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The Impact of Capital Requirements and Managerial Compensation on Bank Charter Value*

DARIUS PALIA†
Department of Finance and Economics, Rutgers Business School-Newark and New Brunswick, 94 Rockafeller Road, Piscataway, NJ 08854-8054, USA, Tel: (732) 445-2306
E-mail: dpalia@rci.rutgers.edu

ROBERT PORTER
Quinnipiac University, School of Business, 275 Mount Carmel Avenue, Hamden, CT 06518, Tel: (203) 582-3647
E-mail: rlporter@quinnipiac.edu

Abstract. This paper examines the joint impact of capital requirements *and* managerial incentive compensation on bank charter value and bank risk. Most of the previous literature in the area of banking and agency theory has focused on asymmetric information between either banks and regulators, (and therefore on the role of bank capital), or between bank shareholders and bank managers, (and therefore on the role of managerial ownership). In this paper we unify these issues and present empirical results from the regression of capital requirements jointly with measures of incentive compensation on Tobin's Q, our proxy for bank charter value, and on the standard deviation of total return, our proxy for bank risk. In a sample of 102 bank holding companies we find that capital levels are consistently a significant positive factor in determining bank charter value and a significant negative factor in determining risk. On the other hand, we find our six measures of incentive compensation to be generally insignificant relative to charter value but do provide some evidence consistent with a theory relating types of incentive compensation with risk.

Key words: banking, capital requirements, incentive compensation

JEL Classification: G21, G32

1. Introduction

In banking literature the term "charter value" is the term most often used to refer to the intrinsic value of the firm. A bank's charter value is the present value of its future economic profits as a going concern. It is the bank's future profit-generating potential arising from such things as efficiency, market power and customer relationships. As in the general corporate finance literature it is often proxied by Tobin's Q. The term "charter value" arises out of the value created when a bank obtains the ability (i.e. receives a charter) to operate in a regulated environment. Banking legislation that limits competition provides market power to approved banking organizations and thereby creates value.

Charter value has been extensively reviewed for its impact on bank risk-taking. Marcus (1984) argued that research in banking that focuses on exploitation of the federal safety

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†Corresponding author.

net ignores the potential loss of valuable charter value due to financial distress. Keeley (1990) presents empirical evidence showing that charter value is robustly negative to bank risk-taking. He documents a decline in charter value associated with deregulation of the banking industry and argues that this is the reason why moral hazard, arising from deposit insurance, only started to influence bank risk-taking 50 years after it was enacted. Saunders and Wilson (1999, 2001), however, present evidence that the risk-restraining attribute of charter value has varied dramatically over the last 100 years. Specifically, they note that charter value has not always provided a restraint on risk-taking, especially in periods of economic contraction. Houston and James (1995) find a positive and significant relation between incentive-based CEO compensation and bank charter value. This result is presented as evidence that compensation policies do not promote risk-taking in banking.

Gorton and Rosen (1995) argue that moral hazard was not the primary cause of increased bank risk in the 1980s. They present a theoretical model and empirical evidence suggesting that it was management entrenchment that caused the increase in risk. Their argument is that bank managers are making the lending decisions that most affect risk, not the shareholders. Further, bank managers are inherently risk-averse in order to protect non-diversifiable human capital, a line of thought that can be traced to Amihud and Lev (1981). When bad managers predominate, however, conservative behavior may not be sufficient for them to keep their jobs and so they increase risk in the hope of achieving extraordinary returns. In other words, Gorton and Rosen believe that corporate control issues are more important than moral hazard in explaining the increase in risk.

Saunders, Strock and Travlos (1990) study bank ownership structure and risk. They find that stockholder controlled banks generally exhibit higher risk-taking behavior than managerially controlled banks. This is consistent with the premise that managers are inherently more risk-averse than shareholders. John, Saunders and Senbet (2000) argue that regulatory efforts to control bank risk through capital ratios will not be effective and will lead to a sub-optimal allocation of resources. They argue that senior bank management compensation contracts may provide a more direct and effective way to control risk in banking. Further, a deposit insurance premium structure can be employed to motivate shareholders to adopt compensation policies for managers that are incentive compatible with the desired level of risk.

Banks operate in a regulated environment and Smith and Watts (1992) show that compensation is less responsive to performance in regulated industries. Since regulation limits the bank's investment opportunity set high pay-performance sensitivity is not necessary. Hubbard and Palia (1995) show that banking deregulation increases the investment opportunity set available to banks and also increases the proportion of incentive compensation included in CEO pay packages.

In the general corporate finance literature a number of studies measure the impact of ownership structure on firm value. Morck, Shleifer and Vishny (1988) present evidence of a non-linear relationship between management ownership and firm value. Tobin's Q rises with increased insider ownership at low levels of insider ownership. As insider ownership increases, however, Tobin's Q first declines and then starts increasing again. Their explanation for this non-monotonic relationship is that alignment effects are operating at low levels of insider ownership, but entrenchment takes over as ownership increases until alignment takes over again at high levels of ownership.

