# 國 立 交 通 大 學

## 財務金融研究所

## 碩 士 論 文

併購活動可以改善日本銀行的績效嗎?

Can Mergers and Acquisitions Improve Japanese Bank Performance?

研 究 生：黃光萍

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中 華 民 國 一 百 年 六 月

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研 究 生：黃光萍                     Student：Kuang-Ping Huang

指導教授：王淑芬　博士               Advisor：Dr. Sue-Fung Wang

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# 併購活動可以改善日本銀行的績效嗎?

研 究 生：黃光萍　　　　　　　　指導教授： 王淑芬 博士

國立交通大學財務金融研究所碩士班

## 摘要

過去的文獻針對銀行併購是否能夠改善經營績效眾說紛紜，而大部分的研究都以美國和歐洲的資料為樣本，然而日本銀行也在 1990 年開始進行多次的併購活動，但是相關的研究卻很少。有鑑於此，本研究蒐集 1993 年至 2008 年所發生之日本商業銀行的併購事件，透過單變量與多元迴歸模式分析併購活動與經營績效的關係。結果顯示日本銀行的績效並無法透過併購活動獲得改善，但卻可以創造成本綜效，此與過去文獻結果一致，同時也隱含之所以無法改善其績效是因為併購活動無法擴大其營收規模。

【關鍵字】銀行績效、併購、成本綜效

# Can Mergers and Acquisitions Improve Japanese Bank Performance?

Student：Kuang-Ping Huang                    Advisor: Dr. Sue-Fung Wang

Graduate Institute of Finance

National Chiao Tung University

## ABSTRACT

A great number of studies discuss mergers and acquisitions (M&A) and bank performance. We find that majority of such studies use US and European samples, and the results between bank performance and M&A are mixed. In contrast, little literature are available on M&A in Japanese banks, which have undergone quite a number of M&A since 1990. Therefore, we gather M&A data, with periods ranging from 1998 to 2008, from Japanese commercial banks. We then use univariate analysis and regression model to investigate the relationship between bank performance and M&A. The result shows that Japanese banks cannot use M&A to improve profit performance. What M&A can do is create cost synergy, which is consistent with previous literature. Bank performance cannot be improved because M&A cannot expand revenue.

[Keywords] Bank performance, M&A, Cost synergy

# 誌謝

終於寫到誌謝這一部分了，這也代表著這兩年來的研究生生涯即將結束，要面臨人生的下一個挑戰。回首寫論文的這一過程，面臨了不少的挫折與困難，但總算是一一克服了。在這段期間，有一群師長親友在背後不斷督促與鼓勵，我才能順利完成論文，我將藉由這篇誌謝，向他們表達我衷心的謝意

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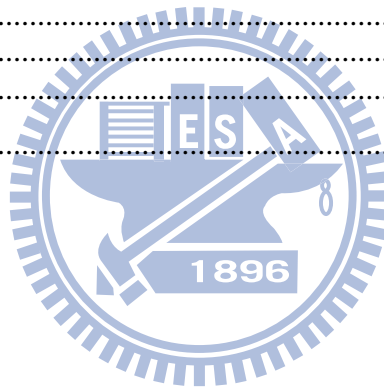最後，我要感謝我的家人，在我煩躁的時候，包容我；在我低潮時，鼓勵我，因為有你們的鼓勵與支持，讓我更加堅強、勇敢。現在，我要將我的喜悅分享給你們，讓我們一起分享這份成果與榮耀。
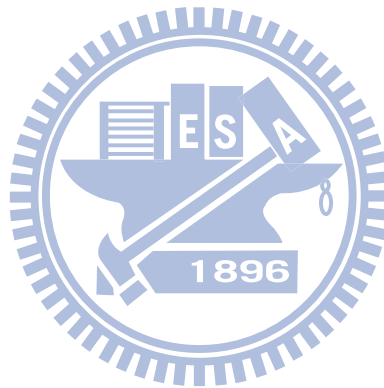
黃光萍　謹誌

國立交通大學財務金融所碩士班

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# 1. Introduction

Between 1960s and 1980s, Japan experienced rapid economic growth, which is often referred to as the Japanese post-war economic miracle. The average growth rates were 10% in the 1960s, 5% in the 1970s, and 4% in the 1980s. By the 1980s, Japan was ranked as the world's second largest economic power after the US. The banking sector plays a prominent role in the Japanese economy. For much of the post-war period, banks were the predominant source of external financing for Japanese firms (Aoki et al., 1994).

