Full Length Research Paper

Differentials in overall performance between banks in financial holding companies and independent banks: Evidence from Taiwan

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This paper, using annual data from 2003 to 2006, examines overall performance differentiation between banks in financial holding companies and independent banks. Overall performance is measured in terms of profitability, liquidity, and safety. In view of interaction between profitability, liquidity, and safety, a simultaneous equations regression model is constructed with profitability, liquidity, and safety, treated as dependent variables. To get the regression model workable, the rate on equity (ROE) is taken as a proxy for profitability, the liquidity reserve ratio as a proxy for liquidity, and the bank of international settlement ratio as well as the debt ratio as two proxies for safety. In view of two proxies for safety, two simultaneous equations regression models, model 1 and model 2, are constructed and estimated using two-stage least squares (2SLS). Evidence shows that 1) banks in financial holding companies performed better in terms of profitability than independent ones in 2005 while estimating both model 1 and model 2; 2) banks in financial holding companies performed better in terms of liquidity than independent ones in 2003 and 2006 while estimating model 2 and in 2005, while estimating model 1; 3) no statistically significant differences in safety are found between banks in financial holding companies and independent ones while estimating model 1 and model 2.

Key words: Performance, profitability, liquidity, safety, two-stage least squares (2SLS).

INTRODUCTION

The financial holding company (hereinafter to be called financial holding company, FHC) focuses on cross-industry operation, stresses different industry alliance, enlarges operation scale, seeks for overall performance to attain capital deployment, cost saving and cross selling of the FHC so as to raise the competitiveness of the organization.

The banking industry is an important part of the financial industry, whose development is like the veins of the overall operation of the nation. So, the sustainable development of the banking sector is very important to the domestic economic growth. Like an ordinary industry, the bank is a profit making institution, with the goal of profit maximization, as well as the safety and liquidity to ensure the benefits of the depositors and general social public and raise confidence for the banks.

Profitability, liquidity and safety, as three goals of a bank, are mutually affected, for instance, excessive pursuit of profitability may have adverse effect on liquidity and safety, on the contrary, excessive pursuit of liquidity and safety may also have negative effect on profitability. At present, the literature on the comparison or analysis of the operational performance of the subsidiary bank of the FHC and independent bank reviews the profitability only, and estimation is made with single regressive equation. So, two problems will occur: first, the bank operational performance covering profitability, liquidity and safety cannot be known; from the point of view of econometrics theory, if the effect of liquidity and safety on profitability is not considered, there will be model specification bias, furthermore, even the profitability regression model

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contains independent variables liquidity and safety, only single regression equation is used to estimate, which will have the simultaneous equations bias. Therefore, this paper, with the goals of profitability, safety and liquidity, sets the simultaneous equations regression model for the endogenous variable, and estimates with the minimum square of two phases, to investigate whether the FHC, with the advantage of its scale and scope of economy, can have better operational performance represented by three targets; profitability, liquidity and safety, as compared to the independent banks.

LITERATURE REVIEW

Zhonghua (2002) compared the FHC banks and independent banks published by Fed, covering 50 FHC banks and 44 independent banks with the period from 1997 to 1998, the results show that the FHC banks have better performance, meeting the overall performance hypothesis, but the degree of variation of the independent banks is big, which means there are also banks with optimal performance in independent banks, meeting small but beautiful hypothesis. Gardner (1984) has the object of the bank owned by minority only 3 years after establishment from 1978 to 1981. He analyses the effect of management performance on profitability (ROA, ROE) via multi-element regression model with financial ratios and manager attributes and found that the models established by the financial ratios have over 50% of explanatory ability. If the manager attribute variable is added to the regression, then they can be as high as 55 to 60%, and the education background of manager in financial field and commercial loan can have significant positive effect on bank profitability.

Smirlock (1985) used 2700 American banks, and with cross section analysis, discuss about the relationship between the profitability and market structure, the results show that the market occupancy has significant positive effect on bank profitability, and market concentration has no significant effect on bank profitability. Yue (1992) used 60 Missouri commercial banks as samples, and DEA modules to estimate the operational efficiency of sample banks from 1984 to 1990, and found that the reason for no efficiency is excessive input or inadequate output, rather than scale. Sherman and Ladino (1995) divided 33 branches of US Growth Bank into 3 different types to measure the operational efficiency of different types, the results show that after reducing 9 million total input and 20% employee number, 23 poor efficiency branches have significant increase in bank bond, check deposit and traveler's check, this means after reducing total input and employee number, the efficiency increases substantially.

