REGULATORY REGIMES AND BANK BEHAVIOR

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Abstract

The purpose of this paper is to examine how the risk-taking behavior differed between Korean regional banks and national banks for the two different regulatory regimes; a very loose regulation period (1994-1997) and a very tightened regulation period (1998-2005). From the panel analysis over the period 1994-2005, we found that regional banks took riskier strategies than national banks when banking regulations are loose. Moreover, their higher risk-taking contributed to higher profit under the period of loose regulation. However, after the banking regulations were tightened after financial crisis around the late 1990s, this phenomenon disappeared and the tendency of regional banks to take greater risk than national banks was not observed any more. Also, the positive relationship between risk-taking and profitability was not observed either after regulations were tightened. These empirical findings would have the following policy implications. When the economic conditions are good, and therefore, banking regulations are relatively loose, the greater risk-taking of regional banks could be profitable, because regional banks are in a better situation in terms of maintaining their market share based on the close ties with their regional clients, and can be protected from excessive competition with national banks. But, if the economic conditions get worse and financial crisis occurs, and therefore, banking regulations get tightened, regional banks are more adversely and sensitively affected by these shocks than national banks because their size is small and their assets are less diversified than national banks, especially being concentrated on loans to small and medium size business sector and real estate loans, which are very sensitive to the fluctuation of the economy. Furthermore, if these adverse economic and financial shocks continue long, the probability of regional banks to fail would be substantially higher and it can cause a serious damage to the regional economy. To avoid these adverse consequences in economic and financial crisis, regional banks need to diversify their asset portfolios and earnings structure, and improve the skill of more forward-looking risk management.

Keywords: Banking Industry, Regulations, National Banks, Regional Banks, Risk-taking

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1 Introduction

Korean banking system experienced rapid regulatory changes with the changes in economic environment surrounding the banking industry over the last couple of decades; liberalization of the Korean economic policy and the consequent deregulation in the banking industry from the early to the mid-1990s, asian countries' financial crises in the late 1990s, and consequent regulatory reforms and strengthening of the banking industry until the mid 2000s. Specifically, the period from the early to the mid-1990s is widely acknowledged to have been a period of significant deregulations in terms of bank activity, interest rates and the reorganization of financial industries including banking sector. The main reason for the significant deregulations around the early 1990s was to promote the efficiency and competitiveness of financial markets and provide a healthier and more advanced market environment.

One of the very important regulatory changes at the early of 1990s was that the regulatory restrictions on establishing regional banks became much looser than the previous periods. There exist two types of commercial banks in Korean banking industry: national banks and regional banks. National banks are allowed to open branch and office nationwide and there is no regional restriction in their operation. Regional banks, however, are allowed to open branch and operate only within their own regions. To help regional banks to overcome the disadvantages due to regional limitation and inferior market structure, and to give them more incentives for the contributions to the regional economy, many regulatory flexibilities and advantages are given to regional banks such as preferential treatment in setting the interest rates, etc. Generally, regional banks are allowed to charge higher loan interest rates to the borrowers than

national banks, and the proportion of raising funds through the deposit with a very low interest rates such as a payable on demand is generally higher for regional banks than national banks. Therefore, the average cost of funds is lower for regional banks than national banks. The number of regional banks increased substantially with the liberalization and deregulation of the Korean banking industry through the late 1980s and the early 1990s. At the beginning of the sample period of this study 1994-2005, there were total twenty four banks in Korea. Among them, fourteen banks were national banks, and ten banks were regional banks. This number of regional banks was maintained until year 1997 just before the financial crisis. In 1997, the number of national banks was sixteen. However, since the financial crisis 1997-1998, the number of commercial banks in Korea continuously decreased, and in 2005, there were only eight national banks and six regional banks.

The purpose of this paper is to examine how the risk-taking behavior differed between Korean national banks and regional banks for the two different regulatory regimes; a very loose regulation period (1994-1997) and a very tightened regulation period (1998-2005). We examine whether there was any difference in the risk-taking behavior between these two groups. And how, if any, their risk-taking behavior was affected by different regulatory regimes. Also we examine whether there was any change in the relationship between risk-taking and profitability for these two groups as the regulatory regimes change.