However, the Japanese financial system experienced significant changes in the 1980s and 1990s. In particular, the globalization of capital markets and the liberalization of Japanese bond markets in the 1980s prompted many prominent corporations to borrow directly from the capital markets, bypassing banks, which were formerly the primary suppliers of capital (Anderson and Makhija, 1999; Hoshi and Kashyap, 2001). Individual savers did not enjoy the parallel liberalization that promoted widespread access to non-bank savings vehicles. In addition, the complex web of regulations that restricted banks to segmented regions and product lines was not dismantled (Sibbitt, 1998; Hoshi and Kashyap, 1999). Thus, Japanese banks faced an exodus of prominent borrowers, retained a captive deposit base, and were restricted to traditional markets for bank services.

Confronted by this change in the operating environment, Japanese banks shifted the focus of their lending practices to risky borrowers, relying heavily on real-estate collateral as security (Hoshi and Kashyap, 1999).

Responding to the changes in their operating environment in the 1980s, Japanese banks altered their lending practices, exposing themselves to risks. These changes subsequently manifested in the banking crisis of the 1990s. The shift in lending strategies proved to be disastrous as collateral values collapsed and recession ensued. Indeed, the Japanese banking crisis is often associated with the collapse of asset prices in the early 1990s (Andersona and Campbell II, 2004). Figures 1 and 2 show the evolution of land prices and Japanese bank stock prices from 1982 to 2009. The correlation coefficient between land price and bank price indices is 0.7. We suggest a significantly high relation between bank performance and land price.

The drop in asset prices substantially decreased both the collateral values against banks that made commercial loans and the value of equity positions held by banks, eroding their hidden capital reserves. The decline in asset prices, the ensuing recession, and the poor performance

by corporate borrowers are considered the proximate causes of the banking crisis (Andersona and Campbell II, 2004).
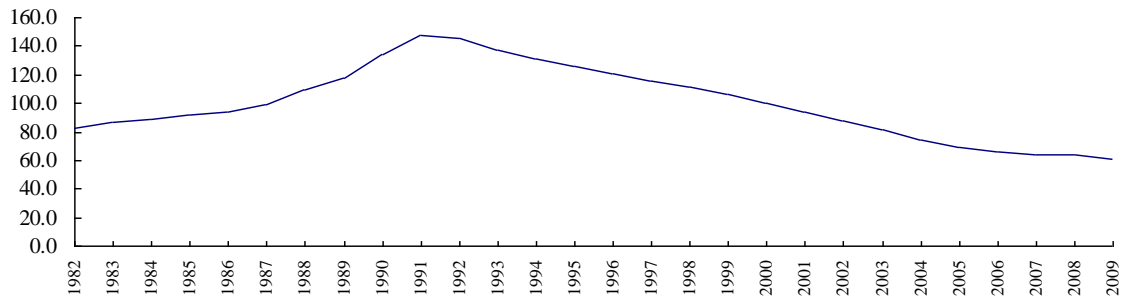


Figure 1. Urban land price index in Japan, end of March 2000=100.　　Source: Japan Real Estate Institute.



Figure 2. Japan Banks Price Index.　　Source: Datastream

In Japan, various banks have been consolidated since the 1990s, when most banks suffered numerous non-performing loans (Hosono, Sakai, and Tsuru, 2007). Table 1 shows number of Japanese commercial banks by year. The number of Japanese banks decreases every year. This decrease is not due to banks becoming bankrupt. We suggest that mergers within the industry are the reason for the yearly decrease in the number of banks.

**Table 1 Number of Japanese commercial banks**

| year | number of commercial banks |
|------|---------------------------|
| 1980 | 147 |
| 1990 | 145 |
| 1995 | 140 |
| 2000 | 133 |
| 2002 | 127 |
| 2003 | 124 |
| 2004 | 121 |
| 2005 | 119 |
| 2006 | 117 |
| 2007 | 116 |
| 2008 | 115 |
| 2009 | 114 |

Sources: Japanese Bankers Association;    Hosono, Sakai, and Tsuru (2007)

Table 2 shows the frequency of bank acquisitions by year. Evidently, M&A increased significantly after 1999. Figure 3 reveals that bank sizes remain constant before 2000, and increase significantly after 2000. These results indicate that, in recent years, Japanese banks have been undergoing a phase of M&A, thereby increasing bank sizes.

