REGULATION, CORPORATE CONTROL AND BANK RISK TAKING

Seok Weon Lee[*]

Abstract

In this study, we examine the relation between ownership structure and risk-taking behavior of banks by analyzing data for three different regulatory and economic regimes of the Korean banking industry. We find that stockholder-controlled banks exhibit higher but unprofitable risk-taking than managerially-controlled banks during the period of deregulation 1994-1995, and that this relation is more transparent during the period of deregulation and decline of the industry 1996-1997. However, higher risk-taking incentives of stockholder-controlled banks become weaker during the period of tightened regulation and structural reform 1999-2000. Furthermore, the profitability of stockholder-controlled banks given a unit increase in the bank's risk appears to be improved in this period relative to the periods of deregulation. Considering that the economic conditions of the Korean banking industry in this period is under recovery stage (not prosperity), these results may suggest that stockholder-controlled banks try to change their risk-taking behavior toward a more deliberate and profitable one, and therefore, may provide somewhat convincing evidence for the corporate control hypothesis stating that insider ownership during periods of regulatory stringency would give banks the incentives to pursue modest, deliberate and profitable risk-taking strategies. In the test for the partitioned sample, we find stronger evidences, that are an integral part of this paper.

Keywords: corporate control, ownership structures, banking, transparency

1. Introduction

As in non-financial corporations, limited liability gives bank stockholders an incentive to expropriate wealth from debtholders (creditors) by increasing risk. But in banking, creditors have weak incentives to monitor and constrain such risk-taking because they are protected by deposit insurance. If creditors provide the major funding, so that only a negligible part of total funding comes from stockholders, incentives for risk-taking will be all the greater. Many studies, however, suggest that the incentives of managers may differ from those of outside stockholders. If managers' wealth is largely in nondiversifiable human capital (firm-specific) form, and managers of failed firms have difficulty finding comparable jobs due to bad reputation about their management abilities, they may act in a risk-averse rather than a value-maximizing manner of stockholders to preserve jobs and perquisite consumption from control of the firm. In this case, their optimal degree of risk taking would be less than that desired by outside stockholders.

This owner/manager agency problem or the conflicts between stockholders and managers, however, can be mitigated if managers' interests (objects) are aligned with those of outside stockholders. One way in which alignment of interests may occur is through insider (managerial) ownership of the firm's stock.

As pointed out by Saunders, Strock and Travlos (1990), and Cebenoyan, Cooperman and Register (1999), ownership structure may have a more powerful effect on the risk characteristics of banks during the periods of deregulation relative to periods of regulation.

[*] Assistant Professor, Department of Finance and Insurance, Soonchunhyang University, Korea. Phone #: (82-41)530-1689, Email address: seoklee@sch.ac.kr

In periods of deregulation, stockholder-manager conflict over the degree of risk-taking should be exacerbated. Thus, bank stockholders, ceteris paribus, have greater incentives and ability to increase risk than when regulations are tight and strictly enforced. That is, in periods of deregulation, the ability of stockholders to maximize the value of their call and put options by greater risk-taking is enhanced. In support of this premise, Saunders, Strock and Travlos (1990) find that stockholder-controlled banks (the banks whose managers hold a relatively large proportion of the bank's stocks) exhibit significantly higher risk-taking behavior than managerially-controlled banks (the banks whose managers hold a relatively small proportion of the bank's stocks) during the 1979-1982 period of deregulation. However, they do not explicitly relate their analysis to the moral-hazard hypothesis. That is, it is unclear whether higher risk-taking of stockholder-controlled banks yields greater profit. Cebenoyan, Cooperman and Register (1999) find similar results by analyzing data for thrifts from 1986 to 1995 period. They find that in the mid-1980s, years of regulatory laxity and low charter values, stockholder-controlled thrifts exhibit unprofitable risk-taking, and demonstrate a bit weaker, but profitable risk-taking in the mid-1990s, a period of tightened regulations and high charter values. However, as pointed out by researchers and regulators, since the mid-1990s is a period of economic prosperity, it is unclear whether this result of modest and profitable risk-taking of stockholder-controlled thrifts during the period of tightened regulation can be interpreted as an evidence for the corporate-control hypothesis[1] in the literature. Recent Korean banking industry between the early 1990s and the late 1990s may be a more appropriate sample period to examine the above issues than the U.S. banking industry around 1980s and 1990s. The post-1990 period of the Korean banking industry 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. Moreover, with implicit guarantee regarding survival of banks by the government, banks were able to pursue excessively risky strategies to maximize their values between the early and mid 1990s. This risk-taking associated with significant deregulations and implicit forbearance regarding bank closure is attributed to be one of the main reasons for the failure and crisis of the Korean banking industry around 1997. Five banks out of total twenty-six failed in 1998, and four more banks failed in 1999. The regulatory reforms enforced with the Core Principles for Effective Banking Supervision of December 1997 include a more tightened BIS (Bank for International Settlement) capital standards, Prompt Corrective Actions and a modest step toward risk-based insurance premiums, etc..

