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RESEARCH ARTICLE

THE EFFECT OF THE EXISTENCE OF CHIEF RISK OFFICER (CRO) ON BANK PERFORMANCE

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Abstract

Over the past few years, numerous studies have examined how top management affects financial performance. These studies highlight the significance of management teams' characteristics and qualities as key factors influencing firms' financial performance. This study focuses on the growing prevalence of Chief Risk Officers (CROs) in the banking industry. It aims to investigate the impact of CROs on the financial performance of banks in the North American Bank sample. The primary objective of this paper is to address the existing gap in the literature by exploring whether there are performance differences between banks that employ CROs and those that do not. This study is based on panel data methodology and the findings of this study provide evidence of a positive correlation between bank size and the presence of a CRO. However, no significant relationship is found between the existence of a CRO and stock return volatility or bank profitability. It is observed that banks with higher volatility levels tend to hire CROs as part of their management team. Consequently, the results suggest that riskier banks are more inclined to employ CROs compared to their safer counterparts.
Keywords: Chief risk officer (CRO), performance, bank, panel data analysis.
JEL Classification: G21, G32, G34

1. Introduction

The most recent financial crisis severely impacted banking industry. Therefore, interest in enterprise risk management grew significantly in recent years (Liebenberg and Hoyt, 2003). For banks to maintain a sustainable financial structure, focusing on risk management became crucial. Especially, banks face many risks such as credit risk, currency risk, etc. Hiring a risk officer is a major indication for a firm about management's perception towards risk. The top management team's effect on firm performance became a theory with upper echelons perspective. The upper echelon theory was developed by Hambrick and Mason in 1984. The theory states that organizational outcomes, strategic choices, and performance levels are partially predicted

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by managerial background characteristics. Accordingly, this study focuses on many hypotheses about top management team's effects on performance. In terms of upper echelon point of view, many studies have been conducted and also different hypotheses have been developed. For example, King et al., (2016) published a paper which is about the influence of CEO education on bank performance and they found that management education delivers skills enabling CEOs to manage increasingly larger and complex banks and achieve successful performance outcomes. Hamid Mehran (1995) published a paper which investigated whether firm performance affected by compensations and the study finds that firm performance is positively related to the percentage of equity held by managers and to the percentage of their compensation that is equity based.

The study by Fahlenbrach and Stulz (2011) about bank CEO incentives and the credit crisis, investigated whether bank performance during the credit crisis is related to chief executive officer incentives before the crisis. In recent years, the concept of CROs managing risk management activities has gained importance. Colquitt et al. (1999) conducted a survey among firms listed in Business Insurance Risk Management Services to evaluate the characteristics and extent of integrated risk management. Their survey revealed that 6.6 percent of these firms reported having an individual with the title of 'Chief Risk Officer' within the company. The results also refer to the traditional risk management concept and according to this, the managers who are responsible for risk management are not given a board level title. The results of this study point out that the respondents' answers suggest the trend toward risk management integration continues. More traditional way of managing risk turned to enterprise risk management (ERM) concept and ERM calls for high level oversight of a company's entire risk portfolio rather than for many different overseers managing specific risks. Furthermore, ERM centralizes management under a CRO or ERM committee who manages the individual overseers to help identify overall how much risk the entity can tolerate, assess mitigation tactics and otherwise take advantages of risk opportunities (Banham, 2005). The role of Chief Risk Officer has begun to gain worldwide acceptance and momentum, a trend that began in the U.S. financial services industry and has extended into Europe and Asia as well as other industries such as energy and non-financial corporations (Lam, 2001). Under the rules issued after crises, the biggest U.S. bank-holding companies are required to have a CRO and a risk committee on the company's board of directors (Sterngold, 2014). There is also evidence that managers in firms with CROs overseeing ERM programs felt more confidence in the efficacy of their risk management system (Pernell et al., 2017). According to Deloitte survey results, assigning an individual executive responsibility for ERM is positively correlated with the level of preparedness to manage risk (Deloitte 2008:15). In recent years, however, corporate risk management has expanded well beyond insurance and hedging of financial exposures to include other kinds of risks such as operational risk, reputational risk, and most recently strategic risk so that the risk management function is now directed often by a senior executive with the title of Chief Risk Officer (CRO) (Nocco and Stulz, 2006). In the related literature, the studies which focus on firm performance in the view of enterprise risk management are common. According to Cumming and Hirtle (2001), Lam (2001), and Meulbroek (2002); enterprice risk management benefits firms by decreasing earnings and stock price volatility, reducing external capital costs, increasing capital