Although there are many studies on Korean banks, there are very few studies focusing on Korean regional banks. More importantly, as far as we know, there has not been any study focusing on how the risk-taking behavior of national and regional banks is differently affected by regulatory changes. Instead, there are some studies that compare other characteristics such as the efficiency and the degree of competition between national and regional banks using the data of some other countries. Generally, they show the results that the efficiency level and the degree of competition are higher for national banks than regional banks. Drake and Hall (2003) compared the efficiency level between larger (city) banks and smaller (regional) banks using a cross-section sample, and data envelopment analysis. They found that larger banks were more efficient than smaller banks. Neal (2004) found that national banks in Australia were more efficient than regional banks. Uchida and Tsutsui (2005) compared the degree of competition between national banks and regional banks in Japanese banking industry, and found that it is stronger for national banks.

We believe it is necessary to examine regional banks' behavior such as risk-taking attitude and profitability separately from national banks because they differ from national banks in asset size, their allowed markets, customer bases, and imposed regulations. Furthermore, considering that the degree of decentralization and local autonomy in Korean society is expected to be strengthening in the future, and that the competitiveness and soundness of regional banks are an essential factor for the regional economy, understanding the behavior pattern of regional banks is a very important issue. From the panel analysis over the period 1994-2005, we found that regional banks took riskier strategies than national banks when banking regulations are loose. Moreover, their higher risk-taking contributed to higher profit under the period of loose regulation. However, after the banking regulations were tightened after the financial crisis around the late 1990s, this phenomenon disappeared and the tendency of regional banks to take greater risk than national banks was not observed any more. Also, the positive relationship between risk-taking and profitability was not observed either after regulations were tightened. Some policy implications of these findings are discussed in the section of conclusion.

The next section describes the data and sample of the banks. Section 3 presents testing models, variables and hypotheses. Section 4 presents empirical results, and the last section offers concluding remarks.

2 Data, sample and descriptive statistics

The data for this study are obtained from the Statistics of Bank Management provided by the Korean Financial Supervisory Service. We use panel data for all the Korean national commercial and regional commercial banks available over the period 1994-2005. Table 1 provides the descriptive statistics for national banks and regional banks, respectively.

National banks are, on average, 6.6 times larger than regional banks in asset size. Regional banks tend to maintain higher equity-to-asset ratio. However, there is not much difference in the ratio of total loans to asset and in the ratio of investment securities to asset between national and regional banks. In the portfolio composition of investment securities, national banks tend to have higher ratio of investment in common stock and lower ratio in government bond. In the comparison of loan asset portfolio, regional banks tend to have higher loans to business sectors and lower loans to consumers than national banks. The average profitability measured by both return on asset and the ratio of nonperforming loans to asset through the whole sample period is greater for national banks.

Table 1. Summary Statistics

	National banks	Regional banks
Asset (in million Korean won)	493,293	74,397
Equity-to-asset	0.039	0.052
Loan-to-asset	0.4501	0.4681
Investment securities-to-asset	0.3161	0.3073
Common stock-to-Investment securities	0.0899	0.0682
Government bonds-to-Investment securities	0.1987	0.2566
Consumer loans-to-Loans	0.2390	0.1902
Commercial loans-to-Loans	0.4105	0.6322
ROA	-0.26	-0.52
Nonperforming loan ratio	4.65	5.40
Fixed asset ratio	57.73	40.30
Net Interest Margins	8,147	1,596
Number of banks	135	90

The table shows the summary statistics for the national banks and regional banks used in the paper, respectively, for the period 1994~2005.

