

# “Bank Capital, Performance and Regulation: Some International Evidence”

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## **Bank Capital, Performance and Regulation: Some International Evidence**

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### **Abstract**

This study addresses the issues of the determinants of bank financial performance and deregulation's effect on performance. This study is based on Bank Scope data covering 464 commercial banks from the U.S., Japan and eleven EU countries for the years 1989-1995. There are a total of 3248 observations in our data set. Our results indicate that a strong positive relationship exists between the equity to total assets ratio and performance, confirming findings by Berger (1995). The results on the regulatory variables are mixed, with no clear pattern emerging across countries. Often these differences in regulations are associated with statistically significant effects on performance, but the direction of the effects change depending on which measure of performance is used.

**Key words:** Banking, financial performance, regulation.

### **Introduction**

The commercial banking industry in many countries around the world has been characterized by significant structural changes over the last twenty-five years. Following the Great Depression of the 1930s and through the late 1970s, banks in many countries faced a multitude of regulatory restrictions and controls such as lines of business restrictions, branching restrictions, interest rate controls, and exchange rate controls. Although these constraints may have been designed to provide for a safe and sound banking industry, they resulted in an environment in which competitive forces affecting the banking industry were distorted and restricted. Many of these regulatory constraints were substantially reduced over the period of the 1980s and 1990s in countries around the world.

Banks have increasingly faced competition from non-bank financial intermediaries. Non-bank financial intermediaries developed, in part, due to restrictions on commercial bank activities. Further competition has come from capital markets. Increasingly, funding for many corporate activities comes, not from banks, but from the issuance of corporate securities. In addition, many loans are securitized so that banks no longer hold the loans in their portfolios.

The increase in competition has coincided with a general decline in bank performance over the past fifteen years. This situation has led policymakers in many different countries to reexamine the way in which banks are regulated. Among the questions of interest are: What are the determinants of bank performance? What broad patterns can be discerned from the different regulatory changes in advanced countries from around the world? And, in particular, what are the effects of dropping these regulatory restraints on bank performance?

### **Banking in the U.S., Japan, and the EU**

The banking environments in Japan, the European Union and the United States have changed significantly over the last two decades. Changes have occurred in a multitude of areas, including the development of new technologies and financial products, deregulation, globalization and securitization. These changes have undoubtedly affected bank performance.

Prior to the Great Depression, banks in the United States, Europe and Japan had considerable latitude in the activities in which they could participate. However, the Great Depression led to significant changes in the banking environment. Banks were widely believed to have played an important role in the Great Depression<sup>1</sup>. To ensure that the widespread banking

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<sup>1</sup> For an in dept analysis of banking panics and the effects of the Great Depression on banks in the U.S., see Wicker (1938). Also of interest is a book by O'Connor (1938) which looks at how the Roosevelt administration's response to the Great Depression affected banks in the U.S.

failures that occurred during the Great Depression would never occur again, President Roosevelt and the Congress adopted measures which greatly restricted the activities in which banks were allowed to participate. In a recent book, Lewis and Pescetto (1996) claim that there were four groups of measures that were introduced in the early 1930s: federally insured deposits, measures that served to reduce price and interest rate competition among banks, geographic branching restrictions, and the separation of commercial and investment banking. Many of these restrictions were gradually adopted in Europe and Japan as well. By 1960, many developed countries had exchange and interest rate controls, geographic restrictions, various capital controls, and severe restrictions on permissible bank activities. These restrictions persisted through the late 1970s.

Since the late 1970s, a more universal-type banking environment has slowly reemerged, particularly in Europe. Indeed, it can be argued that the countries in Europe are converging toward a universal-type banking system. Even the United States and Japan, which have the most restrictive banking systems of developed countries, have moved, albeit more slowly, toward a more permissive banking environment. To better understand the extent of deregulation in developed countries, reconsider the four groups of measures adopted after the Depression listed by Lewis and Pescetto. There are relatively few measures designed to control interest rates or capital movements in the EU, the U.S. or Japan. There are no branching restrictions in Japan or the EU; also, the U.S. which, until recently, had severe geographic restrictions, has significantly relaxed branching restrictions. In Europe, there are few lines of business restrictions between commercial and investment banking. Even Japan and the U.S., which have had a strict separation between commercial bank participation in investment banking, have allowed banks to participate in a limited amount of investment bank activities through affiliated subsidiaries within a holding company framework.

