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**Are Risk Management Disclosures Informative or Tautological?**  
**Evidence from the U.S. Banking Sector**

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## **Abstract**

Banks have gone under increasing risk levels during the latest financial crisis. Investors' confidence was shaken by the effectiveness of bank risk management practices, which has opened new challenges for bank management in approaching their risk. Understanding and communicating adopted risk management mechanisms is most likely to provide insights and enable diagnosis on firm risk exposure. Conveying data that reduces information asymmetry might be reflected on stock performance. Investigating the impact of risk management disclosures content on stock price change and return volatility using a sample of US national commercial banks during 2009-2010 shows that informative risk management disclosures seems to be valued by investors. This is reflected on current year stock prices and reduces the subsequent year return variances.

**Keywords:** Risk management disclosure; Stock return; US banks.

Banks have gone under increasing risk levels during the latest financial crisis (Allen and Moessner, 2011; Brunnermeier, 2009; Ivashina and Scharfstein, 2010), which has led to shaking shareholders' and stock market participants' confidence in the effectiveness of bank risk management (hereafter RM) practices (Acharya et al., 2011; Gatev et al., 2009). This opens new challenges for banks' management to control their risk (Cornett et al., 2011) and communicate their effort toward a safer risk environment (Allen and Moessner, 2001; Gorton, 2009). Understanding adopted risk management mechanisms provides insights into firms' risk profile and assists in asset valuation (Scholes, 2000; Beaver et al., 1989). Indeed, risk management is intended to eliminate financial failure and maintain shareholders value (Solomon et al., 2000). Disclosing risk management information, which diagnoses bank risk exposure (Helbok and Wagner, 2006), is likely to reduce uncertainty (Hubbard, 2000) and assist in evaluating management effectiveness (Lajili and Zeghal, 2005).

Providing information that reduces uncertainty and increases the number of informed investors is most likely to reduce asymmetry and improve stock price (Poshakwal and Courtis, 2005; Healy and Palepu, 2001). As investors react directly to new available information (Merton, 1987), stock prices are influenced by the level of information available in efficient markets (Fama, 1991; Helbok and Wagner, 2006). Furthermore, information content influences stock price positively and the impact of high information content lasts longer (Jennings and Starks, 1985). Therefore, one might expect that having better content of risk management information might be valued by investors and improve stock prices.

Traditional disclosure studies argue that the main objective behind revealing information is to respond to stakeholders' need in terms of improving transparency, reducing agency costs (Jensen and Meckling, 1976; Poshakwale and Courtis, 2005), facilitating investment decision (Meek et al., 1995), and reducing information costs in stock markets

(Cormier and Gordon, 2001; Verrecchia, 2001). Risk is present in almost every aspect of business operations (Lajili and Zeghal, 2005). Disclosing information on firm risk is important to any party interested in the firm (Linsley et al., 2006). On one hand, it allows stakeholders to monitor directors' decisions and the risk they encounter (Linsley and Shrivess, 2005), and on the other hand, risk disclosure assists in managing uncertainty (Hubbard, 2000). Given that risk management practices aim at reducing the possibility of failure and improving profitability (Solomon et al., 2000), risk management disclosure is likely to be considered as part of the governance structure reflecting management competency and success in meeting business objectives (Linsley and Shrivess, 2006). Therefore, providing better understanding to bank risk and its complex transactions lead to having more informed investors (Stiroh, 2006) and hence more investors are attracted (Poshakwale and Courtis, 2005).

In the recent financial crisis, the absence of clear understanding of the banks' complex operations and the dynamics of risk management damaged the financial markets (Allen and Moessner, 2011; Gorton, 2009; Brunnermeir, 2009; Ivashina and Scharfstein, 2010). The complexity of the business transactions promotes the need for quality risk management disclosures to evaluate management effectiveness and approaches followed by dealing with the market volatility (Lajili and Zeghal, 2005). In responding to the new challenges arising from the increasing risk levels during and after the financial crisis (Cornett et al., 2011), banks might manage the higher levels of uncertainty left in financial markets by considering the content of their risk management disclosure to reduce the uncertainty gap between informed and non-informed investors. This is likely to encourage trading and improve stock price (Kim and Verrecchia, 1994), as risk management practices are intended to meet the increasing challenges of the financial crisis by reducing the chance of failure (Solomon et al., 2000).

There is ample literature that examined stock price reaction to revealed information or corporate disclosure in general (Palmros et al., 2004; Kothari et al., 2009; Bushee and Noe, 2000; Akhigbe et al., 2008, etc.). However, to our knowledge, there is a lack of studies that investigated the impact of risk management disclosures (hereafter RMD) as an entirely dedicated disclosure segment on reducing market uncertainty and its reflection on stock prices. This paper seeks to investigate whether better content of RMD is valued by stock market participants and improves stock prices in a sample of US national commercial banks for the years 2009-2010, (i.e.) the period after the financial crisis (Grove et al., 2011; Yeh et al., 2011). Moreover, content analysis technique is used to measure the content of six types of RMD in banks' annual reports contrary to the studies that measured single risk type (e.g. operational risk reporting), relied on rating agencies, or used word or sentence count to measure the quantity of disclosures (Lajili and Zeghal, 2005; Helbok and Wagner, 2006; Bushee and Noe, 2000).

