a practical example and validates the rationale behind the earlier theoretical derivations.

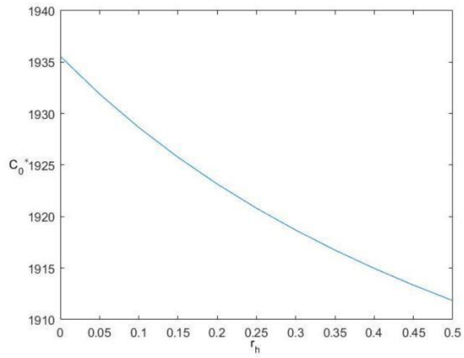
Table 2. Model parameters and fluctuation range

Parameter	Initial value	Fluctuation range
b	10	--
β	1/2	--
E_h	20%	0.1~1
E_f	60%	0.1~1
θ_h	0.3	0.1~1
θ_f	0.5	0.1~1
r_h	15%	0~50%
r_f	10%	0~50%
C_L	10 million CNY	8~12 million CNY

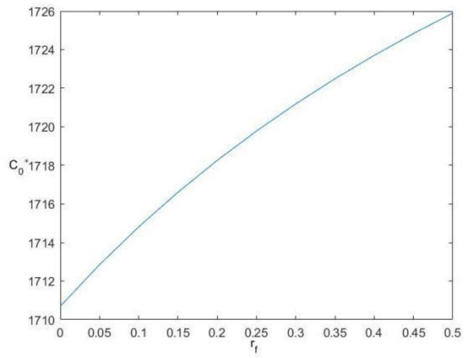
Source: By authors.

4.2.1 Simulation results of capital cost

Figure 2 shows the simulation results of r_h and r_f on C_0^*. The results indicate that C_0^* is decreasing with the increase of r_h, whereas increasing with the increase of r_f, which manifests that the lower capital cost r_h in the domestic market is, or the higher capital cost r_f in the overseas market is, then the higher C_0^* will be. Figure 2 proves the conclusions about the relationships between the capital cost and threshold level of net cash flow in Equations (9) and (10). That is, to ensure the maximum expected returns of controlling shareholders earned from overseas listing, a higher capital cost in the domestic market leads to a lower level of net cash flow, while a higher capital cost in the overseas market requires a higher threshold value.



(a) Simulation result of r_h



(b) Simulation result of r_f

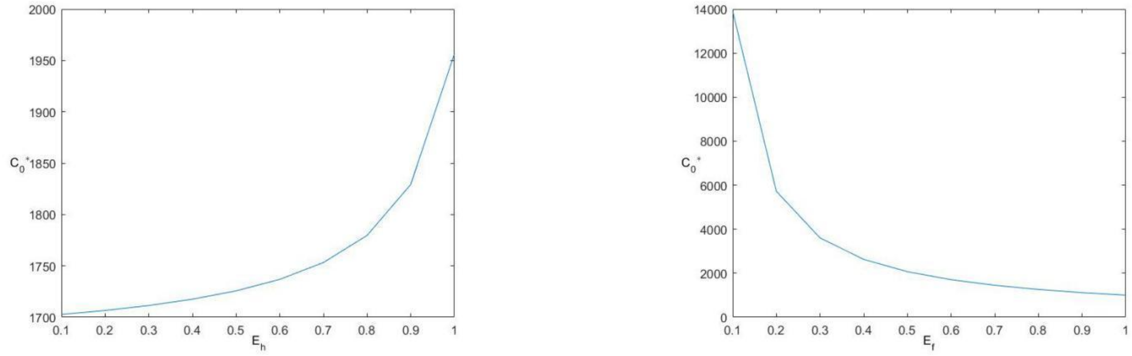
Figure 2. Simulation results of capital cost r_h and r_f

Source: By authors.

Figure 2(a) shows the influence of capital cost in the domestic market (r_h) on C_0^*. Figure 2(b) reports the influence of capital cost in the overseas market (r_f) on C_0^*.

4.2.2 Simulation results of net cash flow multiplier

The influences of E_h and E_f on C_0^* are respectively shown in Figure 3. C_0^* is decreasing with the increase of E_h, and increasing with the increase of E_f. The results indicate as the net cash flow multiplier E_h becomes higher or E_f becomes lower, C_0^* will be higher. Again, simulation results shown in Figure 3 validate the conclusions about the correlations between net cash flow multiplier and threshold level of net cash flow in Equations (11) and (12). To maximize the expected returns of controlling shareholders, firms with stronger cash flow generation capacity under non-overseas listing require more net cash flow to justify overseas listing. Nevertheless, the net cash flow thresholds decrease when the cash flow generation capacity under overseas listing is stronger.