McConnell and Servaes (1990) also investigate the relationship between equity ownership and firm value. They, too, find a curvilinear relation between insider ownership and firm value. Further, they study the impact of institutional ownership on firm value and find a significant positive relation. In McConnell and Servaes (1995) the authors introduce the impact of growth opportunities on ownership and firm value. They find a marginally larger impact of ownership structure on firms with low growth opportunities. The more significant results of this study is the documentation of the dichotomous impact of leverage based on growth options. In a more recent study, McConnell, Servaes and Lins (2003) consider the relation between changes in equity ownership by corporate insiders and changes in firm value. They look at the stock price response to announcements of share purchases by insiders. In this study the results are again consistent with a curvilinear relationship between insider ownership and firm value. As a whole, this literature argues that insider ownership matters.

There are two underlying themes running through the literature discussed above. First, asymmetric information between banks and regulators leads to problems in controlling risk. This is the much discussed moral hazard problem. Second, asymmetric information between bank managers and bank shareholders also leads to problems in achieving the optimal risk level and therefore in maximizing firm value. In this article we seek to extend this literature by examining these two agency problems jointly.

We note that bank regulators have historically attempted to link the level of required bank capital to the level of bank risk-taking in order to address the moral hazard problem. However, since higher returns are associated with higher risk, if capital is also forced higher the return on capital will be truncated. What then is the impact of capital requirements on bank charter value?

Stock ownership has often been studied for its affect on firm value for non-financial firms and charter value for banks. However, incentive compensation plans have also been used extensively to align the interests of managers and shareholders. We employ incentive compensation in our study as it is a more comprehensive factor. Agency theory implies that risk will increase as managers and shareholders become more aligned. What then is the impact of incentive compensation on bank charter value? Further, of these two factors, capital and incentive compensation, which is more important?

More specifically, we wish to study the joint impact of bank capital requirements and incentive compensation on bank charter value. We view the adoption of the Basle Capital Accord in 1988 as a material event affecting the capital structure of banks. Accordingly, we use data from 1991, the required implementation date of the Basle Accord, for our cross-sectional analysis. In lieu of ownership structure alone, as in most previous studies, we examine the impact of managerial incentive compensation. This allows us to consider not only the level of stock ownership of the CEO but also stock options held and the sensitivity of CEO salary to changes in shareholder wealth.

Capital requirements and incentive compensation also have an impact on risk. Accordingly, we include the results of regressing a market-based measure of risk, the standard deviation of the total return for each bank, on our measures of capital and incentive compensation. We are agnostic as to the direction of causality between the variables. For example, capital may act to increase charter value or it may act to decrease risk and the decrease in risk causes an increase in charter value.

The remainder of the article is organized as follows. In Section 2 we briefly review the history of bank capital regulation with emphasis on the Basle Capital Accord. In Section 3 we discuss incentive compensation, the variables employed and how we calculate pay-performance-sensitivity. Section 4 describes our data and methodology, Section 5 discusses the results, and Section 6 concludes.

2. Bank capital requirements

In 1981 the first formal capital requirements were introduced in the U.S. There were different requirements based on bank size but not based on bank risk. In 1988 the Basle Accord was adopted and this, for the first time, introduced risk-based measures into the determination of capital adequacy. Owing to its central position in determining capital adequacy standards for banks, a brief history and summary of the Basle Accord is in order.

The Basle Committee was established by the central bank governors of the Group of Ten countries in 1974 and was designed to foster cooperation on bank supervisory matters among the member countries. The Basle Committee reports to the Committee of Central Bank Governors that meet at the Bank for International Settlements in Basle, hence the committee's name. Since the early 1980s the Basle Committee's efforts have been concentrated on the issue of capital adequacy. This effort was in response to the deteriorating capital position of many international banks at a time of a perceived increase in international risks.

In 1988 the Committee issued a capital measurement system usually referred to as the Basle Capital Accord or Basle Accord I. The Accord had two primary objectives: first, to increase bank capital and reduce credit risk and, second, to provide a level playing field for competition between the banks of the different countries. The Committee felt that the second goal would be accomplished if there were uniform implementation of the rules associated with the first goal.

The rules adopted contained three primary elements. The first element was a system of risk weighting of the assets banks held. This was intended to eliminate the problem of two banks having an identical capital-to-assets ratio even though one bank held a significantly higher amount of risky assets than the other. The second element was a definition of what constituted "regulatory capital". Differing accounting definitions of the member countries led to the potential for differing amounts of capital support for the risk-defined asset categories. As a result the Committee created two classes of capital, "Tier 1" capital and "Tier 2" capital, with specific guidelines as to how much Tier 2 capital could be used in relation to the amount of Tier 1 capital. The third element of the Accord was the inclusion of off-balance sheet items in the determination of the amount of risk and therefore the amount of capital a bank was required to maintain. The general rule of the Accord stated that banks were required to maintain a minimum capital ratio (with acceptable capital as defined by the Accord) equal to eight percent of their risk-weighted assets and off-balance sheet exposures.