Analysing 196 observations indicates that the content of RMD is likely to have improved the current year stock price proxied by two alternative return measures, as well as, reducing stock return variance of the subsequent year proxied by the standard deviation of monthly stock returns. Therefore, better content of RMD seems to provide shareholders and investors with information enabling them to monitor management practices in terms of risk management. This is likely to reduce information asymmetry and uncertainty, thus improving stock performance. Furthermore, the reported results show the improvement of stock price and reduction to return variance when banks achieved better return on assets and book-to-equity ratios. Thus, the results of the study are likely to encourage management to enhance their RMD content to assist in the management of agency problems and achieve better shareholders' wellbeing. The economic consequences of RM disclosure imply that transparent risk management reporting is a preventive tool rather than an exercise to comply

with legislation requirement. Consequently, considering RM disclosure content is important for better shareholder value.

The remainder of the paper is in four sections. The next section covers the literature review and theoretical framework. The third section sets out the research study in terms of sample data and models. A fourth section reviews the empirical results. The final section draws conclusions.

## **LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

Banks as financial intermediaries, linking between depositors and investors, manage clients' assets and finance other industries as well as households (Howells and Bain, 2008; Ivashina et al., 2010). In general, deposits, which form the main source of funds and the main component of debts, are short-term debts where a significant portion is invested in loans with no clear understanding by shareholders and external investors of the value and risk levels of these investments (Gatev et al., 2009). To understand bank's risk and value its equity, investors and shareholders should look beyond the static balance sheet, which is limited in detailing entity risk (Scholes, 2000). Having insights into firm risk management dynamics provides understanding of bank risk exposure in relation to economic changes such as changes in interest rates, commodities market values, and currency rates (Scholes, 2000). For example, a better understanding of the maturity gap between liabilities and assets might help in evaluating asset values since asset value is most likely to decrease if interest rates increase (Beaver et al., 1989).

Investors respond to the dissemination of information once received, and if investors are faced with incomplete information they will be less interested in being shareholders (Merton, 1987). Thus, reducing information asymmetry increases investors' confidence and stock liquidity; consequently stock performance might be enhanced (Healy and Palepu,

2001). Previous research shows that stock prices adjust according to the information disclosed by firms (Helbok and Wagner's, 2006; Fama, 1991; Fama, 1969). Therefore, uninformed investors ask for higher returns due to the higher risk associated with the amount of private information available to other investors (Easley and O'Hara, 2004), and favour dealing with financial assets having low information cost, (i.e.) available and easy to collect (Hubbard, 2002). In this context, Lambert et al. (2007) mention that 'Clearly, decision makers in an economy make decisions on the basis of the information they have available to them. If this information changes, so do their decisions' (Lambert et al., 2007, p. 404). In May 2006, Moody's mentioned that the level of information provided to investors is not sufficient, recommending more informative risk management disclosures (Lewis, 2006). Banks that have poor risk management disclosures, which signal their risk behaviour, might face higher cost of funds and difficulties in accessing capital markets (Linsley and Shrivess, 2005; Helbok and Wagner, 2006).

Communicating risk management practices, which are intended to decrease the possibility of failure (Solomon et al., 2000) and convey the efforts toward maintaining a safe environment (Allen and Moessner, 2001; Gorton, 2009), provides investors with better understanding of banks' complex operations (Gorton, 2009) and details needed to evaluate assets (Lajili and Zeghal, 2005; Scholes, 2000). This encourages trading (Acharya et al., 2011). Having better understanding of bank risk exposure provided through risk management disclosures (Scholes, 2000) reduces uncertainty and information asymmetry and leads to improvements in stock performance (Poshakwal and Courtis, 2005; Lajili and Zahal, 2005; Healy and Palepu, 2001; Hubbard, 2000). Moreover, better RMD content enables shareholders to monitor management practices and attitude toward maintaining acceptable risk levels and their alignment with shareholders' interest (Lajili and Zeghal, 2005). When



investors have higher certainty about the firm, based on information they have, large orders are placed and consequently stock price appreciates (Diamond and Verrecchia, 1991).

Risk information is important to any party interested in the firm to help in the assessment of its risk profile (Linsley et al., 2006). It allows stakeholders to monitor directors' decisions and the risk they encounter; reflecting management competency and, to some extent, risk management could be considered as a governance factor indicating management success in meeting business objectives (Linsley and Shrivess, 2005; Lajili and Zeghal, 2005). Moreover, institutional investors might benefit from risk management disclosures that reflect a firm's internal control mechanism in their decision making process. Detailed risk information is appreciated by investors, since it improves their understanding of bank's risk and complex transactions and consequently assists in having an effective diversified portfolio (Solomon et al., 2000; Stiroh, 2006). Poshakwale and Courtis (2005) show that RMD has the greatest impact in explaining the change in the cost of capital arguing that providing a high level of information to the market reduces the level of uncertainty, lowers the cost of capital, and consequently attracts investors. Therefore, better content of disclosed risk management information facilitates having homogenous belief concerning bank's value (Baumann and Nier, 2004).

If investors are using disclosed information to analyse the firm, predict its future performance, and consequently take their decision, then disclosures might change investors' expectations and this could be seen through changes in stock prices in the disclosure period (Benston, 1967). The content of information disclosed is valued by stock market participants when taking their trading decisions, as the content of disclosed information reflects firm's motivation toward being more transparent and that stock price is a reflection of all public information (Patell, 1976). Arguably, if by improving the content of disclosed RM

information management can reduce the agency cost and enhance the firm's value, then agency theory can explain management intention to disclose better content of RM information. Therefore, we expect that management that avoids holding information and discloses better content of RM information might reduce information asymmetry, improve stock return, and reduce return volatility. This leads to our hypotheses:

HYPOTHESIS 1. The better the content of risk management disclosures, the higher the stock return.