Miller and Noulas (1996) estimated the efficiency of big scale banks with assets of over 1 billion US dollars. The results show that the average non efficiency is at about 5%, in which the big scale and highly   profitable   banks

have higher technical efficiency, but the banks with bigger scale have reduced scale return. Noulas (1997) estimated the change of productivity in 1991 and 1992 and source of change in 10 state run Greek banks and 10 private banks. The results show that the two groups of banks show growth in productivity, and that of the state run is better than the private, the former comes from the technical progress and the latter from increased efficiency. Pastor et al. (1997) compared the efficiency of banks in Spain, US, UK, Germany, Australia, Italy, France, and Belgium, and the results show that the banks in France, Spain and Belgium are the most efficient banks, and the banks in Germany, Australia, Belgium and Italy have high productivity growth rate.

Chen and Yeh (2000) analyzed the efficiency of 34 public and private banks in Taiwan in 1995 and 1996; the results show that the technical efficiency of the public banks is lower than that of the private banks because the former have higher pure technology but no efficiency. Kohers et al. (2000) analyzed the efficiency of FHC in the US, the results show that the FHC have higher profit efficiency but the cost efficiency is lower than that of others. Besides, after the acquiring bank with no efficiency merges with the acquired bank, the fortune increases a lot. Sathye (2001) analyzed the operational efficiency in Australian banks and found that these banks have lower efficiency than their foreign counterparts; this is mainly because of the waste of input factors, while the domestic banks in Australia have higher operational efficiency than foreign banks.

Drake and Hall (2003) used the Japanese banks as the object to study on the bank merger, and analyzed the scale economy and operational efficiency. The results show that the small banks can have cost saving benefit from merger, but when the scale after merger is medium, the pure technical efficiency will be lower. Weill's (2004) study shows that the operational efficiency of banks in transitional economies in central and east Europe is lower than those in West Europe, mainly because that the management in the former is not proper. Bonin et al. (2005) studied on the banks in 11 transitional economies in East Europe and found from study that the operational efficiency of private banks is higher than that of the public banks while the foreign banks are better than local banks in cost efficiency.

Davis and Zhu (2009) evaluated the relationship between price change in commercial asset in industrial economy and individual bank behavior and performance. The results show that the commercial asset price is positively related to the bank loan and profitability, and positively related to net interest difference and bad debt ratio. They also show that the commercial asset price is an important variable to consider in checking for the authority to make guarantee authorization.

The bank operational performance discussed so far in the literature is only limited to financial profitability or input/output efficiency,   actually based on the special

attribute of the banks. The bank operational performance shall be assessed in terms of profitability, liquidity, and safety. Liquidity and safety are related to the operational risk and cannot be neglected. The bank simultaneously determines profitability, safety, and liquidity to maximize the bank's value. This paper uses them as the measures of bank's performance. In the sense that profitability, safety, and liquidity are interrelated, this paper therefore specifies the simultaneous equations regression model with the three measures of performance as dependent variables to detect if the FHC bank performs better than the independent bank due to the benefits from scale and scope economies.

The bank, as financial intermediary, is the main bridge of indirect finance, that is, the bank absorbs various deposit from the social public as the source of fund, and loan the fund to the one needed in way of discount and loaning. To ensure the public interest and maintain social and economic stability, the bank operation activity must be bonded and restricted by various government regulations, so safety is a target for the bank to pursue.

To meet the client withdrawal and loan requirement, the bank shall maintain adequate liquidity for fund. The bank is a profit-seeking institution, it focuses on management of assets and liabilities and to maximize the profit for the shareholder is also its target. Therefore, the bank management shall consider three objectives including safety, liquidity, and profitability.

Safety depends on the bank's ability to pay for debt. It is called solvency by Prather (1969). The bank assets mostly come from the deposit of the social public, therefore, the bank shall maintain adequate self owned asset ratio to increase the safety of financial structure and watch the market interest rate and exchange rate changes and make adjustment to asset portfolio real time to avoid asset loss due to fall in capital market value. The FHC, with its unified management of fund and resources, have diversified operation, offer convenient financial services for the customer and play the whole operation benefits. The bank operation activity is bonded and restricted by related law, especially the FHC with high asset scale, market occupancy and high supervision by authority; its equity capital ratio should be higher than the independent bank. Therefore this paper proposes:

H_1: The FHC banks perform better than the independent banks in terms of safety.