While U.S. bank regulators were active participants in developing the Basle Accord, the U.S. Congress pursued legislative remedies to the problems associated with the S&L crisis and the increased commercial bank failures of the 1980s. In 1989 the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) was passed. The act provided the public funding required to resolve the thrift insolvencies and in return reorganized the regulatory

agencies and deposit insurance management. In 1991 the Federal Deposit Insurance Corporation Improvement Act (FDICIA) was enacted. The act re-capitalized the FDIC after large losses critically reduced the insurance funds available to meet future bank crises and also mandated the development of management standards and policies. Importantly, the FDICIA defined "Prompt Corrective Action" that had to be taken when a bank's capital ratio fell below certain limits. The goal was to enforce minimum capital standards and to require action by regulators before a bank was completely insolvent. At the same time this act limited the flexibility of regulators in their attempt to resolve troubled bank problems in order to avoid another rescue similar to that of Continental Illinois that was particularly troublesome to many legislators.

3. CEO incentive compensation

Previous studies have concentrated on the impact of ownership structure on firm value. The articles cited above conclude that the amount of shares owned by corporate insiders has a significant impact on firm value. Here, we wish to consider not only CEO shares owned but also the impact of options held and other elements of incentive compensation.

We start our analysis by considering the impact of the dollar value of three compensation variables on bank charter value when the compensation variables are in combination with the book-value capital ratio of the bank. Analysis of the number of shares owned is consistent with other studies of ownership structure and firm value. In addition, we investigate the impact on bank charter value of the dollar value of options held by the CEO and the change in the sum of salary, bonus and other compensation.

Next, we consider three measures of incentive compensation that are consistent with the pay-performance sensitivity literature. The first measure employed is the shares owned by the CEO as a percent of the total shares outstanding. This is an analog to the value of the shares owned by the CEO. Our second measure deals with the stock options granted to the CEO. The sensitivity of options is calculated by multiplying the number of options granted as a percent of total shares outstanding by the Black-Scholes hedge ratio adjusted for dividends. The following two assumptions are employed in the calculation: first, all options have a ten year maturity, and second, the risk-free rate is equal to the rate on the ten-year Treasury bond. All other required data for this calculation are available in our dataset. The specific calculation was made as follows:

$$\text{OPTVAL} = N[Pe^{-dt}\Phi(Z) - Ee^{-rt}\Phi(Z - \sigma\sqrt{T})]$$

$$Z = \left[\ln(P/E) + T\left(r - d + \frac{\sigma^2}{2}\right)\right] \Big/ \sigma\sqrt{T}$$

where

N = number of options granted
P = stock price at end of year
E = exercise price of option

$$
\begin{aligned}
d &= \log(1 + \text{div. rate}/P) \\
r &= \log(1 + \text{rate on 10 yr Treas}) \\
\Phi &= \text{normal probability function} \\
\sigma^2 &= \text{volatility of stock} \\
T &= \text{time to exercise}
\end{aligned}
$$

Our third measure is designed to consider the incentives included in salary, bonus and other compensation. Since the sensitivity of the these data items are not observable we estimate them via regression analysis. Following Jensen and Murphy (1990) and Hall and Liebman (1998) we regress the change in CEO salary, bonus, and other compensation on the change in shareholder wealth. The change in shareholder wealth is defined as the market value of the bank's equity at the beginning of the year multiplied by the stock return for that year. More specifically, we perform the following regression analysis:

$$\Delta(\text{SALBON} + \text{OTHCOMP})_t = \alpha + \beta\Delta(\text{Shareholder Wealth})_t + \varepsilon_t$$

The coefficient, beta, is our measure of the pay-performance sensitivity of salary, bonus, and other compensation.

The pay-performance sensitivities calculated as described above are consistent with the results found by Jensen and Murphy and others. In the analysis that follows we use both the dollar value of the compensation variables as well as their respective pay-performance sensitivities.

4. Data, variables and methodology (Tables 1 and 2)

In this section we describe our sources for the data, the key variables we employ, and the basic methodology used. Note that all dollar-value data are in units of $1,000s.

Capital. Our first measure of capital employed is the ratio of the book-value of capital to the book-value of total assets, a leverage ratio. We use only equity in this definition of capital and omit subordinated debt and loan loss reserves. The Federal Reserve Form Y-9C data are used to provide the required bank balance sheet data. All data were retrieved from the Federal Reserve Bank web site, a standard bank balance sheet was assembled for each bank and the ratio calculated. This variable is labeled *BKCAPRATIO91*. The second measure of capital that we employ is the Basle Accord specified capital ratio. As noted above, this ratio is based on risk-based assets plus off-balance-sheet liabilities and both Tier I and Tier II capital. It is labeled RBACAPRATIO91.