efficiency, and creating synergies between different risk management activities. Baxter et al. (2012) focusing on the global financial crisis, suggest that there is no relation between ERM quality and market performance prior to and during the market collapse. Grace et al. (2015) examine risk management practices in the insurance industry and they find that insurance company with CRO, dedicated risk committees, and risk management entities that report to Chief Financial Officers experience higher cost efficiency and return on assets. Quon et al. (2012) examine enterprise risk management and firm performance on non-financial firms in their paper. According to findings of this study, the assessed levels of economic or market risk exposure or consequences are not related to firm performance. Smithson and Simkins (2005) examine an empirical study on risk management and the value of the firm. Their findings show that the evidences about risk management increasing firm value are fairly limited. Beasley et al. (2008) examine equity market reactions to announcement of appointments of senior executive officers.

The literature related with risk management activities for banks is another hot and contemporary topic. The existence of a Chief Risk Officer (CRO) has the potential to significantly improve bank performance. A CRO is responsible for setting, monitoring, and managing risk levels and policies within a bank. This includes managing risk associated with credit, liquidity, market, operational, and other risks. By having a dedicated individual to oversee risk management, banks can more effectively identify and manage risk. CROs also ensure that banks are compliant with regulatory requirements and internal policies. This helps to provide a more secure environment for customers and investors, which can lead to increased confidence in the bank. In addition, CROs can identify potential risks and develop strategies to mitigate them. This can help to prevent potential disasters such as financial crises, which can lead to significant losses for a bank. Overall, the presence of a CRO can help to improve the performance of a bank by providing better risk management and compliance practices. This can lead to increased confidence in the bank, better risk management, and improved performance. For instance, Fahlenbrach and Stulz (2011) investigate the role of risk management in risk reduction. In another study performed by Bailey (2019), it has been found that expertise in the CRO role is particularly important during the financial crisis. According to the findings of Pernell et al. (2017), when banks hire CRO in their upper management team; the usage of risky derivatives are significantly increased to maximize profitability. Another significant finding is revealed by Bailey (2019), and this paper examines insurance companies and finds that if CRO has expertise in a prior high-level risk management role, the contribution of the firm's profitability is positively significant. According to the findings about risk management in insurance companies in the study of Liebenberg and Hoyt (2003); it is suggested that enterprise risk management can be used to increase the value of insurance companies. Lundqvist and Vilhelmsson (2018) investigate the relationship between the degree of Enterprise Risk Management (ERM) and default risk in a panel dataset covering 78 of the world's largest banks and ERM implementation is not found to be a significant determinant of credit ratings that represent default risk and financial ratios according to their findings. Pagach and Warr (2010) study on a dataset of 106 U.S. firms, which are mostly financial firms and announce hiring a CRO. They find that some firms hiring CRO experience a reduction in earnings volatility

but in general they find weak impact of CRO on a wide range of firm variables. These results are consistent with our study's findings that will be revealed in the forthcoming sections.

As far as the literature review is concerned, no study has been found investigating the effect of hiring CRO on the bank performance. Accordingly, in this study, the effect of CRO hiring on bank performance will be investigated on the data set of Compustat North America and Execucomp which are merged for the period between 1992-2014. The paper proceeds as follows. In Section 2, the sample of banks will be introduced. In Section 3, hypothesis and variables will be explained. In Section 4, the descriptive statistics and results of the analysis will be presented. Section 5 is devoted to the conclusion and discussion of the results.