In addition to the four groups of restrictions discussed by Lewis and Pescetto, there were various other lines of business restrictions imposed on banks long ago which are slowly changing. Banks have traditionally been forbidden to underwrite insurance. This restriction is still fairly widespread, but has decreased in the last ten years. There are also restrictions on non-financial firm ownership of commercial banks and commercial bank ownership of non-financial firms. These restrictions exist in part because regulators are concerned that non-financial firms would use banks as a means to obtain inappropriate funds to finance their various projects. Also, it is believed that commercial bank ownership of non-financial firms would subject the bank to excessive risk. Though there are still considerable restrictions on firm ownership of and by banks in developed countries, they have gradually lessened over the last fifteen years. Table 1 contains a list of permissible banking activities in various developed countries.

Table 1

## Permissible Bank Activities

Country	Insurance Activities	Securities Activities	Real Estate Activities	Comm. Bank Investment in Non-Financial Firm	Non-Financial Firm Investment in Comm. Bank
Canada	P	P	P	10%	10%
Denmark	P	U	P	15%	10%
Finland	R	U	P	10%	No Restrictions
France	P	U	P	10%	No Restrictions
Germany	R	U	P	15%	No Restrictions
Italy	P	U	R	Not Permitted	15%
Japan	F	R	R	5%	No Restrictions
Norway	R	U	P	50%	10%
Portugal	P	U	R	15%	No Restrictions
Spain	P	U	R	No Restrictions	20%
Switzerland	P	U	U	30%	No Restrictions
U.K.	P	U	U	No Restrictions	No Restrictions
U.S.	R	R	R	5% in holding company	10%

U = Unrestricted; P = Permitted; R = Restricted; F = Forbidden. In the commercial bank ownership of non-financial firm column, the percentages are the amount of non-financial firm capital banks are allowed to own. In the non-financial firm ownership of commercial bank column, the percentages are the amount of bank capital non-financial firms are allowed to own. Sources: The securities, insurance, and real estate information is from Barth, Nolle, and Rice, 1997, Table 5. The information on ownership restrictions is from Banks Under Stress, OECD 1991.

Even with recent deregulation, Japan and the United States have the most restrictive banking systems of the major developed countries. Also, notice that in the European countries banks are permitted to engage in a broad class of activities, which will change even further with the changes introduced by the European Union.

The international orientation of financial markets has been facilitated by the decrease in the cost of information transmission. The decrease in the cost of computing power and the development of advanced information technologies have broken down what were previously natural barriers to competition. These technologies have reduced the power of geographical restrictions and have thus increased competition within the banking environment. They have also facilitated competition by changing the level at which diseconomies of scale and scope occur. The increase in competition and the availability of alternatives, facilitated by technology have meant that nations which do not deregulate their banking industries have difficulties remaining competitive<sup>1</sup>.

Finally, the last twenty years have seen a change in the way researchers and policymakers view markets. Through much of the 1960s, 70s and even the 80s there was a widely held view that markets were fragile and needed to be controlled. This view is held less widely now. Free capital markets, free trade, and minimum government control over the market are now widely viewed as important components in economic development.

The 1980s were a period of lackluster performance for commercial banks in much of the developed world. Table 2 shows the pre-tax profits as a percentage of total assets for banks in a sample of large developed countries. Notice that the profit levels declined in most countries from 1981 to 1993. In some countries the decline was especially sharp. According to IBCA, a London based credit-rating agency, the average ROE for the 500 biggest banks in the world has been above 10% only since 1990 (see Molyneux, Altunbas, and Gardener 1996). This is poor by historical standards. Until recently, security analysts used benchmarks of 15% for ROE and 1% for ROA to evaluate bank performance. As the table above and the IBCA numbers indicate, these benchmarks have rarely been achieved lately.