In this study, we examine the relation between ownership structure and risk-taking behavior of banks by analyzing data for three different regulatory and economic regimes of the Korean banking industry: a period of deregulation 1994-1995, a period of deregulation and decline of the banking industry 1996-1997, and a period of tightened regulation and structural reform of the industry 1998-2000. We find that stockholder-controlled banks exhibit higher but unprofitable risk-taking than managerially-controlled banks during the period of deregulation 1994-1995, and that this relation is more transparent during the period of deregulation and decline of the industry 1996-1997. However, higher risk-taking incentives of stockholder-controlled banks become weaker during the period of tightened regulation and structural reform 1999-2000. Furthermore, the profitability of stockholder-controlled banks given a unit increase in the bank's risk appears to be improved in this period relative to the periods of deregulation. Considering that the economic conditions of the Korean banking industry in this period is under recovery stage (not prosperity), these results may suggest that stockholder-controlled banks try to change their risk-taking behavior toward a more deliberate and profitable one, and therefore, may provide somewhat convincing evidence for the corporate control hypothesis stating that insider ownership during periods of regulatory stringency would give banks the incentives to pursue modest, deliberate and profitable risk-taking strategies. In the test for the partitioned sample, we find stronger evidences. We find that the tendencies of stockholder-controlled banks to take unprofitable risks during the periods of deregulation 1994-1998 are observed more transparently for the set of unhealthy and declining banks that are acquired by healthier banks in later structural-reform period. Also, the tendencies of stockholder-controlled banks to change their risk-taking behavior toward more deliberate and profitable one during the period of tightened regulation and structural reform 1999-2000 are observed more transparently for the set of banks that are newly borne by acquiring problem banks, and therefore, that would be imposed on heavier regulatory oversights from regulators.

In the next section, we describe the sample of banks. Section 3 describes the testing model of the hypotheses. Section 4 presents the empirical results, and section 5 offers concluding comments.

2. Sample, data and summary statistics

We collect the balance sheet data of banks such as capital-to-asset ratio, book value per share, asset portfolio shares, and asset size from the Statistics of Bank Management for each year, 1994 to 2000, published by the Korea Financial Supervisory Service. Ownership data are collected form the TS-2000 data

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[1] See Gorton and Rosen (1995) for a thorough discussion and references to many studies about the corporate-control hypothesis.

file provided by the Korea Committee of Traded Company. Insider ownership variable is measured by the shares held by officers and directors of the banks as a fraction of shares outstanding. The sample consists of all banks in Korea: 26 form 1994 to 1997, 21 in 1998, and 17 in 1999 and 2000. As described in section III, we conduct cross-sectional regression for each year employing annual data from 1994 to 2000 to eliminate serial-correlation problem. We believe that it may be the best way to reduce the methodological error to include each bank as only one observation over the sample period. But, since the sample size is not large, we conducted panel analysis (more specifically, random effects model) by pooling the cross-sectional and quarterly time-series data for each year, too.

The implications from the results of the panel analysis are very similar to those of the cross-sectional analysis. The results are available from the author. All the data are year-end values.

The summary statistics of all of the variables used in our analysis based on pooled data from 1994 to 2000 are presented in table 1. Insider ownership averages 13 percent of the outstanding shares of the banks during the whole sample periods, ranging from 0 to 62 percent. The average capital-to-asset ratio is 4.61 percent. The banks range from $754 million to $74,033 million in assets, averaging over $17,300 million in assets.

Table 1. Sample describe statistics

	Mean	Median	Standard deviation	Min	Max
Insider ownership	0.13	0.11	0.19	0.00	0.62
Capital-to-asset	0.0461	0.0422	0.0270	-0.0619	0.0415
Asset	17,315	9,520	16,717	754	74,033
Operational leverage	0.0312	0.0299	0.0106	0.0057	0.0665
Non-performing loans-to-asset	0.0637	0.0487	0.0461	0.0023	0.2463
Loan-to-asset	0.4252	0.4241	0.0584	0.2721	0.6552
Investment securities-to-asset	0.3384	0.3298	0.0604	0.2196	0.5314
GMS bonds	0.0900	0.0743	0.0480	0.0255	0.2636
Stock/Corporate bond-to-asset	0.0970	0.0899	0.0336	0.0208	0.2104
Return on asset	-0.3492	0.4750	2.3421	-10.1900	1.1336

The average operational leverage measured by the ratio of fixed assets to total asset is 3.12 percent. The average non-performing loans-to-asset ratio is 6.37 percent. The average ratios of loan-to-asset and investment securities-to-asset are 43 percent and 34 percent, respectively. The return on asset averages –0.35, ranging from –10.2 to 1.13. The ratios of both GMS bond(government bond and monetary stabilizing bond)-to-asset and stock/corporate bond-to-asset average around 9 percent. We partition the full sample into two periods based on the level of regulatory strength: deregulation period 1994-1997 versus the period of tightened regulation and structural reform 1998-2000. Also, each period the full sample banks are partitioned into two groups based on the level of insider ownership (high insider-ownership or stockholder-controlled banks versus low insider-ownership or managerially-controlled banks). Each year the full sample is partitioned at the median for insider-ownership variable. Table 2 presents the means of the variables of the partitioned sample. T-statistics for each period are based on the null hypotheses that the means of the variables are equal between the high and low insider-ownership banks.