Incentive compensation. Note that we wish to do a cross-sectional analysis as of year-end 1991, the year of the full implementation of the Basle I Capital Accord. Standard and Poor's ExecuComp database starts in 1992 and is, therefore, unavailable for our use. Fortunately, we have been provided the compensation and firm performance data gathered by David Yermack covering the period 1984–1991.

Table 1. Variable definitions

Variables	Definitions
Dependent variables	
TOBINSQ91	The market-value of assets divided by the book-value of assets. Calculated as the ratio of the book-value of assets minus the book-value of equity plus the market-value of equity to the book-value of assets.
STDRET91	The standard deviation of the bank's daily total return during 1991.
Capital variables	
BKCAPRATIO91	The bank's ratio of equity to total assets, both measured in book value.
RBACAPRATIO91	The bank's capital ratio as defined by the Basle Accord.
Compensation variables	
STKVALBEG	The value of the CEO's stock holdings at the beginning of the year.
VOPTBEG	The value of the CEO's vested options at the beginning of the year.
CHGSALBON89_90	The change in the sum of salary, bonus, and other compensation.
PCTOWNED	The shares owned by the CEO as a percent of the total shares outstanding.
OPTIONS_PPS90	The number of options granted as a percent of total shares outstanding multiplied by the Black-Scholes hedge ratio adjusted for dividends
BETA_DSALOTH90	The coefficient from regressing the change in SALBON + OTHCOMP on the change in shareholder wealth over the period 1989 to 1990.
SALBON	The total of the CEO's salary and bonus.
OTHCOMP	Fringe benefits and cash payouts from long-term compensation plans (excluding options)
OPTGRANT	The number of new stock options granted during the year.
TOTALPPS	The sensitivity of all compensation items, salary, bonus, and other compensation; options; and shares; (PCTOWNED + OPTIONS_PPS90 + BETA_DSALOTH).
Control variable	
LN_TOTASTS	The natural log of the total assets of the bank; to control for size.

We employ both dollar-value variables and pay-performance sensitivity variables. The dollar value of the stock owned by the CEO at the beginning of the year is labeled *STKVALBEG*. The value of options held by the CEO is labeled *VOPTBEG*. The change in the total value of salary, bonus and other compensation is labeled *CHGSALBON89_90*.

The number of shares owned by the CEO as a percent of total shares outstanding is labeled *PCTOWNED90*. The sensitivity of stock options is labeled *OPTIONS_PPS90* and is calculated by taking the number of stock options granted as a percent of total shares outstanding and multiplying the result by the Black-Scholes hedge ratio adjusted for dividends. The sensitivity of salary, bonus, and other compensation is labeled *BETA_DSALOTH* and is estimated by regressing the change in salary, bonus and other compensation on the change in shareholder wealth and then using the coefficient on shareholder wealth as our measure.

Tobin's Q. Market-based capital values were calculated by multiplying the number of shares outstanding by the year-end stock price. Market-based asset values were then calculated by taking the bank's total assets, subtracting the book-value of equity and adding the market-value of equity. Our proxy, Tobin's Q, was then calculated as the market-value

Table 2. Descriptive statistics

Variables	*N*	Mean	Median	Std dev.
TOBINSQ91	102	1.04	1.01	0.19
STDRET	102	0.0248	0.0213	0.0118
BKCAPRATIO91	102	6.55%	6.44%	1.42%
RBACAPRATIO91	102	12.20%	11.70%	2.77%
STKVALBEG (000's omitted)	102	$4,531.2	$933.9	$12,344.3
VOPTBEG (000's omitted)	102	$1,137.1	$733.7	$1,428.8
CHGSALBON89_90	102	−$6,314	$8,000	$470,440.4
PCTOWNED90	102	1.34%	0.20%	4.23%
OPTIONS_PPS90	102	0.000508	0.000188	0.001182
Beta DSALOTH90	102	0.000347	0.000106	0.001269
SALBON90 (000's omitted)	102	$650.3	$559.0	$332.9
OTHCOMP90 (000's omitted)	102	$152.9	$21.0	$368.6
OPTGRANT90	102	30,908	15,000	53,597
TOTALPPS90	102	0.014263	0.002610	0.042774
LN_TOTASTS	102	16.21	16.05	1.13

Summary statistics for 102 bank holding companies and CEO compensation. Balance sheet data is for 1991 and is from the Federal Reserve Form Y-9C. Compensation and stock price data is for 1991 (unless noted in the variable label) and is from a data base collected by David Yermack. TOBINSQ91 is the 1991 market value of assets divided by the 1991 book value of assets. STDRET91 is the standard deviation of the bank's daily total return during 1991. BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. STKVALBEG is the value of the CEO's stock holdings at the beginning of 1991. VOPTBEG is the value of the CEO's vested stock options at the beginning of the year. CHGSALBON89_90 is the change in the sum of salary, bonus and other compensation from 1989 to 1990. PCTOWNED is the shares of stock owned by the CEO as a percent of total shares outstanding. OPTIONS_PPS90 is the number of options granted during 1990 as a percent of total shares outstanding multiplied by the Black-Scholes hedge ratio adjusted for dividends. BETA_DSALOTH is the coefficient from regressing CHGSALBON89_90 on the change in shareholder wealth from 1989 to 1990. SALBON is the sum of the CEO's salary and bonus. OTHCOMP is the value of fringe benefits and cash payouts from long-term compensation plans other than options. OPTGRANT is the number of options granted during 1990. TOTALPPS is the sum of PCTOWNED, OPTIONS_PPS90, and BETA_DSALOTH. LN_TOTASTS is the natural log of the total assets of the bank.

