

An Analysis of Strategic Equity Stakes Acquisition of Chinese Banks by Foreign Financial Institutions

Hui-Lung Chang, Sou-Shan Wu, and Szu-Lang Liao

ABSTRACT: This paper applies a contingent claim model to examine the risk of and returns to foreign financial institutions after they acquire equity stakes in a Chinese bank. The model considers dynamic factors such as individual asset value and exchange rates in maximizing shareholder value. In addition to analyzing the asset value and factors associated with risk after participation, this paper evaluates the optimal acquisition equity stake ratio using numerical analyses under regulatory capital control. For the Chinese banking sector, we discover that the portfolio risk of foreign financial institution will decrease after acquiring equity stakes when its asset increases, the debt ratio decreases, and the required risk-weighted asset increases. Overall, these foreign financial institutions have well-diversified currency portfolios and enjoy better asset quality and surplus earnings; therefore, they will likely increase their optimal acquisition equity stake ratio if the Chinese banks in which they invest have with good quality assets and are focused on local business.

KEY WORDS: capital control, contingent claim, optimal acquisition equity stake ratio, risk-weighted asset.

In light of the rapid economic development and strong domestic demand that are boosting the average income level in China, many foreign financial institutions strive to build on early leads to invest, develop, and operate in the Chinese market. Moreover, China's twelfth five-year plan, which is ready to implement a deeper reform to further transform economic development and proceed to make a comprehensive well-off society, will open China's financial market. This open market will become a trend and the main driving force in China's growing economy. Most foreign financial institutions, subject to local regulations, proceed with different strategies and objectives according to their own advantages and choose the most effective way to enter the market by building networks and developing multiple services. Therefore, any institution that wishes to perform well and be profitable in a competitive market will need a comprehensive plan to move ahead.

Major commercial banks in China have gradually transformed from local to cross-regional operations, with being listed on the stock market as the ultimate goal. Further, some banks look for an opportunity to cooperate by bringing in foreign financial institutions to participate in acquiring equity stakes to increase international visibility and opportunities overseas, as business agents enhance risk control and capital adequacy to meet local statutory requirements. As twenty-five foreign financial institutions took equity stakes in thirty-four Chinese banks between 2001 and 2011, the Chinese market has been the main mergers and acquisitions (M&A) target market for foreign financial institutions

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in the past decade. After all, to have foreign financial institutions participate in acquiring equity stakes of local banks builds a strong brand identity that includes cross-regional operating skills in accordance with mixed operation tendencies in the future.

Several researchers have stated their ideas on the motivations for M&A or reinvesting to maximize shareholder value, providing cost savings and efficiency analyses. Anderson et al. (1997) showed that merging could allow the merging company to enter the existing network directly without rebuilding it. In addition to those not looking for M&A or reinvesting to maximize shareholder value, Halpern (1983) argued that once the merging company found internal information that was originally not obtainable by an outsider, they could utilize the information on production efficiency better than the merged company, thereby reducing the cost of bankruptcy. Hennart and Park (1993) showed that companies with higher levels of diversification and lower levels of research and development (R&D) intensity would likely use mergers as the main method for increasing operations and earnings in the market. Leland (2007) discovered that merging could improve the solvency of a company. In addition, the degree of financial synergy depends on taxation, bankruptcy cost and scale, and level of cash flow and their correlation. Brailsford et al. (2007) discussed mergers of multinational corporations, which would have negative financial synergy if both parties had a similar degree of interest rate and foreign exchange risk exposure. Conversely, companies of unequal size and risk exposure tend to have positive corporate synergy. Pilloff and Santomero (1998) found that the reasons for successful M&A in the banking sector include the superior professional management capacity and structural knowledge that large-scale banks have, which could help banks with relatively low efficiency and profit to escape their predicament. Vennet (1997) found oligopoly could lead banks to gain control of pricing power and then increasing their market share if banks competed in horizontal mergers.

Mergers or acquisitions are often used by financial institutions to grow business and gain market share to increase profits as a result of economies of scale. Therefore, to best understand the difference between pursuing a growing return and acquiring equity stakes, a company should spend some time analyzing and measuring its risk exposure to confirm that it is within its reasonable risk appetite. However, the importance of risk tolerance is often neglected if companies pay attention only to factors that maximize shareholder value and returns while considering the strategy of acquisition and reinvestment. To meet the social expectations of financial institutional behavior in increasing economic activities and leveraging environments, it is necessary for companies to evaluate both risk and return before making M&A or reinvestment decisions. Other than self-discipline, financial institutions are also required to adhere to government regulations, such as capital requirements, when looking for maximized value through M&A or reinvestment.