Liquidity means the amount of available fund or asset that can be turned into cash owned by the bank to meet abrupt fund requirement. Necessary liquidity can meet the demand for the customer to withdraw, and maintain confidence of the depositor and general social public. The central bank can set the scope of asset of the bank that can be used as reserve for liquidity and request that the bank shall meet the liquid reserve rate above 7%. If this rate is too high, it means that the bank does not put the asset into highly profitable   investment which reduces the

profitability; if the rate is not sufficient, then there might be a run on the bank which might lead the bank to collapse. The FHC bank has huge asset and diversified business, so it pays more to liquidity to protect the right of the depositor and investor and build its confidence. Therefore this paper proposes:

H_2: The FHC banks perform better than the independent banks in terms of liquidity.

The FHC bank experiences scale and scope economies via merger and acquisition and product diversification. Therefore, gained with the financial goods crossing sales and channel increase, multi power input and information equipment and resources share, customer information share and cross-industry sales, the overall efficiency of cost saving, capital efficiency and cross selling can be played. The FHC bank has large scale; a variety of financial products, improved information and hardware equipments, professional talents, increased service diversification, sale channels and posts, among others, profitability can thus be increased. Therefore, this paper proposes:

H_3: The FHC banks perform better than the independent banks in terms of profitability.

METHODOLOGY

Source of data and variable definition

The data set used in this paper is composed of 31 listed or over the counter banks from 2003 to 2006 in Taiwan, including 13 FHC banks (42%) and 18 independent banks (58%). All data are from the Taiwan Economic Journal (TEJ) database, the central bank statistics, the bank's financial statements and market observation post system (MOPS). Based on profitability, liquidity, safety and interaction of these three objectives, this paper specifies two simultaneous equations regression models, which is estimated using the two-stage least squares (2SLS) method. Each regression contains the dependent variables, the control variables and independent variables, the latter include independent variables in common, yearly dummy variables, the bank-type dummy variable, and at least one specific variable included in each of the regression equations.[1] Therefore, the three regression equations are found to be just identified or over-identified.

Dependent variables

1) The return on equity (V1) is the profit earned from business activities. This paper uses the return on equity as the proxy for profitability.
2) The liquidity reserve ratio (V2) is the ratio of current assets to the liquidity reserve. The liquidity reserve includes excess reserves, bank borrowed items, treasury bills, negotiable certificates of deposit, banker acceptances, securities approved by the Central Bank, etc. This paper uses the liquidity reserve ratios as the proxy for liquidity.

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[1] The specific variable is one of the independent variables included in one of the three regression equations, but excluded from the others.

3) The bank of international settlement ratio (V3) is the ratio of the bank's equity to risk assets. If the bank of international settlement ratio is higher, then the bank's capacity to deal with deterioration of bank assets is stronger. Taiwan Bank Law requires that the ratio be over 8%. This paper uses bank of international settlement as the proxy for safety.

4) The debt ratio (V4) is the ratio of the bank liability over total assets. This paper uses the debt ratio as the second proxy for safety.[2]

Control variables

1) BRANCH denotes the number of branches owned by the bank.
2) EMPOLOYEE in thousands denotes the number of employees in the bank. This paper uses the number of employees as a proxy for the size of the bank.

Independent variables

Common variables

1) The operating expense ratio (V5) is the operating expenses incurred by the operating income per dollar.
2) The deposit ratio (V6) is the ratio of total deposit to total liabilities. Most of the operating expenses in a bank are the interest expenses on the deposit.
3) The loan ratio (V7) is the ratio of total loan to total assets. Most of the operating revenues in a bank are the interest revenues on the loan.

Specific variables

1) The interest rate sensitive asset ratio (V8) is the ratio of interest-generating assets to the interest-bearing debt. The profit falls in the bank with the higher the interest rate sensitive asset ratio when interest rates get lower. Therefore, this paper uses the ratio as one of the variables which specifically influences profitability.
2) The financial operating cost ratio (V9) is the ratio of the bank's all financial operating expenditures to the operating expenses. The high ratio reduces the bank's profitability, so this paper uses this ratio as the second variable that specifically affects profitability.
3) The time deposit ratio (V10) is the ratio of time deposits to total deposits. The former includes the time deposits, negotiable certificates of deposit, etc. The higher of the time deposit ratio the lower the liquidity of the bank. Therefore, this paper uses the ratio as the variable that specifically affects the liquidity.
4) The NPL ratio (V11) is the ratio of overdue loan over total loan. The high The NPL ratio suggests that the bank's loan quality and risk management are poor. Therefore, this paper uses this ratio as the specific variable that affects the safety.

