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Managerial Risk-Taking Incentives and Bank Earnings Management: Evidence from FAS 123R

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Abstract: We study the effect of CEOs' risk-taking incentives (vega), derived from their stock options, on earnings management (EMGT) by banks. Prior research finds an inconsistent relationship between vega and EMGT in non-financial firms. In the banking industry, the effect of vega on EMGT is further complicated by the strict regulatory environment. To establish causality, we exploit the exogenous reduction in vega resulting from Financial Accounting Standard (FAS) 123R in 2005 that mandates a fair-value-based method to expense stock options and increases costs of granting option compensation. Using the difference-in-differences approach, we find that banks with a larger drop in CEO vega due to FAS 123R significantly reduce EMGT. The findings suggest that CEO vega has a positive and causal effect on bank EMGT. Our results are robust enough to employ in different research designs and specifications. Furthermore, we find that the negative effect of FAS 123R on EMGT is weaker in banks subject to a higher possibility of regulatory intervention.

Keywords: earnings management; risk-taking incentives; option compensation; bank; FAS 123R

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1. Introduction

The objective of this paper is to investigate the association between CEOs' risk-taking incentives generated from stock options they hold and the earnings management (EMGT) of banks. Financial reporting opacity may impede the effective functioning of the banking sector, which is a vital factor in resource allocation and maintaining the stability of financial markets, because such opacity is detrimental to market discipline, corporate governance, and banking regulation [1–3]. Furthermore, EMGT exacerbates banks' opacity of financial reporting by misleading the public and investors about banks' financial position and distorting information used by stakeholders to make decisions. Given that banks are inherently opaque and EMGT increases information asymmetry [4–6], it is critical to understand the potential determinant of bank EMGT. Since equity-based compensation has become the primary mechanism for shareholders and regulators to incentivize and discipline bank CEOs in recent years [7,8], we attempt to study the impact of CEO equity incentives on bank EMGT. While the prior literature on the banking industry establishes the relationship between CEO pay-performance sensitivity (delta) and EMGT, research on the effect of risk-taking incentives (vega) embedded in CEO compensation on bank EMGT is quite scant.

Risk-taking incentives of bank management and corresponding bank risk are widely studied issues, especially after the 2008 financial crisis [9–11]. Banks are heavily criticized for having taken excessive risks in the recent financial crisis. Managerial risk-taking incentives embedded in compensation are regarded as an important source of bank risk in the crisis. For example, Bhagat and Bolton [12] studied U.S. financial institutions during 2000–2008 and found that risk-taking incentives induced by executive compensation drive excessive risk-taking. Gande and Kalpathy [13] also showed that risk-taking of financial firms during the financial crisis increased with CEO risk-taking incentives generated from stock options in the pre-crisis period. Option compensation induces risk-taking because options make managers' wealth a convex function of stock price, thus, mitigating managers' risk-aversion [14–16]. Therefore, studying the effect of risk-taking incentives induced by CEOs' option compensation on banks' economic behaviors is relevant for understanding banks' risk profile and is, hence, crucial for bank stability.

Regarding the relationship between risk-taking incentives in managers' option compensation and earnings manipulation, prior studies on non-financial firms draw inconsistent conclusions. For example, Armstrong et al. [17] found that risk-taking incentives of the top management team are positively related to discretionary accruals. Wruck and Wu [18] examined the relationship between CEO equity incentives and the quality of disclosures. They found that CEO vega, which captures risk-taking incentives, has a deleterious effect on accounting disclosure quality. On the contrary, O'Connor et al. [19] showed that CEOs' stock options prevent fraudulent financial reporting. This finding suggests that risk-taking incentives embedded in option compensation are associated with a lower degree of accounting manipulation. Nevertheless, Chava and Purnanandam [20] found that CEO risk-taking incentives do not affect accrual management decisions.

The inconsistent empirical results on the relationship between risk-taking incentives and EMGT in non-financial firms may be caused by the inherent endogeneity problems. One such endogeneity issue is the omitted variable problem. Some unobservable firm heterogeneities that are correlated with both EMGT and risk-taking incentives could bias the results. For example, CEO overconfidence affects both option grants (and, thus, vega) and EMGT [21,22]. Hence, using simple association tests may lead to biased results due to unidentified omitted variables. Another endogeneity issue is the reverse causality problem. That is, firms' financial reporting quality affects managerial compensation structure [23]. Cheng and Farber [24] found that CEOs' option compensation decreased if firms experienced earnings restatement. Their findings suggest that earnings manipulation might have a negative effect on risk-taking incentives from stock options. Therefore, the relationship between risk-taking incentives and EMGT may be driven by feedback or mutual effects.

In the banking industry, the theoretical effect of risk-taking incentives on EMGT is ambiguous. On the one hand, managers with greater risk-taking incentives may engage in more EMGT in order to hide the undesirable consequences of their risky behaviors [25,26]. Furthermore, greater EMGT may enable banks to avoid regulatory scrutiny induced by vega-related adverse consequences [6,27–29]. On the other hand, bank regulation may also lead to an insignificant association between risk-taking incentives and EMGT because it can inhibit risk-taking and provides monitoring and disciplining of aggressive EMGT [30,31]. Therefore, for a given level of vega, bank regulation may weaken the incentives for EMGT to mask negative outcomes caused by risk-taking.

To identify the causal relationship between risk-taking incentives derived from CEOs' stock options and bank EMGT, we employ Financial Accounting Standard (FAS) 123R, implemented in 2005. This is because FAS 123R requires firms to expense option compensation using the fair value method, thus, increasing the cost of granting options to employees [15,32]. In reaction to FAS 123R, firms significantly cut down on the use of stock options, which is the major contributor to compensation convexity, resulting in reduced risk-taking incentives [33,34]. Therefore, FAS 123R exogenously impacts CEO risk-taking incentives by imposing a negative shock to option compensation.

To elaborate, we will empirically examine whether the reduction in risk-taking incentives resulting from FAS 123R leads to a decline in EMGT. We perform our empirical tests with the difference-in-differences method and limit the sample period to around the year 2005 when FAS 123R was implemented, i.e., 2002–2007 (excluding 2005). Firms with higher employees' option grants prior to FAS 123R perceive more accounting costs of option expensing and are more likely to be affected by FAS 123R [16,34,35]. Thus, banks in the treatment group are defined as those with average CEO option grants above the sample median before FAS 123R (2002–2004), while the remainder makes up the control group. Following Beatty and Liao [36], we use discretionary loan loss provisions as the primary measurement of bank EMGT. Consistent with Core and Guay [37] and Davidson [38], the vega is measured by the sensitivity of CEOs' option compensation to the volatility of stock returns.

Our study has several key findings. First, we validate that FAS 123R imposes a larger negative shock to option grants and, hence, vega, for bank CEOs in the treatment group. However, there is no difference in the change in delta between the treatment and control groups after FAS 123R. These results show that exogenous shock from FAS 123R to vega is valid, and we can rule out the confounding effect of the delta on EMGT. Second, we find that EMGT in the treatment group decreases significantly after FAS 123R compared to the control group, indicating that greater risk-taking incentives lead to a higher degree of bank EMGT. These findings suggest that managers use EMGT to conceal the large earnings volatility resulting from their risky behaviors induced by risk-taking incentives, in order to avoid the consequent negative effects on their personal wealth and job security, and also to circumvent regulatory attention. Furthermore, we perform a variety of tests to show the robustness of our findings. Third, we conduct a series of tests to ensure that the parallel trend assumption required in the difference-in-differences estimation is satisfied. This addresses concerns that the assignment of the treatment and control groups might be nonrandom, and that systematic differences between the two groups may drive our results.