Model and Methodology

Measurement of Risk and Return

We adopt an option model with contingent claims to analyze the return and related risk after foreign financial institutions acquire equity stakes. The foreign financial institution's assets after acquiring equity stakes consists of some of the original assets before its M&A strategy and some of the equity of the Chinese target bank. With the goal of maximizing the stockholder equity value of foreign financial institutions acquiring equity stakes and considering the capital control and limitations in their home countries, we discuss the factors that affect risk and volatility.

Based on this model of analyzing the returns on and risk of acquiring equity stakes, we also consider the exchange rate risk that is relevant for cross-border investments in equity stakes and assume that the asset values of both the foreign financial institution and the Chinese target bank also follow some dynamic models. The assumptions of such dynamic models are set as follows:

Assumption 1: The dynamics of the asset value of a foreign financial institution acquiring equity stakes are given as

$$\frac{dV_d}{V_d(t)} = r_d(t)dt + \sigma_{V_d} dW_{V_d}^Q(t); V_d(0) = V_d, \quad (1)$$

where r_d is the instantaneous risk-free rate of the foreign financial institution, σ_{V_d} is the constant volatility of the rate of return on the assets of the foreign financial institution, and $W_{V_d}^Q$ is a Wiener process under the foreign financial institution's domestic risk-neutral probability measure.

Assumption 2: The dynamics of the asset value of a Chinese target bank are given as

$$\frac{dV_f}{V_f(t)} = r_f(t)dt + \sigma_{V_f} dW_{V_f}^Q(t); V_f(0) = V_f, \quad (2)$$

where r_f is the instantaneous risk-free rate of the Chinese target bank, σ_{V_f} is the constant volatility of the rate of return on the assets of the Chinese target bank, and $W_{V_f}^Q$ is another Wiener process under the Chinese target bank's foreign risk-neutral probability measure.

Assumption 3: The dynamics of the exchange rate (RMB as quoted currency) are given as

$$\frac{dX(t)}{X(t)} = (r_d(t) - r_f(t))dt + \sigma_X dW_X^Q(t); X(0) = X, \quad (3)$$

where σ_X is the constant volatility of the exchange rate and W_X^Q is another Wiener process under the foreign financial institution's domestic risk-neutral filtered probability space.

According to Assumptions 1–3, there are three types of risk factors in our framework, which are mutually correlated. The instantaneous correlation coefficients are assumed to be constant and are defined as follows:

$$\rho_{ij}dt = E^Q \left[dW_i^Q(t) dW_j^Q(t) \right],$$

where $i, j = V_d, V_f$, and X .

Furthermore, the dynamics of the asset value of a Chinese target bank, in units of the foreign financial institution's home country currency, is $V_{f(d)} = V_f X$. By Ito's lemma and Equations (1) and (2), we have

$$\frac{dV_{f(d)}}{V_{f(d)}} = \mu_{V_{f(d)}} dt + \sigma_{V_{f(d)}} dW_{V_{f(d)}}^Q, \quad (4)$$

where

$$\mu_{V_{f(d)}} = \left(r_d + \rho_{V_f X} \sigma_{V_f} \sigma_X \right)$$

and

$$\sigma_{V_{f(d)}} = \sqrt{\sigma_{V_f}^2 + \sigma_X^2 + 2\sigma_{V_f} \sigma_X \rho_{V_f X}}.$$

With the restrictions on the proportion of equity stakes acquired by a foreign financial institution of no more than 20 percent and 25 percent for all foreign financial institutions, it is difficult to achieve main operating control and dominant rights under this M&A strategy. As noted above, foreign financial institutions that acquire equity stakes will emphasize sharing the profit of a Chinese target bank and diversifying risk as a financial investment. In this way, the two banks have no operating synergy or interaction.