Dummy variables

1) The yearly dummy variables include D1, D2, and D3. If an observation comes from 2003, then D1 = 1; else D1 = 0. If an observation comes from 2004, then D2 = 1; else D2 = 0. If the observation comes from 2005, then D3 = 1; else D3 = 0.
2) Bank denotes the bank-type dummy variable. If the   observation

comes from the FHC banks, then Bank = 1; Bank = 0.

RESULTS FROM FOUR YEARS OF DATA CONSOLIDATED

This paper uses the return on equity (V1) as the proxy of profitability, the liquidity reserve ratio (V2) as the proxy of liquidity, and the bank of international settlement ratio (V3) and the debt ratio (V4) as proxies of safety. First, with the return on equity, the liquidity reserve ratio and the bank of international settlement ratio as the dependent variables, we establish the simultaneous equations regression Model 1ncluding three regression equations, which is called model 1. Next, with the return on equity, the liquidity reserve ratio and the debt ratio as the dependent variables, we establish the second set of simultaneous equations regression model, which is called model 2. The variable at the right hand of each equation includes the number of branches (BRANCH) and number of employees (EMPLOYEE) as the controlling variable, to eliminate the influence of the scale on bank profitability, liquidity and safety; the operating expense ratio (V5), the deposit ratio (V6) and the loan ratio (V7) as common independent variables; the interest rate sensitive asset ratio(V8) and the financial operating cost ratio (V9) as specific variable of profitability, the time deposit ratio (V10) as specific variable of liquidity, the NPL ratio (V11) as specific variable of safety. Besides, this paper uses D1, D2 and D3 three yearly dummy variables to test if the business model has structural change in different years, and uses the bank-type dummy variable (Bank) to test if the banks with different attributes (FHC banks and independent banks) has significant effect on the operational performance.

Model 1 uses the return on equity, the liquidity reserve ratio, and the bank of international settlement ratio as the dependent variables, the number of branches and employees as the control variables, and the operating expense ratio, the loan ratio, the deposit ratio, yearly dummy variable, bank dummy variable and specific variable as the independent variables to establish the simultaneous equations regression model as Equation 1. The specific variable of profitability includes the interest rate sensitive asset ratio (V8) and the financial operating cost ratio (V9), the specific variable of liquidity includes the time deposit ratio (V10), and the specific variable of safety includes the NPL ratio (V11).[3] Table 1 lists the two-stage least squares estimation results of Model 1 from 2003 to 2006[4]:

$$V1_i = \alpha_i^1 + \alpha_1^1 V2_i + \alpha_2^1 V3_i + \alpha_3^1 V5_i + \alpha_4^1 V6_i + \alpha_5^1 V7_i + \alpha_6^1 B$$

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[2] As the bank of international settlement ratio and the debt ratio are the two proxies of safety, this paper specifies and estimates two simultaneous equations regression models. One includes such explained variables as return on equity, liquid reserve ratio, and bank of international settlement ratio The other includes such explained variables as return on equity, liquid reserve ratio, and debt ratio.

[3] The regression equation for profitability with V10 and V11 excluded is just identified. The regression equations for liquidity with V8, V9and V11 excluded and for safety with V8, V9 and V10 excluded are both over identified..
[4] This paper also utilizes three-stage least squares method to estimate Equation 1 and 2, but the findings are similar to that of two stage least squares method, therefore, the results are not listed.

Table 1. Estimation of model 1 with return on equity, liquidity reserve ratio and bank of international settlement ratio as the dependent variables from 2003 to 2006.