Table 2

## Pre Tax Profits/Total Assets

Country	1981	1985	1990	1993
Canada	0.48	0.78	1.22	0.77
Denmark	0.95*	3.72	-0.27	-1.20
Finland	0.48	0.54	0.47	-1.73
France	0.38*	0.21*	0.21	-0.03
Germany	0.43	0.83	0.63	0.55
Italy	0.70	0.89	1.26	0.99
Japan	0.45	0.46	0.36	0.18
Luxembourg	0.32	0.33	0.22	0.52
Netherlands	0.22	0.74	0.50	0.60
Norway	0.72	0.64	-1.03	0.52
Spain	0.75	0.72	1.53	0.01
Sweden	0.41	0.34	0.22	0.15
Switzerland	0.62*	0.73*	0.53*	0.72*
U.K.	NA	1.09	0.70	0.75
U.S.	1.0	0.90	0.73	1.76

\* = large commercial banks.

Source: OECD Bank Profitability 1993.

<sup>1</sup> See Egner (1991) for a discussion of the effect the development of the computer and reduction in the cost of information transformation has had on the banking industry. Also of interest is a study by Steiner and Teixeira (1990). The authors argue that the development of technology is decreasing profits within the industry by increasing competition. They also argue that industry employment is decreasing because computers are being substituted for people.

Bank failures have also increased. According to a recent IMF publication, over three-fourths of the IMF member countries (130 countries) have experienced significant banking problems since 1980 (see Lindgren, Garcia, and Saal, 1996). Policymakers have been increasingly concerned with the decrease in bank performance. Several factors have contributed to the recent decline in bank performance. Some of the causes are short-term factors such as the Basle Accord and the recession of 1990-1991. However, some of the causes such as deregulation and, most importantly, structural changes in the banking industry are likely to have a long term impact on bank performance.

Economies are, of course, constantly evolving. Some industries grow rapidly while others die out. Some researchers have argued that the low profits in the banking industry are a signal that market forces are pushing banks toward extinction. Others argue that the decline in bank performance has occurred because restrictions on bank activity are merely undergoing a period of structural change. According to this latter view, low profits are a signal that banks need to reform. Technological innovation and competition mean that banks no longer have a comparative advantage in many of the activities that they once had. For example, as discussed above, capital markets are a more efficient way for many large corporations to raise money.

### Structural Changes in Banking

There have been many changes in the banking industry in developed countries over the last twenty years. In some countries banks earn less than half of their income from interest. Banks in all developed countries earn an increasingly large amount of their income from non-interest sources. There are several reasons for this change. The development of securitization as a means to finance various types of loans led to a decrease in interest income and an increase in fee income for banks. Also, decreases in business restrictions and technological innovations have led to an increase in competition for banks.

The development of securitization means that banks no longer hold in their loan portfolio many of the assets that they used to hold. Virtually any type of debt is a candidate for securitization (particularly in the United States). Securitization has grown rapidly since it was introduced because there are many advantages to securitizing loans instead of having banks hold the loans. Table 3 lists some of the advantages to securitization. Because of these many advantages, non-mortgage asset-backed securities have grown from \$0 in 1985 to \$300 billion by 1992. Some experts have estimated that the potential size of the market is \$6 trillion (Cantor and Demsetz, 1993).

Table 3

Non Interest Income/Gross Income

Country	Non-interest income as % of gross income 1980-1982	Non-interest income as % of gross income 1990
U.S.	30.0	38.0
Japan	20.4	35.9
Germany	30.6	34.9
France	14.6	24.9
Italy	26.0	26.8
U.K.	28.5	41.1
Canada	21.6	31.0
Australia	32.1	34.0
Belgium	19.6	23.0
Finland	48.8	46.9
Netherlands	25.0	29.7
Norway	27.3	25.9
Spain	15.7	22.3
Sweden	29.8	26.2
Switzerland	46.6	49.1

Source: Bank for International Settlements, Annual Reports.

Securitization is not necessarily bad for bank profits. Banks play a role in the securitization process. Securitization has both intermediation and capital market characteristics. Banks generally earn fees for originating and servicing the loans. They are also able to avoid the default and interest rate risk that would result from carrying the loans in their portfolios. However, the development of securitization is a sign of structural change within the banking industry.