**Table 2 Number of bank acquisitions by year**

| Year | Frequency | % of sample |
|------|-----------|-------------|
| 1993 | 0 | 0 |
| 1994 | 0 | 0 |
| 1995 | 1 | 5 |
| 1996 | 0 | 0 |
| 1997 | 0 | 0 |
| 1998 | 1 | 5 |
| 1999 | 4 | 20 |
| 2000 | 6 | 30 |
| 2001 | 2 | 10 |
| 2002 | 3 | 15 |
| 2003 | 1 | 5 |
| 2004 | 0 | 0 |
| 2005 | 2 | 10 |
| **total** | **20** | **100** |

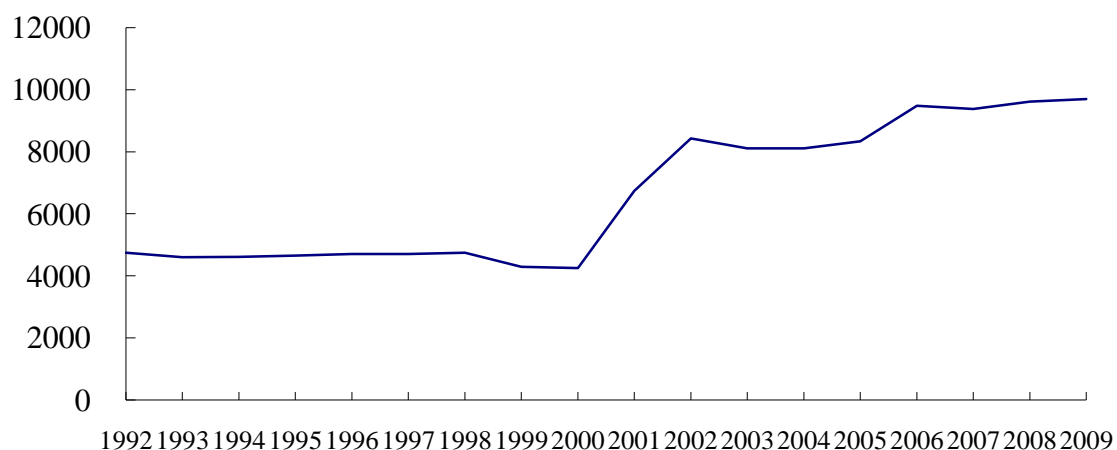Source: Securities Data Corporation (SDC)

Figure 3. Size of Japanese banks in terms of total assets (million).    Source: Compustat

Studies in the US and Europe relating to M&A and bank performance reveal several trends. Several studies agree on the positive relation between M&A and bank performance (Cornett et al., 2006; Huizinga et al., 2001; Diaz et al., 2004; Kapopoulos and Siokis, 2005; Campa and Hernando, 2006; Altunbas and Marques, 2008; Fritsch, 2007; Houston, James, and Ryngaert, 2001). Furthermore, three factors play an important role in the M&A of banks: size, geographical relatedness, and cost cutting. Cornett et al. (2006) find that the M&A of a large bank produce greater performance gains than the M&A of a small bank. They also find that domestic M&A produce greater performance gains than cross-border M&A. Houston, James, and Ryngaert (2001) find that most of the estimated value gains from bank's M&A stem from cost cutting. Other studies find a reduction in cost after M&A (Kwan and Wilcox, 2002; Huizinga et al., 2001; Houston, James, and Ryngaert, 2001; Rhoades, 1998; Piloff, 1996).

Some studies, however, disagree that M&A are able to improve bank performance (Hagendorff and Keasey, 2009; Beccalli, 2009; Piloff, 1996). Beccalli (2009) bears witness to the importance of geographical relatedness and size in the M&A of banks. He finds cross-border M&A have worse bank performance than domestic M&A. He also finds a "big" size for both the acquirer and the combined bank determines a negative impact on profit efficiency.

We find that majority of the studies on M&A of banks are based on US and European studies. The results between bank performance and M&A are mixed. In contrast, there is little literature about the M&A of Japanese banks, although Japanese banks have been dealing with quite a number of merger and acquisition activities recently. Therefore, we want to investigate

the relation between M&A and Japanese bank performance.

# 2. Empirical models and variables

## 2.1 Data source

We identify all Japanese bank acquisitions between 1993 and 2008 reported in the Securities Data Corporation (SDC) M&A database. Twenty-four Japanese commercial banks engaged M&A from 1993 to 2008. The accompanying individual accounting data for each of the merged companies were taken from Compustat. Referring to Table 1, there are 114 commercial banks in Japan, but only 96 are available in Compustat.