3 Testing models, variables and hypotheses

We examine the differences in the pattern of risk-taking behavior and profitability between national banks and regional banks under the two different regulatory regimes by estimating the following multivariate panel regression equation over the two sample period, 1994-1997 (loose regulation) and 1998-2005 (tightened regulation), respectively.

$$(RISK, or\ PROFIT)_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXAST)_{i,t}+\varepsilon_{i,t}. \quad (1)$$

To examine the differences in the risk-taking behavior between national and regional banks, we use four variables measuring ex-ante risk-taking incentives of banks as the dependent variable. These four variables are the ratio of total loans to total asset, the ratio of investment securities to total asset, the ratio of common stock to government bond, and the ratio of commercial loans to consumer loans. In this study, we focus on quantifying the bank's ex-ante risk-taking incentives. Many other studies use the variables such as the ratio of nonperforming loans or problem loans to total loans as the measure of the bank's risk-taking incentives. However, these measures are just the ex-post measures for the bank's past risk-taking behavior, and just reflect how the bank's past loans have been deteriorated, and therefore, how much financially healthy the current assets are, rather than measuring the bank's current incentives for risk-taking. Or rather, it would be more logical to employ the proportion of nonperforming loans or problem loans as one control variable to estimate the current level of risk-taking incentives.

The intuitions for the choice of the above four variables as the ex-ante risk-taking incentives are pretty clear. The greater the ratio of loans to total asset, the more exposed the bank's future performance to the future economic conditions. Furthermore, of the categories for asset portfolio composition, loans are generally considered the highest risk category, and are assigned the highest risk weight of 100% in the calculation of BIS capital ratio and risk-adjusted asset value. Thus, we expect the banks with greater risk-taking incentives to have a larger portion of loans in their asset portfolio. On the other hand, investment securities are generally considered safer, especially compared to loans. Furthermore, on average, more than 90% of investment securities in the sample of this study are accounted for by relatively safe non-common stock type securities. That is, the investment securities in the sample of this study mainly consist of very safe ones, and we expect the banks with greater risk-taking incentives to have a smaller portion of investment securities in their asset portfolio. In addition to loans and investment securities, we employ two more transparent proxies for risk-taking incentives; the ratio of common stock to government bond and the ratio of commercial loans to consumer loans. The choice of these variables is based on general belief and intuition that common stocks are the riskiest type of securities, and that commercial loans are relatively risky and consumer loans are safe.

As the explanatory variable for the bank's risk taking incentives, we use the two very frequently used variables that are known to affect bank's risk-taking incentives in the literature; bank asset size and equity ratio. The implication of the too-big-to-fail hypothesis and the moral hazard incentives of stockholders associated with limited liability under the protection of government's deposit insurance system expect the level of risk-taking to be positively related to the bank asset size and negatively related to the equity ratio of the bank. Also, as explained above, to control for the performance and healthiness of past loans on the bank's current risk-taking incentives, we include the ratio of nonperforming loans as one control variable for risk-taking. We include the ratio of fixed asset to total asset as another control variable

to control for the effect of operational leverage on the bank's risk-taking behavior.

To complete our analysis for the bank's risk-taking behavior, we examine whether the risk-taking, if any, turned out to be profitable or not. If their risk-taking was taken deliberately at an optimal level, the risk-taking would turn out to be positively related to the profitability measure. We use the return on asset as the measure for the profitability. We also include net interest margins as another dependent variable to examine the characteristics of the bank's risk-taking, which is measured as the difference between the interest rates on loans and the interest rates on deposits and borrowings.

To examine the difference in the risk-taking incentives between national banks and regional banks with respect to the main two explanatory variables (asset size and financial leverage), the dummy variable associated with these two variables is assigned the value of one to the regional banks and zero to the national banks for each year. So, the coefficient β_2 indicates how the risk-taking incentive of the regional banks with respect to the change in asset size is different from that of the national banks. Similarly, the coefficient β_4 indicates how the risk-taking incentive of the regional banks with respect to the change in equity ratio is different from that of the national banks. To examine how the difference in the risk taking incentives between the two groups, if any, is related to different regulatory regimes of the banking industry, we estimated the multivariate panel regression equation over two different sample periods; 1994-1997 vs 1998-2005, respectively, and examined whether there were any differences.