Table 2. Means of the variables

T-statistics are based on the null hypothesis that the means of the variables are equal between high and low insider ownership banks. One, two, or three asterisks indicate statistical significance at the 10, 5, or 1 percent level, respectively.

	1994-1997			1998-2000		
	High insider ownership	Low insider ownership	T-statistic	High insider ownership	Low insider ownership	T-statistic
Capital-to-asset	0.0407	0.0665	-3.56***	0.0311	0.0295	0.83
Asset	14,547	12,512	1.73*	25,443	23,551	1.68*
Operational leverage	0.0440	0.0162	2.97***	0.0411	0.0263	1.90**
Non-performing loans-to-asset	0.0620	0.0389	4.11***	0.0902	0.0836	1.46
Loan-to-asset	0.5331	0.3273	2.62***	0.4380	0.3710	1.63*
Investment securities-to-asset	0.2975	0.3687	-0.98	0.2881	0.4051	-1.70*
GMS bonds	0.0605	0.0801	-1.55	0.1090	0.1475	-1.33
Stock/Corporate Bond-to-asset	0.1105	0.0703	5.07***	0.1091	0.1079	0.26
Return on asset	-0.1023	0.1292	-4.71***	-0.6510	-0.7584	1.32

Table 2 reveals that the mean capital ratio is significantly lower, mean operational leverage is significantly higher, mean non-performing loan ratio is significantly higher, mean loan ratio is significantly higher, and mean ratio of stock and corporate debt is significantly higher for the high insider-

ownership banks during the deregulation period 1994-1997. These results suggest that high insider-ownership banks tend to behave at a very risky operating structure when regulations are loose. Furthermore, a significantly lower ROA of these banks combined with the above results would suggest that these banks pursue unprofitable risk-taking when regulations are loose.

However, as shown in the right column, the tendencies of high insider-ownership banks to behave at a risky operating structure become weaker during the period of tightened regulation 1998-2000. Furthermore, a higher ROA of high insider-ownership banks (though not significant at 10% significance level) presents that the profitability of these banks is more improved (less worsened) relative to low insider-ownership banks in this period. This might suggest that high insider-ownership banks may try to change their risk-taking behavior toward a more deliberate and profitable one when regulations are tightened. Of course, these comparisons are only suggestive because they do not control for other factors affecting bank risk-taking.

3. Specification of the testing model

We use the following model to examine the relation between ownership structure and risk-taking for banks:

Risk=f(insider ownership, capital-to-asset ratio, asset size, operational leverage)

where, *risk for each individual bank* is proxied by alternative risk measures.

Insider ownership is the percentage of the equity held by officers and directors of a bank.

Following Saunders, Strock and Travlos (1990), we are assuming that ownership structure is exogenous and the level of risk-taking is endogenously determined. That is, the level of insider ownership is the driving variable and risk is the result. We include capital-to-asset ratio, asset size, and operational leverage as control variables affecting the risk taking behavior of banks: To control for the effect of financial leverage on risk, we include bank's capital-to-asset ratio. We use the bank's book value of capital-to-asset ratio since this is the leverage measure most commonly monitored by regulators. We include the bank asset size as another control variable affecting the risk taking behavior of banks. If the implication of the too-big-to-fail policy holds, risk-taking would be higher for the banks with larger asset size. Alternatively, if the larger banks have greater potential to diversify asset risk, asset size and risk should be negatively related. Operating leverage is included as another control variable. Many researchers such as Mandelker and Rheeargue (1984), and Saunders, Strock and Travlos (1990) argue that operating leverage acts in an analogous fashion to financial leverage in increasing firm risk.

To summarize, the following cross-sectional regression is estimated each year during the three different regulatory and economic regimes of the banking industry (1994-2000). All the data are year-end values for each year:

$\text{Risk}_i = \beta_0 + \beta_1 (\text{Insider-ownership})_i + \beta_2 (\text{Capital-ratio})_i + \beta_3 (\text{Asset})_i + \beta_4 (\text{Operational-leverage})_i + \varepsilon_i$

We use alternative proxies for risk. The first one is the ratio of non-performing loans to asset. The other two are the ratio of loans to asset and the ratio of investment securities to asset. Loans are generally considered to be risky instruments and are given higher risk weight at the calculation of risk-adjusted asset and BIS (Bank for International Settlement) capital ratio. Investment securities are generally considered to be safer than loans. Finally, we classify investment securities into two categories based on risk: the ratio of risk-free securities to asset; GMS bond (government bond and monetary stabilizing bond), and the ratio of risky securities to asset; stocks/corporate bonds.