(a) Simulation result of E_h (b) Simulation result of E_f

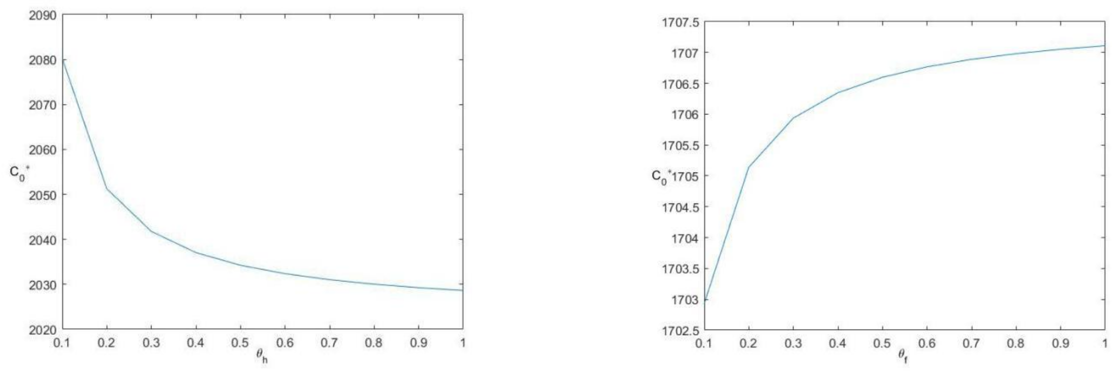
Figure 3. Simulation results of the net cash flow multiplier E_h and E_f

Source: By authors.

Figure 3(a) shows the influence of the net cash flow multiplier of firms maintaining non-overseas listing (E_h) on C_0^*. Figure 3(b) shows the influence of net cash flow multiplier when firms list overseas (E_f) on C_0^*.

4.2.3 Simulation results of investor protection

Figure 4 reports the influences of investor protection in the domestic and overseas markets on C_0^*, respectively. It reveals that C_0^* increases with θ_h decreasing, and θ_f increasing. The results indicate that the weaker investor protection in the domestic market is, or the stronger investor protection in the overseas market is, the higher C_0^* will be. The conclusions about the correlations between investor protection and the threshold level of net cash flow in Equations (13) and (14) are proven. That is, to maximize the expected returns of controlling shareholders, a higher level of investor protection in the domestic market will cause a lower level of minimum net cash flow required to justify overseas listing; while a higher level of investor protection in the overseas market will need a higher threshold value to satisfy the expectation of controlling shareholders' overseas listing decision.



(a)Simulation result of θ_h (b) Simulation result of θ_f

Figure 4. Simulation results of investor protection θ_h and θ_f

Source: By authors.

Figure 4(a) shows the influence of investor protection in the domestic market (θ_h) on C_0^*. Figure 4(b) shows the influence of investor protection in the overseas market (θ_f) on C_0^*.

4.2.4 Simulation results of overseas listing compliance cost

The influence of overseas listing compliance cost C_L on C_0^* is shown in Figure 5. It shows that there is a positive relationship between C_0^* and C_L, which suggests that higher overseas listing compliance cost C_L leads to higher C_0^*.

The simulation result proves the conclusion about the relationship between overseas listing compliance cost and the threshold level of net cash flow in Equation (15). To ensure the maximum expected returns of controlling shareholders, a higher overseas listing compliance cost leads to a higher net cash flow required to implement overseas listing.

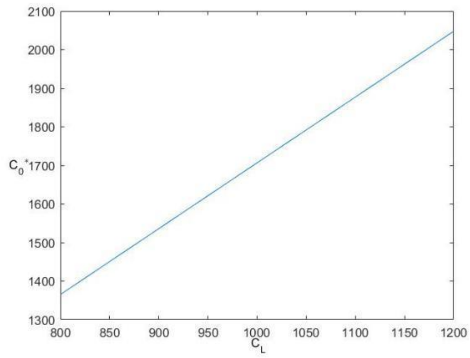


Figure 5. Simulation result of overseas listing compliance cost C_L

Source: By authors.

Figure 5 shows the influence of overseas listing compliance cost (C_L) on C_0^*.The higher C_L, the higher C_0^*.