Fourth, we show that, compared to the control group, risk-taking in the treatment group decreases more after FAS 123R, supporting the proposition that the effect of the decline in vega resulting from FAS 123R on EMGT is with the assumption of reduced risk-taking. Fifth, we find that the negative effect of FAS 123R on bank EMGT is concentrated in the treatment group that exhibits the largest decrease in vega. These results verify the argument that decreased vega is the cause of the decline in EMGT after FAS 123R. Finally, we find that the negative effect of the drop in vega on EMGT is reduced when bank capital ratios are closer to the required regulatory minimum. These results indicate that banks with a higher likelihood of regulatory intervention are more likely to engage in opportunistic EMGT, which weakens the negative impact of FAS 123R on EMGT.

Our paper provides a two-fold contribution. First, we contribute to the literature on the relationship between managerial compensation and bank earnings manipulation. The prior literature on the banking industry studying the impact of executive incentives on discretionary accruals has focused on pay-performance sensitivity [27,39], without considering the role of risk-taking incentives resulting from option compensation. Understanding how managerial risk-taking incentives affect banks' behaviors in the area of accounting discretion is important because banks are vulnerable to risks such as runs and contagion [5,40–42]. To fill the gap, we explore the impact of risk-taking incentives on bank EMGT.

Second, this paper exploits FAS 123R to explore the causal effect of risk-taking incentives on bank EMGT. Since managerial compensation is endogenously determined, it is a challenge to infer the causal relationship between risk-taking incentives and EMGT. However, FAS 123R, as a natural experiment, provides us with an opportunity to address the potential endogeneity issues and identify the causal association. Thus, this paper contributes to the existing literature on the inconsistent relationship between risk-taking incentives and accounting manipulation [17–20].

This paper proceeds as follows. Section 2 explains the identification strategy. Section 3 reviews the related literature and develops the hypotheses. Section 4 presents our sample selection, variable construction, and empirical model. Sections 5 and 6 discuss a battery of empirical results. Section 7 concludes the paper.

2. Identification Strategy

It is challenging to infer the causal association between risk-taking incentives in CEOs' stock options and bank EMGT due to endogeneity issues, such as the omitted variable and reverse causality problems. To overcome this challenge, we employ the plausibly exogenous shock of FAS 123R in 2005 to identify the causal effect of risk-taking incentives in CEOs' option compensation on bank EMGT. We use a difference-in-differences approach.

In the above framework, FAS 123R implementation is the first difference. The FAS 123R policy was issued by the Financial Accounting Standards Board (FASB) in December 2004 and took effect for large public companies for the first reporting period starting after 15 June 2005 (for small public companies, FAS 123R took effect for the first reporting period starting after 15 December 2005). Before FAS 123R, companies could choose to expense options based on either fair-value-based or intrinsic-value-based methods. The method of intrinsic value allows companies to set the exercise prices of options higher than or equal to the underlying stock price on the grant date. In this case, the intrinsic value of stock options is zero, and companies can avoid expensing stock options in the income statement [43]. Therefore, it is not surprising that nearly all companies adopted the method of intrinsic value prior to FAS 123R [33]. Even if companies used the intrinsic value method, the fair value of the options at the grant date was required to be disclosed in the financial statement's footnote, which was called "implied option expense" [35]. However, FAS 123R mandated the fair value method, which means that companies must substantially expense stock options and, hence, this makes the use of option compensation costly. Thus, the implementation of FAS 123R makes stock options less attractive, leading to a significant drop in options granted to executives [34,35]. Because stock options are the main component leading to compensation convexity, vega experienced a significant drop after the implementation of FAS 123R [14,15,34].

The second difference in our difference-in-differences design is the magnitude of the potential exposure to the exogenous shock. Although FAS 123R is applicable to all firms, the differential influence of FAS 123R on firms can be used to define the treatment and control groups. Chava and Purnanandam [20] and Anantharaman and Lee [44] use the change in vega around FAS 123R to measure the change in risk-taking incentives. However, as Ferri and Li [35] suggest, the response of a firm to changing vega cannot be regarded as fully exogenous, even though the event itself is exogenous. Furthermore, Bakke et al. [33] and Hong [15] argue that the companies that did not pay any options to their executives in 2003 and 2004 and the companies that already voluntarily expense options using the fair value method on or before 2002 as the control group. The rest of the companies, excluding the two sets of the control groups, are used as the treatment group. However, this approach does not apply to our sample of Standard & Poor's 1500 bank because the treatment group has far more banks than the control group. Ferri and Li [35] and Hayes et al. [34] indicate that firms with higher option grants before FAS 123R (i.e., implied option expense) are more likely to perceive the accounting costs of option compensation and to decrease the use of stock options after the FAS 123R. In this case, CEOs with higher option grants prior to FAS 123R are more affected by this regulation and will experience a more significant drop in option compensation after FAS 123R (this will be detailed in Section 5.2). Therefore, banks with average CEO option grants above the sample median before FAS 123R are defined as the treatment group and banks with average CEO option grants below or equal to the sample median before FAS 123R belong to the control group. We focus primarily on CEOs instead of other executives because they are corporate policy and decision makers, and their incentives are critical for companies' financial reporting.

In this setting, FAS 123R imposes a larger exogenous negative shock to CEOs' option compensation and, thus, risk-taking incentives for the treatment group compared to the control group. This allows us to identify the causal effect of CEOs' risk-taking incentives derived from stock options on bank EMGT, by comparing the change in EMGT around FAS 123R for the treatment group compared to the control group.

3. Literature Review and Hypotheses Development

3.1. Managerial Incentives and EMGT in Non-Financial Firms

Although equity-based compensation alleviates certain agency problems between managers and shareholders, the evidence on the relationship between managerial equity incentives and agency cost associated with EMGT of non-financial firms is mixed. Regarding the delta (pay-performance sensitivity), some studies found that managers with a higher delta are more likely to manage earnings [45,46]. This is based on the idea that EMGT inflates the stock price, thus, increasing the value of managers' equity portfolios. However, other papers showed that delta is not associated with accounting irregularities or misreporting [17,47]. This result may be driven by the costs associated with EMGT, such as actions by the monitors of firms and negative market perception of accounting manipulation [47,48].

In addition to delta, vega (risk-taking incentives) is another important consideration when studying managerial incentives. Relative to risk-neutral shareholders, managers have fewer incentives to take risks because a major force driving their behaviors is avoidance of the losses of undiversified personal wealth [49,50]. Option compensation helps reduce this risk-related agency problem because it makes managers' payoff asymmetric and its convexity can provide incentives to take risky projects with positive net present value [14,15]. However, the empirical findings on the relationship between managerial risk-taking incentives derived from stock options and EMGT are inconsistent in non-financial firms. Some studies find that risk-taking incentives increase EMGT. For example, Grant et al. [25] showed that CEO risk-taking incentives are associated with an increased degree of income smoothing. Similarly, Armstrong et al. [17] showed that executives' risk-taking incentives measured by the top five executives' vega and discretionary accruals are positively correlated. Wruck and Wu [18] also found a positive relationship between CEO vega and discretionary accruals. In contrast, the finding of O'Connor et al. [19] that CEOs' stock options lower the likelihood of aggressive accounting practice implied that risk-taking incentives embedded in CEO option compensation are negatively related to accounting manipulation. However, Chava and Purnanandam [20] did not find a significant relationship between CEO risk-taking incentives and EMGT.