4 Empirical Results

Table 2 shows the panel regression results using the loan-to-asset ratio as the measure for the bank's risk-taking incentives for the two different regulatory regimes 1994-1997 and 1998-2005, respectively. It is shown in the first table that the coefficient on the dummy variable for the asset size (DUMMY × SIZE) is significantly positive, and the coefficient on the dummy variable for the equity ratio (DUMMY × EQUITY) is significantly negative under the period of deregulation.

Table 2. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	0.2303***	0.0214	10.72
SIZE	1.4033×10^{-7}***	2.9251×10^{-8}	4.79
DUMMY × SIZE	1.1673×10^{-6}***	1.5723×10^{-7}	7.42
EQUITY	3.0036***	0.3926	7.64
DUMMY × EQUITY	-1.8349***	0.2826	-6.49
NPL	0.0013	0.0011	1.22
FIXED	0.0011***	0.0002	5.29
R^2	0.52		
N	100		
F	19.06		
	Coefficient	Standard error	t-value
INTERCEPT	0.4477***	0.0259	17.24
SIZE	8.8091×10^{-8}***	1.9074×10^{-8}	4.61
DUMMY × SIZE	-3.6068×10^{-7}**	1.6123×10^{-7}	-2.23
EQUITY	-0.2879	0.5609	-0.51
DUMMY × EQUITY	2.7735***	0.5392	5.14
NPL	-0.0048***	0.0016	-2.97
FIXED	5.3764×10^{-6}	2.8883×10^{-5}	0.18
R^2	0.42		
N	125		
F	16.10		

$$(Loan\text{-}to\text{-}asset)_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The table shows the panel regression results for the dependent variable of loan-to-asset over the period 1994~1997 and 1998~2005, respectively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

This result indicates that regional banks had significantly greater risk-taking incentives associated with firm size and equity ratio than national banks when banking regulations are loose. However, as shown in the second table, these incentives disappeared after banking regulations became tightened after financial crisis. Or rather, regional banks appeared to have significantly less risk taking incentives associated with these two variables than national banks under the latter period. Table 3 shows the results for the ratio of investment securities as the proxy for risk taking incentives.

Table 3. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	0.5359***	0.0268	19.96
SIZE	-1.2483×10^{-7}***	3.6554×10^{-8}	-3.41
DUMMY × SIZE	-1.0168×10^{-6}***	1.9649×10^{-7}	-5.17
EQUITY	-2.8819***	0.4907	-5.87
DUMMY × EQUITY	1.4983***	0.3532	4.24
NPL	-0.0032**	0.0014	-2.30
FIXED	-0.0011***	0.0002	-4.08
R^2	0.39		
N	100		
F	11.59		
	Coefficient	Standard error	t-value
INTERCEPT	0.2954***	0.0248	11.88
SIZE	-7.1602×10^{-8}***	1.8262×10^{-8}	-3.92
DUMMY × SIZE	5.2049×10^{-7}***	1.5437×10^{-7}	3.37
EQUITY	0.5729	0.5370	1.06
DUMMY × EQUITY	-1.9849***	0.5163	-3.84
NPL	0.0047***	0.0015	2.99
FIXED	-1.8753×10^{-5}	2.7654×10^{-5}	-0.67
R^2	0.30		
N	125		
F	9.91		

$$(Investment\ securities\text{-}to\text{-}asset)_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The first and second table show the panel regression results for the dependent variable of investment securities-to-asset over the period 1994~1997 and 1998~2005, respectively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