Return on equity (V1)				Liquidity reserve ratio (V2)				Bank of international settlement ratio (V3)			
Variable	Coefficient	Parameter	P val	Variable	Coefficient	Parameter	P val	Variable	Coefficient	Parameter	P val
Constant	α_i^1	53.9824	0.4202	Constant	β_i^1	31.0816	0.8996	Constant	γ_i^1	19.3907***	0.0032
V2	α_1^1	-0.1195	0.7195	V1	β_1^1	0.4423	0.6162	V1	γ_1^1	-0.0340	0.7294
V3	α_2^1	0.7730	0.1874	V3	β_2^1	0.9377***	0.0000	V2	γ_2^1	0.7633***	0.0000
V5	α_3^1	-0.0359	0.7478	V5	β_3^1	-0.3296	0.6683	V5	γ_3^1	0.01165	0.8923
V6	α_4^1	-0.0343	0.7448	V6	β_4^1	0.0036	0.9671	V6	γ_4^1	0.4586	0.5264
V7	α_5^1	-0.6953	0.6309	V7	β_5^1	0.1219*	0.0874	V7	γ_5^1	0.1039	0.2645
BRANCH	α_6^1	-0.0559	0.6881	BRANCH	β_6^1	0.0294	0.7956	BRANCH	γ_6^1	-0.0639	0.5937
EMPLOYEE	α_7^1	0.3651	0.2753	EMPLOYEE	β_7^1	0.0619	0.6391	EMPLOYEE	γ_7^1	0.1849	0.2054
D1	α_8^1	-0.6708	0.5099	D1	β_8^1	-0.0976	0.2611	D1	γ_8^1	0.2042	0.8266
D2	α_9^1	0.1864**	0.0164	D2	β_9^1	0.0183	0.8132	D2	γ_9^1	0.2503	0.7575
D3	α_{10}^1	0.0576	0.7424	D3	β_{10}^1	0.0234	0.8197	D3	γ_{10}^1	0.1289	0.2209
V8	α_{11}^1	-0.2428*	0.5596	V10	β_{11}^1	-0.3480***	0.0001	V11	γ_{11}^1	-0.0141	0.8881
V9	α_{12}^1	-0.7484***	0.0000	BANK	β_{12}^1	-0.3296	0.6683	BANK	γ_{12}^1	0.9819	0.9423
BANK	α_{13}^1	-0.0509	0.8017								

*, ** and *** denote significance at the 10, 5 and 1% levels.

RANCH $_i$ $+\alpha_7^1$ EMPLOYEE $_i$ $+\alpha_8^1$ D1 $_i$ $+\alpha_9^1$ D2 $_i$ $+\alpha$

$_{10}^1$ D3 $_i$ $+\alpha_{11}^1$ V8 $_i$ $+\alpha_{12}^1$ V9 $_i$ $+\alpha_{13}^1$ BANK $_i$ $+\varepsilon_i$

V2 $_i$ $=\beta_i^1 +\beta_1^1$ V1 $_i$ $+\beta_2^1$ V3 $_i$ $+\beta_3^1$ V5 $_i$ $+\beta_4^1$ V6 $_i$ $+\beta_5^1$ V7

$_i$ + β_6^1 BRANCH $_i$ + β_7^1 EMPLOYEE $_i$

$+\beta_8^1$ D1 $_i$ $+\beta_9^1$ D2 $_i$ $+\beta_{10}^1$ D3 $_i$ $+\beta_{11}^1$ V10 $_i$ $+\beta_{12}^1$ BANK $_i$

$+\nu_i$

V3 $_i$ $=\gamma_i^1 +\gamma_1^1$ V1 $_i$ $+\gamma_2^1$ V2 $_i$ $+\gamma_3^1$ V5 $_i$ $+\gamma_4^1$ V6 $_i$ $+\gamma_5^1$ V7 $_i$

+ γ_6^1 BRANCH $_i$ + γ_7^1 EMPLOYEE $_i$

$+\gamma_8^1$ D1 $_i$ $+\gamma_9^1$ D2 $_i$ $+\gamma_{10}^1$ D3 $_i$ $+\gamma_{11}^1$ V11 $_i$ $+\gamma_{12}^1$ BANK $_i$ +

η (1)

The proxy of liquidity - the liquidity reserve ratio (V2) and the proxy of safety – and the bank of international settlement ratio (V3) are positively affected.

Table 1 indicates that a one percentage point increase in the bank of international settlement ratio raises the liquidity reserve ratio by 0.9377%; and a one percentage point increase in the liquidity reserve ratio raises the bank of international settlement ratio by 0.7633%. In 1992, the Taiwan authority implements the announced capital agreement of Bank for International Settlement (BIS), the BIS provisions specifies the ratio of bank equity over risk assets at 8%, to maintain the solvency of banks sound. Besides, the Central Bank of Taiwan requires banks to act as a liquidity reserve assets range and requires banks to be prepared to meet the liquidity reserve ratio of 7% or more, that banks must maintain an appropriate equity ratio to maintain banking liquidity and to protect their safety.