3.2. Managerial Risk-Taking Incentives and EMGT of Banks

In the banking industry, the effect of risk-taking incentives on EMGT is theoretically ambiguous. On the one hand, risk-taking incentives from option compensation may induce banks to manage earnings in order to obscure the adverse consequences of risk-taking. To elaborate, risk-taking incentives encourage bank managers to choose risky business policies [8], but performance volatility and possible losses induced by risk-taking have negative effects on managerial wealth and job security [51,52]. Earnings fluctuation also increases the risk perception of investors and leads to the decline or volatility of stock price [53]. Therefore, managers have incentives to use EMGT to mask the negative consequences induced by risk-taking incentives without giving up the potential payoff from risky projects. In addition, undesirable consequences caused by risk-taking incentives, such as the volatility of earnings, may attract regulatory attention. Palvia [54] and Webb [55] found that regulatory scrutiny of banks increases the likelihood of CEO turnover. Cheng et al. [27] also pointed out that regulatory scrutiny is costly for bank CEOs because it decreases stock price and, thus, lowers the value of managers' stock and option holdings. Thus, given the regulatory attention to undesirable consequences caused by risk-taking incentives, banks may use EMGT to avoid regulatory intervention [27–29].

On the other hand, risk-taking incentives from option compensation may not induce bank CEOs to manage earnings because of the relatively stricter regulatory environment in the banking industry, compared to other sectors. Since banks are vulnerable to risks, such as runs and contagion [5,40–42], stringent regulation can mitigate incentives for banks to take on risks [30,31,56]. Therefore, for a given level of vega, bank CEOs are less likely to choose risky policies and, thus, have fewer incentives to engage in EMGT to conceal undesirable consequences caused by risk-taking. Moreover, prior studies showed that bank regulation dampens opportunistic behaviors, such as managing discretionary loan loss provisions [31,57]. For example, Hirtle et al. [31] found that banks that receive more supervisory attention have less discretionary behaviors for loan loss provisions, suggesting that supervision makes banks' accounting policies more conservative. Accordingly, the incentives provided by vega to engage in EMGT are expected to be offset by bank regulation. In sum, regulations may lead to an insignificant relationship between risk-taking incentives and bank EMGT.

In the end, whether CEOs' risk-taking incentives embedded in stock options increase bank EMGT becomes an empirical question. Here, FAS 123R, which induces a larger drop in vega in the treatment group compared to the control group, serves as the setting for causal identification. If CEO risk-taking incentives have a positive effect on bank EMGT, we predict that, compared to the control group, the treatment group has a larger decrease in EMGT after FAS 123R. Based on the above discussion, we hypothesize the following:

Hypothesis H1 (H1). *The treatment group experiences a reduction in EMGT from the period before to after FAS 123R compared to the control group.*

3.3. Cross-Sectional Hypothesis

We then investigate whether the effect of FAS 123R on bank EMGT varies with capital ratio levels, which capture the possibility of regulatory scrutiny faced by banks. Because bank capital is stringently regulated and banks' earnings are included in regulatory capital, banks tend to use discretion in financial reporting to manage capital [36,58,59]. That is, regulatory capital is an important consideration in decisions concerning bank EMGT. Cheng et al. [27] considered both earnings and capital management and found that capital ratios affect the degree of EMGT. Specifically, they showed that high potential regulatory intervention induced by low capital ratios leads banks to engage in a higher degree of EMGT. According to the prior literature, banks with low levels of capital ratios are more likely to manage earnings to improve regulatory capital in order to circumvent potential regulatory scrutiny. Therefore, if the treatment group decreases EMGT around FAS 123R compared to the control group, i.e., CEOs' risk-taking incentives generated from option compensation increase EMGT, we expect the negative effect of FAS 123R on bank EMGT to be weaker when banks' capital ratios are low. Based on the above discussion, we hypothesize the following:

Hypothesis H2 (H2). *The reduction in EMGT around FAS 123R in the treatment group compared to the control group, if any, is weaker in banks with low capital ratio levels.*

4. Sample, Variable, and Empirical Model

4.1. Data

We obtain our data from Standard & Poor's Execucomp and Bank Compustat. As a starting point to construct our sample, executives' compensation and characteristics data are obtained from Standard & Poor's Execucomp. In addition to CEOs identified by the specific variable in Execucomp, we also include some other individuals as CEOs, based on the dates at which these individuals assumed office and left office as CEOs. We obtain banks' financial data from Bank Compustat. We merge the quarterly data of Bank Compustat and the annual data of Execucomp on a quarterly basis.

We employ FAS 123R, implemented in 2005, to identify causality between vega and EMGT. Thus, we start our analysis in 2002 and end in 2007 to avoid the confounding influences of the 2001 and 2008 recessions. Because the FASB issued FAS 123R in December 2004, some companies may have started changing their option compensation strategies after that [34]. Moreover, the effective date of FAS 123R was the first reporting period after 15 June 2005 (15 December 2005) for large (small) public companies (in our sample, the fiscal year and quarter are almost the same as the calendar year and quarter). Therefore, FAS 123R worked for some banks in 2005, but became mandatory for all banks in 2006. Consequently, we exclude the transition year 2005 to avoid any noisy information [16,60], and define 2002–2004 and 2006–2007 as the period before and after FAS 123R, respectively. Furthermore, in our sample, we require all banks to have at least one observation in both the pre- and post-FAS 123R periods. Our final sample contains 1124 bank-quarter observations on 65 banks of Standard & Poor's 1500 during 2002–2007 (excluding 2005).

4.2. Variable Construction

4.2.1. Bank EMGT

The literature on bank EMGT stresses loan loss provisions (LLPs) as the basis for measurement of EMGT, because LLPs are the primary bank accrual [36]. Following Cohen et al. [61] and Kanagaretnam et al. [62], we measure EMGT by estimating a LLP prediction model and using the residuals as the discretionary LLPs. Using the residuals as the proxy for EMGT requires the validity of the LLP model. Beatty and Liao [36] constructed a model whose residuals optimally predict the Security Exchange Commission (SEC) comment letters and financial restatements by assessing nine LLP models in the previous banking literature. Therefore, we use Beatty and Liao's [36] optimal model to measure the EMGT of banks as follows:

$$\begin{aligned} LLP_{i,t} &= \beta_0 + \beta_1 ChangeNPA_{i,t+1} + \beta_2 ChangeNPA_{i,t} + \beta_3 ChangeNPA_{i,t-1} \\ &+\beta_4 ChangeNPA_{i,t-2} + \beta_5 ChangeLoan_{i,t} + \beta_6 Size_{i,t-1} \\ &+\beta_7 GrowthGDP_t + \beta_8 CSRET_t + \beta_9 ChangeUR_t + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $LLP_{i,t}$ is loan loss provisions, and $ChangeNPA_{i,t}$ is the change in non-performing assets between quarter $t-1$ and t. This model includes $ChangeNPA_{i,t+1}$, $ChangeNPA_{i,t-1}$, and $ChangeNPA_{i,t-2}$, because banks also use future and historical information on non-performing assets to estimate loan loss provisions. Here, $ChangeLoan_{i,t}$ is the change in total loans between quarter $t-1$ and t. All of the above variables are deflated by lagged total loans. Furthermore, $Size_{i,t-1}$ is the natural logarithm of total assets in quarter $t-1$. In addition, this model includes three macroeconomic variables, namely growth rate of GDP ($GrowthGDP_t$), return of the Case–Shiller Real Estate Index ($CSRET_t$), and change in unemployment rates ($ChangeUR_t$). Consistent with Cornett et al. [63], we standardize the absolute value of the residuals, as follows:

$$DLLP_{i,t} = (\varepsilon_{i,t} \times Loan_{i,t-1}) / Asset_{i,t} \quad (2)$$

where $Loan_{i,t-1}$ is total loans in quarter $t-1$, and $Asset_{i,t}$ is total assets in quarter t. The larger value of $DLLP$ indicates a greater degree of EMGT. In addition to discretionary loan loss provisions, we also use the abnormal component of realized gains and losses on available for sale (AFS) securities to measure bank EMGT in the robustness check section.