It is shown in the first table that the coefficient on the dummy variable for the asset size is significantly negative, and the coefficient on the dummy variable for the equity ratio is significantly positive under the period of deregulation. Thus, regional banks had significantly greater incentives to hold less investment securities as asset size increases and equity ratio decreases than national banks under the period of deregulation. Consistent with the results for the case of loan ratio in table 2, this result indicates that regional banks had greater risk taking incentives than national banks under regulatory deregulation. However, the second table shows that these incentives disappeared after regulations became tightened. Overall the result in table 2 and 3 strongly show that regional banks tended to have stronger incentives to pursue riskier strategies by expanding riskier loans and reducing safer investment securities than national banks when regulations are loose as their asset size increases and equity ratio decreases. Table 4 and 5 show the results for the case where the proxies for risk taking incentives are more narrowly and specifically defined. Table 4 uses the ratio of common stock to government bond and table 5 uses the ratio of commercial loans to consumer loans, respectively. Table 4 presents a significantly negative coefficient on equity ratio dummy variable, and table 5 presents a significantly positive coefficient on asset size dummy variable and a significantly negative coefficient on equity ratio dummy variable under the period of loose regulation 1994-1997. Thus, regional banks had greater risk taking incentives by investing more in risky stock and by making more commercial loans than national banks under the period of loose regulation as their asset size increases and equity ratio decreases. However, these incentives disappeared or became less after tightened regulation. Thus, these results are very strongly consistent with the findings in table 2 and 3.

The results for the two control variables, the ratio of non-performing loans to asset (NPL) and the ratio of fixed asset to total asset (FIXAST), in table 2 and 3, are as follows. There was a negative relationship between NPL and the loan-to-asset ratio and a positive relationship between NPL and the ratio of investment securities to total asset under the period of tightened regulation. Thus, banks had the incentives to take safer and conservative strategies as their asset qualities deteriorate after the regulations are tightened. For the ratio of common stock to government bond, the sign was negative as expected in the latter period; however, it was not significant. For the ratio of commercial loans to consumer loans, the sign was different from expected. For the other control variable, the ratio of fixed asset, the tables generally show that the banks with higher ratio of fixed asset tend to take riskier strategies.

Table 4. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	0.4100	0.3266	1.25
SIZE	-2.4248×10^{-7}	4.4485×10^{-7}	-0.54
DUMMY × SIZE	2.8122×10^{-7}	2.3912×10^{-6}	0.11
EQUITY	25.9703***	5.9719	4.34
DUMMY × EQUITY	-25.8139***	4.2989	-6.00
NPL	0.0154	0.0171	0.90
FIXED	-0.0003	0.0034	-0.10
R^2	0.46		
N	100		
F	15.53		
	Coefficient	Standard error	t-value
INTERCEPT	0.0937	0.1512	0.61
SIZE	6.3095×10^{-8}	1.1111×10^{-7}	0.56
DUMMY × SIZE	9.0760×10^{-7}	9.3929×10^{-7}	0.96
EQUITY	4.9610	3.2675	1.51
DUMMY × EQUITY	-3.7228	3.1416	-1.18
NPL	-0.0067	0.0095	-0.69
FIXED	0.0002*	0.0001	1.64
R^2	0.42		
N	125		
F	16.10		

$$(\text{Common stock-to-government bond})_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The first and second table show the panel regression results for the dependent variable of common stock-to-government bond over the period 1994~1997 and 1998~2005, respectively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

Table 5. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	7.6109***	2.0374	3.73
SIZE	-9.1083×10^{-6}***	2.7751×10^{-6}	-3.28
DUMMY × SIZE	4.5316×10^{-5}***	1.4917×10^{-5}	3.03
EQUITY	28.1798	37.2547	0.75
DUMMY × EQUITY	-59.4193**	26.8179	-2.21
NPL	-0.2560**	0.1067	-2.39
FIXED	0.0222	0.0214	1.03
R^2	0.19		
N	100		
F	5.00		
	Coefficient	Standard error	t-value
INTERCEPT	1.7524***	0.5181	3.38
SIZE	-5.7027×10^{-7}	3.8058×10^{-7}	-1.49
DUMMY × SIZE	6.9806×10^{-6}**	3.2171×10^{-6}	2.16
EQUITY	-4.9687	11.1917	-0.44
DUMMY × EQUITY	7.8065	10.7605	0.72
NPL	0.1289***	0.0328	3.92
FIXED	0.0001	0.0005	0.30
R^2	0.33		
N	125		
F	11.14		

$$(\text{Commercial loans-to-consumer loans})_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The first and second table show the panel regression results for the dependent variable of commercial loans-to-consumer loans over the period 1994~1997 and 1998~2005, respect ively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

Table 6 shows the results for the profitability test using the return on asset as the dependent variable. It presents a significantly positive coefficient on asset size dummy variable and a significantly negative coefficient on equity ratio dummy variable under the period of loose regulation.