In the aspect of control variables, the number of branches (BRANCH) and employees (EMPLOYEE) has no significant effect on the return on equity, the liquidity reserve ratio and the bank of international settlement ratio. In common dependent variables, in the operating income of banks, and the interest income of loans is accounted for the majority, if banks raise the interest income, it will help banks improve profitability, therefore, the loan ratio (V7) has a significant positive effect on liquidity. In specific variables, the financial operating cost ratio (V9) as expected has a significant negative impact on the return on equity, which indicates that bank to create a better profitability, the financial operatiing cost will have to reduce. The time deposit ratio (V10) has a significant negative impact on the liquidity reserve ratio, as the higher the ratio of time deposit, the more the interest to be paid by the bank. Accordingly, the utilization of funds would be very limited, assets can be realized immediately will be less, and thereby bank liquidity will be reduced. The NPL ratio (V11) has a negative impact on the bank of international settlement ratio (V3), but does not pass the 10% significance test level.

In yearly dummy variables, D2 has a significant positive effect on the return on equity (V1), which means that the profitability in 2004 is higher than the ones in other years. The impact of the yearly dummy variables on the liquidity reserve ratio (V2) and the bank of international settlement ratio (V3) is not significant, that is the liquidity and safety in each year from 2003 to 2006 are of no significant difference.

The results of combined estimation of four years of data show that the bank-type dummy variable has no significant impact on the return on equity, the liquidity reserve ratio and the bank of international settlement ratio. In other words, the FHC banks and independent banks are of no significant difference in profitability, liquidity and safety, therefore the empirical results do not support the three hypotheses.

Model 2 is shown as Equation 2, which is similar to model 1, except that the debt ratio replaces the bank of international settlement ratio as the safety proxy, the rest are the same. Table 2 lists the two-stage least squares estimation results of model 2 from 2003 to 2006:

$$V1_i = \alpha_i^1 + \alpha_1^1 V2_i + \alpha_2^1 V4_i + \alpha_3^1 V5_i + \alpha_4^1 V6_i + \alpha_5^1 V7_i + \alpha_6^1 B$$

$$RANCH_i + \alpha_7^1 EMPLOYEE_i + \alpha_8^1 D1_i + \alpha_9^1 D2_i + \alpha_{10}^1 D3_i +$$

$$\alpha_{11}^1 V8_i + \alpha_{12}^1 V9_i + \alpha_{13}^1 BANK_i + \varepsilon_i$$

$$V2_i = \beta_i^1 + \beta_1^1 V1_i + \beta_2^1 V4_i + \beta_3^1 V5_i + \beta_4^1 V6_i + \beta_5^1 V7_i + \beta_6^1 B$$

$$RANCH_i + \beta_7^1 EMPLOYEE_i$$

$$+\beta_8^1 D1_i + \beta_9^1 D2_i + \beta_{10}^1 D3_i + \beta_{11}^1 V10_i + \beta_{12}^1 BANK_i + \nu_i$$

$$V4_i = \gamma_i^1 + \gamma_1^1 V1_i + \gamma_2^1 V2_i + \gamma_3^1 V5_i + \gamma_4^1 V6_i + \gamma_5^1 V7_i + \gamma_6^1 BR$$

$$ANCH_i + \gamma_7^1 EMPLOYEE_i$$

$$+\gamma_8^1 D1_i + \gamma_9^1 D2_i + \gamma_{10}^1 D3_i + \gamma_{11}^1 V11_i + \gamma_{12}^1 BANK_i + \eta_i \quad (2)$$

The proxy of liquidity - the liquidity reserve ratio (V2) and the proxy of safety - the debt ratio (V4) are mutually negatively affected. Table 2 indicates that a one percentage point increase in the debt ratio will result in the reduced liquidity reserve ratio by 0.9830%; and a one percentage point increase in the liquidity reserve ratio will result in the reduced debt ratio by 0.5397%[5]. The proxy of profitability - the return on equity (V1) has positive impact on the debt ratio (V4) and the liquidity reserve ratio (V2), but the two do not pass the 10% level of significant test. The debt ratio (V4) and the liquidity reserve ratio (V2) on the return on equity (V1) have negative and positive impact respectively, but the two do not pass the 10% level of significant test either.