The sample M&A announced between 1993 and 2008 are majority acquisitions, which resulted in the acquirer having a stake of at least 50% in a target institution.

To be included in the sample, the acquirers must have been involved in only one merger or acquisition activity. Four banks involved more than one merger or acquisition between 1993 and 2008 were deleted. Thus, our effective sample total comprises 92 commercial banks in Japan and 20 banks that participated in one merger or acquisition during the data period, all of which are domestic M&A.

## 2.2 Variables

Univariate analysis and regression model are applied to investigate how M&A affect bank performance. The three different bank performance measures in our model are return on assets (ROA), Tobin's Q, and Costs/Assets. All variables are defined and shown in Table 3.

**Table 3 variable definition**

This table presents descriptions of variables used in this study. The sample period is from 1993 to 2008. All the financial data computed for the variables are from Compustat (GV). The market premium comes from Securities Data Corporation (SDC).

| Dimension | Variable | Definition |
|---|---|---|
| **bank performance measures** | | |
| ROA | ROA | return on asset |
| Tobin's Q | Q | (the book value of total assets minus the book value of equity plus the market value of equity) to the book value of total assets |
| Costs/Assets | Costs/Assets | total expenses to total assets |
| **M&A indicator** | M&A dummy | Dummy indicating the years following a bank's M&A. Equals 0 before the bank's M&A and 1 following the M&A. |
| | post-merger 13 | Dummy variable that equal 1 from first to third year after M&A |
| | post-merger 3 | Dummy variable that equal of 1 in all years after the third |
| **bank attributes** | | |
| Capitalization | E/A | Total capital to total assets |
| Credit risk | BADL/NII | Loan loss provisions to net interest revenues |
| Loan activity | LOAN/DEP | Customer loans to customer deposits |
| Fee-based activity | NINT | Non-interest income to total assets |
| Technology and innovation | OE/A | Other expenses to total assets |
| **Size** | Size | natural log of total assets in t-1 for each bank |
| **Market share** | Market share | market share in t-1 for each bank |

We employ a regression method to determine how M&A affect bank performance. We construct a dummy variable (M&A dummy) that equals to 0 before M&A of banks, and equals to 1 following M&A. The dummy is equal to 0 for all period for banks that did not undergo M&A. To distinguish short-term effect and long-term effect of M&A, we construct two dummy variables, post-merger 13 and post-merger 3 (Focarelli, Panetta, and Salleo, 2002). The former equals to 1 from first to third year after M&A and the latter equals 1 in all years after the third year, otherwise the two dummy variables are equal to 0. The two dummy variables are equal to 0 for all period for banks that did not undergo M&A. The post-merger 13 measures the adjustments made during the transition which is short-term effect. And the

post-merger 3 shows the long-term effects of mergers and acquisitions.

We also use a variety of bank attributes to define the features of banks. These indicators include measures of capital structure, risk exposure, type of activities, and financial innovation. Among the explanatory variables, size and market share are included because these variables are expected to be important determinants of bank performance. The summary of statistics is reported in Table 4.

**Table 4 descriptive statistics**

|              | mean   | median | Max     | min    |
|--------------|--------|--------|---------|--------|
| ROA          | 0.048  | 0.128  | 3.461   | -5.805 |
| Q            | 51.259 | 47.136 | 860.576 | 5.531  |
| Costs/assets | 0.030  | 0.028  | 0.132   | 0.007  |
| E/A(%)       | 4.512  | 4.330  | 21.504  | 0.857  |
| BADL/NII     | 0.279  | 0.138  | 28.887  | -1.972 |
| LOAN/DEP     | 0.812  | 0.754  | 5.513   | 0.000  |
| NINT(%)      | 0.580  | 0.425  | 17.063  | -1.553 |
| OE/A(%)      | 0.069  | 0.006  | 2.389   | -0.584 |
| Size         | 7.827  | 7.743  | 12.140  | 5.075  |
| Market share | 0.010  | 0.004  | 0.303   | 0.000  |

We use ROA and Tobin's Q to measure bank value, which is calculated from the annual accounting data of Compustat. ROA is income before extraordinary items divided by total assets. We calculate Tobin's Q (hereafter, Q) as the market value of equity plus the book value of debt (computed as the book value of assets minus the book value of equity) divided by the book value of total assets. This definition of Q has been used in various studies (La Porta et al., 2002; Doidge, Karolyi, and Stulz, 2004).