Finally, to complete the analyses by examining the relation between ownership structure and the performance of banks, we estimate the above equation employing bank profitability measured by the return on asset as the dependent variable.

$\text{ROA}_i = \beta_0 + \beta_1 (\text{Insider-ownership})_i + \beta_2 (\text{Capital-ratio})_i + \beta_3 (\text{Asset})_I + \beta_4 (\text{Operational-leverage})_i + \varepsilon_i$

4. Empirical Results
4.1. Results based on the full sample
4.1.1. Results on the ratio of non-performing loans

The results for estimating the relation between ownership structure and risk-taking using alternative risk measures each year over 1994-2000 are presented in table 3-7. The result for estimating the relation between ownership structure and profitability is presented in table 8.

Table 3 presents the results for the regressions using the ratio of non-performing loans to asset as the risk measure. During the period of deregulation 1994-1995, the coefficient on insider-ownership is significantly positive indicating that stockholder-controlled banks have higher risk-taking incentives than managerially-controlled banks when regulations are loose.

During the period of deregulation and decline of the industry 1996-1997, the coefficient is more significantly positive, as consistent with the findings of Saunders, Strock and Travlos (1990), and Cebenoyan, Cooperman and Register (1999). Thus, the effect of insider ownership in inducing managers to take on more risk associated with deregulation is greater when the industry is declining. However, this relation becomes weaker during the period of tightened regulation and structural reform of the industry 1998-2000 as indicated by the insignificant coefficients.

For control variables, the coefficient on capital ratio is consistently negative for the regressions from 1994 to 1998 (significant for 1996 and 1997). This result suggests that the banks with lower capital ratio have higher incentives to increase risk when regulations are loose and that this behavior resulted in the high ratio of non-performing loans. However, the coefficient becomes insignificantly positive during the period of tightened regulation 1999-2000. Regulatory oversight would be imposed more heavily on the banks with lower capital ratio when regulations are tight, and therefore, these banks should put more effort to improve their risk status. Regarding asset size, we do not find any consistent or significant relations during the period 1994-1998. However, the coefficient is significantly negative during the period 1999-2000. This result may be attributed to the fact that large banks during the period 1999-2000 are generally those that are newly borne by acquiring problem banks through structural reform of the industry, and therefore, regulatory oversight would be imposed more heavily on these banks. Operational leverage has consistently positive relation with risk for the sample period.

Table 3. Regression results when risk is measured as the ratio of non-performing loans to asset

Year	Intercept	Insider ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.0121	0.1531*	-0.0126	1.5477^{+8}	0.0021*	0.21
	(0.21)	(1.64)	(-0.04)	(0.43)	(1.73)	
1995	0.0491	0.1762**	-0.0103	1.5360^{+8}	0.0060*	0.23
	(0.12)	(2.01)	(-1.07)	(0.57)	(1.65)	
1996	0.0380	0.2394**	-0.0198*	-0.5141^{+8}	0.0013	0.21
	(0.15)	(2.31)	(-1.70)	(-0.01)	(1.47)	
1997	0.0711	0.2008***	-0.0284*	-0.3817^{+8}	0.0144**	0.15
	(0.38)	(2.79)	(-1.63)	(-0.92)	(2.03)	
1998	0.0492	0.0714*	-0.0037	-0.1892^{+8}	0.0032	0.19
	(0.14)	(1.64)	(-0.74)	(-0.81)	(0.99)	
1999	0.0781	0.0788	0.0007	$-1.6921^{+8}*$	0.0056	0.27
	(0.41)	(1.17)	(0.85)	(-1.66)	(1.25)	
2000	0.0660	0.1103	0.0005	$-2.0058^{+8}*$	0.0173*	0.28
	(0.09)	(1.08)	(0.92)	(-1.67)	(1.81)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. $Risk_i = \beta_0 + \beta_1(Insider\text{-}ownership)_i + \beta_2(Capital\text{-}to\text{-}asset)_i + \beta_3(Asset)_i + \beta_4(Operational\text{-}leverage)_i + \varepsilon_i$

4.1.2. Results on the ratio of total loans to asset, and the ratio of investment securities to asset

Table 4 and 5 present the results for the regressions using the ratio of total loans to asset and the ratio of investment securities to asset as the risk measure, respectively. With respect to loan ratio, the results are similar to the previous regressions.