4.2.2. CEO Incentives

We follow the methodology of Core and Guay [37] and Davidson [38] to measure vega and delta. According to this method, CEOs' compensation vega, i.e., risk-taking incentives, is statistically expressed as the dollar-change in CEOs' option value when the standard deviation of stock returns changes by 1% (*Vega*). The compensation delta, representing the CEO pay-performance sensitivity, is statistically expressed as the dollar-change in CEOs' stock and option value when the stock price changes by 1% (*Delta*). A larger value of *Vega* (*Delta*) indicates higher CEO risk-taking incentives (pay-performance sensitivity). Following Bakke et al. [33] and Mao and Zhang [16], we use Ln(1 + *Vega*) and Ln(1 + *Delta*) in our regressions to remove the skewness.

4.3. Empirical Model

Based on the discussion in Section 2, we construct a model to establish the causality between CEOs' risk-taking incentives generated from option compensation and EMGT of banks, as follows:

$$\begin{aligned} DLLP_{i,j,t} = {} & \beta_0 + \beta_1 Treatment_i \times Post-123R_t + \beta_2 Size_{i,t} + \beta_3 Tier1_{i,t} + \beta_4 EBTP_{i,t} \\ & + \beta_5 Diversification_{i,t} + \beta_6 LLP\_lag_{i,t} + \beta_7 CEO\ Age_{i,j,t} \\ & + \beta_8 CEO\ Tenure_{i,j,t} + \beta_9 CEO\ Duality_{i,j,t} + \gamma_i + \delta_t + \varepsilon_{i,j,t} \end{aligned} \quad (3)$$

where $DLLP_{i,j,t}$ is the standardized absolute value of discretionary loan loss provisions for CEO j of bank i in quarter t, which serves as the proxy for EMGT. Here, $Treatment_i$ is a dummy variable that equals one if bank i is in the treatment group, and zero otherwise, while $Post-123R_t$ is a dummy variable that equals one after FAS 123R (2006–2007), and zero before FAS 123R (2002–2004). In this setting, difference-in-differences estimate β_1 is our main focus, which captures the impact of the drop in risk-taking incentives resulting from FAS 123R on bank EMGT for the treatment group compared to the control group. Following the prior literature [62–64], we control for bank and CEO characteristics in our regression. Appendix A details the definitions of all variables. This model includes bank and year-quarter fixed effects, γ_i and δ_t. Here, $Treatment$ and $Post123R$ are not controlled for in the regression, since they are subsumed by the bank and year-quarter fixed effects, respectively. We winsorize all continuous variables at the top and bottom one percentile levels to minimize the influences of outliers.

5. Empirical Results

5.1. Descriptive Statistics

Tables 1 and 2 report summary statistics for our sample. Table 1 covers the entire sample period. The mean value for the standardized absolute value of discretionary loan loss provisions (*DLLP)* is roughly 0.066%, indicating that on average discretionary loan loss provisions account for about 0.066% of total assets. The median value of *DLLP* is about 0.049%. The mean (median) vega approximately equals $236,000 ($95,000), implying that the mean (median) option portfolio value increases by approximately $236,000 ($95,000) when the standard deviation of stock returns increases by 1%.

Table 1. Summary statistics—full sample.

Variables	N	Mean	Std. Dev	Min	25th	Median	75th	Max
Earnings Management								
DLLP (‱)	1124	6.573	5.571	0.098	2.228	4.850	9.541	26.729
CEO Incentives								
Vega ($000)	1124	235.975	324.644	0.000	30.751	95.307	313.048	1553.492
Delta ($000)	1124	644.956	757.499	11.070	148.368	343.308	849.657	3455.236
P_OptionGrant	1124	0.262	0.228	0.000	0.042	0.226	0.405	0.903
CashComp ($000)	1124	1600.697	1868.039	256.250	752.462	1000.000	1610.000	10,883.040
CEO Characteristics								
CEO Age	1124	56.843	5.056	45.000	54.000	57.000	60.000	68.000
CEO Tenure	1124	8.836	5.874	1.000	4.000	7.500	13.000	24.000
CEO Duality	1124	0.722	0.448	0.000	0.000	1.000	1.000	1.000
Bank Characteristics								
Size	1124	9.899	1.527	7.507	8.704	9.529	10.908	14.134
Tier1 (%)	1124	9.788	2.201	6.520	8.255	9.350	10.740	19.200
EBTP (‱)	1124	52.865	17.368	−9.743	43.154	52.860	62.979	99.856
Diversification	1124	0.253	0.155	0.004	0.141	0.230	0.341	0.780
LLP_lag (‱)	1124	5.880	6.619	−3.748	1.546	4.078	8.221	37.991

Table 2. Summary statistics—sample before and after FAS 123R.

Variables	Before FAS 123R(2002–2004)			After FAS 123R(2006–2007)		
	N	Mean	Std. Dev	N	Mean	Std. Dev
Earnings Management						
DLLP (‱)	664	4.189	3.957	460	10.014	5.764
CEO Incentives						
Vega ($000)	664	249.094	337.651	460	217.038	304.256
Delta ($000)	664	637.748	716.652	460	655.360	813.541
P_OptionGrant	664	0.309	0.232	460	0.195	0.204
CashComp ($000)	664	1888.677	2002.423	460	1185.003	1566.119
CEO Characteristics						
CEO Age	664	56.080	4.874	460	57.943	5.116
CEO Tenure	664	7.995	5.394	460	10.050	6.317
CEO Duality	664	0.702	0.458	460	0.752	0.432
Bank Characteristics						
Size	664	9.789	1.515	460	10.058	1.533
Tier1 (%)	664	9.984	2.311	460	9.505	1.999
EBTP (‱)	664	56.841	15.521	460	47.125	18.281
Diversification	664	0.286	0.158	460	0.205	0.137
LLP_lag (‱)	664	6.737	6.872	460	4.643	6.032

In Table 2, we present the summary statistics for periods before and after FAS 123R, respectively. We observe that the average option usage in CEO total compensation decreases from 30.9% to 19.5%, and the average CEO vega decreases from $249,094 to $217,038. These changes suggest that FAS 123R implementation indeed reduces the attraction of option compensation and, thus, risk-taking incentives of bank CEOs. However, the mean of CEO delta is found to increase from $637,748 to $655,360. The changes in option compensation, vega, and delta from the period before to after FAS 123R are in line with Bakke et al. [33] and Hong [15].

5.2. The Shock from FAS 123R to Risk-Taking Incentives

In this section, we investigate whether the treatment group experiences a larger drop in CEOs' option compensation and risk-taking incentives due to the adoption of FAS 123R. Table 3 reports the estimation results for the regression of option grants as a percentage of total pay, vega, and delta. Following Hayes et al. [34] and Mao and Zhang [16], we include bank size (*Size*), cash compensation (*CashComp*), and CEO tenure (*CEO Tenure*) as control variables. In columns (1)–(2), we find that the coefficient of *Treatment* × *Post-123R* is significantly negative at the 1% and 5% levels, respectively, suggesting that the treatment group significantly decreases the stock option grants and, hence, vega following FAS 123R compared to the control group. These results confirm the exogenous shock from FAS 123R to risk-taking incentives derived from option compensation.