2. Sample Selection

This study utilizes data extracted from Execucomp database regarding management team properties. Execucomp database is used as the starting point of the sample. Also, Compustat North America database is used for extracting the financials of banks. Accordingly, Execucomp and Compustat databases are merged in this study. Period of Execucomp database is starting from 1992 until 2014. So, the period of the data downloaded from Compustat database is chosen to cover the years between 1992-2014 to comply with Execucomp database. The sample is restricted as to comply with the paper of Fahlenbrach and Stulz (2011) that focuses on Bank CEO incentives and credit crisis. Firm-year observations for firms are downloaded by using Standard Industry Classfication (SIC) codes between 6000 and 6300 for the period of 1992 and 2014. The firms with SIC code 6282 (Investment Advice) are excluded, because these are not in the lending business. The initial sample has 2,989 bank-year observations and is based on a total of 340 banks. After missing variables are excluded from the sample, the final sample comprises 1,575 bank-year observations belonging to 186 banks.

The variables related to non-interest income and deposits are not in the Compustat database so these variables are extracted from Compustat-Bank database. Bank size, equity capital, charter value, and retained earnings variables are generated from Compustat database. Volatility variable is taken from CRSP database. Variables with respect to macroeconomic conditions are taken from Federal Reserve Bank of Philadelphia website and merged into the main sample.

In Table 1, the number of observations is demonstrated by years. The total number of observations is 1,575 and 406 of them represent the existence of CRO in the banks. So, 74.22% of total observations do not have a CRO with the remaining 25.78% of the observations having a CRO.

Table 1: Number of Observations by Year

Years	Without CRO	With CRO	CRO %	Total
1994	6	0	0	6
1995	18	0	0	18
1996	15	1	6.3	16
1997	11	1	8.3	12
1998	19	2	9.5	21
1999	67	14	17.3	81
2000	68	16	19.0	84
2001	73	14	16.1	87
2002	70	16	18.6	86
2003	70	19	21.3	89
2004	67	20	23.0	87
2005	67	17	20.2	84
2006	73	16	18.0	89
2007	74	25	25.3	99
2008	82	31	27.4	113
2009	73	32	30.5	105
2010	69	34	33.0	103
2011	66	32	32.7	98
2012	62	37	37.4	99
2013	59	41	41.0	100
2014	60	38	38.8	98
Total	**1,169**	**406**		**1,575**
Percentage	**74.22%**	**25.78%**		

3. Hypothesis Development

This study's hypothesis centers on the impact of a Chief Risk Officer (CRO) on bank performance. We utilize Return on Assets (ROA), a metric that represents bank profitability, as our primary measure. ROA is calculated as the ratio of net income to the total book value of assets. In defining control variables, we follow the framework established by King et al. (2016), who investigated the effects of CEO education on bank performance. The hypothesis of our study is formulated as follows:

H1: *Existence of CRO in the bank is positively associated with higher performance.*

Accordingly, ROA represents performance criteria as the dependent variable. Additionally, selected control variables that take into year effect is utilized in the econometric model so that the model is displayed as below;

$$Bank\ Performance_{i,t+1} = \beta_0 + \beta_1 CRO_t + \beta_2 Controls_t + Year_t + \varepsilon_{i,t} \quad (1)$$

In the model 1 above, CRO is designed as dummy variable. If the bank hires a CRO, the variable is described as 1 and if not described as 0.

We follow King et al. (2016) in choosing our control variables that include; bank size, equity capital, charter value, deposits, volatility, non-interest income, retained earnings, and macroeconomic conditions. The aforementioned study focuses on a specific trait of management team such that the link between CEO education and bank performance is examined. Our study focuses on the relationship between upper management team that is directed by CRO and bank performance. The details of control variables are demonstrated in Appendix 1.