of assets divided by the book-value of assets. This variable is labeled *TOBINSQ91* and is our dependent variable. We examine the potential for correlation between our independent variables. As noted in Table 3, the correlation between bank capital and the compensation variables employed is not significant with the exception of the change in salary and bonus which is significant at the 10% level.

Standard deviation of total return. We use the Center for Research in Security Prices (CRSP) data to calculate the standard deviation of the daily total return during 1991 for our sample banks. This variable is labeled STDRET91 and is our proxy for bank risk.

Table 3. Pearson correlation coefficients

	BKCAPRATIO91	RBACAPRATIO91	STKVALBEG	VOPTBEG	CHGSALBON89_90
BKCAPRATIO91	1.00000	0.40381 (<.0001)	−0.07729 (0.4400)	0.05926 (0.5541)	0.17647 (0.0760)
RBACAPRATIO91		1.00000	0.11354 (0.2559)	0.05346 (0.5936)	0.12361 (0.2158)
STKVALBEG			1.00000	0.08264 (0.4089)	0.29300 (0.0028)
VOPTBEG				1.00000	0.00371 (0.9705)
CHGSALBON89_90					1.00000

BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. STKVALBEG is the value of the CEO's stock holdings at the beginning of 1991. VOPTBEG is the value of the CEO's vested stock options at the beginning of the year. CHGSALBON89_90 is the change in the sum of salary, bonus and other compensation from 1989 to 1990. Probability $> |r|$ under HO: Rho $= 0$ are in parentheses.

Methodology (Table 3). We wish to investigate the relation between bank charter value and the combination of bank capital requirements and managerial incentive compensation. Tobin's Q is our proxy for bank charter value. We also want to examine the relation between risk and the same combination of capital requirements and incentive compensation. The standard deviation of total daily returns is our proxy for risk. The sample banks' book-value capital ratios immediately after the implementation of the Basle I Capital Accord are used as a proxy for bank capital requirements. We also use the Basle Accord defined risk-based capital ratio to proxy for capital requirements. Managerial incentive compensation is tested by three independent proxies as well as by the three independent proxies with an interaction term between the proxy and the bank book-value capital ratio. We also consider the results for all three proxies in combination and all three proxies with all of their respective interaction terms in combination. Please note that the interaction terms did not produce any significant change in any of the regressions and therefore are not reported. All terms are defined in Table 1. We control for bank size in all regressions. In addition, we employ the compensation variables both in dollar terms and as pay-performance sensitivity ratios. In Table 3 we find a general lack of correlation among our main regressors, namely the bank capital variables and our managerial incentive compensation measures.

5. Results

5.1. Impact on bank charter value

Compensation variables in dollar amounts (Table 4). The coefficients on our bank-capital-requirement variables are consistently positive and highly significant. We find no evidence that excessive capital requirements are creating negative pressure on bank charter

Table 4. Effects of capital and compensation on Tobin's Q using dollar-valued compensation variables

	Dependent variable: TOBINSQ91			
Independent variable	Model 1	Model 2	Model 3	Model 4
	Panel A: Employing book-value based capital ratio			
Intercept	1.70295***	1.90615***	1.69786***	1.94747***
	(6.21)	(6.54)	(6.23)	(6.53)
BKCAPRATIO91	3.65727***	3.36355**	3.58740**	3.11217**
	(3.00)	(2.78)	(2.91)	(2.49)
STKVALBEG	−0.00407			−0.01070
	(−0.29)			(−0.73)
VOPTBEG		0.24050*		0.25360*
		(1.85)		(1.92)
CHGSALBON89_90			0.00018	0.00026
			(0.48)	(0.69)
LN_TOTASTS	−0.05565***	−0.06880***	−0.05516***	−0.07012***
	(−3.64)	(−4.13)	(−3.62)	(−4.15)
	Panel B: Employing risk-based capital ratio per basle accord			
Intercept	1.91513***	2.12563***	1.90450***	2.15052***
	(7.26)	(6.54)	(7.23)	(7.69)
RBACAPRATIO91	1.23249**	1.08663*	1.12065*	1.09095*
	(1.95)	(1.76)	(1.77)	(1.75)
STKVALBEG	−0.0108			−0.01850
	(−0.76)			(−1.27)
VOPTBEG		0.2769**		0.29340**
		(2.10)		(1.92)
CHGSALBON89_90			0.00037	0.00038
			(0.48)	(1.04)
LN_TOTASTS	−0.06304***	−0.07717***	−0.06184***	−0.01674***
	(−4.09)	(−4.63)	(−4.01)	(−4.68)