After acquiring equity stakes, the asset value of the foreign financial institution will be volatile, with gains or losses in this investment. Under the assumption of no interaction, the asset value of the foreign financial institution will be composed of asset values that are not invested in acquiring equity stakes and stockholder equity of a Chinese target bank:

$$V_d^I = i_1 V_d + i_2 E_{f(d)}, \quad (5)$$

where i_1 is the proportion of asset value that is not invested in acquiring equity stakes, i_2 is the ratio of stockholder equity of the Chinese target bank, and $E_{f(d)}$ is the equity value of the Chinese target bank in units of the foreign financial institution's home country currency. By Equation (4) and Ito's lemma, we have the dynamics of $E_{V_{f(d)}} = f(V_{f(d)})$ as

$$dE_{f(d)} = \left(g_2 + g_1 \mu_{V_{f(d)}} V_{f(d)} + \frac{1}{2} g_{11} \sigma_{V_{f(d)}}^2 V_{f(d)}^2 \right) dt + g_1 \sigma_{V_{f(d)}} V_{f(d)} dW_{V_{f(d)}}^Q, \quad (6)$$

where $g_1 = \partial E_{f(d)} / \partial V_{f(d)}$, $g_2 = \partial E_{f(d)} / \partial t$, and $g_{11} = \partial^2 E_{f(d)} / \partial V_{f(d)}^2$.

Furthermore, the dynamics of the asset value of a foreign financial institution after acquiring equity stakes is

$$\begin{aligned} \frac{dV_d^I}{V_d} &= i_1 \frac{dV_d}{V_d} + i_2 \frac{dE_{f(d)}}{V_d} \\ &= \left[i_1 r_d + \frac{i_2}{V_d} \left(g_2 + g_1 \mu_{V_{f(d)}} V_{f(d)} + \frac{1}{2} g_{11} \sigma_{V_{f(d)}}^2 V_{f(d)}^2 \right) \right] dt \\ &\quad + i_1 \sigma_{V_d} dW_{V_d}^Q + \frac{i_2}{V_d} g_1 \sigma_{V_{f(d)}} V_{f(d)} dW_{V_{f(d)}}^Q. \end{aligned}$$

We also have the constant volatility of the rate of return on the assets of the foreign financial institution after acquiring equity stakes $\sigma_{V_d^I}$:

$$\left(w_1^2 \sigma_{V_d}^2 + w_2^2 \sigma_{V_f}^2 + w_2^2 \sigma_X^2 + 2w_1 w_2 \sigma_{V_d} \left(\sigma_{V_f} \rho_{V_d V_f} + \sigma_X \rho_{V_d X} \right) + 2w_2^2 \sigma_{V_f} \sigma_X \rho_{V_f X} \right)^{1/2}, \quad (7)$$

where $w_1 = i_1$ and

$$w_2 = \frac{V_{f(d)}}{V_d} g_1 i_2 = \frac{V_f X}{V_d} g_1 i_2.$$

As above, the instantaneous volatility is affected by the correlation coefficient of the asset return of the foreign financial institution acquiring equity stakes and the Chinese target bank. This also includes the correlation coefficients of individual assets and the exchange rate.

Optimal Acquisition Equity Stake Ratio Under Capital Control

In accordance with the requirements of the new Basel Accords on capital, financial institutions shall consider the capital control derived by risky assets when expanding their business category and scope. The total level of capital shall also be calculated with the risk weights such that the minimum capital requirement is satisfied. Assume the average risk weight of the foreign financial institution acquiring equity stakes is w . The minimum amount of capital K_d^I should be no less than the w (risk weight) $\times V_d^I$ (asset value) $\times \sigma_{V_d^I}$ (volatility of asset return) after acquiring equity stakes:

$$K_d^I = V_d^I - B_d^I \geq w\sigma_{V_d^I} V_d^I \Rightarrow B_d^I \leq V_d^I (1 - w\sigma_{V_d^I}), \quad (8)$$

where B_d^I is the amount of liability of the foreign financial institution acquiring equity stakes.