HYPOTHESIS 2. The better the content of risk management disclosures, the lower the stock return volatility.

## **RESEARCH DESIGN**

### **Sample Selection and Data Collection**

To test the hypotheses, we have drawn a sample from the active listed US national commercial banks. The purpose of selecting only national commercial banks is to have coherent sample observations subject to similar regulations and providing similar services. Banks are then sorted according to their total assets in year 2009 and banks having total assets less than one billion are omitted to avoid small banks and ensure coherence sample. The initial sample size is 214 observations in both years, (i.e.) 2009 and 2010.

As a tool to communicate firms' specific information, annual reports are used by previous researchers to measure disclosures (Perignon and Smith, 2010; Linsley and Shrives, 2006; Ahmed et al., 2004) since disclosures form a vital part of them (Gul and Leung, 2004). Thus, the management discussion and analysis section in banks annual reports and forms 10-K are reviewed to measure the content of RMD. Financial information to compute stock price change and the control variables is obtained from *Thomson ONE Banker* database. Due to missing data, closures, and bank mergers, the final examined sample size in both years after

omitting observations with missing data comprises of 196 observations having asset size greater than one billion.

### **Stock Price Changes (Stock Return)**

In efficient capital markets, stock prices respond to newly revealed information reflecting investors' reaction to the new available information and the efficiency of the market (Ross et al., 2005; Patell, 1976). The change in stock value implies a new assessment to the predicted future cash flows and consequently mirroring firms' current and future performance; in other words, stock prices are a reflection of the firms' overall market valuation (Klassen and Mclaughlin, 1996). Improvement in stock prices is not only important to enhance shareholders' value but also important to increase stock market liquidity (Breen et al., 2002) and correct asset undervaluation, which harms the firm and its management specially when raising equity capital or approaching the expiry of stock options (Healy et al., 1999). Previous research shows that releasing firms' information is sufficient to explain changes in stock prices (Lobo, 2000; Lynch and Mendenhall, 1997; Chambers and Penman, 1984). In estimating our relationships, stock return and the variation in stock return are used (Geld and Zarowin, 2002; Lamber et al., 2007; Pereira and Zhang, 2010; Anderson and Fraser, 2000).

### **Risk Management Disclosures**

Providing information that enables investors to evaluate bank activities and anticipate expected future risk levels acts as a process that disciplines both the market and bank management (Flannery and Sorescu, 1996). The extent and comprehensiveness of revealed mandatory information is defined by management, the ultimate owner of information, and, therefore, the voluntary aspect could be found in mandatory disclosure since more disclosures enhance readers' knowledge of the firm's practices and reflect transparency (Kent and Stewart, 2008). Pillar 3 of Basel emphasizes the importance of providing better disclosures in

order to act as market discipline, while Sarbanes-Oxley standards hold firms' management accountable to disclose RM information and liable for non-compliance (Helbok and Wagner, 2006).

The content analysis approach is adopted in measuring the content of RMD in the management discussion and analysis section of banks' annual reports. In disclosing risk management activities, management is most likely to reveal information illustrating a firm's risk exposure and the approach followed to identify, monitor and mitigate risk 'Disclosures related to risk management have to include the risks to which banks are exposed and the techniques used to identify, measure, monitor, and control these risks' (Helbok and Wagner 2006, p.6).

Communicated information is addressed to a wide range of users including but not limited to shareholders, investors, and creditors. Each group of users has different needs and is looking for different types of information. This limits the ability to classify the best reported data that might be useful to interested parties (Benston, 1967). Previous studies highlight the interest of different groups to different information types and the importance of each information type on firms' performance. For example, portfolio quality information and risk levels assist in managing clients' uncertainty (Hubbard, 2000), while financial indicators, such as maturity gap and non-performing loans, impact negatively on investors (Linsley et al., 2006). Ahmed et al. (2004) conclude that maturity-gap disclosure could be more informative than the information presented in banks' financial statements. Moreover, risk disclosures that reflect firms' internal control mechanism and decision making process are valued by institutional investors (Solomon et al., 2000). Jorion (2002) suggests that value at risk disclosure assists in forecasting the trading revenue volatility due to its importance in comparing the risk of banks' trading portfolios.

We classify RMD into six categories according to risk types and covering information disclosed regarding the management of credit risk, interest rate risk, liquidity risk, market risk, legal and compliance risk, and operational risk (COSO, 2009; Linsley et al., 2006; Baumann and Nier, 2004; Ahmed et al., 2004; Jizi, 2015; Nehme et al., 2016). In view of the absence of a clear guide that assists in prioritizing among the different types of disclosed RM information or giving different weight to each type, the study provides equal weighting across the examined types, as each disclosure type is likely to be of equal importance. This avoids the inherent subjectivity in providing weights for each disclosure type and provide equal importance to all users (Raffournier, 1995).

The narrative content of each risk category is scored from zero to three according to the thoroughness of discussion (risk management indicators and discussion topics are illustrated in appendix A). Therefore, a score of one point is given if the bank, when discussing a risk management type, provides definition for the risk and its scope accompanied by a brief discussion on how they are approaching it. If the discussion is extended to include the policies, frameworks, and techniques used (e.g. stress testing, calculating value at risk, portfolio classification and concentration, and net portfolio value estimation and earning simulation) to assess their risk exposure as well as discussing the results of the testing conducted, then the disclosure is given a score of two points. If the assumptions employed and considered when applying the testing or adopting a framework and/or the rationale behind selecting a testing technique in particular is discussed then the disclosure is given a score of three points. An additional point is given if numerical figures are disclosed supporting the narrative discussion and another point if the figures are compared with previous years' results or projected target figures. Therefore, a maximum of five points could be achieved by each category and thirty as a maximum score. The final score used in the

analysis is computed by dividing the sum of points awarded over the maximum score a bank can achieve, (i.e.) thirty points.