The sample consists of 102 bank holding companies. The dependent variable, TOBINSQ91, is the 1991 market value of assets divided by the 1991 book value of assets. BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. STKVALBEG is the value of the CEO's stock holdings at the beginning of 1991. VOPTBEG is the value of the CEO's vested stock options at the beginning of the year. CHGSALBON89_90 is the change in the sum of salary, bonus and other compensation from 1989 to 1990. LN_TOTASTS is the natural log of the total assets of the bank. *T*-statistics are in parentheses.
The sign *denotes significance at 10% level; **denotes significance at the 5% level; ***denotes significance at the 1% level. Coefficients for STKVALBEG, VOPTBEG, and CHGSALBON89_90 are presented as the actual coefficient multiplied by 10ˆ4.

value. We find a slight decline in the significance of the capital variable when we use the risk-based capital ratio compared with the book-value capital ratio.

Of the three compensation variables, the only one that was found to be significant was the value of options held by the CEO. In a regression with the bank book-value capital ratio while controlling for bank size we find the value of options to be significant at the 10% level. The sign of the coefficient is positive implying higher levels of options result in higher charter value. Interestingly, when we use our risk-based capital measure the significance of the value of CEO options increases.

Our other two compensation variables, the value of stock owned and the change in salary, bonus and other compensation, appear to have no significant effect on bank charter value. Please note that the use of dollar-denominated managerial incentive compensation variables produced exceptionally small parameter coefficients for these variables. Accordingly, the coefficients for these variables are presented as the actual coefficient multiplied by ten raised to the fourth power.

The absence of significance of our stock ownership variable is in contrast to the general corporate finance literature. While opinions differ as to the linear or curvilinear nature of the relation there has been little doubt of the significance of insider ownership on firm value. Here we are employing the value of stock held by the CEO, presumably a non-trivial portion of the stock held by corporate insiders, as one of our compensation variables and find no significance. Our results, therefore, differ from the general finance literature where ownership structure has been documented as a significant factor influencing firm value.

As a general result, we do not find high significance in the relation of incentive compensation and bank charter value. This result is, of course, consistent with Smith and Watts (1992) who report lower levels of incentive compensation in regulated industries. In addition, the deregulation and increased use of options by banks reported by Hubbard and Palia (1995) may not have been fully developed by 1991.

Compensation variables as ratios (Table 5). When we convert our compensation variables into pay-performance sensitivity ratios we find very similar results. The bank book-value capital ratios are all positive and highly significant explanatory variables. We again find the same positive sign with a slight decline in significance when we employ the risk-based capital ratio compared with the book-value capital ratio.

When we use pay-performance sensitivity ratios as our independent compensation variables we find no statistical significance to any of the compensation variables. This includes when they are regressed individually or collectively and both with and without their respective interaction terms. Results including the interaction terms were not materially different than our basic results and, therefore, are not reported. When we employ the risk-based capital ratio as our proxy for capital we continue to find no significance to any of the incentive compensation variables.

We have measured the pay-performance sensitivity of stock owned as the number of shares owned by the CEO as a percent of total shares outstanding. This is the same variable used by the ownership structure studies noted above except it is only for the CEO and not all corporate insiders. The absence of significance is consistent with our previous findings.

5.2. Impact on bank risk

Compensation variables in dollar amounts (Table 6). We again find our capital variables to be highly significant but now the coefficient is negative and not positive as it was for bank charter value. This is true in all cases, regardless of the compensation variables included and whether we employ the book-value capital ratio or the risk-based capital ratio. For our sample increased capital levels decrease risk when risk is measured by the standard deviation of total return.

Table 5. Effects of capital and compensation on Tobin's Q using pay-performance sensitivity variables

	Dependent variable is TOBINSQ91			
Independent Variable	Model 1	Model 2	Model 3	Model 4
Panel A: Employing panel A: Employing book-value based capital ratio				
Intercept	1.74201***	1.69651***	1.69353***	1.74192***
	(6.11)	(6.18)	(5.80)	(5.67)
BKCAPRATIO91	3.51095**	3.68479***	3.68985**	3.50873**
	(2.80)	(3.03)	(2.96)	(2.70)
PCTOWNED90	−0.23848			−0.24250
	(−0.57)			(−0.56)
OPTIONS_PPS90		−1.12838		0.64860
		(−0.08)		(0.04)
BETA_DSALOTH			0.04609	−0.08349
			(0.00)	(−0.01)
LN_TOTASTS	−0.05739***	−0.05545***	−0.05532***	−0.05739***
	(−3.67)	(−3.62)	(−3.45)	(−3.45)
Panel B: Employing risk-based capital ratio per Basle accord				
Intercept	1.974091***	1.91125***	1.93866***	1.99668***
	(7.41)	(7.18)	(6.92)	(7.04)
RBACAPRATIO91	1.21679**	1.17554*	1.14161*	1.18956*
	(1.95)	(1.87)	(1.79)	(1.86)
PCTOWNED90	−0.57056			−0.58213
	(−1.37)			(−1.35)
OPTIONS_PPS90		−2.21255		3.20452
		(−0.15)		(0.21)
BETA_DSALOTH			−5.03418	−4.39601
			(−0.35)	(−0.30)
LN_TOTASTS	−0.06639***	−0.06261***	−0.06401***	−0.06758***
	(−4.26)	(−4.04)	(−3.97)	(−4.14)