We use ROA and Q to measure profit performance and Costs/Assets to measure cost performance. The variable Costs/Assets is total interest plus noninterest expenses divided by assets. Both interest and noninterest expenses are included because bank management may substitute between providing depositor services and interest payments in attracting funds and because both contribute equally to the goals of the organization (Berger et al., 2005).

The capital adequacy level is measured as the ratio of equity to total assets (E/A). Practitioners, analysts, and regulators have attached great importance to this variable in recent years. From a prudential regulatory perspective, bank capital has become the focal point of

bank regulation (Vives, 2000).

The effect of changes in the capital adequacy level on performance depends on the theory of the banking firm. According to the "signaling hypothesis," commercial banks specialize in lending information to problematic borrowers (Berger, Herring, and Szego, 1995). Because bank managers usually have a stake in the capital of the bank, "it will prove less costly for a 'good' bank to signal better quality through increased capital than for a 'bad' bank."[1] Therefore, banks can signal favorable information by merging with banks with larger capital ratios, indicating a positive correlation between capital and earnings, and suggesting a positive relationship between capital structure dissimilarities and performance (Acharya, 1988). Conversely, Ross (1977) argues that lower, rather than higher, capital ratios signal positive information because signaling good quality through high leverage would be less onerous for a "good" bank than for a "bad" bank.[2]

Credit risk strategy is measured as the level of loan loss provisions divided by net interest revenues (BADL/NII). Regarding loan and deposit profiles of banks, the ratio of total loans to total customer deposits (LOAN/DEP) is included because it provides a proxy for the use of relatively low-cost deposits in relation to the amount of outstanding loans (Altunbas and Marques, 2008).

Traditionally, banks rely on interest income as their primary revenue source. Today, rather than traditional core deposit business, banks have other activities that generate non-interest income, This non-interest income includes fees from the sale of mutual funds and insurance policies, fees from securitization activities, income from loan servicing, fees from providing trust services, and income from providing cash management services. Thus, the ratio of non-interest income to total operating income (NINT) indicates the importance of fee-generating activities versus more traditional lending (DeYoung and Rice, 2004).

Finally, the strategy of banks in terms of technology and innovation is measured as other costs (i.e., total costs excluding interest, staff, and other overhead costs) to total assets (OE/A) (Altunbas and Marques, 2008).

We include the natural log of lagged assets and the market share to account for differences in bank size and market power.

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[1] Berger (1995, p.436).

[2] Another argument regarding changes in the capital structure and performance relates to agency problems between shareholders and managers. Some corporate finance studies suggest that increasing financial leverage could reduce this type of agency problem because leverage may increase pressure on bank managers to become more efficient owing to short-term pressures arising from debt-servicing needs (see Berger et al., 1995; Jensen, 1986).

## 2.3 Empirical models

First, we use univariate analysis (t-test) to compare pre-merger and post-merger bank performance variables.

We take the pre-merger average of the bank over the five years prior M&A. If the pre-merger data available is for less than five years, we take the pre-merger average over the maximum years for which data are available. Focarelli and Panetta (2003), Focarelli and Pozzolo (2005), and Rhoades (1998) show that a 2–3 year post-merger period is needed to determine whether there are any post-merger gains. We take the average of the post-merger bank performance measures over the (at most) five years after M&A and take the difference between the pre-merger 5-year average and the post-merger 5-year average.

We perform the t-test for the null hypothesis, where the differences between pre-merger and post-merger bank performance measures have a mean equal to zero.

We then run two stage regressions to examine how M&A influence bank performance. The bank performance measures specified as the dependent variables are ROA, Tobin's Q, and Costs/Assets.

The regression model includes only size and market share in first stage, which is shown in Equation (1). In second stage, we add bank attributes to regression model. We use bank attributes to represent bank characteristics, including capital structure, risk exposure, type of activities, and financial innovation. Bank attributes include E/A, BADL/NII, LOAN/DEP, NINT, and OE/A, which are defined in Table 3. Equation (2) is a complete regression model, which includes bank attributes, size, and market share.