As discussed earlier, deregulation has blurred the lines between various types of financial intermediaries and has led to increased levels of competition. We have already seen the effect of increased competition on bank performance. Also, increased competition often drives marginal firms either to fail or merge with a stronger firm. Banks also hope to take advantage of economies of scope that may exist in the provision of some of the activities which are allowed under the second directive. There were 1151 private acquisitions involving financial intermediaries in the EU between 1984 – June, 1991 (Molyneux, Alunbas, Gardener 199). A recent issue of *The Economist* reported that there have been \$1.4 trillion-worth of mergers in the industry since 1987<sup>1</sup>.

Increases in competition have created pressure on commercial banks to evolve and find new ways to maintain adequate levels of performance. Banks have done this by increasing their non-interest income. Despite the recent increase in the relative importance of capital markets at the expense of banks, banks still have comparative advantages in many areas of the financial service industry. Banks are earning an increasingly large amount of income for providing the services in which they have expertise. These services include loan origination, cash management, trade financing operations and collateral (Chadwick and Weitman 1993). Table 4 shows that an increasingly large component of bank income comes from various fees banks charge for services.

Table 4

## Some Advantages to Securitization

Loans	Securities
Liquid	Liquid/tradable
Collateral valuation subjective and periodic	Market determines value
Originator assesses risk	Third parties – rating agencies – assess risk
Investor market local	Investor market national/global
Limited terms and rates offered borrowers	Various rates and terms offered borrowers

Source: A Primer on Securitization 1996.

Closely related to the issue of structural change is bank performance. Banks have not performed well over the last ten years. Reasons for the decrease in bank performance include an increase in competition both among banks and by non-bank financial intermediaries and the need for capital-poor banks to increase their capital levels due to the Basic Accord.

### Previous Studies of Bank Performance

The empirical section of this paper is concerned with the determinants of bank performance. Of particular interest is the effect that differences in regulations across countries have on bank performance. By studying bank performance across countries, one should gain insight into the effect that different regulatory environments have on bank performance. This is especially important in the current banking environment, which is characterized by considerable regulatory change.

According to Bourke (1989), prior to 1989 there had been only 3 major studies of international bank profitability. The main reason for the virtual absence of studies is that differences in accounting practices across countries make comparisons difficult. The few existing studies of bank performance have focused either on the effects of market concentration or the effects of economies of scale and scope.

<sup>1</sup> August 16, 1997, page 53.

Research on the relationship between concentration and performance has yet to yield any definitive conclusions. A recent book by Molyneux, Altunbas, and Gardener (1996) reviewed 29 studies that focused on the relationship between concentration and performance. Of these 29 studies, 15 found that concentration had a positive effect on bank performance; the other 14 were unable to discern any relationship. One conclusion that can be safely drawn from these studies is that if concentration has any effect, it is very small. This would explain why some studies find evidence for a relationship while others do not. For example, Short (1979) studied profit rates and concentration for 60 banks in Canada, Western Europe, and Japan. Concentration rates were measured by the Herfindahl index, and the one-, two-, and three-bank concentration ratios. He found that concentration had a significant, but small effect. For example, he found that the three-firm concentration ratio must fall by 30% to increase bank profits 1%. The magnitude of Short's findings are typical of the studies that find a positive relationship between concentration and profitability. Ruthenberg (1991) found that concentration has a non-linear effect on bank performance. At very high levels, concentration had a positive effect on bank performance. However, below a certain level of concentration Ruthenberg found that concentration had no effect on bank performance. Ruthenberg's results may explain why some studies find a relationship while other studies do not; different degrees of concentration yield different results. Only four European countries (Ireland, Greece, Netherlands, and Portugal) have high enough concentration levels to enhance performance. Further empirical studies are needed to clarify the precise relationship between concentration and performance. It is clear, however, that the concentration levels that are currently observed in a majority of EU countries, Japan, and the United States are not high enough to have a large effect on performance. Thus, concentration measures are not used in this study.

There is a rich literature measuring economies of scale and scope for banks. Most of these studies are for banks in a single country (the U.S. in particular). Many of the earlier studies use the Cobb-Douglas functional form. Later studies adopt a more flexible functional form such as the translog. There have also been a number of studies which have employed parametric and non-parametric cost and production frontiers.