The equity value of the foreign financial institution acquiring equity stakes E_d^I is regarded as a call option on the underlying asset V_d^I , with an exercise price of B_d^I . With capital K_d^I invested by the foreign financial institution acquiring equity stakes and the requirement of a minimum capital adequacy ratio, the objective of maximizing stockholder's equity value can be set as

$$\max L_d^I = E_d^I - K_d^I; \text{ s.t. } B_d^I \leq V_d^I (1 - w\sigma_{V_d^I}), \quad (9)$$

where $E_d^I = V_d^I N(d_1) - B_d^I e^{-rT} N(d_2)$ and

$$d_1 = \frac{\ln\left(\frac{V_d^I}{B_d^I}\right) + \left(r + \frac{1}{2}\sigma_{V_d^I}^2\right)T}{\sigma_{V_d^I}\sqrt{T}}, \quad d_2 = d_1 - \sigma_{V_d^I}\sqrt{T}.$$

Considering the restriction in capital allocation $B_d^I = V_d^I(1 - w\sigma_{V_d^I}^*)$, the first-order condition of the objective function L_d^I is

$$\begin{aligned} \frac{\partial L_d^I}{\partial \sigma_{V_d^I}} &= \frac{\partial(E_d^I - K_d^I)}{\partial \sigma_{V_d^I}} = \frac{\partial V_d^I N(d_1)}{\partial \sigma_{V_d^I}} - \frac{\partial B_d^I e^{-rT} N(d_1 - \sigma_{V_d^I}\sqrt{T})}{\partial B_d^I} \frac{\partial B_d^I}{\partial \sigma_{V_d^I}} - \frac{\partial K_d^I}{\partial \sigma_{V_d^I}} \\ &= V_d^I N(d_1) + V_d^I w e^{-rT} N(d_1 - \sigma_{V_d^I}\sqrt{T}) - V_d^I w, \end{aligned} \quad (10)$$

and the second-order condition is

$$\frac{\partial^2 L_d^I}{\partial \sigma_{V_d^I}^2} = V_d^I N''(d_1) + V_d^I w e^{-rT} N'(d_1 - \sigma_{V_d^I}\sqrt{T}) \left(\frac{\partial d_1}{\partial \sigma_{V_d^I}} - \sqrt{T} \right), \quad (11)$$

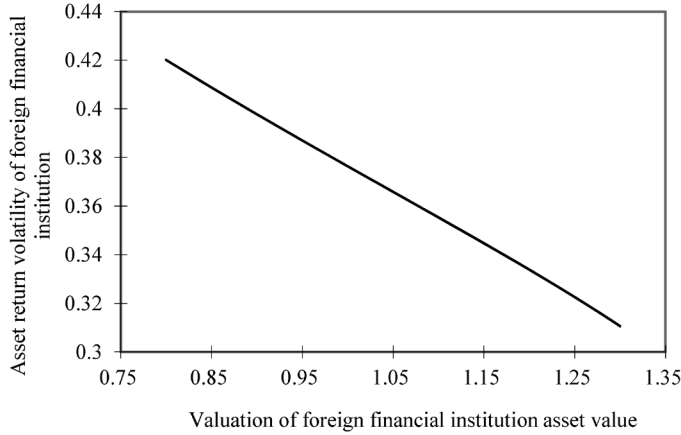


Figure 1. Relationship between asset return volatility and foreign financial institution's asset value

where

$$\frac{\partial d_1}{\partial \sigma_{v_d^I}} - \sqrt{T} = - \left(\frac{\ln(V_d^I / B_d^I)}{\sqrt{T}} + r\sqrt{T} \right) (\sigma_{v_d^I})^{-2} - \frac{\sqrt{T}}{2} \leq 0.$$

The second-order condition in Equation (11) is negative in sign, which means that there exists optimal instantaneous volatility of asset returns $\sigma_{v_d^I}^*$ to the foreign financial institution acquiring equity stakes to maximize stockholder equity. Without the closed form $\sigma_{v_d^I}^*$, we adopt numerical analyses with different parameters. Furthermore, the comparative static statistics and the results are discussed to analyze the risk factor of the portfolio after acquiring equity stakes.

Results and Analysis

With regard to the relative comparative static statistics, Equation (11) returns the following results.