Table 6. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	-0.3451	0.3094	-1.11
SIZE	2.0715×10^{-6}***	4.2152×10^{-7}	4.91
DUMMY × SIZE	1.1298×10^{-6}***	2.2658×10^{-6}	4.98
EQUITY	24.4377***	5.6587	4.31
DUMMY × EQUITY	-9.1768**	4.0734	-2.25
NPL	-0.1949***	0.0162	-12.02
FIXED	-0.0135***	0.0032	-4.15
R^2	0.76		
N	100		
F	55.52		
	Coefficient	Standard error	t-value
INTERCEPT	-1.0577*	0.6024	-1.75
SIZE	-2.6352×10^{-7}	4.4251×10^{-7}	-0.59
DUMMY × SIZE	1.6665×10^{-6}	3.7407×10^{-6}	0.44
EQUITY	57.6820***	13.0128	4.43
DUMMY × EQUITY	-14.8307	12.5114	-1.18
NPL	-0.2940***	0.0381	-7.71
FIXED	-0.0005	0.0006	-0.82
R^2	0.65		
N	125		
F	39.61		

$$(ROA)_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The first and second table show the panel regression results for the dependent variable of return on asset over the period 1994~1997 and 1998~2005, respectively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

Combined with the results from table 2 to 5, these results in table 6 suggest that the greater risk taking incentives of regional banks associated with larger asset size and lower equity ratio under the period of loose regulation contributed to generate higher profit than national banks. That is, regional banks pursued profitable risk-taking strategies when regulations are loose. However, these positive associations between greater risk-taking and higher profitability were not observed any more after banking regulations became tightened.

Table 7. Panel regression results

	Coefficient	Standard error	t-value
INTERCEPT	-789.78	653.0003	-1.2094
SIZE	0.0134***	0.0008	15.1301
DUMMY × SIZE	0.0022	0.0047	0.4653
EQUITY	5046.54	11940.03	0.4626
DUMMY × EQUITY	7322.59	8595.07	0.8519
NPL	-65.7442*	34.2192	-1.9216
FIXED	12.5504*	6.8806	1.8240
R^2	0.76		
N	100		
F	55.43		
	Coefficient	Standard error	t-value
INTERCEPT	-4501.32***	1358.55	-3.31
SIZE	0.0230***	0.0009	23.11
DUMMY × SIZE	0.0135	0.0084	1.60
EQUITY	28683.85	29344.90	0.97
DUMMY × EQUITY	37080.55	28214.20	1.31
NPL	102.83	86.0106	1.19
FIXED	-2.5121*	1.5111	-1.66
R^2	0.89		
N	125		
F	169.79		

$$(NIM)_{i,t}=\beta_0+\beta_1(SIZE)_{i,t}+\beta_2 DUMMY\times(SIZE)_{i,t}+\beta_3(EQUITY)_{i,t}+\beta_4 DUMMY\times(EQUITY)_{i,t}+\beta_5(NPL)_{i,t}+\beta_6(FIXED)_{i,t}+\varepsilon_{i,t}$$

The first and second table show the panel regression results for the dependent variable of net interest margin over the period 1994~1997 and 1998~2005, respectively. *, **, *** indicate statistical significance at the 10, 5, or 1% significance level, respectively. DUM=1 if the sample period belongs to regional banks for each year, and 0 otherwise.

Table 7 shows the results for the case where NIM (net interest margin) is used as the dependent variable.