4. Descriptive Statistics and Regression Results

a. Descriptive Statistics

This paper's primary measure of firm performance as a proxy for bank profitability is defined as bank ROA and as consistent with the study of King et. al. (2016), industry adjusted ROA is created, which is defined as a bank's ROA minus the mean ROA of all other banks on a per annum basis. Prior studies have shown that differences in bank size may have a positive impact on profitability due to economies of scale (Westman, 2011). A more complicated management structure, with an increasing number of managerial layers, may reduce the efficiency of large banks (Williamson, 1967). So, in this study, Bank size (natural logarithm of total assets), Equity capital (fraction of equity to total assets) and Charter value (logarithm of market to book value of equity) are utilized as control variables. According to Demirgüç-Kunt and Huizinga (2010), in response to banking deregulation as described earlier, banks are increasingly relying on non-traditional sources of income to improve profit margin and diversify risk. In line with the study of King et al. (2016); non-interest income, which is measured as the ratio of non-interest income to total assets, is also controlled. Furthermore, deposits (fraction of customer deposits to assets) are also controlled to capture how variation in funding models impact profitability (King et. al. 2016). According to Demirgüç-Kunt et al. (2013), banks which fund operations with a larger fraction of deposits are less likely to face funding fragility. Evidence shows that banks that follow riskier policies and retain larger amounts of earnings are more likely to perform better (Adams et al., 2012). In accordance with King et al. (2016), volatility and retained earnings (fraction of retained earnings to assets) are controlled. Whereas in the study of King et al. (2016), volatility is taken as the standard deviation of daily stock returns, in this study volatility is computed as the standard deviation of monthly stock returns. And also, to comply with the literature, macro-economic conditions which are measured at the Federal Reserve Bank of Philadelphia's state-coincident index are also controlled.

Table 2 shows descriptive statistics for the selected variables of the model. In this study, the mean result for profitability, measured as ROA, is 0.27 An average bank in the sample holds 9.5% equity capital and has high charter value. The findings in this study with respect to equity capital, charter value, non-interest income, deposits, retained earnings are consistent with the current literature

findings. Bank size and volatility change from sample to sample so the results are consistent with some other studies in the literature.

Table 2: Descriptive Statistics for Full Sample

	Mean	Sd	p50	p25	p75	Min	Max
Profitability	0.027	0.016	0.027	0.015	0.039	-0.018	0.065
Bank size	9.569	1.425	9.258	8.545	10.342	7.329	14.085
Equity capital	0.095	0.029	0.091	0.076	0.108	0.036	0.214
Charter value	0.685	0.394	0.592	0.427	0.828	0.076	2.543
Non-interest income	0.017	0.015	0.013	0.008	0.021	-0.000	0.107
Deposits	0.698	0.105	0.706	0.631	0.780	0.341	0.886
Volatility	0.086	0.052	0.073	0.051	0.105	0.026	0.333
Retained earnings	0.047	0.035	0.049	0.028	0.069	-0.081	0.131
Macroeconomic conditions	94.240	8.902	95.220	88.120	100.160	63.270	119.780
Observations	1,575						

Note: Table 2 presents descriptive statistics of variables. This table shows summary statistics for 1,575 bank year observations. P25, P50(median), p75 represents quartile values for the variables. Profitability is the industry-adjusted measure of bank profitability, defined as bank ROA minus the mean ROA of all other banks per annum. Bank Size is calculated as the natural log of total assets. Equity Capital represents the ratio of total equity to assets. Charter Value is the log of the market-to-book value of equity. Non-interest Income is calculated as the fraction of non-interest income to total assets. Deposits presents the ratio of customer deposits to assets. Volatility is the standard deviation of daily stock returns. Retained Earnings is the fraction of retained earnings to assets. Macroeconomic Conditions represents Coincident Index for each state where a bank is headquartered as provided by Federal Reserve Bank of Philadelphia.