In column (3) of Table 3, we examine whether the shock of FAS 123R to the compensation delta differs between the treatment and control groups. The delta may increase both risk-taking incentives and bank EMGT. Armstrong et al. [17] pointed out that greater values of delta may increase risk-taking incentives since the managers' wealth increases with the stock price. Prior studies also showed that bank EMGT increases with delta [39]. However, as presented in column (3), the coefficient of *Treatment*×*Post-123R* is insignificant, indicating that the differences in the change in delta between the two groups after FAS 123R are not significant. This result validates the negative shock of FAS 123R to vega rather than delta, which is consistent with Bakke et al. [33] and Hong [15].

Table 3. Difference-in-differences regressions—the impact of FAS 123R on option grants, vega, and delta.

Variables	**P_OptionGrant (1)**	**Ln(1 + Vega) (2)**	**Ln(1 + Delta) (3)**
Treatment × Post-123R	−0.212 ***	−0.503 **	−0.127
	(−3.67)	(−2.06)	(−0.65)
Size	−0.007	0.742 **	0.427 *
	(−0.06)	(2.01)	(1.75)
CashComp	−0.000 ***	−0.000	0.000
	(−4.95)	(−0.22)	(0.83)
CEO Tenure	−0.006	0.071 ***	0.134 ***
	(−1.24)	(3.12)	(6.94)
Constant	0.202	−8.569 **	−0.701
	(0.18)	(−2.28)	(−0.28)
Bank fixed effects	Yes	Yes	Yes
Year-quarter fixed effects	Yes	Yes	Yes
Observations	1124	1124	1124
Adjusted R-squared	0.526	0.861	0.868

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

5.3. The Impact of FAS 123R on EMGT

Here, we test whether the decline in vega resulting from FAS 123R reduces bank EMGT. The estimation results are presented in Table 4. The dependent variables in all columns are *DLLP*. The difference-in-differences estimate, i.e., the coefficient of *Treatment × Post-123R* variable, is our main focus. In column (4), we report the basic specification of Equation (3) with control variables and bank and year-quarter fixed effects. The control variables are omitted in column (3). Columns (1) and (2) use the variables *Treatment* and *Post-123R* to control for differences and common trends between the treatment and control groups. In column (1), we do not include covariates.

Across all regressions, the coefficients of *Treatment × Post-123R* are significantly negative at the 5% level. These findings indicate that the decrease in vega caused by the shock of FAS 123R results in a statistically significant drop in EMGT. The results are also economically significant. Specifically, the estimation of Equation (3) in column (4) indicates that after FAS 123R, the ratio of discretionary loan loss provisions to total assets in the treatment group decreased by about 0.019% compared to that of the control group. Thus, in the banking industry, CEO risk-taking incentives provided by option compensation have a positive and causal effect on EMGT. The findings coincide with the argument of Cheng et al. [27], Gallemore [28], Grant et al. [25], and Shu and Thomas [26]. That is, bank CEOs' risk-taking incentives encourage them to engage in EMGT in order to conceal undesirable consequences of their risky behaviors with the aim of avoiding regulatory attention and negative influences on their personal wealth and job security.

Table 4. Difference-in-differences regressions—the impact of the reduction in vega resulting from FAS 123R on bank EMGT.

Variables	**DLLP (1)**	**DLLP (2)**	**DLLP (3)**	**DLLP (4)**
Treatment	1.134 *	2.100 ***		
	(1.94)	(3.66)		
Post-123R	7.078 ***	6.876 ***		
	(15.01)	(12.85)		
Treatment × Post-123R	−2.384 **	−2.180 **	−2.539 **	−1.878 **
	(−2.64)	(−2.49)	(−2.63)	(−2.03)
Size		−0.751 ***		1.439
		(−3.99)		(1.03)
Tier1		−0.321 ***		−0.060
		(−4.13)		(−0.48)
EBTP		0.013		0.003
		(0.96)		(0.14)
Diversification		−5.022 ***		−1.174
		(−3.13)		(−0.22)
LLP_lag		0.119 ***		0.070 *
		(2.79)		(1.91)
CEO Age		0.090 *		−0.023
		(1.90)		(−0.17)
CEO Tenure		−0.002		0.363 **
		(−0.06)		(2.57)
CEO Duality		−0.231		−1.344
		(−0.48)		(−1.62)
Constant	3.572 ***	8.592 ***	3.743 ***	−12.944
	(11.25)	(2.81)	(7.41)	(−0.81)
Bank fixed effects	No	No	Yes	Yes
Year-quarter fixed effects	No	No	Yes	Yes
Observations	1124	1124	1124	1124
Adjusted R-squared	0.274	0.337	0.511	0.532

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

5.4. Validity of the Identification Strategy

One important econometric concern is the possibility of non-randomness in the grouping of the treatment and control groups. This is because firms endogenously determine managers' option compensation and, thus, the extent to which they are influenced by FAS 123R. Another concern is that inherent time-varying differences between the treatment and control groups may drive our results. These potential problems may violate the parallel trend assumption which must be satisfied in a difference-in-differences design. The parallel trend assumption requires that there are similar trends in the outcome variable (i.e., *DLLP*) between the treatment and control groups in the absence of the treatment event. Consistent with prior difference-in-differences work in the literature [15,16], we employ several approaches to test this assumption.

First, we compare the time trends in EMGT between the treatment and control groups from pre- to post-FAS 123R. As shown in Figure 1, during the period before FAS 123R (2002–2004), there are similar trends between the two groups and the EMGT of the treatment group is higher than that of the control group. However, as soon as FAS 123R was implemented in 2005, the two trends cross suddenly, with the EMGT in the treatment group being significantly lower than that in the control group. The abrupt change in EMGT trends between the two groups after 2005 indicates that the change in EMGT is driven by exogenous variation in vega resulting from FAS 123R.

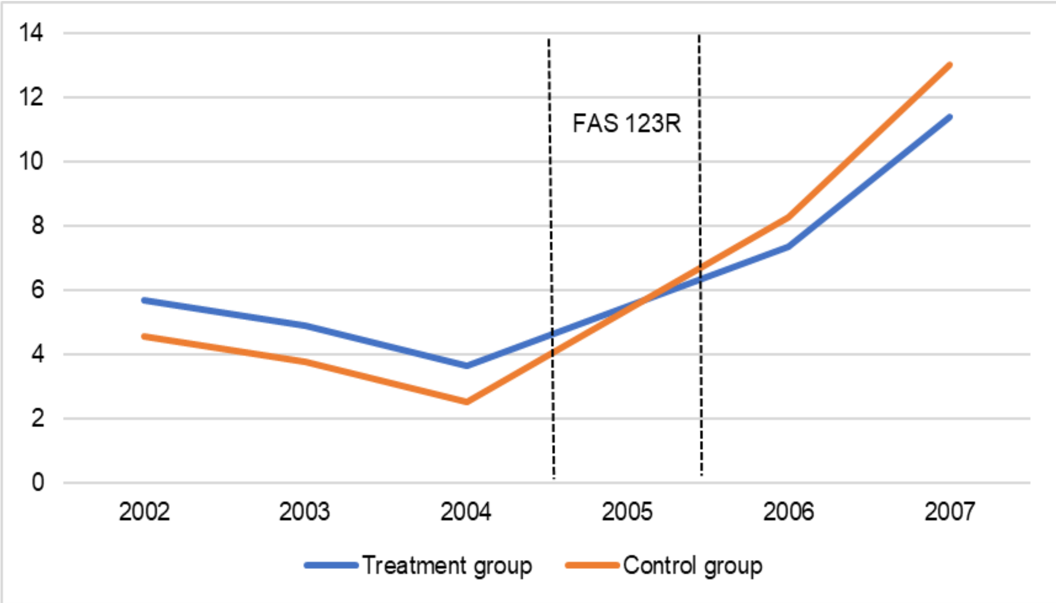

Figure 1. The time trends in bank EMGT around FAS 123R.