1. The asset return volatility and increasing asset value of the foreign financial institution after acquiring equity stakes show a negative correlation, as shown in Figure 1. With the asset value approach demonstrating an increase of the foreign financial institution's asset value, the volatility of the asset return would be lower. In addition, the foreign financial institution must pay attention to the potential risk that may arise once the equity value increases.
2. The asset return volatility and the foreign financial institution's liability are positively correlated after taking equity stakes, as shown in Figure 2. The result shows that an increase in the liability-to-asset ratio causes the asset return volatility to increase when foreign financial institutions borrow to invest. In other words, the portfolio risk and liabilities increase simultaneously.
3. The asset return volatility of the foreign financial institution and the risk weight are negatively correlated, as shown in Figure 3. When the amount of liability is

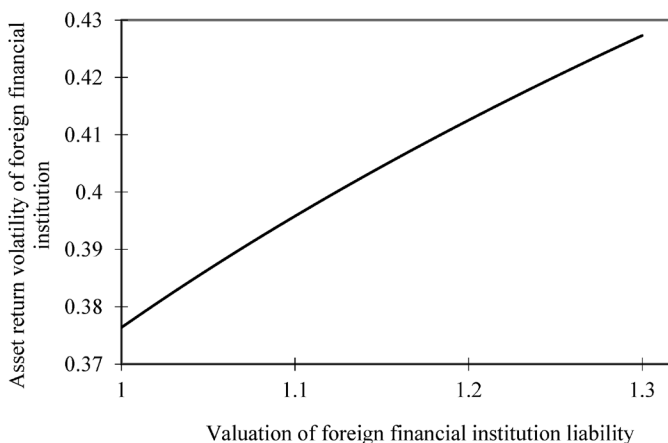


Figure 2. Relationship between asset return volatility and foreign financial institution's liability

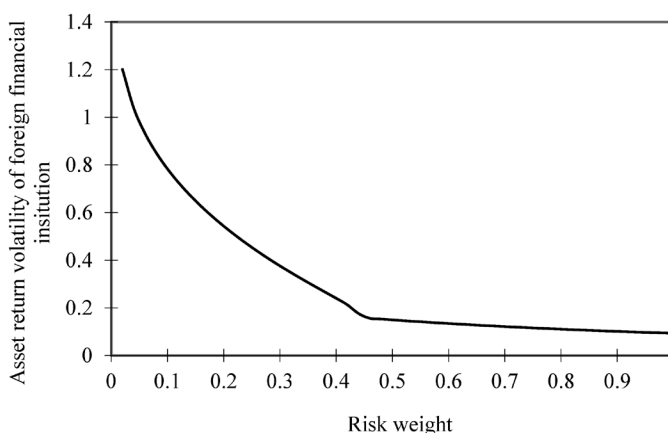


Figure 3. Relationship between asset return volatility of foreign financial institution and risk weight

limited and with more high-risk weight, the foreign financial institution must have more capital and fewer risk-weight assets to reduce the portfolio's risk and asset return volatility.

Furthermore, we can calculate the corresponding optimal acquisition equity stake ratio i_2^* when $\sigma_{V_d}^*$ is known. This optimal ratio will be affected by eight factors: the asset value of the Chinese bank V_f and its liabilities B_f ; the individual volatility of asset returns to the Chinese target bank σ_{V_f} and the foreign financial institution σ_{V_d} ; the volatility of the exchange rate between the foreign financial institution's domestic currency and the RMB σ_X ; the correlation coefficient of the asset returns to the foreign financial institution and the Chinese target bank ρ_{V_d, V_f} ; the correlation coefficient of the asset returns to and exchange rate of the foreign financial institution $\rho_{V_d, X}$; and the correlation coefficient of the asset returns to and exchange rate of the Chinese target bank $\rho_{V_f, X}$. These eight factors have the following effects on choosing the optimal ratio.

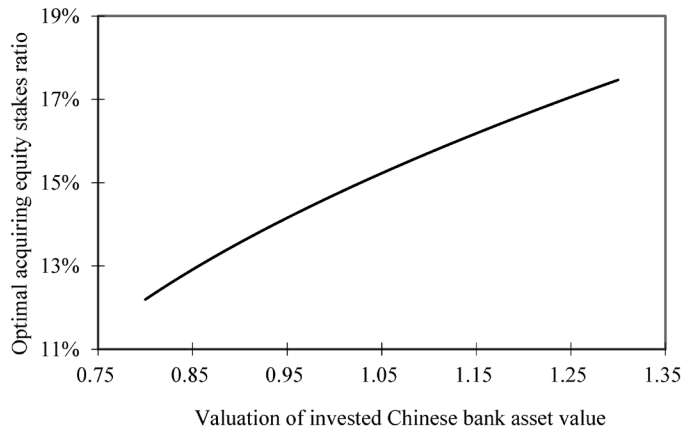


Figure 4. Relationship between optimal ratio and invested Chinese bank asset value