The mean difference results are presented in Table 3 below. The table represents the differences between the banks that hire a CRO or not. In terms of profitability, bank size, charter value, non-interest income, deposits, volatility, and retained earnings; the differences are statistically significant at %1. The banks which are larger in size hire CRO more than the banks which are smaller in size. The banks whose volatility level is high, hire CRO in their management team. So, it can be inferred from the results that more risky banks tend to hire more CROs in comparison to the banks that are less risky. This result is consisted with the findings of Pagach and Warr (2011) suggesting that larger firms and those with greater exposure to risk are more likely to recognize the potential benefits of ERM and are more likely to invest in a CRO to oversee the implementation of ERM strategies. This indicates that firms recognize the importance of managing risk in order to maximize returns and minimize losses, and are willing to invest in the necessary personnel to ensure proper risk management.

Table 3: Mean Differences Table

	Without CRO Mean N=1169	With CRO Mean N=406	Diff.	t-statistics
Profitability	0.029	0.022	0.007	7.501***
Bank size	9.425	9.985	-0.560	-6.925***
Equity capital	0.095	0.094	0.001	0.579
Charter value	0.650	0.785	-0.135	-6.010***
Non-interest income	0.016	0.020	-0.004	-4.885***
Deposits	0.693	0.710	-0.017	-2.818***
Volatility	0.083	0.095	-0.012	-4.047***
Retained earnings	0.049	0.042	0.007	3.356***
Macroeconomic conditions	93.294	96.962	-3.668	-7.270***

Note: Table 3 represents mean differences of the variables used in the paper. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

b. Results of the Empirical Model

This study investigates the impact of the existence of CRO on performance for a sample of banks that is described in detail above. The primary variable is the existence of CRO, control variables are mentioned in Section 3 above, year effects are controlled by including year fixed effects into the model. Because the presence of a CRO is relatively constant over time we do not include bank level fixed effects since it is problematic due to multicollinearity problem

Panel data analysis is employed in this study since this methodology combines time series and cross-sectional observations; thus, enabling data variability, enhanced informativeness, and higher degrees of freedom. Therefore, the applied model is considered to be superior to the models that only utilize one of those dimensions. Additionally, this methodology controls for heterogeneity, whereas time-series and cross-sectional analysis can come up with biased results in the case of heterogeneity (Baltagi, 2001). Additionally, problem of multi-collinearity is also reduced (Wooldridge, 2002).

In order to determine the estimator to be applied for model, numerous tests are run. Firstly, the existence of multicollinearity is checked and, no problem is detected among the selected variables. Secondly, to determine whether there is any unit effect or not; Likelihood-Ratio and F tests are run. According to the results, the model is found to have unit effects. Thirdly, to examine whether there is any time effect or not; F and LM tests are run and the model is found to have time effects. Accordingly, these results show that the model is not classical. To understand whether the model has fixed effect or random effects; Hausman test is run, the results of which can be found in Appendix 2. As the value of prob >chi2 is 0.000, H_0 stating that the difference between parameters is not systematic is rejected and the model is determined to be a two ways fixed effect model. After that heteroskedasticity test is conducted and the results are found to demonstrate the presence of heteroskedasticity. Then, in order to test for autocorrelation; Modified Bhargava et al. Durbin-Watson and Baltagi-Wu LBI Tests are run, and the model is found to be free from autocorrelation (Tatoglu, 2021).

Table 4 represents the regression results. According to the regression results, no significant relationship is detected between hired CRO in the bank and bank profitability. Though the coefficient is found to be positive, it is not significant. The findings of this study are consistent with the results of Quon et al. (2012). According to this study, the assessed levels of economic or market risk exposure or consequences are not found to be related with firm performance. Another study, which finds an insignificant relationship, is that of Smithson and Simkins (2005) and their findings show that the evidence that risk management increases firm value is fairly limited.