Table 4. Regression results when risk is measured as the ratio of total loans to asset

Year	Intercept	Insider ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.3145***	0.0176	-0.0091	$1.8477^{+7}*$	0.0004	0.19
	(3.21)	(1.61)	(-0.91)	(1.73)	(0.73)	
1995	0.2871***	0.0391*	-0.0083	1.7860^{+7}	0.0006	0.08
	(4.12)	(1.71)	(-0.92)	(1.57)	(0.65)	
1996	0.4018***	0.0551*	-0.0113*	$1.3141^{+7}*$	0.0013*	0.07
	(3.55)	(1.72)	(1.70)	(1.63)	(1.69)	
1997	0.3910***	0.0698**	-0.0116	$1.7204^{+7}*$	0.0007	0.11
	(5.38)	(1.78)	(-0.56)	(1.69)	(0.03)	
1998	0.4927***	0.0335	-0.0099	1.13812^{+8}	0.0012*	0.18
	(5.14)	(1.41)	(-0.28)	(1.51)	(1.71)	
1999	0.3827***	0.0110	0.0064	0.6935^{+7}	0.0006	0.19
	(3.41)	(1.09)	(0.75)	(1.42)	(0.25)	
2000	0.3615***	0.0220	0.0009	0.9948^{+7}	0.0011	0.08
	(3.09)	(1.33)	(0.02)	(1.07)	(0.81)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. $Risk_i = \beta_0 + \beta_1(Insider\text{-}ownership)_i + \beta_2(Capital\text{-}to\text{-}asset)_i + \beta_3(Asset)_i + \beta_4(Operational\text{-}leverage)_i + \varepsilon_i$

During the period of deregulation 1994-1995, the coefficient on insider-ownership is positive (significant for 1995). During the period of deregulation and decline of the industry 1996-1997, it is more significantly positive. During the period of tightened regulation and structural reform 1999-2000, it is also positive, but not significant. With respect to the ratio of investment securities to asset, the coefficient on insider ownership is generally negative as expected but not significant during the period 1994-1998. In-

terestingly, during the period 1999-2000, it is significantly negative. As presented in table 6 of 4.1.3, this result is attributed to the fact that stockholder-controlled banks substantially decrease their invest-

ment in relatively risky investment securities such as stocks and corporate bonds in this period.

Table 5. Regression results when risk is measured as the ratio of investment securities to asset

Year	Intercept	Insider owner-ship	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.4112***	-0.0112	-0.0008	-1.4109^{+7}**	-0.0077	0.39
	(3.11)	(-0.76)	(-0.64)	(-2.11)	(-0.89)	
1995	0.3650**8	-0.0291	-0.0007	-1.7263^{+7}*	-0.0101*	0.28
	(2.98)	(-0.53)	(-0.51)	(-1.67)	(-1.67)	
1996	0.4710***	-0.0171	0.0010	-0.7629^{+7}	0.0018	0.22
	(3.65)	(-0.48)	(0.28)	(-1.53)	(0.01)	
1997	0.3809***	-0.0431	-0.0011	-1.1183^{+7}*	-0.0083*	0.31
	(2.69)	(-1.03)	(-0.47)	(-1.78)	(-1.71)	
1998	0.5110***	-0.0623	0.0009	-0.9793^{+7}	-0.0009	0.18
	(4.03)	(-1.25)	(0.51)	(-0.90)	(-0.83)	
1999	0.4119***	-0.0881*	0.0008	-0.8192^{+7}	0.0002	0.35
	(4.67)	(-1.68)	(0.37)	(-1.32)	(0.59)	
2000	0.5103***	-0.1002*	-0.0001	-0.4743^{+7}	0.0004	0.27
	(4.19)	(-1.71)	(-0.19)	(-0.85)	(1.01)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. $Risk_i = \beta_0 + \beta_1(\text{Insider-ownership})_i + \beta_2(\text{Capital-to-asset})_i + \beta_3(\text{Asset})_i + \beta_4(\text{Operational-leverage})_i + \varepsilon_i$

For control variables, the coefficient on asset size is significantly positive with respect to the loan ratio and is significantly negative with respect to the ratio of investment securities for most of the regressions from 1994 to 1998. Thus, large banks tend to increase risk by raising loan ratio and lowering investment-securities ratio when regulations are loose. However, these tendencies of large banks become weaker during the period of tightened regulation.

4.1.3. Results on the ratio of stock/corporate bonds to asset, and the ratio of GMS bonds to asset

Table 6 and 7 present the results for the regressions using the ratio of stock/corporate bonds to asset and the ratio of GMS bonds to asset as the risk measure,

respectively. With respect to the ratio of stock/corporate bonds to asset, we find the results expected. During the period 1994-1997, the coefficient on insider-ownership is positive (significant for 1995 and 1996). Thus, stockholder-controlled banks have the incentives to increase risk by raising the ratio of risky investment securities such as stocks and corporate bonds when regulations are loose. However, as previously presented, during the period 1999-2000, the coefficient becomes significantly negative due to increased regulatory oversight. Table 7 presents that stockholder-controlled banks seem to have low incentives to invest in relatively safe investment securities, GMS bonds, during the whole sample period.