Finally, we run regression analysis to identify short-term and long-term effect on bank M&A. The post-merger 13 exhibits short-term effect, which measures the adjustments made during the transition. And the post-merger 3 shows the long-term effects of mergers and acquisitions.

$$\text{Bank performance measures} = \alpha + \beta1 * \text{M\&A dummy} + \beta2 * \text{Size} + \beta3 * \text{Market share} \quad (1)$$

$$\text{Bank performance measures} = \alpha + \beta1 * \text{M\&A dummy} + \beta2 * \text{bank attributes} + \beta3 * \text{Size} + \beta4 * \text{Market share} \quad (2)$$

$$\text{bank performance measures} = \alpha + \beta1 * \text{post-merger 13} + \beta2 * \text{post-merger 3} + \beta3 * \text{bank attributes} + \beta4 * \text{Size} + \beta5 * \text{Market share} \quad (3)$$

# 3. Empirical results

## 3.1 Univariate analysis

Table 5 shows the results of t-test, which was used to compare pre-merger and post-merger bank performance. Results show that both the mean value of difference between pre-merger and post-merger ROA and Tobin's Q are not significantly different from zero. This means that Japanese banks cannot use M&A to gain profit, which is consistent with prior studies (Hagendorff and Keasey, 2009; Beccalli, 2009; Piloff, 1996).

We also examine whether M&A can improve cost efficiency, and find that the mean value of difference between pre-merger and post-merger Costs/Assets is significantly smaller than zero (-0.0113). This shows that the M&A of the bank can create cost synergy, which is also consistent with previous literature (Kwan and Wilcox, 2002; Huizinga et al., 2001; Beccalli, 2009).

**Table 5 Paired t-test of bank performance measures**

The data consists of 20 Japanese commercial banks that have M&A activity. We run paired t-test and take pre-merger and post-merges average over five year bank performance measures. If the pre-merger and post-merger data are available for less than five years, we take the average over the maximum years for which we can observe the data. Bank performance measures include ROA, Tobin's Q, and Costs/Assets. ROA is income before extraordinary items divided by total assets. The Tobin's Q is (Total assets - Book value of equity + Market value of equity) divided by book value of total assets. Costs/Assets is total interest plus noninterest expenses divided by assets. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively.

|         | ROA    | Tobin's Q | Costs/Assets |
|---------|--------|-----------|--------------|
| Mean    | 0.2401 | -4.7999   | -0.0113***   |
| t value | 1.0800 | -1.2900   | -8.3400      |
| p-value | 0.2949 | 0.2137    | <.0001       |

## 3.2 Regression result

We run two stage regressions to examine how M&A influence bank performance. The results are shown in Table 6. In first stage, the regression model includes only size and market share. Then, we add bank attributes to regression model in second stage. We use bank attributes to represent bank characteristics, including capital structure, risk exposure, type of activities, and financial innovation. This is a complete regression model, which includes bank attributes, size, and market share.

**Table 6 Regression on bank performance measures**

This table reports regressions results for Equation (1) and Equation (2). The dependent variables are bank performance measures. Bank performance measures include ROA, Tobin's Q, and Costs/Assets. ROA is income before extraordinary items divided by total assets. The Tobin's Q is (Total assets - Book value of equity + Market value of equity) divided by book value of total assets. Costs/Assets is total interest plus noninterest expenses divided by assets. M&A dummy is a dummy variable that equals 0 before the bank's M&A and 1 following the M&A. The dummy equals 0 for all period for banks that did not undergo M&A. The bank attributes include E/A, BADL/NII, LOAN/DEP, NINT, and OE/A. E/A is capital ratio of equity to total assets. BADL/NII is credit risk measured by loan loss provisions divided by net interest income. LOAN/DEP is the ratio of total loans to total customer deposits. NINT is the ratio of non-interest income to total operating income. OE/A is other costs (i.e., total costs excluding interest, staff and other overhead payments) to total assets. Size is natural log of bank's total assets in t-1. Market share is natural log of bank's market share in t-1. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively. The values of t-statistics are in parentheses.