According to the panel data analysis results, equity capital, charter value, non-interest income, deposits are found to have significant relationships with profitability with all demonstrating 1% level of significance. In this study, charter value is calculated as book to market value of equity so, as consistent with the formula, the sign is negative in line with the expectations and the result is consistent with findings of King et al. (2016). Volatility and retained earnings have significant relationships with profitability but the level of significance is 10% which is lower than the level of other significant variables. Considering R-squared result, the explanatory power of the model is 65%.

Table 4: The impact of CROs and Firm Profitability and Stock Return Volatility

Variables	Profitability	Volatility
CRO	0.032	0.002
	(0.76)	(1.02)
Bank size	-0.001	-0.005***
	(-0.07)	(-7.57)
Equity capital	9.504***	-0.417***
	(13.63)	(-12.69)
Charter value	-1.108***	0.062***
	(-16.64)	(21.58)
Non-interest income	32.615***	0.574***
	(24.03)	(9.20)
Deposits	0.553***	0.001
	(2.86)	(0.13)
Volatility	0.963*	
	(1.76)	
Retained earnings	1.092*	-0.135***
	(1.87)	(-4.96)
Macroeconomic conditions	-0.004	-0.001**
	(-0.90)	(-2.41)
Constant	1.953***	0.160***
	(3.85)	(6.99)
Observations	1,575	1,577
R-squared	0.646	0.628
Year FE	Yes	Yes

Note: The column 1 of the table 4 represents regression results of the model 1, examining existence of CRO impact on bank profitability. The column 2 presents the results of panel data regressions where dependent variable is volatility. In

both regressions, the main independent variable of interest is CRO Dummy that equals 1 for firms that announced CRO appointments, 0 for firms in the control sample. The control variables are described in Appendix 1. The model includes year fixed effects. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

After investigating the relationship between the presence of CRO and profitability, another panel data analysis is conducted to examine the relationship between CRO and another variable; namely, stock return volatility. As it is shown in the second column of Table 4, no significant relationship is detected between presence of CRO and volatility, though the sign of the coefficient is positive.

Also, the relationship between CRO and Bank size is investigated to observe whether CROs have any influence on bank size. Therefore, another regression is conducted and, the results are provided in Table 5 below. According to regression results, the existence of CRO has a positive relationship with Bank size at 1% level of significance. However, it is also important to note that this significant positive relation between the existence of CRO and bank size might be due to endogeneity.

Table 5: The Relationship between CRO and Bank Size

Variables	Bank Size
CRO	0.423***
	(5.96)
Equity capital	-10.378***
	(-8.98)
Charter value	0.654***
	(5.85)
Non-interest income	28.122***
	(12.80)
Deposits	-4.940***
	(-16.21)
Volatility	-6.594***
	(-7.20)
Retained earnings	2.836***
	(2.86)
Macroeconomic conditions	0.005
	(0.68)
Constant	11.704***
	(14.40)
Observations	1,575
R-squared	0.326
Year FE	Yes

Note: This table represents regression results of the model, examining the relationship between existence of CROs and banks' size. The main independent variable of interest is CRO Dummy that equals 1 for firms that announced CRO appointments, 0 for firms in the control sample. The control variables are described in Appendix 1. The model includes year fixed effects. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels.

5. Conclusion and Discussion

This study is conducted by utilizing the Compustat database, specifically focusing on North American banks. The paper examines whether the existence of CRO affects bank's profitability or not. According to regression results, no significant relationship is detected between CRO and profitability. Although the relationship is positive as expected, it is not significant. As additional analyses, the relationship between existence of CRO and the banks' volatility is also checked. While initial univariate analysis in Table 3 provides some evidence of difference in terms of stock return volatility there is also no significant relationship between two variables in our panel data analysis. The relationship between existence of CRO and bank size is also checked. According to regression results, existence of CRO is found to be positively and significantly related with bank size at 1% level of significance.