Table 6. Regression results when risk is measured as the ratio of stock/corporate bonds to asset

Year	Intercept	Insider ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.2731**	0.0085	0.8274	0.9375^{+8}*	0.0021**	0.25
	(2.17)	(1.47)	(0.46)	(1.81)	(1.95)	
1995	0.1892**	0.0103*	-0.5428*	-0.1755^{+8}	0.0193*	0.21
	(1.81)	(1.65)	(-1.69)	(-0.65)	(1.67)	
1996	0.2490	0.0118*	-0.0148*	0.5827^{+8}	-0.6947	0.19
	(1.61)	(1.66)	(-1.73)	(1.34)	(-0.87)	
1997	0.4015*	0.0078	0.3826	0.4017	0.0082	0.26
	(1.68)	(1.28)	(0.15)	(0.93)	(1.55)	
1998	0.3365	0.0005	0.2947	0.8201	-0.0027	0.26
	(0.99)	(0.94)	(1.03)	(0.77)	(-0.37)	
1999	0.3027	-0.0002*	0.6239	-0.2630	-0.0083	0.17
	(1.02)	(-1.63)	(1.20)	(-1.33)	(-0.28)	
2000	0.2218	-0.0003*	0.3956	-0.7203	-0.0019	0.30
	(1.44)	(-1.82)	(1.06)	(-1.46)	(-0.07)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. $Risk_i = \beta_0 + \beta_1(\text{Insider-ownership})_i + \beta_2(\text{Capital-to-asset})_i + \beta_3(\text{Asset})_i + \beta_4(\text{Operational-leverage})_i + \varepsilon_i$

Table 7. Regression results when risk is measured as the ratio of GMS bonds to asset

Year	Intercept	Insider ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.0638	-0.0004	0.0001	-0.5297^{+8}	0.0018	0.04
	(0.47)	(-0.58)	(0.37)	(-0.27)	(1.21)	
1995	0.0374	-0.0006	0.0005	0.7352^{+8}	0.0173	0.06
	(0.71)	(-0.92)	(0.26)	(0.53)	(0.90)	
1996	0.0247	0.0004	-0.0003	0.6273^{+8}	-0.0417*	0.07
	(1.02)	(0.16)	(-0.17)	(0.14)	(-1.63)	
1997	0.0519	-0.0012	0.0003	0.5283^{+8}	-0.0618**	0.02
	(0.38)	(-0.71)	(0.04)	(0.71)	(-1.88)	
1998	0.0284	-0.0005	-0.0001	-0.2803^{+8}	0.0029	0.06
	(0.81)	(-0.80)	(-0.16)	(-0.05)	(-0.72)	
1999	0.0682**	-0.0002	-0.0002	-0.1963^{+8}	0.0163	0.06
	(1.70)	(-0.39)	(-0.41)	(-0.10)	(0.38)	
2000	0.0529	-0.0001	0.0009	0.0174^{+8}	-0.0004	0.09
	(1.48)	(-0.74)	(0.58)	(0.19)	(-0.26)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. Risk$_i$ = β_0 + β_1(Insider-ownership)$_i$ + β_2(Capital-to-asset)$_i$ + β_3(Asset)$_i$ + β_4(Operational-leverage)$_i$ + ε_i

4.1.4. Results on profitability

In this section, to examine the relation between ownership structure and profitability, we run regression using return on asset as the dependent variable. The results are presented in table 8. The coefficient on insider ownership is generally negative and significant during 1994-1997 period. These results, combined with the results in the previous sections, suggest that stockholder-controlled banks take on perverse and unprofitable risks when regulations are loose and the industry is declining, which is consistent with the suggestions of the literature. However, the coefficient becomes positive (at 15% significance level) during the period 1999-2000. Considering that the economic conditions of the Korean banking industry in this period is under recovery stage (not prosperity), these results may suggest that stockholder-controlled banks try to change their risk-taking behavior toward a more deliberate and profitable one, and therefore, may provide somewhat convincing evidence for the corporate control hypothesis stating that insider ownership during periods of regulatory stringency would give banks the incentives to pursue modest, deliberate and profitable risk-taking strategies.

Table 8. Regression results on profitability test

Year	Intercept	Insider ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.2836	-0.0455*	0.0023	-0.2975^{+7}	-1.5863**	0.47
	(0.54)	(-1.87)	(0.51)	(-0.26)	(-2.01)	
1995	-0.1937*	-0.0623	0.0006	-0.8362^{+7}	-1.2974*	0.51
	(-1.66)	(-1.55)	(0.28)	(-0.37)	(-1.66)	
1996	-0.3618	-0.0832**	-0.0015	0.1937^{+7}	-1.4719***	0.48
	(-0.90)	(-1.93)	(-0.75)	(0.55)	(-3.11)	
1997	-0.7165**	-0.0473	0.0219*	-0.7392^{+7}	-2.1735	0.50
	(-2.32)	(-1.38)	(1.67)	(-0.41)	(-1.48)	
1998	-0.2846	-0.0795	-0.0003	0.6193^{+7}	-1.0284*	0.43
	(-1.59)	(-1.28)	(-0.82)	(0.93)	(-1.71)	
1999	0.0174	0.0275	-0.0002	-0.6381^{+7}	-1.8375*	0.32
	(1.22)	(1.50)	(-0.57)	(-0.11)	(-1.63)	
2000	0.0319	0.0317	-0.0010	0.2647*	-1.0029	0.37
	(0.79)	(1.57)	(-0.44)	(1.64)	(-0.97)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. ROA = β_0 + β_1(Insider-ownership)$_i$ + β_2(Capital-to-asset)$_i$ + β_3(Asset)$_i$ + β_4(Operational-leverage)$_i$ + ε_i

Taken together, employing better samples than those of the previous studies in terms of regulatory and economic regimes of the industry, we find the results, strongly supporting the premises of the literature associated with the effect of change in ownership structure on risk-taking behavior of banks.