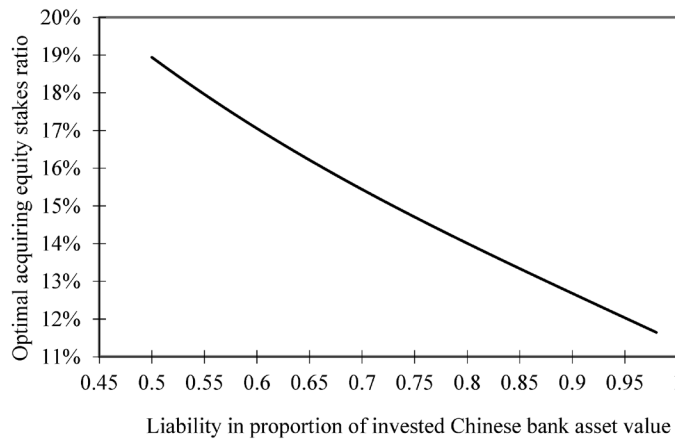


Figure 5. Relationship between optimal ratio and liability in proportion of invested Chinese bank asset value

1. The optimal ratio shows a positive correlation (Figure 4) with asset value V_f and a negative correlation (Figure 5) with liabilities B_f , in proportion to the asset value of the Chinese target bank. This result indicates that if the Chinese bank has a higher asset value or lower liability value, then its corresponding equity will be higher as well. In other words, the foreign financial institution will increase its optimal ratio to improve the return when acquiring equity stakes.
2. The optimal ratio shows a negative correlation with the asset return volatility σ_{v_f} of the Chinese target bank (Figure 6). When the foreign financial institution has restricted capital, as indicated by the risk-weighted asset, it will likely not invest in a higher risk object to reduce the portfolio risk. This conclusion is similar to the argument made above that when the Chinese target bank has better asset quality and stable asset return volatility, this can help stimulate the

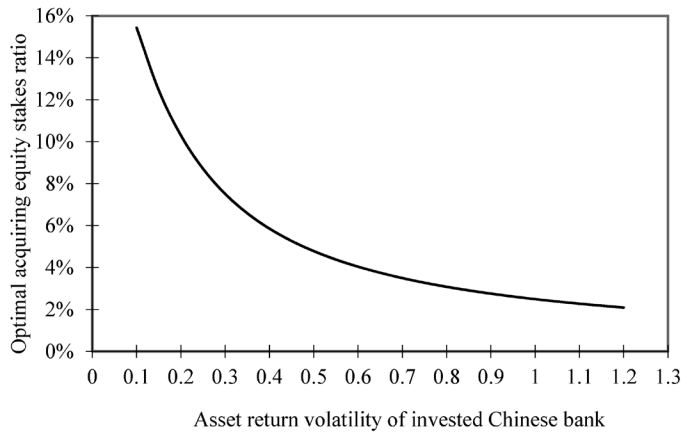


Figure 6. Relationship between optimal ratio and asset return volatility of invested Chinese bank

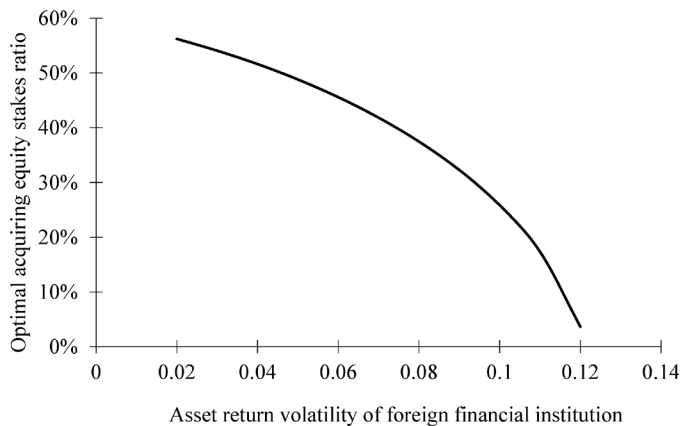


Figure 7. Relationship between optimal ratio and asset return volatility of foreign financial institution

foreign financial institution to invest and increase its optimal acquisition equity stake ratio.