The coefficients on the dummy variables for the two main explanatory variables, DUMMY × SIZE and DUMMY × EQUITY are statistically insignificant within 10% significance level for both loose and tightened regulation period. However, both the magnitude and statistical significance of the coefficients are much greater and stronger for the latter period. The coefficient on asset size dummy variable is positive at 11.1% significance level for the latter period. This result could be interpreted marginally consistent with the above results in table 2-6. That is, under the period of loose regulation, regional banks did not have higher dependency on NIM than national banks. Instead, regional banks tried to take riskier strategies to maximize their profits as observed in the previous tables. However, after regulations became tightened, the dependency of regional banks on NIM became greater, indicating that regional banks tended to take more conservative and passive strategies by more significantly controlling for the NIM under tightened regulations.

5 Conclusion

The purpose of this paper is to examine how the risk-taking behavior differed between Korean regional banks and national banks for the two different regulatory regimes; a very loose regulation period (1994-1997) and a very tightened regulation period (1998-2005). From the panel analysis over the period 1994-2005, we found that regional banks took riskier strategies than national banks when banking regulations are loose. Moreover, their higher risk-taking contributed to higher profit under the period of loose regulation. However, after the banking regulations were tightened after financial crisis around the late 1990s, this phenomenon disappeared and the tendency of regional banks to take greater risk than national banks was not observed any more. Also, the positive relationship between risk-taking and profitability was not observed either after regulations were tightened. These empirical findings would have the following policy implications. When the economic conditions are good, and therefore, banking regulations are relatively loose, the greater risk-taking of regional banks could be profitable, because regional banks are in a better situation in terms of maintaining their market share based on the close ties with their regional clients, and can be protected from excessive competition with national banks. But, if the economic conditions get worse and financial crisis occurs, and therefore, banking regulations get tightened, regional banks are more adversely and sensitively affected by these shocks than national banks because their size is small and their assets are less diversified than national banks, especially being concentrated on loans to small and medium size business sector and real estate loans, which are very sensitive to the fluctuation of the economy. Furthermore, if these adverse economic and financial shocks continue long, the probability of regional banks to fail would be substantially higher and it can cause a serious damage to the regional economy. To avoid these adverse consequences in economic and financial crisis, regional banks need to diversify their asset portfolios and earnings structure, and improve the skill of more forward-looking risk management.

References

1. Akhavein, J. D., Berger, A. N., and Humphrey, D. B., 1997. The Effects of Bank Megamergers on Efficiency and Prices. *Review of industrial Organization* 12.
2. Demsetz, R.S., M.R. Saidenberg, and P.E. Strahan, 1997. Agency problems and risk taking at banks. *Federal Reserve Bank of New York Economic Review*
3. Demsetz, R.S., and Strahan, P.E., 1997. Diversification, Size, and Risk at Bank Holding Companies. *Journal of Money, Credit, and Banking* 29 : 300-313.
4. Drake, L. and Hall, M. J. B., 2003. Efficiency in Japanese banking: An empirical analysis.
5. *Journal of Banking and Finance*, 27, 891-917.
6. Galloway, T.M., W.B. Lee, and D.M. Roden, 1997. Banks' changing incentives and opportunities for risk taking. *Journal of Banking and Finance* 21, 509-527.
7. Gunther, J. W.., and Robinson, K. J., 1990. Empirically assessing the role of moral hazard in increasing the risk exposure of Texasbanks. *Federal Reserve Bank of Dallas Economic Review.*
8. Mckenzie, J. A., Cole, R. A., and Brown, R. A., 1992. Moral hazard, portfolio allocation, and asset returns for thrift institutions. *Journal of Financial Research* 315-339.
9. O'Hara, M. and W. Shaw., 1990. Deposit Insurance and wealth Effects: The Value of Being "Too Big to Fail. *Journal of Finance* 5. 1587-1600.
10. Uchida, H. and Tsutsui, Y., 2005. Has competition in the Japanese banking sector improved? *Journal of Banking and Finance*, 29, 419-439.