The sample consists of 102 bank holding companies. The dependent variable, TOBINSQ91, is the 1991 market value of assets divided by the 1991 book value of assets. BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. PCTOWNED is the shares of stock owned by the CEO as a percent of total shares outstanding. OPTIONS_PPS90 is the number of options granted during 1990 as a percent of total shares outstanding multiplied by the Black-Scholes hedge ratio adjusted for dividends. BETA_DSALOTH is the coefficient from regressing CHGSALBON89_90 on the change in shareholder wealth from 1989 to 1990. LN_TOTASTS is the natural log of the total assets of the bank. T-statistics are in parentheses.
The sign * denotes significance at 10% level; ** denotes significance at the 5% level; *** denotes significance at the 1% level.

When we consider the impact of our incentive compensation variables on risk we find that the change in the level of salary and bonus carries a significant and negative coefficient regardless of the capital variable employed. This is consistent with the theory presented by John, Saunders and Senbet (2000) that managers act to decrease risk when their compensation is primarily salary and bonus.

The balance of our compensation variables are generally insignificant with one exception. When we employ our risk-based capital ratio as the proxy for capital and include all

Table 6. Effects of capital and compensation on risk using dollar-valued compensation variables

	Dependent variable is STDRET91			
Independent variable	Model 1	Model 2	Model 3	Model 4
Panel A: Employing book-value based capital ratio				
Intercept	0.09101***	0.08448***	0.09013***	0.08073***
	(6.08)	(5.25)	(6.56)	(5.05)
BKCAPRATIO91	−0.53052***	−0.52080***	−0.50499***	−0.48366***
	(−7.96)	(−7.80)	(−7.70)	(−7.20)
STKVALBEG	0.00006			0.00079
	(0.08)			(1.01)
VOPTBEG		−0.00755		−0.00848
		(−1.05)		(−1.19)
CHGSALBON89_90			−0.000054**	−0.00005***
			(−2.33)	(−2.53)
LN_TOTASTS	−0.00194**	−0.00153*	−0.00199**	−0.00146
	(−2.33)	(−1.66)	(−2.46)	(−1.61)
Panel B: Employing risk-based capital ratio per Basle accord				
Intercept	0.05224***	0.04179***	0.05341***	0.03971***
	(3.01)	(2.25)	(3.18)	(2.24)
RBACAPRATIO91	−0.11664***	−0.10753***	−0.09895**	−0.10054***
	(−2.81)	(−2.62)	(−2.45)	(2.54)
STKVALBEG	0.00089			0.00189**
	(0.95)			(2.04)
VOPTBEG		−0.000001		−0.000001*
		(−1.61)		(−1.84)
CHGSALBON89_90			−0.000064***	−0.000077***
			(−2.68)	(−3.18)
LN_TOTASTS	−0.00084	−0.00014	−0.00103	−0.00011
	(−0.83)	(−0.13)	(−1.04)	(−0.11)

The sample consists of 102 bank holding companies. The dependent variable, STDRET91, is the standard deviation of the bank's total return during 1991. BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. PCTOWNED is the shares of stock owned by the CEO as a percent of total shares outstanding. OPTIONS_PPS90 is the number of options granted during 1990 as a percent of total shares outstanding multiplied by the Black-Scholes hedge ratio adjusted for dividends. BETA_DSALOTH is the coefficient from regressing CHGSALBON89_90 on the change in shareholder wealth from 1989 to 1990. DUMMYQ takes the value of one for the top half of the sample when ordered by Tobin's Q and takes the value zero otherwise. LN_TOTASTS is the natural log of the total assets of the bank. T-statistics are in parentheses.

The sign *denotes significance at 10% level; **denotes significance at the 5% level; ***denotes significance at the 1% level. Coefficients for STKVALBEG, VOPTBEG, and CHGSALBON89_90 are presented as the actual coefficient multiplied by 10^4.

compensation variables in the regression we find all of the compensation variables are significant at least at the 10% level. The change in salary and bonus continues to carry a negative sign and the value of options held by the CEO also has a negative sign. The value of the CEO's stock at the beginning of the year, however, carries a positive sign. The latter finding is again consistent with John, Saunders and Senbet, increases in CEO stock holdings

produce increases in risk. The negative sign on the value of options is not consistent with any theory known to the authors.

Compensation variables as ratios (Table 7). We again find a negative and highly significant coefficient on our capital variables using both the book-value capital ratio and the risk-based capital ratio. Higher levels of capital are associated with lower levels of risk.

