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SUSTAINABLE RISK MANAGEMENT BY AUDIT COMMITTEES: EVIDENCE OF DERIVATIVES USAGE IN NON-FINANCIAL COMPANIES

Dr. Rubeena Tashfeen[*1], Dr. Tashfeen Azhar[2]

*[*1]Associate Professor, Faculty of Management Sciences, University of Central Punjab, Lahore, Pakistan,*
[2]Professor, HSM Business School University of Management & Technology, Lahore, Pakistan

[*1]rubeena.tashfeen@ucp.edu.pk; [2]tashfeen.azhar@umt.edu.pk

ABSTRACT

This research examines the performance of audit committees in non-financial firms. The scale of the financial crisis leads to the nagging question: what were the audit committees doing? Did they take any measures to contain firm risks during the crisis? Using data from the financial crisis period, this study explores whether audit committees provide consistent performance during periods of normalcy and crises. We find that audit committees contribute to effective use of financial derivatives to achieve value-enhancing and risk-reducing hedging activities in non-financial firms.

The beneficial risk effects are not evidenced in the firms not employing financial derivatives indicating that audit committees are less involved with risk management activities within these firms. The vigilance may stem from the larger risks and responsibilities involved in the reporting of financial derivatives in financial statements and having to attest to related risks. Following on the premise that audit committees impact firm profitability, we find no impact. It is likely that audit committees are perforce becoming more involved in risk management activities to the detriment of their primary financial reporting. The study provides an insight into functions of audit committees in respect of risk management and uses instrumental variables with 2 SLS methodology and GMM to overcome problems of endogeneity. Further, we employ the Markov Chain Monte Carlo (MCMC) imputation method to capture larger data set. This is amongst the few studies to fill the gap regarding sustainable performance of audit committees in a hedging environment.

Keywords: *financial derivatives, risk management, audit committee, corporate governance, financial performance, financial reporting, internal control*

INTRODUCTION

This study focuses on non-financial firms. The primary concern is how risk may be most effectively monitored by the board of directors (board). Some members of the boards insist that risk should be managed by the full board as it is part of the overall firm strategy and therefore, they resist separate committee to manage risk. Others highlight the risk management failures and emphasize the special expertise required to handle risk related matters and so suggest the importance of having separate committees to manage risk. While boards continue to debate on the matter, audit committees have been drawn into overseeing risk activities of the firm related to issues ranging from credit risk, liquidity risk and to other related operational and financial risks. during the financial crisis. Therefore, "as audit committees get drawn further and further into collateral areas of risk management, they stand to be increasingly distracted from their core responsibility: financial reporting" (Willkie Farr & Gallagher LLP, 2014).

The overarching question leading up to the financial crisis is: what did audit committees do to contain the risk, if any? Why did the audit committees not see the increasing risks on their balance sheets and warn the boards of corrective actions? This study investigates whether the audit committees manage risk in sustainable manner both during normal and crises periods? It leads to the larger question of whether audit committees should be allowed to participate in this role, take on additional functions of risk management and lastly whether this role is affecting their primary function of financial reporting to reduce profitability.

The findings show that audit committees (AC) impact financial derivatives decisions of the company: they induce a decrease in the amounts of derivatives used by the firm. Their influence results in effective hedging outcomes to reduce firm risk and increase value of the firm. Conversely, in companies not employing derivative instruments (non-users), audit committees enhance risk without impact on value. Overall, the findings indicate that audit committees reduce earnings in both derivative user and non-user groups of firms. The reduction in performance could be the direct or indirect effect of relaxation in their primary internal control and financial reporting functions.

Therefore, the research makes contributions in several areas. Firstly, it contributes to the financial derivatives literature to suggest that audit committees monitor financial derivatives effectively to induce effective hedging strategies and are important to the derivatives hedging decisions of the firm. Secondly, the study extends the corporate governance literature to highlight audit committees' effective risk governance but that in this role there may be a conflict between their risk management and financial reporting-monitoring roles. Thirdly, it contributes to the on-going debate on whether members of audit committees manage company risk effectively and should continue in this role. However, the counter effects on firm performance evidenced in the study may stem from reduced effectiveness in their primary role of financial reporting and internal controls which indicates that this aspect needs to be re-examined and properly redefined. Therefore, the paper makes contributions to the area of corporate governance and financial risk management. There is a dearth of studies in this area with respect to non-financial firms, and the study fills this gap.