Overall, the results of studies based on U.S. banks using translog functions show that there are economies of scale, but only for low levels (between \$25 and \$500 million in deposits) of production (see Kolari and Zardkehi 1987; Berger, Hanweck and Humphrey, 1987; Gropper, 1991). A recent OECD (1993) survey looked at over 100 studies that were done between 1982 and 1991. The survey of studies could find no evidence of any consensus concerning the existence of economies of scale or scope. The survey found that any economies of scale or scope that existed were overwhelmed by the effects of organizational inefficiency (see OECD 1993). This finding supports that of Humphrey (1987), who found that cost variations across banks of the same size were two to four times greater than the variations across bank size. Thus, economies of scale explain only a small part of the variation in costs across banks.

There have been several studies on economies of scale for banks in European countries. These studies have also found that there are economies of scale at low levels of output, but they are exhausted at moderate levels of output. There is little consensus in the literature on the optimal size of banks. Much evidence suggests that beyond a certain relatively low level of output, there is no advantage (or disadvantage) to reaching a larger size. Gropper (1991) found that over the period of deregulation of U.S. banking in the 1980s, the region where scale economies were exhausted increased to about \$500 million in total assets.

A key European study of economies of scope is by Molyneux, Altunbas, and Gardener (1996). Because the translog function does not allow the researcher to estimate economies of scope when one of the outputs becomes zero, Molyneux, Altunbas, and Gardener employed a hybrid translog function to eliminate this problem. The study used data from 201 French, 196 German, 244 Italian, and 209 Spanish banks. To determine the presence of economies of scope, they tested for cost complementarities. Cost complementarities are a sufficient condition for economies of scope between any pair of outputs. The authors found mixed results. For example, in France they found that there were economies of scope between loans and securities for large banks at the plant and firm level, but for smaller banks there were significant diseconomies of scale at the plant level.

There should be a relationship between business cycles and bank performance. When an economy is in a recession, there is a decrease in demand for various intermediation activities. Investment decreases and thus the demand for loans decreases. Defaults on existing loans increase. During the business downturn in the early 1990s, banks throughout the developed world performed poorly (see *The Banker*, 1991). After the downturn ended, banks throughout the world improved their performance. Thus, real GDP growth will be included in this study.

The recent changes in the regulatory environment certainly affect bank performance, but exactly how is unknown. Of several recent studies on bank performance by Barth, Nolle, and Rice (1997), Davutyan (1995), Berger (1995), and Gorten and Rosen (1995), only the Barth et. al.'s study includes any regulatory variables. This study provides additional information on the effects of these regulations by using several dummy variables that capture the cross-country differences in regulatory regimes. To summarize, banks perform numerous tasks that are important in facilitating exchange, investment, and growth. Healthy banks are a product of a healthy macroeconomy, prudent regulations that do not impair the bank's ability to diversify risk, and a well designed deposit insurance system. While a significant amount of research has been done on bank performance, many questions remain unanswered. Using individual bank data, this study examines the determinants of bank performance and is one of the few studies to examine the impact of regulatory differences across countries.

## Variables and Data

Meaningful cross country comparisons are difficult to conduct because substantial differences exist in accounting and legal practices. The International Bank Credit Analysis Ltd. (IBCA) has, to some extent, mitigated this problem. IBCA is a London-based credit-rating agency which produces standardized accounting data. Most of the data used in this study are from Bank Scope. Bank Scope receives much of its balance sheet data from IBCA. Our sample consists of data from 464 commercial banks from the U.S., Japan and the EU for the years 1989-1995. There are a total of 3248 observations in the data set.

There are various ways to characterize bank performance. Commonly used measures are ROA and ROE, where  $ROA = \text{Net Income} / \text{Total Assets}$  and  $ROE = \text{Net Income} / \text{Equity Capital}$ . ROE and ROA are frequently used in comparative studies of bank performance. Gilbert (1984), Molyneux and Thornton (1992), and Canals (1993) recommend ROA and ROE to compare bank performance across countries. ROA is used by researchers who are interested in comparing bank performance without regard to equity capital levels the bank holds. ROE is of interest to researchers wishing to focus on the return to shareholders. Note that neither of these measures captures all aspects of bank performance. It is for this reason that we use two measures of bank performance.

ROA and ROE complement each other and, taken together, give a fairly complete picture of bank performance. For the country level analysis, only ROA is used to measure performance. For the bank level analysis, both measures are used as performance measures.