| | Model excluding bank attributes | | | Model including bank attributes | | |
| --- | --- | --- | --- | --- | --- | --- |
| | ROA | Tobin's Q | Costs/Assets | ROA | Tobin's Q | Costs/Assets |
| M&A dummy | 0.035 | -7.580 *** | -0.008 *** | -0.008 | -7.590 *** | -0.006 *** |
| | (0.77) | (-3.78) | (-7.24) | (-0.22) | (-3.86) | (-6.25) |
| bank attributes | | | | | | |
| E/A | | | | 0.001 *** | 3.773 *** | -0.004 *** |
| | | | | (3.46) | (6.57) | (-14.87) |
| BADL/NII | | | | 0.106 *** | -0.025 *** | 0.000 *** |
| | | | | (11.28) | (-4.06) | (11.64) |
| LOAN/DEP | | | | -0.003 *** | 37.454 *** | 0.005 *** |
| | | | | (-23.71) | (6.13) | (5.89) |
| NII/A | | | | -0.041 | -2.773 ** | 0.007 *** |
| | | | | (-1.38) | (-1.98) | (16.99) |
| OE/A | | | | 0.150 *** | -2.853 | -0.002 |
| | | | | (9.64) | (-0.79) | (-1.27) |
| Size | -1.027 *** | 9.695 *** | -0.003 *** | -0.930 *** | 8.902 *** | -0.002 *** |
| | (-12.4) | (11.47) | (-5.93) | (-14.44) | (10.31) | (-4.95) |
| Market share | 0.003 | -153.936 *** | 0.172 *** | 0.008 | -126.482 *** | 0.056 *** |
| | (0.23) | (-4.64) | (9.16) | (0.69) | (-3.69) | (3.43) |
| Observation | 1255 | 1205 | 1255 | 1255 | 1205 | 1255 |
| R-squared | 0.1102 | 0.1196 | 0.1033 | 0.4881 | 0.1750 | 0.4123 |
| Adj R-squared | 0.1081 | 0.1174 | 0.1012 | 0.4848 | 0.1694 | 0.4086 |

Results show that both ROA in two models have no significant change after M&A. However, we can see both Q in two models decreases significantly after M&A. We find that Japanese bank's profit performance may remain the same or even get worse after M&A. Besides, results also show that Costs/Assets decrease significantly after M&A. We find mergers and acquisitions can improve Japanese bank's cost performance. Therefore, we conclude that Japanese banks cannot improve their profit performance through M&A but can

create cost synergy. This finding is consistent with previous literature.

Then we run regression analysis to identify short-term and long-term effect on bank M&A. The post-merger 13 exhibits short-term effect, which measures the adjustments made during the transition. And the post-merger 3 shows the long-term effects of mergers and acquisitions. The regression results are shown in Table 7.

Results show that the coefficients on post-merger 13 and post-merger 3 are insignificant on ROA, indicating ROA does not significantly change both in short-term and long-term period after M&A. However, the coefficients on post-merger 13 and post-merger 3 are negative significantly on Q. We find that mergers and acquisitions have not only short-term effect, which is the adjustments made during the transition, but also long-term effect on Q. From aspects of ROA and Q, we find that mergers and acquisitions cannot improve Japanese bank profit performance or even make it worse both in short term and in long term.

Results also show that the coefficients on post-merger 13 and post-merger 3 are negative significantly on Costs/Assets. We find that mergers and acquisitions have short-term cost cutting effect. At the same time, we expand bank's size and have long-term cost reduction effect through M&A; thus, achieve economic scale.

In addition, results show that a significantly positive relation exists between capital ratio (E/A) and bank profit performance. It shows that banks with high capital ratio have better performance, which is consistent with "signaling hypothesis."[3] We also find that banks with higher credit risk (BADL/NII) have better performance (higher ROA and Q; lower Costs//Assets). And banks with higher loan activity (LOAN/DEP) have worse performance (lower ROA and Q; higher Costs//Assets). Besides, banks with a more fee-based activity (NINT) have positive effect on bank performance (for Q). The finding is consistent with a previous study that states that increases in non-interest income have been associated with higher profits (DeYoung and Rice, 2004). The coefficients on technology and innovation (OE/A) have mixed performance results.

Smaller banks, as measured by natural log of lagged assets, are generally associated with better performance than larger banks (statistically significantly lower ROA). This negative association is consistent with the results of EU bank efficiency studies.[4] In contrast, banks with larger market share have better performance results (statistically significantly higher Q

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[3]  Because bank managers usually have a stake in the capital of the bank, "it will prove less costly for a 'good' bank to signal better quality through increased capital than for a 'bad' bank."( Berger, 1995) Therefore, banks can signal favorable information by merging with banks with larger capital ratios, indicating a positive correlation between capital and earnings (Acharya, 1988).

[4]  Beccalli (2009) finds that a "big" size for both the acquirer and the combined bank determines a negative impact on profit efficiency.

and lower Costs/Assets).