The advantage of the adopted method over using disclosure scores rated by agencies, or using word or sentence count scores, is that content analysis reflects both quantity and quality (Hasseldine et al., 2005). Moreover, the followed coding approach is clear and overcomes sample selection limitation if selected banks were not rated by the rating agency.

### ***Disclosure score reliability***

Although full assurance could not be achieved (Linsley and Shrivs, 2006; Jizi et al., 2016), Krippendorff's alpha is used to measure scoring subjectivity and reliability (Krippendorff, 2007). Several disclosure studies (e.g. Hasseldine et al., 2005; Holder-Webb et al., 2009; Jizi et al., 2014 and Newson and Deggan, 2002) used Krippendorff's alpha to measure inter-rate agreement considering alpha that ranges between 70% and 85% sufficient and the scores are reliable for further analysis.

Twenty annual reports covering 10% of the examined annual reports have been randomly selected and have been provided to two independent coders to test for disclosures score reliability. The approach followed to score RMD along with the scoring sheet has been explained to the coders. The score provided by the two independent coders' along with the score computed by the author are used to test scoring process reliability. Since the first reliability test reports alpha less than 75%, reconciliation between the three scores is performed. The scores with variation greater than 30% are selected and the coding is analysed with the other coders to identify the reason behind such differences. After agreeing on the adjusted scores another reliability test has been performed and reported alpha in the second round is 81.5%.

## REGRESSION MODELS

The regression models estimating the relationships between RMD, stock-return, and return volatility are as follows:

$$\text{Model (1)} \quad PCh = \alpha + \beta_1 RMD + \beta_2 ROA + \beta_3 Lev + \beta_4 BtoM + \beta_5 AG + \epsilon$$

$$\text{Model (2)} \quad RSD = \alpha + \beta_1 RMD + \beta_2 ROA + \beta_3 Lev + \beta_4 BtoM + \beta_5 AG + \beta_6 Size + \epsilon$$

Where:

**PCh** change in stock price measured as the difference between the closing-price of the observed year and preceding year, scaled by the preceding year closing-price. As an alternative measure, dividends are added to the numerator to compute the total investment return.

**RSD** standard deviation of the monthly stock returns for a given firm *i* in a certain year *t*.

$\alpha$  the intercept

$\beta_1 \dots \beta_n$  the regression coefficients

$\epsilon$  the error term

### Control variables

Firms' growth signals their potential for new investment opportunities generating expected future return and consequently enhancing equity value as well as reducing return volatility (Kothari et al., 2009; Pilotte, 1992). According to agency theory, corporate managers benefit from new investment opportunities in reducing agency cost by utilizing their available free cash flow in new investments (Sibilkov, 2009; Fama and French, 2002). Pilotte (1992) finds that firms that witnessed considerable growth are able to eliminate declines in stock prices, while Bushee and Noe (2000) mention that better book-to-market value is likely to lower stock return volatility. High return on assets reduces spread, signals a firm's efficiency, and

provides compensation for additional risk-taking (Flannery and Sorescu, 1996). On the other hand, poor-performing companies are more sensitive to financial difficulties and lack resistance to external shocks (Baek et al., 2004). In this context, Berger and Udell (2006) mention that profit efficiency enhances expected returns and might protect the firm from expected crisis.

Leverage could be seen as a tool to manage agency conflicts and consequently enhance stock prices (Kochhar, 1996). The presence of leverage enforces corporate managers to utilize their assets effectively and eliminate inefficient expenditures in order to fulfil commitments and avoid settlement delays or even bankruptcy (Kochhar, 1996). In the recent financial crisis liquidity risk came to be of greater concern stressing on asset pricing (Acharya et al., 2011; Allen and Moessner, 2011). As leverage is one of the measures that predict bank failure, increasing bank's risk and impacting on its market value (Kothari et al., 2009; Helbok and Wagner, 2006), we use leverage to control for liquidity. Large banks might experience less return volatility compared to small banks (Baumann and Neir, 2004) due to their ability in diversifying their investments (Demsetz and Strahan, 1997) and obtaining external financing (Baek et al., 2004). Moreover, Anderson and Fraser (2000) argue that in addition to the diversification effect bank size might affect its risk level due to its ability to access capital markets when liquidity is needed.

The measurements of the independent variables are illustrated in table 1.

[Table 1 about here]

## **RESULTS AND FINDINGS**

### **Descriptive Statistics**

The stock price change in the examined sample varies between (1.07) and (-1.00). Only 24% of the banks covered in the examined sample witnessed enhancements in their stock prices



during 2009 compared to 65% in 2010. The mean is (-0.06) and the standard deviation is (0.41). On the other hand, the standard deviation of the monthly stock returns varied between zero and (0.49) having a mean of (0.123) and standard deviation of (0.082).

All banks covered in the sample revealed information related to their risk management practices with clear variation in the comprehensiveness and the quality of the disclosed information. The variation is in both the level of information disclosed and the types of risks management disclosed. The highest risk management score is 0.9 across the defined risk types and the lowest score is 0.17 points. 42% of the examined banks obtain RMD score above the mean (0.47). The standard deviation is (0.11) showing the level of variation between scores. These results highlight the issue of the voluntary aspect in mandatory disclosure mentioned by Kent and Stewart (2008).