The rest of the paper proceeds as follows. The next section provides the institutional background of audit committee responsibilities under SOX, followed by the literature review and hypotheses development. Section 4 discusses data sample, variables and methodology used in the study. Section 5 provides the results of the empirical analyses. The final section provides the conclusions of the study.

2. Background

New York Stock Exchange directs listed companies to constitute audit committee comprising independent directors, with a minimum of three members and possessing financial expertise. The AC oversee the external auditors and monitor audit and non-audit services to be provided by the AC. Financial firms are only required to constitute risk committees. Therefore, in non-financial businesses, the audit committee assumes responsibility for internal controls related to accounting and auditing matters and oversight of the financial reporting process. The audit committee has additional responsibilities with respect to risk assessment and managements policies and is required to report to the BOD. Further, the annual reports need to include a statement on the controls in the financial reporting process of the firm. Under SOX, and NYSE and NADAQ rulings, it appears that audit committees have a lot on their plate, including a monitoring role related to company risk.

Audit committees impact financial derivatives in two ways: directly and indirectly. Firstly, they have a direct impact through their monitoring or risk overseeing role. The audit committee needs to: oversee that the internal control systems are in place, and are operational and effective; assess the risk environment to enable them to confidently give assurance on the whole range of financial and operational risks as stated in the financial statements. In this capacity, the committee needs to assure themselves: of the integrity and faithful representation of the information in the financial reports and to assure themselves that there is an environment that would support management claims. Financial reporting and disclosures have an impact on company performance, for example Elshandidy and Neri (2015) find that financial statement risk disclosures have an impact on the market liquidity measures. Therefore, audit committees can impact company performance through financial reporting processes and control. One of the committee's main roles with respect to financial derivatives is related to the financial reporting and disclosures of derivatives. They need to ensure that the derivatives transactions are properly recorded, and accurately reflected. Derivatives are complex instruments and their misuse and manipulation are easily camouflaged which exposes audit committees to the risks involved in hedging and in their reporting. Finally, it is the responsibility of audit committees to endorse that the derivatives were used for hedging or speculative purposes, and that they are being fairly reflected in the financial statements.

Secondly, the audit committee has an indirect impact and acts as a deterrent to the misuse, and an influence for management to employ derivatives efficiently. It induces management to employ adequate risk management strategies overall and refrain from using financial derivatives for their personal motives.

3. Literature Review and Hypothesis Development

However, results are mixed (Brown et al, 2009; Subramaniam, 2009; and Yatim, 2010) and one reason could be the limited data on the company's risk management practices.

Research is mixed on whether audit committees are effective risk managers. Vera-Muñoz, (2005) documents how audit committees have come under greater scrutiny due to recent corporate governance reforms, which has provided greater challenges with respect to the risks involved in oversight of the financial reporting processes. Audit committees are becoming involved with the increasing demands and larger range of duties and extended responsibilities especially over risk oversight (Lorsch and Simpson, 2009). Some contend that it is unrealistic to expect the committees to conduct extensive reviews with limited resources and skills (Zaman, 2001), and doubt whether they can oversee both financial and non-financial risks of the company (Brown and Caylor, 2009). Others (Bugalla et al., 2012; De Lacy, 2005) suggest that in the changing, complex business environment risk management committees should be independent entities. While Daly and Bocchino (2006) contend that majority of audit committee members are not happy with the extra burden of risk oversight. Therefore, many are convinced that independent risk management committees are better equipped in reinforcing the internal controls (Yatim, 2010).

Many studies find supporting evidence for the benefits of larger audit committee size. Lin et al., (2006) suggest that increased audit committee size enhances monitoring of the financial reporting process and thereby improves quality of earnings. Larger audit committees command more power, status and resources, and therefore provide better monitoring (Kalbers and Fogarty, 1993) and better internal control; and would be better placed in detecting problems and fraud (Pincus et al., 1989) which also leads to lower interest rates for debt. There are two implications of larger audit committees: 1) larger size would indicate more resources for better monitoring and 2) it would also indicate access to higher levels of financial expertise as all members are required under the new rules to have or equip themselves with some accounting or financial expertise, thereby enhancing the quality of monitoring. Researchers (Zaman et al., 2011) indicate that larger committees will have access to more experience and larger knowledge base that will enable them to resolve problems without having to depend on outsourcing consultancy services. Anderson et al. (2004) suggests that audit committee size would reduce the cost of debt financing indicating a reduction in risk. Within companies that use derivatives, Dionne and Trikki (2005) find support for the argument that audit committees with at least three members induce increased hedging and better risk management. In their examination of companies with separate risk committees and, combined risk and audit committees, Subramaniam et al. (2009) find that companies with separate risk committees are more likely to have larger boards, lower organisational complexity and higher financial reporting risk indicating the influence of the audit committeess reducing risk. Therefore, in keeping with literature, we hypothesize as alternative hypotheses that:

H1: Audit committees manage risks related to derivatives hedging decisions to achieve enhanced value in US listed companies.

H2: Audit committees manage risks related to derivatives hedging decisions to achieve a reduction in risk in US listed companies.

Literature in respect of company performance, and specifically earnings, show mixed results. Bates and Leclerc (2009) proffer the many business failures as evidence of audit committee ineffectiveness in their monitoring and risk management functions. Chan and Li (1996) find a negative association between audit committee size and Q, while Yang and Krishnan (2005) contend that there is a negative relationship between audit committee characteristics and earnings management. Other studies do not find any significant relationship between audit committee (size) and earnings management (Abbott et al. 2004; Xie et al., 2003; Bedard et al.,2004), while Brown and Caylor (2009) show that more of the mandated corporate governance provisions are less closely linked to company operating performance.

Mangena and Pike (2005) too do not find any relationship between number of members on the audit committee and interim financial disclosures, however, the sign of the coefficient is negative which they suggest may weakly support the fact that smaller audit committees improve financial reporting. While Sharma et al. (2009) find a positive relationship between frequency of audit committee meetings and size. They suggest that audit committee meetings have a negative association with independence, but a positive relationship with both independence and financial expertise when there is a higher risk of misreporting. Aldamen et al. (2012) examine audit committee governance attributes on performance and contend that smaller audit committees with more experience and financial expertise are more likely to be associated with positive company performance in the market. Therefore, we do not form any expectations of the impacts of audit committee on company performance, and we hypothesize a priori, in null form:

H03: Audit committees have no effect company earnings in US listed companies

4. Sample and data

We collect data from Bloomberg database comprising companies appearing on the New York Stock Exchange. We collect data pertaining to financial derivatives from the SEC 10-K statements available on the Direct Edgar database and the corporate governance data from WRDS GMI Ratings:Corporate Library, by matching CIK numbers for each company. We take data on board of directors (BOD) from Corporate Library, but use a pivot table to extract information about each individual director on the audit committee. The final sample contains 12,476 company year observations comprising an unbalanced panel over the period from 2003-2011 and is presented in Table 1.

Table1: Derivation of Sample

	Number of Companies
NYSE Sample (2002-2011)	27410
Delete 2002	(2741)
Delete missing corporate governance variables	(12179)
Full sample with imputation of missing variables	12490
Delete outliers	(14)
Final sample	12476

4.1 Markov Chain Monte Carlo (MCMC) Data Imputation

In the manner used in the literature (Survey of Consumer Finances (SCF), conducted by the Board of Governors of the US Federal Reserve System in cooperation with the Statistics of Income Division of the Internal Revenue Service), we employ Markov Chain Monte Carlo (MCMC) method to estimate missing data. Kofman and Sharpe (2003) suggest that the imputation method outperforms other ad hoc approaches used in the finance literature to handle missing data[1]. From 1989, the SCF has imputed missing values using a multiple imputation method with the objective to provide data that is the best possible estimate of the missing data. Yao et al. (2004) provide a detailed description used in the SCF

1Some researchers in the finance literature have applied the multiple imputation estimations of missing data (Allee and Yohn, 2009; Lin and Grace, 2007; Rydqvist et al., 2014; Cano and Andreu, 2010; Mach and Wolken, 2012) in their empirical analysis.

imputation method which results in five complete data sets for each year. Each dataset is combined into a single dataset for analysis by using a method called the "repeated-imputation inference" (RII). This results in estimated variances that more closely represent the true variances than would be obtained by using just one implicate (Kennickell and Woodburn, 1999; Montalto and Sung, 1996) and provides the best fit data.