5. Further Analysis

5.1 Influence of Overseas Listing Decision on Minority Shareholders' Expected Returns

According to the CSMAR database, overseas listing locations of Mainland Chinese firms are centered on developed capital markets. Since overseas listings in developed capital markets help alleviate agency conflicts between controlling and minority shareholders [21,22,42], and reduce controlling shareholders' extraction of private benefits of control [39], then increase the protection of minority shareholders. Does an overseas listing decision aimed at maximizing controlling shareholders' expected returns enhance the returns of minority shareholders? Then, we further discuss the effect of the overseas listing decision made by controlling shareholders on minority shareholders' expected returns. Given Q_h and Q_f as minority shareholders' expected returns under non-overseas listing and overseas listing respectively, we obtain $Q_h = (1-\beta)V_h - (1-\beta)P_h\varphi_h V_h$ and $Q_f = (1-\beta)V_f - (1-\beta)P_f\varphi_f V_f$.

Substituting $\varphi_h^* = \frac{1-\beta}{b\theta_h}$, $P_h = \beta(1-\theta_h)$, $V_h = \frac{E_h(1+r_h)}{1+r_h-E_h}C_0$, and $\varphi_f^* = \frac{1-\beta}{b\theta_f}$, $P_f = \beta(1-\theta_f)$, $V_f = \frac{1+r_f}{1+r_f-E_f}(E_f C_0 - C_L)$ separately into Q_h and Q_f, then we obtain Equations (16) and (17).

$$Q_h = \left[\frac{b\theta_h(1-\beta)-\beta(1-\beta)^2(1-\theta_h)}{b\theta_h}\right]\left(\frac{1+r_h}{1+r_h-E_h}\right)E_h C_0 \tag{16}$$

$$Q_f = \left[\frac{b\theta_f(1-\beta)-\beta(1-\beta)^2(1-\theta_f)}{b\theta_f}\right]\left(\frac{1+r_f}{1+r_f-E_f}\right)(E_f C_0 - C_L) \tag{17}$$

Taking the net cash flow C_0 at time t_j as the abscissa and minority shareholders' expected returns Q at time t_j+1 as the ordinate, the function graph of minority shareholders' expected returns is given by Figure 6.

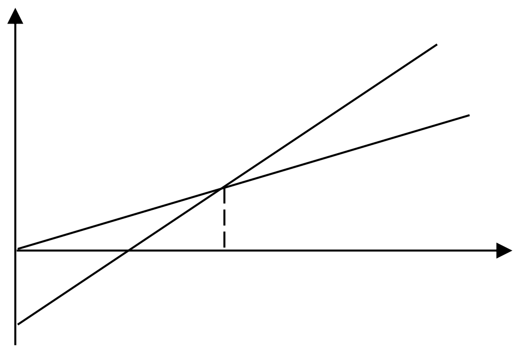


Figure 6. Function of minority shareholders' expected returns
Source: By authors.

Figure 6 is the function graph of minority shareholders' expected returns under overseas listing (Q_f) and non-overseas listing (Q_h). There exists a threshold level of net cash flow $C_0^{'}$ to judge whether minority shareholders can benefit from the overseas listing decision.

Lemma 3 *There exists a threshold level of net cash flow* $C_0^{'}$ *used to judge whether minority shareholders can benefit from the overseas listing decision.*

Proof of Lemma 3 *According to Figure 6, there exists a threshold level of net cash flow* $C_0^{'}$. *When* $C_0 = C_0^{'}$, *we obtain* $Q_f = Q_h$, *at this point, the controlling shareholders' decision to list overseas is irrelevant to minority shareholders' returns. When* $0 < C_0 < C_0^{'}$, *we obtain* $Q_f < Q_h$ *overseas listing decisions implemented by controlling shareholders adversely affect minority shareholders' returns. However, when* $C_0 > C_0^{'}$, *we obtain* $Q_f > Q_h$ *minority shareholders can benefit from the overseas listing decision.*