Second, we conduct the placebo test through a pseudo treatment event. Specifically, 2000–2002 and 2004–2005 are the periods before and after the event, respectively. We use the treatment and control groups as in our real tests. As shown in column (1) of Table 5, the difference-in-differences estimate is statistically insignificant, suggesting that the EMGT changes are similar for the treatment and control groups under the pseudo-event. These findings address the concern that baseline results may be driven by systemic differences between the two groups, since, if so, differential trends also exist under the placebo event.

Table 5. Placebo tests.

	Pseudo Treatment Event	**Pseudo Treatment Group**
Variables	**DLLP (1)**	**DLLP (2)**
Treatment×Pseudo_Post-event	−0.111	
	(−0.15)	
Pseudo_Treatment×Post-123R		0.376
		(0.98)
Size	0.342	1.866
	(0.24)	(1.50)
Tier1	−0.170	−0.043
	(−0.92)	(−0.35)
EBTP	−0.022	0.002
	(−1.04)	(0.07)
Diversification	4.699	−0.104
	(0.63)	(−0.02)
LLP_lag	0.119 *	0.084 **
	(1.80)	(2.35)
CEO Age	−0.254	−0.028
	(−1.38)	(−0.19)
CEO Tenure	0.185	0.389 **
	(0.88)	(2.64)
CEO Duality	−1.554 **	−1.291

Table 5. *Cont.*

	Pseudo Treatment Event	Pseudo Treatment Group
Variables	**DLLP (1)**	**DLLP (2)**
	(−2.52)	(−1.52)
Constant	15.316	−17.664
	(1.06)	(−1.16)
Bank fixed effects	Yes	Yes
Year-quarter fixed effects	Yes	Yes
Observations	927	1124
Adjusted R-squared	0.257	0.526

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. **, and * represent significance at the 5%, and 10% levels, respectively.

Third, we randomly assign banks into the pseudo treatment group and use the same pre-FAS 123R (2002–2004) and post-FAS 123R (2006–2007) periods as in our primary tests. As reported in column (2) of Table 5, we do not find a significant result. This supports our definitions of the treatment and control groups according to the median value of the average CEO option grants in the period before FAS 123R. Overall, the findings above indicate that our identification strategy satisfies the parallel trend assumption and is, thus, valid.

6. Further Analyses

6.1. The Impact of FAS 123R on Risk-Taking

Since the effect of risk-taking incentives on bank EMGT is built on the idea that vega has a positive effect on risk-taking behaviors, we examine whether the drop in vega caused by FAS 123R does indeed reduce the risk-taking of banks. Following Houston et al. [65] and Laeven and Levine [66], we measure banks' risk-taking based on both accounting and market data. Specifically, our risk-taking measures include z-score (*Z-score*), the volatility of earnings before taxes and loan loss provisions ($\sigma(EBTP)$), and stock return volatility ($\sigma(StockRet)$). The data on bank stock returns are obtained from CRSP daily stock files, and the market returns data are obtained from CRSP daily stock market indexes. We further decompose stock return volatility into its systematic and nonsystematic components [8,11]. To remove the skewness, these risk measures are logarithmically transformed (except for the measure of systematic risk). The larger value of the z-score indicates that a bank has a lower risk-taking, while larger values of earnings volatility and stock return volatility indicate a higher bank risk-taking.

The results are reported in Table 6. The dependent variables are several risk measures. In columns (1)–(2), the risk is measured by z-score (*Z-score*) and earnings volatility ($\sigma(EBTP)$), respectively. In columns (3)–(5), we use stock return volatility ($\sigma(StockRet)$) to measure risk, including total risk, systematic risk, and nonsystematic risk, respectively. We find that the coefficient of interaction term *Treatment*×*Post-123R* is significantly positive in column (1), and significantly negative in columns (2) and (3), suggesting that the reduction in vega induced by FAS 123R indeed reduces banks' risk-taking. The coefficient of the interaction term is significantly negative in column (5) but insignificant in column (4), which suggests that the drop in CEO risk-taking incentives results in a decline in idiosyncratic risk rather than systematic risk. This is in line with intuition, because managers have more direct control over idiosyncratic risk, but limited managerial control over systematic risk. The above findings indicate that increased vega incentivizes banks to follow risky behaviors, which is consistent with the finding of Bhagat and Bolton [12] and Gande and Kalpathy [13]. However, the result is inconsistent with Hayes et al. [34] who found that the decline in option usage and, thus, vega due to the adoption of FAS 123R does not decrease risky policies in non-financial firms. A possible explanation for this difference between banking and non-financial industries is that relative to non-financial industries, government bailouts and deposit insurance reduce the possibility of bank failure caused by risk-taking. Thus, greater vega in banks leads to higher risk-taking.

Table 6. Difference-in-differences regressions—the impact of the reduction in vega resulting from FAS 123R on bank risk-taking.

	Z-Score	σ(EBTP)	σ(StockRet)		
			Total	Systematic	Unsystematic
Variables	(1)	(2)	(3)	(4)	(5)
Treatment×Post-123R	0.430 **	−0.412 ***	−0.169 **	−0.001	−0.114 **
	(2.65)	(−2.66)	(−2.46)	(−0.97)	(−2.03)
Size	0.358	0.110	−0.158 *	−0.003	−0.146 *
	(1.14)	(0.36)	(−1.93)	(−0.98)	(−1.92)
Tier1	0.035	0.039	−0.004	0.000	−0.005
	(1.07)	(1.19)	(−0.33)	(0.87)	(−0.45)
ROA	0.017 ***	−0.013 ***	0.001	−0.000	−0.000
	(4.08)	(−3.37)	(0.62)	(−0.87)	(−0.20)
Diversification	0.026	0.338	−0.594 *	−0.009	−0.366
	(0.04)	(0.36)	(−1.98)	(−0.85)	(−1.21)
CEO Age	−0.037 **	0.024	0.009 *	0.000	0.010 **
	(−2.10)	(1.25)	(1.71)	(0.87)	(2.11)
CEO Tenure	0.054 **	−0.040 **	−0.014 *	0.000	−0.013 **
	(2.49)	(−2.08)	(−1.94)	(0.80)	(−2.32)
CEO Duality	0.339 **	−0.205 *	−0.081	0.001	−0.063
	(2.21)	(−1.69)	(−1.36)	(0.97)	(−1.30)
Constant	1.518	−0.240	−2.767 ***	1.095 ***	−3.063 ***
	(0.44)	(−0.07)	(−3.11)	(43.25)	(−3.76)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Year-quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1124	1124	807	807	807
Adjusted R-squared	0.511	0.478	0.626	0.799	0.633

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

6.2. Change in Vega and the Impact of FAS 123R on EMGT

Our prior evidence indicates that FAS 123R exerts a negative shock to vega, resulting in a drop in EMGT. To further verify that the decreased vega is indeed the factor driving the observed reduced EMGT, we test whether the impact of FAS 123R on EMGT is more pronounced in the treatment group that experiences the greater reduction in vega. To this end, we measure the change in vega, Δ*Vega*, as the difference of the average vega between the periods before and after FAS 123R. Then, we define *High_*Δ*Vega* (*Low_*Δ*Vega)*) as a dummy variable equal to one if Δ*Vega* is in the highest (lowest) quintile and zero otherwise. Columns (1) and (2) of Table 7 show the triple differences regression results. We find that the coefficient of *High_*Δ*Vega* × *Treatment* × *Post-123R* is significant and negative, but the coefficient of *Low_*Δ*Vega* × *Treatment* × *Post-123R* is insignificant. These findings indicate that, after FAS 123R, the larger the decline in vega, the greater the decrease in EMGT. Thus, the drop in EMGT after FAS 123R is driven by reduced vega.