In the aspect of control variables, the number of employee (EMPLOYEE) has a significant positive impact on the debt ratio (V4). Table 2 indicates that a unit increase in the number of employees (thousands) will resulted in the debt ratio increase by 0.3786% which demonstrates that the larger scale banks can afford higher ratio debt. The number of branches (BRANCH) has no significant effect on the return on equity (V1), the liquidity reserve ratio (V2) and the debt ratio (V4). In specific variables, model 2 is not much difference model 1. The financial operating cost ratio (V9) as expected, has a significant negative impact on the return on equity, Table 2 indicates that a one percentage point increase in the financial operating cost ratio by 1% will result in the reduced return on equity by 0.7606%. The time   deposit

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[5]Both the bank of international settlement ratio (V3) and the debt ratio (V4) are the proxy of safety, however, the two variables are changed in opposite direction, their correlation coefficient is -0.727.

Table 2. Estimation of model 2 with the return on equity, liquidity reserve ratio and debt ratio as the dependent variables from 2003 to 2006.

Return on equity(V1)				Liquidity reserve ratio(V2)				Debt ratio(V4)			
Variable	Coefficient	Parameter	P val	Variable	Coefficient	Parameter	P val	Variable	Coefficient	Parameter	P val
Constant	α_i^1	26.5398	0.1576	Constant	B_i^1	19.3807***	0.0000	Constant	γ_i^1	15.6759***	0.0028
V2	α_1^1	0.1919	0.6589	V1	B_1^1	0.1095	0.2373	V1	γ_1^1	0.0845	0.3665
V4	α_2^1	-0.4870	0.1817	V4	B_2^1	-0.9830***	0.0000	V2	γ_2^1	-0.5397***	0.0000
V5	α_3^1	-0.0362	0.7403	V5	B_3^1	0.0116	0.8923	V5	γ_3^1	0.0952	0.2626
V6	α_4^1	-0.1147	0.1049	V6	B_4^1	0.0458	0.5264	V6	γ_4^1	0.0388	0.6275
V7	α_5^1	-0.6515	0.6436	V7	B_5^1	0.1039	0.2645	V7	γ_5^1	0.0327	0.7271
BRANCH	α_6^1	-0.1096	0.4755	BRANCH	B_6^1	-0.0639	0.5937	BRANCH	γ_6^1	0.0785	0.5014
EMPLOYEE	α_7^1	0.4025	0.2566	EMPLOYEE	B_7^1	0.1894	0.2054	EMPLOYEE	γ_7^1	0.3786***	0.0044
D1	α_8^1	0.0215	0.8423	D1	B_8^1	0.0204	0.8266	D1	γ_8^1	-0.5677	0.5826
D2	α_9^1	0.1872**	0.0145	D2	B_9^1	0.0250	0.7575	D2	γ_9^1	-0.0773	0.3415
D3	α_{10}^1	0.1090	0.4510	D3	B_{10}^1	0.1289	0.2209	D3	γ_{10}^1	-0.0754	0.4595
V8	α_{11}^1	-0.2300	0.5678	V10	B_{11}^1	-0.5750***	0.0000	V11	γ_{11}^1	0.1155	0.9009
V9	α_{12}^1	-0.7606***	0.0000	BANK	B_{12}^1	-0.0981	0.2489	BANK	γ_{12}^1	-0.0557	0.5024
BANK	α_{13}^1	-0.0658	0.7530								

*, ** and *** denote significance at the 10, 5 and 1% level.

ratio (V10) has a significant negative impact on the liquidity reserve ratio (V2), which indicates that a one percentage point increase in the ratio of time deposits to total deposits will result in the reduced liquidity reserve ratio by 0.5750%. The NPL ratio (V11) has no significant impact on the debt ratio (V4).

In yearly dummy variables, as in model 1, D2 has a significant positive effect on the return on equity (V1), which means that the profitability in 2004 is higher than the ones in other years. The impact of the yearly dummy variables (D1, D2 and D3) on the liquidity reserve ratio (V2) and the debt ratio (V4) do not pass the 10% significance test level, that is, the liquidity and safety in each year from 2003 to 2006 are of no significant difference.

As in model 1, the results of combined estimation of four years of data show that the bank-type dummy variable has no significant impact on bank profitability, liquidity and safety. In other words, the FHC banks and independent banks are of no significant difference in profitability, liquidity and safety, therefore, the empirical results do not support the three hypotheses.