Our study's findings align closely with those of Lundqvist S. and Vilhelmsson A. from their 2018 investigation into the relationship between Enterprise Risk Management (ERM) implementation and default risk in a dataset of 78 major global banks. They concluded that ERM implementation does not significantly influence credit ratings, which are indicative of default risk and financial ratios. Similarly, our results resonate with those of Pagach D. and Warr R.'s 2010 study on 106 U.S. firms, predominantly financial, that announce hiring a CRO. According to their findings, while they observed a decrease in earnings volatility in some firms with a CRO, their overall findings showed minimal impact of a CRO's presence on a broad range of firm variables. These results are similar to ours and underscore the consistency and relevance of our study's outcomes in the context of existing research.

It is possible that the observed significant and positive correlation between the presence of a Chief Risk Officer (CRO) and the size of a bank could stem from endogeneity. In other words, it might be that larger banks tend to appoint more CROs due to their size, rather than the presence of a CRO directly contributing to the bank's larger size. Distinguishing between these two scenarios necessitates further robustness tests, which are beyond the scope of this study and are suggested as a direction for future research.

References

Adams, R. B. and Mehran, H. (2012). Bank board structure and performance: evidence for large bank holding companies. *Journal of Financial Intermediation,* 21 (2): 243–267.

Banham, R. (2005). Enterprising Views of Risk Management. *Articles of Merit Award Program for Distinguished Contribution to Management Accounting,* August*:* 14–21.

Bailey, C. (2019). The Relationship Between Chief Risk Officer Expertise, ERM Quality, and Firm Performance. *Journal of Accounting, Auditing & Finance* , 37(1): 1-25.

Baltagi, B. H. (2001). *Econometric analysis of panel data*. (2nd ed.). United Kingdom.

Colquitt, L. L., Hoyt, R. E. and Lee, R. B. (1999). Integrated Risk Management and The Role of Risk Manager. *Risk Management and Insurance Review,* 2(3): 43-61.

Cumming, C. M. and Hirtle, B. J. (2001). The Challenges of Risk Management in Diversified Financial Companies. *Economic Policy Review,* 7(1): 1-17.

Deloitte, (2008). *Perspectives on ERM and the Risk Intelligent Enterprise*. (http://www.ipai.pt/fotos/gca/surveyerm_pt_1_123.333.8524.pdf).

Demirgüç-Kunt, A., Detragiache, E. and Merrouche, O. (2013). Bank capital: lessons from the financial crisis. *Journal of Money Credit and Banking,* 45 (6): 1147–1164.

Demirgüç-Kunt, A. and Huizinga, H. (2010). Bank activity and funding strategies: the impact on risk and returns. *Journal of Financial and Economics,* 98 (3): 626–650.

Pagach, D. and Warr, R. (2010). The Effects of Enterprise Risk Management on Firm Performance, *Social Sciences Research Network.* Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1155218.

Pagach, D. and Warr, R. (2011). The Characteristics of Firms That Hire Chief Risk Officers. *The Journal of Risk and Insurance,* 78(1): 185-211.

Fahlenbrach, R. and Stulz, R. M. (2011). Bank CEO incentives and the credit crisis. *Journal of Financial Economics,* 99(1): 11-26.

Hambrick, D. C. and Mason, P. A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review,* 9(2):193-206.

Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics*, 38(2):163-184.

Liebenberg, A. P. and Hoyt, R. E. (2003). The Determinants of Enterprise Risk Management: Evidence From the Appointment of Chief Risk Officers. *Risk Management and Insurance Review,* 6(1): 37-52.

King, T., Srivastav, A. and Williams, J. (2016). What's in an education? Implications of CEO education for bank performance. *Journal of Corporate Finance*, 37(1): 287-308.

Lam, J. (2001). The CRO Is Here to Stay. *Risk Management,* 48(4): 16-22.