4.2. Results based on the partitioned sample

In this section, we test the robustness of the previous results by further examining the relation between the banks' healthiness (and the level of regulatory oversight) and the effect of insider ownership on risk-taking behavior of banks. We partition the whole sample banks into two groups based on the risk characteristics of banks and the level of regulatory oversight from regulators. Basically, we believe that one of the best measures for the firm's healthiness is whether the firm is survived or not. We define the banks that are acquired by other banks during structural reform as unhealthy ones. Also, we believe that

regulatory oversight would be imposed more heavily on the newly borne banks by acquiring unhealthy ones. We test the robustness of the previous results by running the regressions including the dummy variables for the risk characteristics of banks and the level of regulatory oversight for the banks. For the sample period 1994-1998, we give the value one to the unhealthy and declining banks that are acquired by other banks during later structural-reform period. For the sample period 1999-2000, we give the value one to the banks that are newly borne by acquiring unhealthy and declining banks, and therefore, that would be imposed on heavier regulatory oversight from regulators. Then, we estimate the following cross-sectional regressions by including the interaction variable between the dummy variable and insider ownership.

$$Risk_i = \beta_0 + \beta_1 (Insider\text{-}ownership)_i + \beta_{11} (\textbf{\textit{Dummy}} \times Insider\text{-}ownership)_i + \beta_2 (BIS\ capital\text{-}ratio)_i + \beta_3 (Asset)_i + \beta_4 (Operational\text{-}leverage)_i + \varepsilon_i$$

$$ROA_i = \beta_0 + \beta_1 (Insider\text{-}ownership)_i + \beta_{11} (\textbf{\textit{Dummy}} \times Insider\text{-}ownership)_i + \beta_2 (BIS\ capital\text{-}ratio)_i + \beta_3 (Asset)_i + \beta_4 (Operational\text{-}leverage)_i + \varepsilon_i$$

We test the null hypothesis of no difference in the relations between ownership structure and risk taking for the two groups (healthy banks versus un-healthy banks, and the banks with heavier regulatory oversight versus the banks with looser regulatory oversight) by examining the sign and statistical significance of the coefficient β_{11} on the dummy inter-action variables. During the period 1994-1998, the coefficient β_1 measures the relation between ownership structure and risk-taking for the healthy banks, while the coefficient measuring the relation between ownership structure and risk-taking for the unhealthy and declining banks is the sum of β_1 and β_{11}. Therefore, during the sample period 1994-1998, the coefficient β_{11} measures how the relation between the level of insider ownership and risk of the unhealthy banks is different from that of the healthy banks when regulations are loose. Similarly, during the sample period 1999-2000, the coefficient β_{11} measures how the relation between the level of insider ownership and risk of the banks with heavier regulatory oversight is different from that of the banks with loose regulatory oversight when regulations are tight.

The results are presented in table 9 and 10. For the sake of brevity, we present only the results for the regressions using the ratio of non-performing loans to asset as the dependent variable.

Table 9. Partitioned sample regression results when risk is measured as the ratio of non-performing loans to asset

Year	Intercept	Insider ownership	$\textbf{\textit{Dummy}} \times$ Insider-ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.0089	0.1281	0.0264*	-0.0141	1.5126^{+8}	0.0030*	0.23
	(0.20)	(1.60)	(1.65)	(-0.05)	(0.44)	(1.73)	
1995	0.0399	0.1011**	0.0138	-0.0099	1.5721^{+8}	0.0048*	0.32
	(0.16)	(1.98)	(1.57)	(-1.14)	(0.56)	(1.67)	
1996	0.0328	0.1638*	0.0419**	-0.0187*	-0.5044^{+8}	0.0020	0.32
	(0.16)	(1.66)	(1.85)	(-1.68)	(-0.03)	(1.42)	
1997	0.0563	0.1811***	0.0226*	-0.0291*	-0.3448^{+8}	0.010**	0.29
	(0.37)	(2.56)	(1.66)	(-1.64)	(-0.91)	(2.11)	
1998	0.0478	0.0419**	0.0071	-0.0041	-0.1824^{+8}	0.0019	0.18
	(0.14)	(2.02)	(0.59)	(-0.80)	(-0.69)	(0.77)	
1999	0.0518	0.0559	0.0134	0.0007	-1.7156^{+8}*	0.0048	0.27
	(0.40)	(0.97)	(1.28)	(0.81)	(-1.64)	(1.19)	
2000	0.0596	0.1002	0.0219	0.0006	-2.0120^{+8}*	0.0180*	0.22
	(0.12)	(1.31)	(1.32)	(0.86)	(-1.69)	(1.79)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. $Risk_i = \beta_0 + \beta_1(Insider\text{-}ownership)_i + \beta_{11}(\textbf{\textit{Dummy}} \times Insider\text{-}ownership)_i + \beta_2(Capital\text{-}to\text{-}asset)_i + \beta_3(Asset)_i + \beta_4(Operational\text{-}leverage)_i + \varepsilon_i$