A lens on the control variables shows that return on assets varied widely during 2009-2010. The highest ROA is (3.69) and the lowest was (-9.53) with a standard deviation of (1.88). The proportion of banks that were able to have positive ROA during 2009 and 2010 was (60%) and (67%) respectively. Leverage ranges between (1.01) to (0.08) having a mean of (0.9) and standard deviation of (0.06). The book-to-market ratio varies between (28.45) and (-2.68). The mean of the sample is (1.89) and the standard deviation is (2.75). Asset growth varies from (0.81) to (-0.22) having a sample mean of (0.02).

[Table 2 about here]

### **Tests of Hypotheses**

The relationships between stock price changes and the content of RMD are examined by employing the linear regression analysis with robust standard error. This section illustrates and analyses the results obtained from the employed regressions.

Table (3) below relaxes the assumption of multicollinearity between the independent variables (Haniffa and Cooke, 2005; Jing et al., 2008). However, the correlation between the ROA and the book-to-market value of equity (-0.70) might be of a concern. Therefore, ROA and book-to-market value will be introduced gradually into the examined model since collinearity between variables could also be detected if the coefficient values of the independent variables are affected with the addition or the removal of any examined variable (Brooks, 2008). The variance inflation factor (VIF) test reports results that vary between 1.16 and 2.9 which are considered acceptable results, suggesting no serious multi-collinearity problem (Gujarati, 2003; Jing et al., 2008). We test for heteroscedasticity using the Breusch-Pagan / Cook-Weisberg test for heteroscedasticity. With the exception of the standard deviation of stock returns 2010-2011, no threat of heteroscedasticity was reported.

[Table 3 about here]

To estimate the association between RMD content and stock return, three alternative measures are used. Table (4) shows the estimated relationships using price change (return), price change with dividends (indicating the total investment return), and the standard deviation of the monthly stock returns for the following year. In all estimated equations, variables with potential risk of multicollinearity are introduced gradually in order to monitor their impact on other variables and identify irregularities.

[Table 4 about here]

The results show that the overall explanatory power of equation II and IV is 31% and 34% respectively and significance at ( $p < 0.01$ ). With respect to the equations estimating the impact of RMD on stock return standard deviation along with the control variables, equation VI and VII are significant at ( $p < 0.01$ ) explaining 51% of the return variance. The content of

RMD is statistically significant and positively associated with stock price across the two measures used, (i.e.) price change with and without dividends, at ( $t= 1.95$ ,  $p < 0.1$ ) and ( $t= 2.01$ ,  $p < 0.05$ ) respectively. On the other hand, RMD content is negatively associated with the following year stock return variance at ( $p < 0.05$ ). Return on asset is significant at ( $p < 0.01$ ) across all estimated relationships. Book-to-market value of equity is also found to be significant at ( $p < 0.01$ ) across all equations with the exception of the equations estimating the stock return standard deviation where it is significant at ( $p < 0.1$ ). In accordance with the predicting signs, book-to-market value is negatively associated with price change and positively associated with return variance. On the other hand, debt to assets is only associated with price change when dividends are included, (i.e.) total investment return, while asset growth is only associated with price change without dividends at ( $p < 0.1$ ).

The reported results provide evidence supporting the set hypotheses proposing a positive association between the content of disclosed risk management information and changes in stock prices on the one hand, and a negative association with return variances on the other hand. These results suggest that better content of risk management disclosure is of value and likely to be considered when valuing assets. That is, having better understanding of bank risk exposure provided through risk management disclosures (Scholes, 2000) is likely to reduce uncertainty and information asymmetry and leads to improvements in stock performance (Poshakwal and Courtis 2005; Lajili and Zahal 2005; Healy and Palepu, 2001; Hubbard, 2000). Therefore, the transparency and comprehensiveness in disclosing risk management information, which signals bank risk behaviour (Helbok and Wagner, 2006), is appreciated and reflected on stock performance by improving current year stock prices and decreasing the return volatility of the following year.

In line with agency theory, return on assets is highly significant thereby improving stock price and reducing return variance. Higher return seems to enhance investors' confidence in stocks, reduce the level of monitoring to be exercised by shareholders, and consequently reduces agency cost and enhances a firm's equity value. This is in line with Baumann and Nier (2004), Berger and Udell (2006), and Gelb and Zarowin (2002) indicating that firms with higher profitability have lower variation in their stock returns. Banks that achieve better growth ratios are able to improve their stock prices or eliminate negative price downturn on one hand, and decrease return volatility on the other hand. The results reconcile with Pilotte (1992), Gelb and Zarowin (2002), and Kothari et al. (2009) showing a positive relationship between stock price changes and higher growth ratios.

The study examines potential solutions that assist in the management of the increasing risk levels, shaken confidence, and falling market values resulting from the recent financial crisis. It contributes toward better understanding to the influence of RMD content and its substantive consequences on shareholder value. In addition, by examining this relation, the paper seeks to provide better understanding on how investors recognize disclosed RM information; whether they are considered as a valuable and reliable source when assessing bank risk and building trading decisions. The obtained results might be valuable to banks' management in understanding information users' reaction to disclosed RM information and what effort could be exercised to maximize banks' benefit from their disclosures.