Table 7. Triple difference regressions.

Variables	DLLP (1)	DLLP (2)	DLLP (3)
Treatment × Post-123R	−0.905	−2.047 *	−2.923 ***
	(−0.97)	(−1.75)	(−2.81)
High_ΔVega × Post123R	2.023 **		
	(2.32)		
High_ΔVega × Treatment×Post-123R	−5.338 ***		
	(−3.33)		
Low_ΔVega × Post123R		0.958	
		(1.15)	
Low_ΔVega × Treatment × Post-123R		0.092	
		(0.06)	
Low_Cap × Post123R			−0.759
			(−0.93)
Low_Cap × Treatment × Post-123R			4.280 ***
			(3.16)
Size	1.188	1.282	1.517
	(0.93)	(0.91)	(1.06)
Tier1	−0.095	−0.080	−0.031
	(−0.64)	(−0.62)	(−0.24)
EBTP	−0.003	0.003	0.006
	(−0.11)	(0.14)	(0.27)
Diversification	0.029	−1.382	−0.895
	(0.01)	(−0.27)	(−0.19)
LLP_lag	0.067 *	0.072 *	0.075 **
	(1.86)	(1.93)	(2.07)
CEO Age	−0.106	−0.030	−0.022
	(−0.84)	(−0.22)	(−0.18)
CEO Tenure	0.349 **	0.357 **	0.336 **
	(2.33)	(2.56)	(2.58)
CEO Duality	−1.337 *	−1.289	−1.324
	(−1.71)	(−1.55)	(−1.66)
Constant	−5.476	−10.741	−14.245
	(−0.38)	(−0.67)	(−0.90)
Bank fixed effects	Yes	Yes	Yes
Year-quarter fixed effects	Yes	Yes	Yes
Observations	1124	1124	1124
Adjusted R-squared	0.540	0.533	0.543

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

6.3. Regulatory Capital and the Impact of FAS 123R on EMGT

We now test whether the effect of FAS 123R on EMGT is affected by banks' capital adequacy, which is a proxy for potential regulatory intervention. The triple differences regression result is reported in column (3) of Table 7. We use the capital ratio level close to the required minimum to capture the possibility of banks being subject to stronger supervision. Specifically, we define a dummy variable, *Low_Cap*, to equal one when the Tier 1 capital ratios are in the bottom quintile and zero otherwise. We find that the coefficient of the triple interaction term *Low_Cap* × *Treatment* × *Post-123R* is significantly positive. That is, relative to the better-capitalized banks, the EMGT of banks with capital ratios closer to the required minimum decrease less after FAS 123R. This result is consistent with Cheng et al. [27] who found that when the likelihood of regulatory intervention is high, bank managers have greater incentives to engage in EMGT to avoid regulatory intervention. Overall, our finding supports the view of Bischof et al. [58] and Huizinga and Laeven [59] that banks tend to manage earnings for capital considerations.

6.4. Robustness Checks

We perform a battery of tests to check the robustness of our results. First, we use the discretionary component of realized gains and losses on available for sale (AFS) securities as an alternative measure of bank EMGT. Indeed, AFS is prevalently used to manage earnings after Accounting Standards Codification (ASC) 320 because of its increased size [67]. Following Cohen et al. [61] and Cornett et al. [63], we measure discretionary AFS securities gains and losses as follows:

$$RSGL_{i,t} = \beta_0 + \beta_1 Size_{i,t} + \beta_2 URSGL_{i,t} + \varepsilon_{i,t} \quad (4)$$

where *RSGL* is realized AFS securities gains and losses divided by total assets, *Size* is the natural logarithm of total assets, and *URSGL* is unrealized AFS securities gains and losses divided by total assets. The data on realized and unrealized gains and losses on AFS securities are obtained from the Bank Regulatory Database of Wharton Research Data Services. We use a linkage table (CRSP-FRB LINK) created by the Federal Reserve to merge Bank Regulatory data with our Bank Compustat data. The absolute value of residuals in Equation (4) represents the discretionary component of realized AFS securities gains and losses (*DRSGL*). The larger value of *DRSGL* indicates a higher degree of EMGT. Column (1) of Table 8 exhibits the result of using this new measure of the dependent variable. We find that our results continue to hold.

Table 8. Robustness tests.

	Alternative Measure	**PSM**	**Alternative Treatment Group**	**Controlling for Delta**	**Extending the Sample Period**	**No Performance-Based Shares**
Variables	**DRSGL (1)**	**DLLP (2)**	**DLLP (3)**	**DLLP (4)**	**DLLP (5)**	**DLLP (6)**
Treatment × Post-123R	−0.247 **			−1.928 **	−1.725 *	−3.215 ***
	(−2.06)			(−2.09)	(−1.73)	(−2.73)
Treatment_PSM × Post-123R		−3.351 **				
		(−2.61)				
AccImpact × Post-123R			−1.539 *			
			(−1.68)			
Ln(1 + Delta)				−0.306		
				(−0.61)		
Size	−0.050	0.336	1.734	1.591	−0.557	0.878
	(−0.17)	(0.13)	(1.34)	(1.12)	(−0.35)	(0.68)
Tier1	−0.003	0.098	−0.065	−0.053	−0.516 *	0.216
	(−0.09)	(0.50)	(−0.53)	(−0.44)	(−1.76)	(1.53)
EBTP	−0.002	0.037	0.003	0.005	−0.060 **	−0.028
	(−1.25)	(1.00)	(0.13)	(0.20)	(−2.15)	(−1.05)
Diversification	−1.276	−9.874	−1.113	−0.997	1.881	7.697
	(−0.95)	(−1.02)	(−0.21)	(−0.19)	(0.35)	(1.62)
LLP_lag	0.005	0.013	0.088 **	0.066 *	0.225 ***	0.128 ***
	(1.17)	(0.34)	(2.41)	(1.79)	(3.77)	(2.76)
CEO Age	−0.004	−0.030	−0.011	−0.031	−0.116	0.053
	(−0.32)	(−0.28)	(−0.08)	(−0.22)	(−0.59)	(0.34)
CEO Tenure	0.017	0.257	0.376 **	0.407 **	0.496 **	0.328 *
	(1.44)	(1.69)	(2.60)	(2.57)	(2.18)	(1.78)
CEO Duality	−0.302 *	0.449	−1.307	−1.331	−1.635	−2.691 **
	(−1.81)	(0.30)	(−1.63)	(−1.58)	(−1.04)	(−2.41)
Constant	1.536	−0.421	−16.363	−13.165	17.351	−15.792
	(0.50)	(−0.02)	(−1.03)	(−0.82)	(0.95)	(−0.76)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	716	329	1124	1124	1343	641
Adjusted R-squared	0.231	0.667	0.530	0.532	0.501	0.570

The *t*-statistics based on robust standard errors clustered at the bank level are shown in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Second, although our treatment and control groups confirm that the parallel trend assumption holds, we perform a further test to address the issue that the two groups have different characteristics which may drive our results. Specifically, we first partition banks into quintiles based on the average CEO option grants before FAS 123R. Next, we employ propensity score matching (PSM) to match banks in the highest quintile and those in the lower 4 quintiles based on the control variable in Equation (3), using three years of pre-event data. We do not use the treatment group in the primary test to match the control group because the two groups are similar in number and difficult to match. The matching ensures that the characteristics of the matched treatment and control groups are very similar (untabulated). Then, in column (2) of Table 8, we repeat the analysis. The results remain unchanged.