## Table 7 Regression on bank performance measures

This table reports regressions results for Equation (3). The dependent variables are bank performance measures. Bank performance measures include ROA, Tobin's Q, and Costs/Assets. ROA is income before extraordinary items divided by total assets. The Tobin's Q is (Total assets - Book value of equity + Market value of equity) divided by book value of total assets. Costs/Assets is total interest plus noninterest expenses divided by assets. Post-merger 13 is a dummy variable that equals to 1 from first to third year after M&A and post-merger 3 is also a dummy variable that equals 1 in all years after the third year, otherwise the two dummy variables are equal to 0. The two dummy variables equal 0 for all period for banks that did not undergo M&A. The bank attributes include E/A, BADL/NII, LOAN/DEP, NINT, and OE/A. E/A is capital ratio of equity to total assets. BADL/NII is credit risk measured by loan loss provisions divided by net interest income. LOAN/DEP is the ratio of total loans to total customer deposits. NINT is the ratio of non-interest income to total operating income. OE/A is other costs (i.e., total costs excluding interest, staff and other overhead payments) to total assets. Size is natural log of bank's total assets in t-1. Market share is natural log of bank's market share in t-1. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively. The values of t-statistics are in parentheses.

|  | ROA | Tobin's Q | Costs/Assets |
|---|---|---|---|
| post-merger 13 | -0.020 | -7.247 ** | -0.004 *** |
|  | (-0.39) | (-2.46) | (-2.81) |
| post-merger 3 | 0.001 | -8.000 *** | -0.007 *** |
|  | (0.02) | (-3.17) | (-5.81) |
| bank attributes |  |  |  |
| E/A | 0.001 *** | -0.020 | 0.000 *** |
|  | (3.47) | (-1.37) | (5.21) |
| BADL/NII | 0.106 *** | 4.216 *** | -0.004 *** |
|  | (11.28) | (7.5) | (-15.76) |
| LOAN/DEP | -0.003 *** | -0.026 *** | 0.000 *** |
|  | (-23.7) | (-4.07) | (12.11) |
| NINT | -0.041 | 35.882 *** | 0.005 *** |
|  | (-1.38) | (5.77) | (5.63) |
| OE/A | 0.150 *** | -3.148 ** | 0.007 *** |
|  | (9.63) | (-2.24) | (17.72) |
|  |  |  |  |
| size | -0.930 *** | -3.874 | -0.001 |
|  | (-14.43) | (-1.07) | (-0.59) |
| market share | 0.008 | 6.772 *** | -0.001 *** |
|  | (0.7) | (10.2) | (-3.39) |
|  |  |  |  |
| Observation | 1255 | 1205 | 1255 |
| R-squared | 0.4881 | 0.1669 | 0.4209 |
| Adj R-squared | 0.4844 | 0.1606 |  |

# 4. Conclusion

Can M&A improve bank performance? A number of studies have explored this question. Studies on M&A of banks mostly use US and European data, and have produced different answers. Japanese banks have engaged in many M&A activities since 1990. However, very few studies are available about such activities. Therefore, we want to investigate the relation between bank performance and M&A using data from Japan commercial banks during the periods between 1998 and 2008. We use univariate analysis and regression model to find answers.

Results from univariate analysis and two stage regression show that Japanese banks cannot improve profit performance through M&A. These results are consistent with prior studies. However, M&A can help Japanese banks to create cost synergy. This finding is also consistent with previous literature. Furthermore, we run regression analysis to identify short-term and long-term effect on bank M&A. We find that mergers and acquisitions cannot improve Japanese bank profit performance or even make it worse both in short term and in long term. We also find that mergers and acquisitions have short-term cost cutting effect. Moreover, we have long-term cost reduction effect by expanding bank size through M&A and, thus, achieve economic scale. In addition, smaller banks are generally associated with better performance than larger banks. This negative association is consistent with the results of EU bank efficiency studies.

In conclusion, Japanese banks cannot use M&A to improve performance; however M&A generate create cost synergy. The results of this study also imply that bank performance cannot be improved because M&A cannot expand revenue. Investment income is an important part of revenue for bank; however, Japanese banks invest heavily in real estate and real-estate collateral as security, whose values decrease following the decline in asset prices. Figure 1 shows that land price index substantially decreases from 1992 to 2009. Therefore, Japanese banks experience major losses on investment and, as a result, cannot expand their revenue.

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