Beasley, M., Pagach, D. and Warr, R. (2008). Information Conveyed in Hiring Announcements of Senior Executives Overseeing Enterprise-Wide Risk Management Processes. *Journal of Accounting, Auditing and Finance,* 23(3): 311-332.

Grace, M. F., Leverty, J. T., Phillips, R. D. and Shimpi, P. (2015). The Value of Investing in Enterprise Risk Management. *Journal of Risk and Insurance,* 82(2): 289-316.

Meulbroek, L. K. (2002). Integrated Risk Management for the Firm: A Senior Manager's Guide. *Journal of Applied Corporate Finance*, 14(4): 56-70.

Nocco, B.W. and Stulz, M. (2006). Enterprise risk management: theory and practice. *Journal of Applied Corporate Finance,*18(4): 8-20.

Pernell, K., Jung, J. and Dobbin, F. (2017). The Hazards of Expert Control: Chief Risk Officers and Risky Derivatives. *American Social Review,* 82(3): 511–541.

Quon, T. K., Zegnal, D. and Maingot, M. (2012). Enterprise risk management and firm performance. *Procedia-Social and Behavioral Sciences*, 62: 263-267.

Baxter, R., Bedard, J. C., Hoitash, R. and Yezegel, A. (2013). Enterprise Risk Management Program Quality: Determinants, Value Relevance, and the Financial Crisis. *Contemporary Accounting Research,* 30(4): 1264-1295.

Smithson, C. and Simkins, B. J. (2005). Does risk management add value? A survey of the evidence. *Journal of Applied Corporate Finance,* 17(3): 8-17.

Sterngold, J. (2014). After Crisis, Risk Officers Gain More Clout at Banks, *Wall Street Journal,* June.

Lundqvist, S., A. and Vilhelmsson, A. (2018). Enterprise Risk Management and Default Risk: Evidence from the Banking Industry. *Journal of Risk and Insurance,* 85(1): 127-157.

Tatoglu, F. (2021). *Panel Veri Ekonometrisi-Stata Uygulamali,* Istanbul: Beta Press.

Westman, H. (2011). The impact of management and board ownership on profitability in banks with different strategy. *Journal of Banking and Finance*, 35(12): 3300-3318.

Williamson, O. (1967). Hierarchical control and optimum firm size. *Journal of Political Economy,* 75(2): 123-138.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. London: The MIT Press.

https://www.philadelphiafed.org/surveys-and-data/regional-economic-analysis/state-coincident-indexes

Appendix 1

Definition of Variables;

CRO (Chief Risk Officer): Dummy that equals one for firms that announced CRO appointments, 0 for firms in the control sample (Execucomp database).

Bank Size: The natural log of total assets (Compustat North America database).

Equity Capital: A ratio of total equity-to-assets (Compustat North America database).

Charter Value: Book-to-market value of equity (Compustat North America database).

Deposits: A ratio of customer deposits-to-assets (Compustat-Bank database).

Volatility: The standard deviation of monthly stock returns (CRSP database).

Non-interest Income: The ratio of non-interest income-to-total assets (Compustat-Bank database).

Retained Earnings: The ratio of retained earnings to assets (Compustat North America database).

Macroeconomic Conditions: Coincident Index for each state where a bank is headquartered as provided by Federal Reserve Bank of Philadelphia (Federal Reserve of Philadelphia website).

Appendix 2

	fe	re	Difference	S.E.
CRO	-0.063	0.001	-0.065	0.043
Bank size	-0.180	0.029	-0.209	0.060
Equity capital	14.575	10.991	3.584	0.837
Charter value	-1.059	-1.131	0.071	0.031
Non-interest income	33.969	36.228	-2.259	2.518
Deposits	1.017	1.073	-0.055	0.262
Volatility	-1.828	-0.902	-0.926	0.167
Retained earnings	-10.092	-2.230	-7.862	0.796
Coincident index	-0.021	-0.027	0.005	0.002

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 154.04
Prob>chi2 = 0.0000