### **Additional Testing**

To test the robustness of the estimated results and ensure that RMD will continue to be influential on stock return and risk regardless of the crisis-years, an interaction variable is introduced between years and RMD. Year 2009 was given a value of one and zero otherwise. RM disclosure's coefficient estimate remains significant in equation II and IV (Table 5)

implying that RMD has effect on stock return. The results show that RMD and Year-RMD variables are statistically significant. This suggests that in year 2010, when the interaction variable has a value of zero, RMD coefficient explains the association between RMD and stock return. While, in year 2009, which is closer to the crisis and where the reliability of the disclosed information is doubtful, the influence of RMD is lower as it is substantially reduced by the negative coefficient of the Year-RMD interaction variable. When estimating equations VI and VII, table (5) shows that the results are consistent with our previous findings and Year-RMD interaction variable is not statistically significant. A second interaction variable between ROA and RMD is introduced to examine the effect of profitability on the relationship between RMD and stock performance. First ROA was transferred into a dummy variable, giving a value of 1 for profitable banks and 0 otherwise. Then the interaction variable between RMD score and ROA dummy variable was developed. Table (5) shows that while RMD coefficient is not significant in equation I and III, a positive and significant association is documented between ROA-RMD interaction variable and stock return. That is, for profitable banks, better content of RMD has an impact on stock return. This suggests that investors in general might give more consideration and higher reliability to the disclosed RM information when banks have positive profitability; as the implemented RM practices were sufficient to assist in generating positive results and maximizing shareholders interest. On the other hand, RMD continue to be significantly related to stock return standard deviation as illustrated in table (5), equation V. This suggests that banks disclosing better content of RMD are more successful in reducing stock return volatility irrespective of their profitability level, as the impact on stock return volatility is not influenced by bank's ROA.

[Table 5 about here]

Communicated information is addressed to a wide range of users, including but not limited to shareholders, investors, and creditors. Each group of users has different needs and

is looking for different types of information. This limits the ability to classify the best reported data that might be useful to interested parties (Benston, 1967) and encourage the use of aggregate scores. However, to have further insights into the influence of each risk management disclosure type on stock performance, we run twelve regressions summarized in table (6). Table (6) shows that credit, liquidity, interest rate, and legal risk management disclosures contribute in enhancing sock return. The results also suggest that liquidity, interest rate, and operational risk management disclosures assist in the management of stock return volatility. The highest coefficient value is to the liquidity risk management, which was of high concern after the 2008 financial crisis (Allen and Moessner, 2011; Acharya et al., 2011).

[Table 6 about here]

## **CONCLUSION**

The role of banks as financial intermediaries investing depositors assets (Howells and Bain, 2008; Ivashina and Scharfstein, 2010) requires a high level of transparency to provide shareholders as well as investors understanding on the value and risk level of the investments undertaken by the bank (Gatev et al., 2009). This turns out to be more crucial during and after the financial crisis where banks were facing increasing risk levels (Allen and Moessner, 2011; Brunnermeier, 2009) affecting their equity value (Acharya et al., 2011; Ivashina and Scharfstein, 2010).

To understand bank risk, a look beyond the static financial statements should be considered (Scholes, 2000) in order to explore bank-risk dynamics and investments-risk exposures (Beaver et al., 1989; Scholes, 2000). In this concern, banks disclose information on their risk management practices, which are intended to mitigate risk and reduce failure possibility (Solomon et al., 2000). Revealing such information that illustrates portfolio

quality and risk levels manages uncertainty (Hubbard, 2000) and is requested by all interested parties to assess risk profile (Linsley et al., 2006).

This paper investigates whether better content of risk management disclosures influence stock price and return volatility, targeting a unique sample of US national commercial banks in the period just after the financial crisis, (i.e.) years 2009 and 2010 (Grove et al., 2011; Yeh et al., 2011). The targeted sample and disclosure type are not the only contribution of the paper, which also contributes to the literature by employing the content analysis technique to measure disclosure content rather than relying on agency rating or using word and sentence count to proxy for disclosure content (Lajili and Zeghal, 2005; Helbok and Wagner, 2006; Bushee and Noe, 2000), as such techniques tell little about quality (Hasseldine et al., 2005).

In line with the set hypotheses, our findings indicate that banks that disclosed better content of risk management information provide investors with needed information to evaluate their financial assets, reducing uncertainty concerning their risk environment, and enhancing the ability to monitor management practices. As a result, this was reflected in stock prices, improving total investment return. Second, the results suggest that a comprehensive content of RMD was valued by investors and conveyed higher trust that reduces the volatility in stock return for the coming year. These results add significant input to understanding the impact of a financial disclosure segment on stock behaviour and the importance of transparency in enhancing shareholders' value. This promotes RM disclosure to be considered as a preventive tool rather than an exercise to comply with legislation requirement, and considering its content important for better shareholder value. The suggested results might be useful for both investors and bank management. Indeed, improved stock price and lower return volatility signal relatively bank risk and performance.

As any other research, the study has its limitations and expanding opportunities could be identified. First, a longer sample period after the financial crisis could be targeted to estimate relationships and could have additional evidence on the consistency of the results reported. Having a wider time period will enable using different econometric techniques to reconcile results as well as identifying trends. Second, the sample could be enlarged to include other types of US banks and/or non-US banks to draw more generalized conclusions. Third, the current paper examined the impact of risk management disclosures on stock return volatility, (i.e.) idiosyncratic risk, while other risk measures such as beta could be used to understand its effect on other types of risk.