Third, despite tests in Section 5.4 mitigating the concern that the assignment of the treatment and control groups may be from endogeneity choices, following the approach adopted by Mao and Zhang [16], we further use the sample median of implied option expense (deflated by fully diluted shares) before FAS 123R to define the two groups. Column (3) of Table 8 reports the result. We find that our results continue to hold. Fourth, we control for delta in our regression given that it may influence risk-taking incentives and bank EMGT, although the results in Table 3 do not show the difference in the delta between the treatment and control groups around FAS 123R. The result is presented in column (4) of Table 8. We find that previous results still hold, which further confirms that the shock of FAS 123R works through CEO compensation vega.

Fifth, we extend the sample period to ensure that our results are robust to the selection of the sample period. Specifically, we extend the post-FAS123R period to 2008. Although the prior literature [29,59] indicates that banks have greater incentives to engage in EMGT during crises, including the crisis year in the sample helps further support our conclusion rather than hurt it. The finding presented in column (5) of Table 8 shows that our previous results still hold. In other words, our results are insensitive to the choice of the sample period.

Finally, we exclude the effect of performance-based shares. According to Bettis et al. [68], firms granting performance-based equity awards to executives increase from about 18% in 2002 to 48% in 2007. Bettis et al. [68] also found that performance-based equity awards increase managers' risk-taking incentives. Since our measure of vega does not consider the convexity of performance-based equity awards, if banks increase performance-based equity awards after FAS 123R, the drop in vega after FAS 123R may be overstated. In this vein, real risk-taking incentives may be incorrectly measured. To address this concern, we focus only on banks that do not have any performance-based shares in our sample period. As shown in column (6) of Table 8, our results remain robust.

7. Conclusions and Implications

This study examines whether risk-taking incentives (vega) in CEOs' stock options affect bank EMGT. We establish the causality between the two variables using the exogenous shock from FAS 123R in 2005. This regulation mandates a fair-value-based method to expense option compensation, which reduces the accounting benefits of stock options, and, thus, induces a significant decrease in vega. Using a difference-in-differences method, we show that banks with average CEO option grants above the sample median prior to FAS 123R (treatment group) significantly reduce their EMGT after this accounting regulation, compared to the remainder of banks (control group). The effect is concentrated in the treatment group with the largest drop in vega. These findings suggest that bank EMGT is positively and causally related to CEO risk-taking incentives. Because the effect of vega on EMGT is with the assumption that vega leads to increased risk-taking, we examine the impact of FAS 123R on banks' risk-taking. We show that FAS 123R leads to a greater decrease in risk-taking in the treatment group compared to the control group. In addition, we find that the negative effect of the decrease in risk-taking incentives resulting from FAS

123R on EMGT is weakened in banks with a higher possibility of regulatory intervention, suggesting that these banks engage in EMGT to avoid regulatory intervention.

Our paper captures the results of a trade-off between the benefits and costs of risk-taking incentives from option compensation. Because of the convex payoff of stock options, managers will benefit from the increase in stock price and the loss due to the decrease in stock price is relatively limited. Thus, option compensation induces managers to take on risky projects. However, risk-taking has costs, such as earnings volatility and consequent stock price volatility. Thus, managers tend to use discretion in financial reporting to mask risks, in order to avoid regulatory intervention and lower the risk perception of investors. In this regard, our findings have implications for investors and regulators. Investors should weigh the banks' EMGT against managers' risk-taking incentives, because while compensating risk-averse managers with stock options helps solve the risk-related agency problem, it incurs the agency cost associated with EMGT. Moreover, regulators should pay close attention to the financial reporting of banks with higher option compensation since banks have incentives to engage in EMGT to obscure the adverse consequences induced by risk-taking incentives related to option compensation. Regulators' focus on banks' financial reporting helps to avoid the fact that opaque financial reporting distorts stakeholders' understanding of banks' risk exposure and, thus, can avert financial instability caused by the absence of decision-useful information.

In closing, we highlight some limitations of our paper and several suggestions for future research that are closely associated with our analysis. First, our finding, i.e., the degree of bank EMGT increases with CEO risk-taking incentives, indicates that bank managers have motivations to use EMGT to conceal undesirable consequences of risk-taking. Thus, earnings manipulation is costly for shareholders and bank regulators, because it is not conducive to the knowledge of banks' "real" risk-taking. However, we have limited understanding of the benefit of using EMGT to obscure risk. That is, there is also the possibility that, under certain circumstances, the role of bank EMGT in reducing outsiders' risk perception aligns with the interests of shareholders and regulators' objectives. Therefore, we encourage future research to consider this explanation. In addition, our paper does not provide a direct test on the effect of bank risk on EMGT. Thus, future research should focus on how risk change affects banks' accounting practices. Additionally, because managerial ability or incentive to hide negative information is different during economic downturns and expansions, studying whether managers respond to bank risk differently during different economic conditions in terms of EMGT would yield interesting insights. Finally, our study on the effect of managerial risk-taking incentives on bank EMGT is merely a start, and understanding of how managerial risk-taking incentives interact with EMGT in affecting banks' economic behaviors is also needed.

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Appendix A

Table A1. Variable definitions.

Variables	Definitions
DLLP	The standardized absolute value of residuals estimated by Equation (1)
Vega	The dollar-change in CEOs' option value when the standard deviation of stock returns changes by 1%
Delta	The dollar-change in CEOs' stock and option value when the stock price changes by 1%
Treatment	Equals one if the average CEO option grants before FAS 123R (2002–2004) are above the sample median, and zero otherwise
Post-123R	Equals one during the period after FAS 123R (2006–2007), and zero during the period before FAS 123R (2002–2004)
P_OptionGrant	Option grant value divided by total pay
CashComp	Cash compensation (salary and bonus)
Size	The natural logarithm of total assets
Tier1	Tier 1 capital ratio
EBTP	Earnings before taxes and loan loss provisions divided by total assets
σ(EBTP)	The natural logarithm of the standard deviation (eight quarter rolling) of EBTP
Diversification	The ratio of non-interest income to total income
LLP_lag	Loan loss provisions divided by total assets, lagged by one quarter
CEO Age	CEO age
CEO Tenure	The number of years since the executive became CEO at the current bank
CEO Duality	Equals one if the CEO also serves as chairman of the board, and zero otherwise
ROA	The return on assets
DRSGL	The absolute value of residuals estimated by Equation (4)
AccImpact	Equals one if the average implied option expense (deflated by fully diluted shares) is above the sample median before FAS 123R (2002–2004), and zero otherwise
Z-score	The natural logarithm of return on assets (ROA) plus capital assets ratio divided by the standard deviation (eight quarter rolling) of ROA
σ(StockRet) (Total)	The natural logarithm of the standard deviation of daily stock returns over a quarter
σ(StockRet) (Systematic)	Beta coefficient estimated from the market model over a quarter
σ(StockRet) (Unsystematic)	The natural logarithm of the standard deviation of the market model residuals over a quarter

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