To explain individual bank performance differences, the following bank-specific regressors are used: total assets (TA), the ratio of loan loss reserves to gross loans (LLRGL), the ratio of equity to total assets (ETA), and the ratio of net loans to total assets (NLTA). Total assets is included to measure the relationship between the size and performance of banks. Although not an explicit test of economies of scale, this coefficient should provide some indication of their existence. Firms with a higher performance for a given level of assets should, *ceteris paribus*, have lower costs. LLRGL is a measure of asset quality. More specifically, LLRGL measures the percentage of a bank's loan portfolio for which the bank has set aside capital to cover non-performing loans. Thus, higher levels of LLRGL should indicate poor loan quality and should reflect poorer performance.

ETA is a measure of the amount of a bank's equity capital. Holding equity is costly for a firm. Until recently, it was believed that the higher the amount of equity capital is, the lower bank performance, *ceteris paribus*. A recent paper by Berger (1995) called this view into question. According to Berger, for U.S. banks from 1983 to 1989, there was a positive relationship between

capital-asset ratios and ROE. Our empirical results will provide some evidence on the nature of this relationship.

NLTA is a measure of the percentage of a bank's assets that consists of loans. Banks hold different types of assets, and the types of assets they are allowed to hold differ across countries. In some countries, banks hold a considerable percentage of their assets in securities. In other countries banks are not allowed to own securities.

Also included is the growth rate of real per capita gross domestic product (RGDPG). During an economic recession, bank performance tends to decrease. Banks are affected in a number of ways by the overall health of the economy. When the economy is performing poorly loan defaults tend to rise, the demand for loanable funds decreases, and because real incomes fall, the currency to deposit ratio rises. Thus, we should observe a positive relationship between bank performance and RGDPG.

Several regulatory dummy variables are included in the analysis. RE is a dummy variable which indicates whether banks in the country are permitted to participate in real estate activities (0 = No; 1 = Yes). SEC is a dummy variable which measures the extent to which commercial banks can participate in securities (underwriting) activities (unrestricted = 1). The effect that securities activities have on commercial bank performance is an important policy question today, with both Japan and United States rethinking restrictions on commercial bank's participation in securities activities. NFFOCB is a continuous variable on the unit interval, which measures the extent to which non-financial firms in the country are permitted to own banks. The number a country receives is a function of the percentage of a bank's share capital non-financial firms are allowed to own. Therefore if, for instance, Spanish non-financial firms are allowed to hold up to 20% of a bank's share capital, Spain would have a value of 0.2 for NFFOCB. A country like Switzerland, where there are no restrictions on the ownership of banks, would be assigned a value of 1 for NFFOCB. CBONFF is also a continuous variable on the unit interval, which measures the extent to which banks in the country are permitted to own non-financial firms. This variable is similar to NFFOCB. A country like Canada, where banks are not allowed to own more than 10% of the capital of a non-financial firm, would be assigned a value of 0.1 for CBONFF.

Deposit insurance is not included in this study because virtually all countries had deposit insurance throughout the entire period. The loan exception is Greece, which only has banks in our sample. Greece implemented a deposit insurance system in 1995.

## Results

Both models are estimated by OLS and the results are given in Table 5. The results for ROA are given in column 1 and ROE in column 2 of Table 5. The  $R^2$  of the ROA and ROE model are 0.22 and 0.09, respectively. Six of the coefficients in the ROA model and eight in the ROE model are statistically significant. Apparently, the independent variables do the best job of explaining ROA. Let us examine the independent variables in turn.

The regression coefficient on total assets is positive and insignificant in both the ROA and ROE equations. These results do not indicate the presence of economies of scale. The coefficient of ETA, the ratio of equity to total assets, is positive and highly significant in both equations. In fact, the t-ratios for ETA are the highest of any variable in the model. The existence of a strong positive relationship between this ratio and bank performance confirms recent findings by Berger (1995).

The coefficients of LLRGL are negative and significant in both equations. This variable measures the percentage of the bank's loan portfolio for which the bank has set aside capital to cover nonperforming loans. Higher levels of LLRGL should be associated with poorer performance, and this negative relationship is confirmed by our findings.

The results on NLTA, the percentage of the bank's assets in loans, are mixed. The coefficient is insignificant in the ROA equation and negative and significant in the ROE equation. From these results little can be concluded about the relationship between NLTA and performance.