3. The optimal ratio and asset return volatility σ_{v_d} of the foreign financial institution after acquiring equity stakes also are negatively correlated (Figure 7). That also illustrates that when the foreign financial institution has good asset quality and high profitability, its asset quality will be more stable, allowing the foreign financial institution to tolerate increased risk taking and exposure.
4. The optimal ratio and exchange rate volatility σ_x are negatively correlated (Figure 8). Based on this result, we can say that when the foreign financial institution's country of origin uses a major currency or the exchange rate between the portfolio's denominated currency and the RMB is not very volatile, the optimal acquisition equity stake ratio will increase. When economic and trade activities

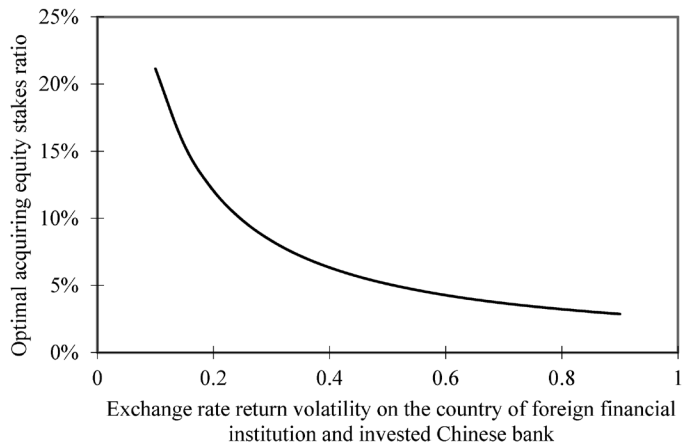


Figure 8. Relationship between optimal ratio and exchange rate volatility

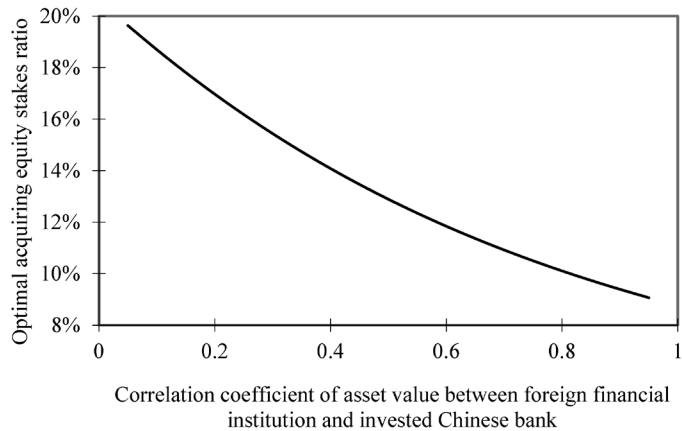


Figure 9. Relationship between optimal ratio and correlation coefficient of asset value between the foreign financial institution and invested Chinese bank

become more frequent and stable between the foreign financial institution and local bank’s country of origin, the volatility level will remain more stable and the optimal ratio will increase.

5. The optimal ratio and correlation coefficient of the asset values of the foreign financial institution and the Chinese target bank ρ_{V_d, V_f} have are negatively correlated (Figure 9). When a foreign financial institution acquires equity stakes in a Chinese target bank, it will focus on creating more value and developing complementary businesses more than the local bank did. These activities are in lieu of achieving economic scale benefit solely by acquiring equity stakes. In addition, when both institutions have a low correlation in asset portfolios, this will help reduce the portfolio risk and meet the risk-weighted asset requirements of the foreign financial institution’s home country.

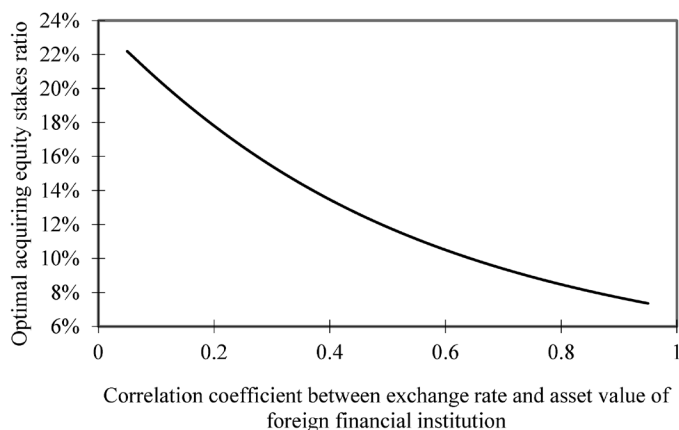


Figure 10. Relationship between optimal ratio and correlation coefficient between exchange rate and asset value of the foreign financial institution