When $Q_f = Q_h$, we obtain $\left[\frac{b\theta_f(1-\beta)-\beta(1-\beta)^2(1-\theta_f)}{b\theta_f}\right]\left(\frac{1+r_f}{1+r_f-E_f}\right)(E_f C_0 - C_L) = \left[\frac{b\theta_h(1-\beta)-\beta(1-\beta)^2(1-\theta_h)}{b\theta_h}\right]\left(\frac{1+r_h}{1+r_h-E_h}\right)E_h C_0$. Denoting $C = \frac{b\theta_h(1-\beta)-\beta(1-\beta)^2(1-\theta_h)}{b\theta_h}$, $D = \frac{b\theta_f(1-\beta)-\beta(1-\beta)^2(1-\theta_f)}{b\theta_f}$, then we can derive the expression for the threshold level of net cash flow $C_0^{'}$ as shown in Equation (18).

$$C_0' = \frac{D(1+r_f)(1+r_h-E_h)}{D(1+r_f)E_f(1+r_h-E_h)-C(1+r_h)E_h(1+r_f-E_f)}C_L \tag{18}$$

Based on Lemma 2, when the net cash flow C_0 produced by the firm is more than the threshold value C_0^* controlling shareholders will implement overseas listing decisions. To analyze the influence of controlling shareholders' overseas listing decisions on minority shareholders' returns, we then compare C_0^* to $C_0^{'}$. Letting $X = C_0^* - C_0^{'}$, we obtain:

$$X = C_0^* - C_0' = \frac{A(1+r_f)(1+r_h-E_h)}{A(1+r_f)E_f(1+r_h-E_h)-B(1+r_h)E_h(1+r_f-E_f)}C_L - \frac{D(1+r_f)(1+r_h-E_h)}{D(1+r_f)E_f(1+r_h-E_h)-C(1+r_h)E_h(1+r_f-E_f)}C_L$$

$$= \left[\frac{A}{A(1+r_f)E_f(1+r_h-E_h)-B(1+r_h)E_h(1+r_f-E_f)} - \frac{D}{D(1+r_f)E_f(1+r_h-E_h)-C(1+r_h)E_h(1+r_f-E_f)}\right](1+r_f)(1+r_h-E_h)C_L$$

$$= \left[\frac{1}{(1+r_f)E_f(1+r_h-E_h)-\frac{B}{A}(1+r_h)E_h(1+r_f-E_f)} - \frac{1}{(1+r_f)E_f(1+r_h-E_h)-\frac{C}{D}(1+r_h)E_h(1+r_f-E_f)}\right](1+r_f)(1+r_h-E_h)C_L$$

Since $\frac{B}{A} = \frac{\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}}{\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}} = \frac{(1-\beta)^2\left(\frac{1}{\theta_h}-1\right)+2b}{(1-\beta)^2\left(\frac{1}{\theta_f}-1\right)+2b}$, $\frac{C}{D} = \frac{\frac{b\theta_h(1-\beta)-\beta(1-\beta)^2(1-\theta_h)}{b\theta_h}}{\frac{b\theta_f(1-\beta)-\beta(1-\beta)^2(1-\theta_f)}{b\theta_f}} = \frac{b-\beta(1-\beta)\left(\frac{1}{\theta_h}-1\right)}{b-\beta(1-\beta)\left(\frac{1}{\theta_f}-1\right)}$, $0<\theta_h<\theta_f<1$, then $\frac{B}{A} > \frac{C}{D}$ is always tenable. At this point, $X = C_0^* - C_0' > 0$, $C_0^* > C_0'$, so it follows that the overseas listing decision made by controlling shareholders aiming at maximizing their expected returns enhances minority shareholders' returns. Further, taking investor protection of the domestic market θ_h as the X-axis, investor protection of the overseas market θ_f as the Y-axis, and minority shareholders' expected returns as the Z-axis, Figure 7 shows the simulation results of minority shareholders' expected returns, which supports the above results.

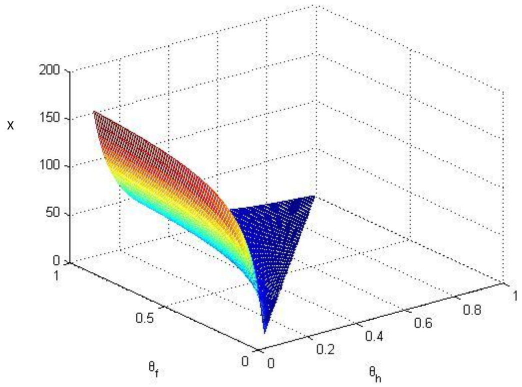


Figure 7. Simulation results of minority shareholders' expected returns
Source: By authors.

Figure 7 shows the influence of investor protection in the domestic market (θ_h) and overseas market (θ_f) on *X*. *X* is the difference between $C_0^{'}$ and C_0^{*}.