Table 5

## Empirical Results Bank Performance Regressions

VARIABLE	ROA as dependent Variable	ROE as dependent Variable
Intercept	-0.121 (1.06)	10.450*** (4.22)
TA (millions)	0.363 (1.03)	7.897 (1.084)
ETA	0.133*** (21.41)	0.929*** (7.17)
LLRGL	-0.036*** (7.74)	-1.007*** (10.28)
NLTA	-0.001 (0.33)	-0.082** (2.55)
RGDPG	6.323*** (5.48)	87.083*** (3.64)
RE	0.035 (0.38)	-0.392 (0.21)
SEC	-0.321*** (3.85)	-7.042*** (4.08)
NFFOCB	-0.302*** (4.75)	5.173*** (3.93)
CBONFF	0.407*** (4.18)	8.800*** (4.35)
Adj. R <sup>2</sup>	0.22	0.09

Note: T-statistics are given in parentheses. Statistical significance at the 1% and 5% level is indicated by the superscripts \*\*\*, and \*\*, respectively.

The results on RE, the extent of participation in real estate activities, are inconclusive. Although a positive relationship is expected, the coefficient is positive and insignificant in the ROA equation and negative and insignificant in the ROE.

Consistent results are found for CBONFF, the extent to which banks are permitted to own non-financial firms. The coefficient is positive and significant in both the ROA and ROE equations.

To summarize, the strongest results obtained are for the variables ETA and LLRGL. ETA is always significantly positively related to bank performance and LLRGL is always significantly negatively related to bank performance. These are two consistently strong relationships in our findings. The regulatory variables are usually significant, but the direction of the effect is not consistent on the NFFOCB variables across the performance measures.

Because this study uses independent variables which have been used very little in the literature, comparing results to other studies is difficult. Barth, Nolle, and Rice (BNR) (1997) most closely resemble this study in the variables used and issues examined. BNR use ROE as the dependent variable. In contrast to our finding, BNR find that the ratio of equity to total assets is negatively related to ROE. However, the coefficient is only significant at the 10% level. BNR also find a negative relationship between the ROE and the net loans to total asset ratio, but we are unable to consistently detect this negative relationship. Both studies find evidence of a positive relationship between ROE and real GDP growth, but in our study this relationship exists in the ROA and ROE equations only. Finally, BNR were unable to detect any significance for any of the regulatory variables which were used in this study. We often find statistical significance, but the direction of the effect is suspect across performance measures. One reason for the different conclusions could be that their study uses a much smaller data set (142 banks for 1993) than the

one used in this study. We find several of the regulatory variables to be statistically significant, but sign changes across performance measures leave little to conclude.

Bourke (1989) finds a positive relationship between bank capital and performance. He also finds a positive relationship between (cash + investment securities)/total assets and performance. This variable is closely related to net loans/total assets which were used in this study. Because more investment securities entail fewer loans, this result would imply an inverse relationship between net loans/total assets and performance. We find a negative relationship in our ROA equation and a negative and significant relationship in the ROE equation. Bourke does not use any variables to capture the regulatory environment. Molyneux and Thornton (1992) estimate the same model as Bourke (1989) using a different data set. They also find a positive relationship between capital and performance. They find a negative relationship between (cash + investment securities) / total assets and performance. This result differs from Bourke's result.

## Conclusions

The commercial banking industry has been characterized by significant structural changes over the last twenty years. Many of the constraints banks previously faced have been reduced or eliminated while competition from non-bank financial intermediaries has increased. The increase in competition has coincided with a general decline in bank performance over the past decade. This situation has led policymakers to reexamine the way in which banks are regulated and wonder about the effects of deregulation on bank performance.

This study examines the effects of differences in regulations on bank performance. Using Bank Scope data from 464 commercial banks from the U.S., Japan, and eleven EU countries for the years 1989-1995, we find a strong positive relationship between the equity to total assets ratio and performance, confirming findings by Berger (1995), and a strong negative relationship between performance and the percentage of the bank's portfolio set aside to cover nonperforming assets. The results on the regulatory variables are mixed. Often these differences in regulations are associated with statistically significant effects on performance, but the direction of the effect on the NFFOCB changes depending on which measure of performance is used.

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