Conclusion

By referring to the Taiwan Economic Journal (TEJ), the Central Bank Statistics, the banks' financial statements and MOPS information collected from 2003 to 2006, this paper analyzes the data of 13 banks under financial holding companies and 18 independent banks (58%), 31 banks in all, which are listed Taiwan Stock Exchange, and discusses their differences in business model and operating performance. We first use ANOVA to view the two types of banks' differences in business model and operating performance, the results found that there are significant differences between banks under the financial holding companies (the FHC banks) and independent banks concerning the return on equity, the liquidity reserve ratio, the bank of international settlement ratio, the deposit ratio, ratio of time deposit in total deposit, and the number of employees.

Banks' operating performance should not only form its profitability, the two other banks' objectives, liquidity and safety, are also relevant to the success or failure of banks. Because profitability, liquidity and safety are interactive, therefore, this paper takes profitability, liquidity and safety as dependent variables to construct simultaneous equations regression models. This paper uses the return on equity (V1) as the proxy of profitability, the liquidity reserve ratio (V2) as the proxy of liquidity, and the bank of international settlement ratio (V3) and the debt ratio (V4) as proxies of safety. First, with the return on equity, the liquidity reserve ratio and the bank of international settlement ratio as the dependent variables, we establish the simultaneous equations regression model including three regression equations, which is called model 1. Next, with the return on equity, the liquidity reserve ratio and the debt ratio as the dependent variables, we establish the second set of simultaneous equations regression model, which is called model 2. Every equation in each regression model contains dependent variables, controlled variables and independent variables, the latter includes common independent variables, the yearly dummy variables, the bank-type dummy variable and at least one specific variable that affects individual operation objectives. This paper utilizes the estimated regression coefficients of the bank-type dummy variable to verify the 3 hypotheses on whether banks under the financial holding companies all perform better in terms of safety, liquidity and profitability than those of independent banks.

This paper employs the two-stage least squares (2SLS) method to construct two simultaneous equations regression models, model 1 and model 2, from 2003 to 2006. In the interaction of profitability, liquidity and safety, the empirical results found that: 1) in the interaction between profitability and liquidity, model 1 illustrates that the impact of the return on equity (V1) on the liquidity reserve ratio (V2) is of no statistical significance. Model 2 demonstrates that the impact of the return on equity (V1) on the liquidity reserve ratio (V2) is positive, and the impact of V2 on V1 is also positive, but the two do not

pass the 10% level of significant test; 2) in the interaction between profitability and safety, model 1 shows that the impact of the return on equity (V1) on the bank of international settlement ratio (V3) is of no statistical significance. Model 2 points out that the impact of the return on equity (V1) on the debt ratio (V4) is positive, and V4 has negative impact on V1, but the two do not pass the 10% level of significant test; 3) as for the interaction between liquidity and safety, model 1 indicates that the liquidity reserve ratio and the bank of international settlement ratio are obviously positively affected; while, model 2 denotes that the liquidity reserve ratio and the debt ratio are mutually negatively affected. In short, on the interaction among profitability, liquidity and safety, we find that on models 1 and 2, the impacts between liquidity and safety are significantly positive and negative respectively. Next, the impacts between profitability and liquidity as well as profitability and safety (the bank of international settlement ratio) on model 1 show no interactions; however, the safety (the debt ratio) on model 2 and the liquidity on profitability have negative and positive impact (but not significant) respectively. Neither of these empirical results supports the anticipation of trade-off relationship among profitability, liquidity, and safety.

The empirical results have been found on the overall assessment of bank management performances in terms of profitability, liquidity and safety: a) in both models 1 and 2, D2 has a significant positive effect on the return on equity (V1), which means that the profitability in 2004 is higher than the ones in other years, but the results of combined estimation of four years of data show that the bank-type dummy variable has no significant impact on the return on equity, in other words, the FHC banks and independent banks are of no significant difference in profitability. The results do not support H_1; b) in both models 1 and 2, the impact of the yearly dummy variables on the liquidity reserve ratio (V2) is not significant, in other words, the FHC banks and independent banks are of no significant difference in liquidity, therefore the empirical results do not support H_2; c) in both the safety presented by the bank of international settlement ratio (model 1) and the debt ratio (model 2), the results of combined estimation of four years of data show that the bank-type dummy variable has no significant impact on the bank safety of the financial holding banks and independent banks, therefore the empirical result do not support H_3.

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