5.2 The Influence of Overseas Listing Decision on Firm Value

Previous research has shown that overseas listing alleviates agency conflicts between shareholders and creditors [46], reduces capital cost [14], improves corporate governance [1,21,22], optimizes financial decisions [23,24], and increases the net cash flow multiplier. Among these benefits, both the reduction of capital cost and the increase of net cash flow multiplier enhance firm value to some degree. Does an overseas listing decision implemented by controlling shareholders to maximize their own expected returns simultaneously enhance firm value? Next, we will analyze the influence of overseas listing decisions on firm value. According to Equations (1) and (2), the value of non-overseas listed firms is $V_h = \frac{E_h(1+r_h)}{1+r_h-E_h}C_0$ and the value of overseas listed firms is $V_f = \frac{1+r_f}{1+r_f-E_f}\left(E_f C_0 - C_L\right)$. Taking the net cash flow C_0 at time t_j as the abscissa and the firm value V at time t_j+1 as the ordinate, the function graph of firm value is shown in Figure 8.

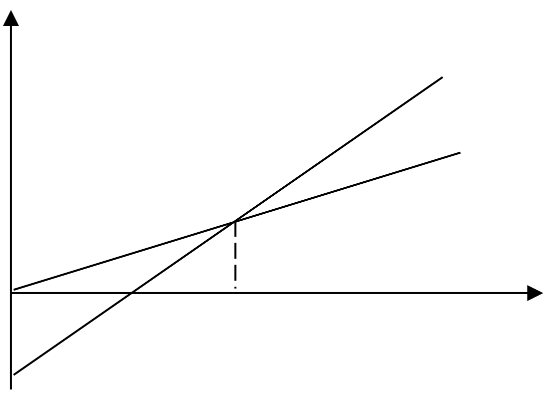


Figure 8. Function of firm value
Source: By authors.

Figure 8 is the function graph of firm value under overseas listing (V_f) and non-overseas listing (V_h). There exists a threshold level of net cash flow C_0^* to judge whether the overseas listing decision enhances firm value.

Lemma 4 *There exists a threshold level of net cash flow $C_0"$ used to assess whether the overseas listing decision of controlling shareholders enhances firm value.*

Proof of Lemma 4 *According to Figure 8, there exists a threshold level of net cash flow $C_0"$, when $C_0 = C_0"$, then we obtain $V_f = V_h$. At this point, the controlling shareholders' overseas listing decision will not affect firm value. When $0 < C_0 < C_0"$, we obtain $V_f < V_h$, which means that the overseas listing implemented by controlling shareholders will decrease firm value. While when $C_0 > C_0"$, we obtain $V_f > V_h$, that is, the overseas listing decision will improve firm value.*

When $V_f = V_h$, $\frac{1+r_f}{1+r_f-E_f}\left(E_f C_0 - C_L\right) = \frac{1+r_h}{1+r_h-E_h}E_h C_0$ is tenable. We can derive the expression for the threshold of net cash flow $C_0"$ as Equation (19) shows.

$$C_0" = \frac{\left(1+r_f\right)\left(1+r_h-E_h\right)}{\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-\left(1+r_h\right)E_h\left(1+r_f-E_f\right)}C_L \tag{19}$$

Based on Lemma 2, when the net cash flow produced by the firm is more than C_0^*, controlling shareholders will list overseas. To analyze the influence of controlling shareholders' overseas listing decision on firm value, we then compare C_0^* to $C_0"$. Given $Y = C_0^* - C_0"$, then we obtain:

$$Y = C_0^* - C_0" = \frac{A\left(1+r_f\right)\left(1+r_h-E_h\right)}{A\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-B\left(1+r_h\right)E_h\left(1+r_f-E_f\right)}C_L - \frac{\left(1+r_f\right)\left(1+r_h-E_h\right)}{\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-\left(1+r_h\right)E_h\left(1+r_f-E_f\right)}C_L$$

$$= \left[\frac{A}{A\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-B\left(1+r_h\right)E_h\left(1+r_f-E_f\right)} - \frac{1}{\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-\left(1+r_h\right)E_h\left(1+r_f-E_f\right)}\right]\left(1+r_f\right)\left(1+r_h-E_h\right)C_L$$

$$= \left[\frac{1}{\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-\frac{B}{A}\left(1+r_h\right)E_h\left(1+r_f-E_f\right)} - \frac{1}{\left(1+r_f\right)E_f\left(1+r_h-E_h\right)-\left(1+r_h\right)E_h\left(1+r_f-E_f\right)}\right]\left(1+r_f\right)\left(1+r_h-E_h\right)C_L$$