Table 7. Effects of capital and compensation on risk using pay-performance sensitivity variables

	Dependent variable is STDRET91			
Independent variable	Model 1	Model 2	Model 3	Model 4
	Panel A: Employing book-value based capital ratio			
Intercept	0.09465***	0.09226***	0.09387***	0.09724***
	(6.09)	(6.16)	(5.89)	(5.82)
BKCAPRATIO91	−0.54398***	−0.53278***	−0.53819***	−0.54966***
	(−7.95)	(−8.03)	(−7.91)	(−7.77)
PCTOWNED90	−0.01736			−0.01550
	(−0.76)			(−0.65)
OPTIONS_PPS90		−0.47701		−0.29979
		(−0.61)		(−0.36)
BETA_DSALOTH			−0.37019	−0.30809
			(−0.47)	(−0.38)
LN_TOTASTS	−0.00210**	−0.00199**	−0.00208**	−0.00222**
	(−2.46)	(−2.39)	(−2.37)	(−2.46)
	Panel B: Employing risk-based capital ratio per Basle accord			
Intercept	0.04917***	0.05354***	0.04917***	0.04610***
	(2.79)	(3.05)	(2.67)	(2.47)
RBACAPRATIO91	−0.11435***	−0.11256***	−0.10788***	−0.11064***
	(−2.77)	(−2.71)	(−2.57)	(−2.63)
PCTOWNED90	0.03187			0.03489
	(1.16)			(1.23)
OPTIONS_PPS90		−0.27984		−0.68900
		(−0.29)		(−0.67)
BETA_DSALOTH			0.59223	0.65652
			(0.62)	(0.67)
LN_TOTASTS	−0.00067	−0.00092	−0.00071	−0.00051
	(−0.65)	(−0.90)	(−0.67)	(−0.47)

The sample consists of 102 bank holding companies. The dependent variable, STDRET91, is the standard deviation of the bank's total return during 1991. BKCAPRATIO91 is the 1991 bank ratio of equity to total assets, both measured at book value. RBACAPRATIO91 is the bank's capital ratio as defined by the Basle Accord. PCTOWNED is the shares of stock owned by the CEO as a percent of total shares outstanding. OPTIONS_PPS90 is the number of options granted during 1990 as a percent of total shares outstanding multiplied by the Black-Scholes hedge ratio adjusted for dividends. BETA_DSALOTH is the coefficient from regressing CHGSALBON89_90 on the change in shareholder wealth from 1989 to 1990. DUMMYQ takes the value of one for the top half of the sample when ordered by Tobin's Q and takes the value zero otherwise. LN_TOTASTS is the natural log of the total assets of the bank. T-statistics are in parentheses.

The sign *denotes significance at 10% level; **denotes significance at the 5% level; ***denotes significance at the 1% level.

Our incentive compensation variables, on the other hand, have no significant impact on risk when the variables are defined as pay-performance sensitivity ratios. This is true in regressions employing both the book-value capital ratio and the risk-based capital ratio.

5.3. Summary

We find capital levels significantly impact both bank charter value and bank risk but in opposite directions. Higher capital levels are associated with higher charter value and lower risk. Lower capital levels are associated with lower charter value and higher risk. This implies that charter value and risk are inversely related which is consistent with the literature reviewed. However, Saunders and Wilson's caveat remains, the relation between charter value and risk changes over time and the business cycle.

We find weak evidence that an increase in salary and bonus produces a decrease in risk while an increase in stock held by the CEO produces an increase in risk. These findings are consistent with John, Saunders and Senbet. We also find some evidence that the value of options held by the CEO is positively associated with charter value. Unfortunately, other results concerning the impact of incentive compensation on risk and charter value are insignificant.

6. Conclusions

In an empirical study of the effect of bank capital and managerial incentive compensation on bank charter value we find that bank capital is by far the most significant variable and has a positive effect. The value of stock options held by the CEO is found to have a positive effect on charter value but only when measured in dollar value. The significance of the options is at the 5% level when capital is proxied by the risk-based capital ratio and at the 10% level when the book-value capital ratio is employed. All other managerial incentive compensation variables are found to be insignificant. The absence of significance of the impact on bank charter value of the majority of our incentive compensation variables is in conflict with the findings reported in the general finance literature for non-financial corporations.

When we re-specify our study to measure the effect of bank capital and managerial incentive compensation on bank risk we again find that bank capital is by far the most significant variable. In this specification, however, the coefficient on capital is negative. Higher capital levels are associated with lower levels of risk. We also find some evidence that salary and bonus is negatively associated with risk while stock held by the CEO is positively associated with risk.

Future research might examine whether both factors, capital and incentive compensation, have a significant impact on charter value and risk during different time periods as in Saunders and Wilson (1999, 2001). It is plausible that managerial incentive compensation may have increased in significance over time and may have become a significant determinant of charter value and/or risk. In addition future research could consider if foreign banks have similar results.

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