## APPENDIX

### Risk Management Types Discussion Topics

	<b>Risk type</b>	<b>Risk management indicators</b>
1	Credit risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Policies developed to ensure loans are extended within tolerable risk measures</li> <li>• Mechanisms used to measure various credit risks (credit rating and related discussions and how they are impacting cost of funds the ability to raise fund)</li> <li>• Monitoring tools to assess the portfolio performance (presentation to credit portfolio classified by industry, credit type, geographical concentration etc.)</li> <li>• Loan restructuring (nonperforming loans and borrowers experiencing financial difficulties)</li> <li>• Provisions for credit losses</li> </ul>
2	Liquidity risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• The framework implemented to ensure cash availability to lenders and depositors (discussion on employed liquidity testing and stress testing and the underlined assumptions)</li> <li>• The role of ALCO committee</li> <li>• Cash and liquidity sources such as “available for sale securities”</li> <li>• Contingency funding plans, how the bank can response to liquidity stress events at various levels of severity</li> </ul>
3	Interest rate risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Describing the techniques used to measure and monitor changes in interest rate <ul style="list-style-type: none"> <li>▪ re-pricing assets,</li> <li>▪ liabilities and derivatives,</li> <li>▪ earning simulation modelling and related assumption</li> <li>▪ net portfolio value estimation and discussion on assumptions used in the estimation</li> </ul> </li> <li>• Tools adopted to manage the interest rate risk</li> </ul>
4	Market risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Trading and non-trading portfolios market risk exposures</li> <li>• Describing the tools used to monitor and manage risk exposures</li> <li>• Discussions on foreign exchange risk</li> <li>• Discussion on trading risk management (value at risk disclosure if available)</li> <li>• Discussion on commodity risk</li> <li>• Discussion on equity risk</li> <li>• Discussion on issuer credit risk (if available)</li> </ul>

	<b>Risk type</b>	<b>Risk management indicators</b>
5	Operational risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Policies and procedures followed to manage operational risk</li> <li>• Trainings provided to minimize the occurrence of operational risk</li> <li>• The assessment and reporting of operational risk</li> <li>• Identifying and managing key human capital risks</li> <li>• Presenting information about employees turnover rates and performance</li> <li>• Policies and procedures adopted to mitigate IT risks</li> <li>• Tests and procedures employed to ensure the adequacy of IT controls</li> </ul>
6	Legal and compliance risk	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Policies and procedures followed to manage fiduciary risk</li> <li>• Categories of risks covered under the fiduciary risk policies and procedures</li> <li>• The role of fiduciary risk management function (if any)</li> </ul>

Source: COSO, 2009; Linsley et al., 2006; Baumann and Nier, 2004; Ahmed et al., 2004; Jizi, 2013.

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**TABLE 1**  
Independent variables measurement

Variable name	Variable code	Variable descriptions	Predicted sign	
			PCh	RSD
Risk management disclosure score	RMD	Risk management disclosures score measured as the ratio of the points obtained on the content of risk management disclosure types over the maximum points a bank can achieve	+	-
Profitability	ROA	Net income over total assets	+	-
Leverage	Lev	Debt divided by total assets	-	+
Book-to-market value of equity	BtoM	The value of equity divided by the market value of equity (market capitalization)	-	+
Asset Growth	AG	The difference in asset size between the beginning and end of year divided by the beginning of year asset size	+	-
Size	Size	Natural logarithm of current year total assets		-

**TABLE 2**  
Descriptive statistics

Description	Price Change	Price Change with dividends	Return S.D 2010-2011	RMD	ROA	Lev	Book-to-Market	Asset Growth	Assets (billions)
Mean	-0.06	-0.043	0.123	0.47	0.32	0.90	1.89	0.02	94.2
Mode	0	0	0.088	0.50	0.43	0.93	14.88	0	6.05
Median	-0.02	-0.010	0.1	0.47	0.4	0.90	1.063	0.01	4.04
Maximum	1.07	1.078	0.49	0.90	3.69	1.01	28.45	0.81	2,264
Minimum	-0.86	-0.806	0	0.17	-9.53	0.08	-2.68	-0.22	1.015
Standard deviation	0.41	0.41	0.082	0.11	1.88	0.06	2.75	0.11	0.78
Skewness	0.12	0.140	2.10	0.73	-1.9	-10.6	6.04	2.34	1.53

**TABLE 3**  
Correlations matrix

Variables	VIF	RM	ROA	Debt to Assets	Book-to-Market	Asset Growth	Log Assets
RM	1.72	1.000					
ROA	1.32	0.149	1.000				
Debt to Assets	2.85	-0.160	-0.165	1.000			
Book-to-market value of equity	2.9	-0.183	-0.703	0.143	1.000		
Asset Growth	1.16	-0.114	0.335	0.034	-0.338	1.000	
Log Assets	1.77	0.457	0.139	-0.379	-0.190	-0.108	1.000

**TABLE 4**

Linear regression analysis of the relationship between stock price changes, return S.D and RMD content along with the selected control variables.