Since $0 < \theta_h < \theta_f < 1$, $\frac{B}{A} = \frac{\frac{(1-\beta)^2(1-\theta_h)+2b\theta_h}{\theta_h}}{\frac{(1-\beta)^2(1-\theta_f)+2b\theta_f}{\theta_f}} = \frac{(1-\beta)^2\left(\frac{1}{\theta_h}-1\right)+2b}{(1-\beta)^2\left(\frac{1}{\theta_f}-1\right)+2b} > 1$, then $Y = C_0^* - C_0" > 0$, $C_0^* > C_0"$. This indicates that overseas listing decisions made by controlling shareholders with the objective of maximizing their own returns can also enhance overall firm value. Further, taking investor protection in the domestic market θ_h as the X-axis, investor protection in the overseas market θ_f as the Y-axis, and firm value as the Z-axis, we obtain the simulation result as shown in Figure 9, which is consistent with the theoretical derivation.

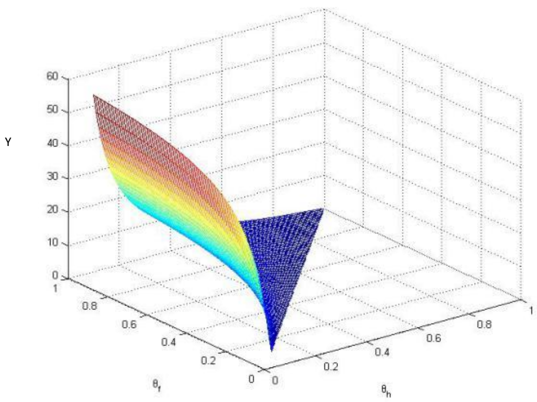


Figure 9. Simulation result of the firm value

Source: By authors.

Figure 9 shows the influence of investor protection in the domestic market (θ_h) and overseas market (θ_f) on *Y*. *Y* is the difference between C_0^* and C_0^*.

6. Conclusions

Amid the accelerating integration of global capital markets and the increasing complexity of cross-border regulatory environments, we explore the strategic decision-making of controlling shareholders in Mainland Chinese firms regarding overseas listings. From the perspective of maximizing controlling shareholders' expected returns, we investigate how controlling shareholders balance equity earnings and private benefits of control by constructing a firm value model and an expected returns model. We then examine the underlying mechanisms influencing the overseas listing decisions in terms of capital cost, net cash flow multiplier, investor protection, and overseas listing compliance cost. Predictions derived from the theoretical model are validated through Matlab simulations. Finally, we analyze the impact of overseas listing decisions on minority shareholders' expected returns and overall firm value.

The results indicate as follows: (1) listing in the developed overseas market constrains the optimal proportion of controlling shareholders' private benefits of control to firm value. (2) There exists a threshold level of net cash flow at which controlling shareholders compare their expected returns and determine whether to pursue an overseas listing. If and only if the firm's net cash flow is greater than the threshold value, an increase in the controlling shareholders' expected returns will lead them to list overseas. (3) A greater increase in the net cash flow multiplier under non-overseas listing, coupled with lower levels of investor protection and capital cost in the domestic market, raises the threshold level of net cash flow for choosing overseas listing. (4) A smaller increase in the net cash flow multiplier under overseas listing, along with higher investor protection, capital cost, and overseas listing compliance cost in developed markets, also increases the threshold level of net cash flow for overseas listing. (5) Both the expected returns of minority shareholders and the firm value will improve when implementing the overseas listing decision, which is based on the maximization of the controlling shareholders' expected returns.

This paper investigates the strategic decision-making process of controlling shareholders concerning overseas listing, with a particular emphasis on the trade-offs between equity earnings and private benefits of control under varying institutional and market environments. Future research could extend this framework by incorporating dynamic market conditions, conducting cross-country regulatory comparisons, and performing empirical analyses using firm-level panel data. Additionally, future studies might also examine the heterogeneity effects of overseas listings across industries and ownership structures to provide a more nuanced understanding of their implications.

Acknowledgements

This article received no financial or funding support.

Conflicts of Interest

The authors confirm that there are no conflicts of interest.

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