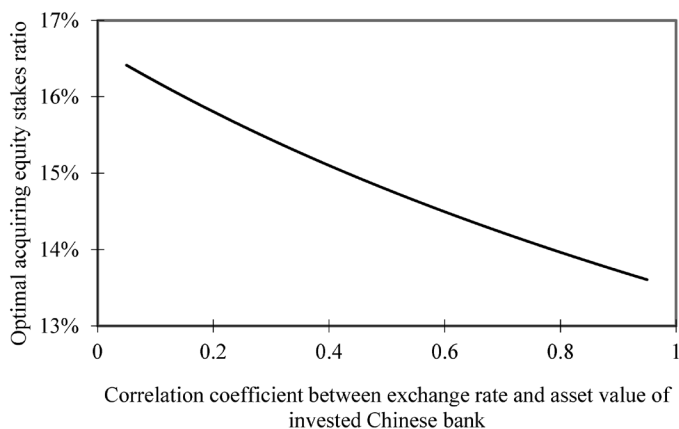


Figure 11. Relationship between optimal ratio and correlation coefficient between exchange rate and asset value of the invested Chinese bank

6. The optimal ratio has a negative correlation to the correlation coefficient of the exchange rate and the foreign financial institution's asset value $\rho_{v_d,x}$ as well as to the correlation coefficient of the exchange rate and the Chinese bank's asset value $\rho_{v_f,x}$ (Figures 10 and 11). This indicates that when the foreign financial institution has diversified its currency portfolio with the Chinese target bank, the optimal ratio will be increased, while the foreign financial institution can reduce the risk of exposure to meet the risk-weighted asset requirement.

Conclusions

As transnational investment is a trend, this paper has considered exchange rate cross-currency risk with the capital restrictions of the new Basel Accord on capital in analyzing foreign financial institutions' acquisitions of Chinese banks. By using the contingent claim

optimization model, we find that the correlation coefficient, including both individual return of assets and exchange rate, would affect the instantaneous standard deviation of both institutions. In addition, if two institutions are complementary or have a low correlation and the overall asset portfolio of the foreign financial institution has a negative or no correlation to the RMB or the Chinese target bank as operating mainly locally, then the risk of the foreign financial institution can be reduced by acquiring equity stakes.

With the minimum Bank for International Settlements ratio requirement for foreign financial institutions to take ownership stakes in Chinese banks and pursue the goal of maximizing shareholder value, we also found the instantaneous standard deviation of the optimal returns on an asset. The results of the numerical analyses show that the overall portfolio risk of foreign financial institutions would be reduced if the asset value increases, the debt ratio decreases, and the regulatory risk weight decreases after acquiring equity stakes, if the foreign financial institution is restricted on the risk-weighted asset by current regulations.

Finally, we examine the factors that could affect the optimal acquisition equity stake ratio. Specifically, this ratio is affected by factors such as the Chinese bank's asset value, liabilities, volatility of asset return, and the correlation coefficient between the returns and the exchange rate. Other factors include the correlation coefficient of the foreign financial institution's asset value, the exchange rate, and the volatility of asset returns. The results show that the asset value of the Chinese bank has a positive correlation with the optimal ratio but other factors are negative correlated. The explanation for this result may be that when foreign financial institutions implement the strategy of acquiring equity stakes, apart from meeting the capital requirement to lower portfolio risk, they create maximum value and returns by picking local banks with good asset quality that are locally and financially well developed. Furthermore, the optimal ratio could be more beneficial if both parties operated complementary businesses.

Currently there are restrictions on the proportion of equity stakes that may be acquired: not more than 20 percent by any one foreign financial institution and 25 percent for all foreign financial institutions. However, from acquiring equity stakes, foreign financial institutions can have a beneficial effect on equity returns by helping the Chinese banks to create strong earning power, design business expansion, and improve corporate governance. This argument comes with the same conclusion as the model applied in this paper.

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