Dependent variable	Price change		Price change with dividends		Return S.D 2010-2011		
	Equation I.	Equation II.	Equation III.	Equation IV.	Equation V.	Equation VI.	Equation VII.
Independent variables	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value
Constant	<b>-0.601</b> <b>-1.91*</b>	0.732 1.19	-0.498 -1.32	<b>1.165</b> <b>1.90**</b>	0.310 0.47	-0.158 -0.51	-0.159 -0.50
RM	<b>0.530</b> <b>2.30**</b>	<b>0.444</b> <b>1.95*</b>	<b>0.535</b> <b>2.46**</b>	<b>0.428</b> <b>2.01**</b>	<b>-0.119</b> <b>-2.76***</b>	<b>-0.088</b> <b>-2.29**</b>	<b>-0.089</b> <b>-1.74*</b>
ROA	<b>0.112</b> <b>9.83***</b>	<b>0.098</b> <b>7.85***</b>	<b>0.117</b> <b>7.48***</b>	<b>0.100</b> <b>6.15***</b>	<b>-0.027</b> <b>-4.63***</b>	<b>-0.022</b> <b>-4.47***</b>	<b>-0.022</b> <b>-4.47***</b>
Debt to Assets	0.368 1.17	-1.024 -1.62	0.272 0.69	<b>-1.466</b> <b>-2.29**</b>	-0.154 -0.21	0.335 1.00	0.335 0.98
Asset Growth	-0.287 -1.62	<b>-0.333</b> <b>-1.96*</b>	-0.204 -0.91	-0.261 -1.29	-0.001 -0.01	0.016 0.32	0.016 0.32
Book-to-Market		<b>-0.020</b> <b>-2.67***</b>		<b>-0.024</b> <b>-3.31***</b>		<b>0.007</b> <b>1.68*</b>	<b>0.007</b> <b>1.66*</b>
Log Assets							0.0003 0.04
Adj. R-squared	0.278	0.306	0.301	0.343	0.428	0.513	0.513
Prob > F	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
F-test	32.30	34.39	24.14	29.64	16.93	16.61	14.08

\*P < 0.1, \*\*P < 0.05, \*\*\*P < 0.01

**TABLE 5**

Linear regression analysis investigating the effect of interacting years with the RMD score and ROA on the association between RMD and firm stock price changes, return S.D along with the selected control variables.

Dependent variable	Price change		Price change with dividends		Return S.D 2010-2011		
	Equation I.	Equation II.	Equation III.	Equation IV.	Equation V.	Equation VI.	Equation VII.
Independent variables	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value	Coeff. <i>t</i> -value
Constant	0.792 1.36	0.859 1.33	<b>1.252**</b> <b>2.15</b>	<b>1.290**</b> <b>2.02</b>	-0.155 -0.79	-0.156 -0.83	-0.156 -0.79
RM	0.208 0.79	<b>0.500**</b> <b>2.16</b>	0.087 0.35	<b>0.481**</b> <b>2.32</b>	<b>-0.101**</b> <b>-2.39</b>	<b>-0.090**</b> <b>-2.46</b>	<b>-0.082**</b> <b>-1.73</b>
ROA	<b>0.068***</b> <b>4.75</b>	<b>0.085***</b> <b>6.50</b>	<b>0.057***</b> <b>3.26</b>	<b>0.088***</b> <b>5.42</b>	<b>-0.024***</b> <b>-4.64</b>	<b>-0.021***</b> <b>-5.16</b>	<b>-0.021***</b> <b>-5.15</b>
Debt to Assets	<b>-1.096*</b> <b>-1.83</b>	-1.045 -1.56	<b>-1.570**</b> <b>-2.58</b>	-1.487 -2.21	0.330 1.56	0.335 1.59	0.332 1.56
Asset Growth	<b>-0.340**</b> <b>-2.11</b>	-0.150 -0.85	-0.272 -1.47	-0.084 -0.44	0.015 0.35	0.009 0.23	0.007 0.20
Book-to-Market	<b>-0.018**</b> <b>-2.65</b>	<b>-0.021**</b> <b>-2.62</b>	<b>-0.023***</b> <b>-3.23</b>	<b>-0.025***</b> <b>-3.23</b>	<b>0.006**</b> <b>2.58</b>	<b>0.006**</b> <b>2.56</b>	<b>0.006**</b> <b>2.51</b>
Log Assets							-0.001 -0.34
Years-RMD		<b>-0.619***</b> <b>-6.43</b>		<b>-0.604***</b> <b>-6.36</b>		0.021 1.47	0.022 1.51
ROA-RMD	<b>0.341**</b> <b>2.19</b>		<b>0.493**</b> <b>3.18</b>		0.019 0.88		
Adj. R-squared	0.3244	0.4347	0.3810	0.4627	0.5144	0.5168	0.5169
Prob > F	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
F-test	18.56	25.16	20.35	26.52	14.35	15.45	14.93

\*P < 0.1, \*\*P < 0.05, \*\*\*P < 0.01

**TABLE 6**

Summary linear regression analysis of the relationship between stock price changes, return S.D and the content of the six measured risk types.

Independent variables	Credit risk	Liquidity risk	Market risk	Interest Rate risk	Operational risk	Legal risk
Dependent variables	Coeff. Model Adj-R <sup>2</sup>	Coeff. Model Adj-R <sup>2</sup>	Coeff. Model Adj-R <sup>2</sup>	Coeff. Model Adj-R <sup>2</sup>	Coeff. Model Adj-R <sup>2</sup>	Coeff. Model Adj-R <sup>2</sup>
Price change	<b>0.21*</b> <b>0.30</b>	<b>0.38***</b> <b>0.32</b>	-0.04 0.29	<b>0.23*</b> <b>0.30</b>	0.05 0.30	<b>0.35**</b> <b>0.30</b>
Return S.D 2010-2011	-0.04 0.51	<b>-0.66*</b> <b>0.52</b>	-0.01 0.50	<b>-0.03*</b> <b>-0.50</b>	<b>-0.02*</b> <b>0.50</b>	-0.004 0.49

\*P < 0.1, \*\*P < 0.05, \*\*\*P < 0.01