The results for the other risk measures are very similar, and are available from the author. We can easily find that the previously-found results in 4.1.1 are more clearly observed in the partitioned-sample test. The coefficient β_{11} in table 9 is significantly positive for most of the regressions during 1994-1997 period. The coefficient β_{11} in table 10 measuring the relation between ownership structure and profitability is significantly negative during 1995-1997 period. These results suggest that the greater and unprofitable risk-taking of stockholder-controlled banks during the periods of deregulation is more transparent for the set of unhealthy and declining banks. Also, as indicated by the positive β_{11} during the period 1999-2000 in table 10 (significant for 2000), the tendencies of stockholder-controlled banks to change risk-taking behavior toward a more modest and profitable one when regulations are tightened are observed more transparently for the set of banks with heavier regulatory oversights.

Table 10. Partitioned sample regression results on profitability test.

Year	Intercept	Insider own-ership	*Dummy*×Insider-ownership	Capital-to-asset	Asset	Operational leverage	Adj-R^2
1994	0.2754	-0.0481*	0.0015	0.0025	-0.3001^{+7}	-1.5998***	0.45
	(0.57)	(-1.69)	(0.18)	(0.62)	(-0.17)	(-2.54)	
1995	-0.1826*	-0.0455	-0.0028*	0.0006	-0.7816^{+7}	-1.2110*	0.30
	(-1.63)	(-1.51)	(-1.69)	(0.31)	(-0.32)	(-1.65)	
1996	-0.4018	-0.0611*	-0.0102**	-0.0052	0.1776^{+7}	-1.4711***	0.39
	(-1.17)	(-1.63)	(-2.36)	(-0.60)	(0.49)	(-3.05)	
1997	-0.6981**	-0.0210	-0.0207*	0.0177*	-0.6884^{+7}	-1.9927	0.42
	(-2.16)	(-1.29)	(-1.70)	(1.69)	(-0.35)	(-1.45)	
1998	-0.3003*	-0.0491	-0.0006	-0.0003	0.6118^{+7}	-1.0018*	0.34
	(-1.63)	(-1.02)	(-0.97)	(-0.64)	(0.88)	(-1.64)	
1999	0.0150	0.0195	0.0114	-0.0001	-0.5992^{+7}	-1.6650	0.41
	(1.21)	(1.58)	(1.25)	(-0.60)	(-0.10)	(-1.60)	
2000	0.0337	0.0190	0.0103**	-0.0014	0.2117*	-1.0110	0.36
	(0.90)	(1.12)	(1.99)	(-0.50)	(1.64)	(-0.88)	

*** denotes statistical significance at 1% level, ** denotes statistical significance at 5% level, * denotes statistical significance at 10% level. ROA = β_0 + β_1(Insider-ownership)$_i$ + β_{11}(***Dummy***×Insider-ownership)$_i$ + β_2(Capital-to-asset)$_i$ + β_3(Asset)$_i$ + β_4(Operational-leverage)$_i$ + ε_i

5. Concluding comments

In this study, we examine the relation between ownership structure and risk-taking behavior of banks by analyzing data for three different regulatory and economic regimes of the Korean banking industry. We find that stockholder-controlled banks exhibit higher but unprofitable risk-taking than managerially-controlled banks during the period of deregulation 1994-1995, and that this relation is more transparent during the period of deregulation and decline of the industry 1996-1997. However, higher risk-taking incentives of stockholder-controlled banks become weaker during the period of tightened regulation and structural reform 1999-2000. Furthermore, the profitability of stockholder-controlled banks given a unit increase in the bank's risk appears to be improved in this period relative to the periods of deregulation. Considering that the economic conditions of the Korean banking industry in this period is under recovery stage (not prosperity), these results may suggest that stockholder-controlled banks try to change their risk-taking behavior toward a more deliberate and profitable one, and therefore, may provide somewhat convincing evidence for the corporate control hypothesis stating that insider ownership during periods of regulatory stringency would give banks the incentives to pursue modest, deliberate and profitable risk-taking strategies.

In the test for the partitioned sample, we find stronger evidences. We find that the tendencies of stockholder-controlled banks to take unprofitable risks during the periods of deregulation 1994-1998 are observed more transparently for the set of un-healthy and declining banks that are acquired by healthier banks in later structural-reform period. Also, the tendencies of stockholder-controlled banks to change their risk-taking behavior toward a more deliberate and profitable one during the period of tightened regulation and structural reform 1999-2000

are observed more transparently for the set of banks that are newly borne by acquiring problem banks, and therefore, that would be imposed on heavier regulatory oversights from regulators.

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