In this study, we first conduct a diagnostic study of the trend of data to ensure randomness of the data to justify the use of multiple imputation method. We do not impute the missing data for corporate governance variables but conduct MCMC for the remaining variables. Our data showed a step-wise trend of missing data so that while each variable may have only from 1% to 6% data missing, but with a line-wise deletion of data the whole data set is reduced to half. Therefore, instead of line wise deletion of missing data we use the MCMC technique. In the manner of the SCF and other applications in the literature, we estimate the missing data by using an iterative multiple imputation procedure based on the Markov Chain Monte Carlo (MCMC) or the chained equations imputation method (Schunk, 2008; Ziegelmeyer, 2009). Similarly, we use five imputed datasets from which the final sample is derived using the Rubin (1987, 1996).

4.2 Derivatives Measures

Several accounting standards have been issued with regard to the financial reporting of derivatives. The FASB issued Statement 133 Accounting for Derivative Instruments and Hedging Activities in 1998 to be applied effective 2000 and this superseded all earlier requirements regarding disclosures and recognition of specific derivatives. Subsequently and frequently, this Statement has been superseded by other rulings. As a result, the recognition of derivatives in the financial reports have changed over the sample period making it difficult to find consistently applied measures for derivatives for the period. Hence the study employs derivatives usage measure, rather than valuation of derivatives and use a dummy variable to identify the companys in our sample using derivative instruments in the manner of many other researchers (Nance et al., 1993; Mian, 1996; Fok et al., 1997; Marsden and Prevost, 2005; Bartram et al., 2009).

Following Bartram et al. (2011) we apply extraction software and the Direct Edgar software to derive data from the SEC 10-K statements. We use search words such as: derivativ*, swap*, future, forward, and option, etc. We apply the Direct Edgar filter and extraction software to the SEC 10-K statements to obtain information on companys that use derivatives in the period 2003-2011. This yields several millions of rows of search word data. We extract four lines on either side of each search word to ensure that the search is related to the company's usage of derivatives (as opposed to the mere mention of the search words in the report). From this data set we thus manually obtain our sample.

4.3 Methodology

Studies have shown that hedging decisions are endogenously determined and are correlated to company value and risk in a reverse causal relationship. Therefore, to resolve the simultaneous problem between hedging and company value, and hedging and company risk, we use instrumental variables approach.

We use two stage least squares (2SLS) to test our hypotheses as shown below:

$$y_2 = x'_1\psi_1 + z'_1\psi_2 + z'_2\psi_3 + v \quad (1a)$$

$$y_1 = y'_2\beta_1 + x'_1\beta_2 + \mu \quad (1b)$$

Equation (1b) is the structural equation where y_1 is the dependent variable, company value; y'_2 represents the endogenous regressor: derivatives; x'_1 represents the exogeneous regressors: the independent and control variables; and u is the error term. Equation (1a) is the first stage equation and y_2 estimates y'_2 in equation (1b); z'_1 and z'_2 are the instrumental variables: lag debt and liquidity ratio; x'_1 represents same exogeneous regressors as in (1b); and v is the error term in the equation.

Similarly, we use 2SLS to test our hypotheses related to company risk as below:

$$p_2 = m'_1\sigma_1 + k'_1\sigma_2 + k'_2\sigma_3 + v \quad (2a)$$

$$p_1 = p'_2\gamma_1 + m'_1\gamma_2 + \mu \quad (2b)$$

Equation (2b) is the structural equation where p_1 is the dependent variable to depict company risk; p'_2 is the endogenous variable for derivatives; m'_1 represents the exogenous regressors; and v is the error term. Equation (2a) is the first stage equation and p_2 estimates p'_2 in equation (2b); k'_1 and k'_2 are the instrumental variables: lag debt and capital expenditures; m'_1 represents the same exogenous regressors as in (2b); and u is the error term of the equation.

Since derivatives is a binary variable, therefore we conduct the 2SLS in two stages. We use the probit method in the first stage regression due to the binary nature of the endogenous variable, and this provides the predicted value of derivatives for the second stage regression analysis. For the instruments to be valid, they will need to have a relationship with derivatives (the endogenous variable) but not have a relationship with the dependent variables (in the second stage equation): value, risk and company profitability (earnings). We test for endogeneity through the Hausman (1978) test, and we use the Hansen (1982) test for over-identifying restrictions to test the validity of our instruments. Further, we also conduct weak instruments test and examine Wald test size and first-stage F-static (Stock and Yogo, 2005, p. 80). The results of all these tests are reported along with the regression results.

4.3.1 Instrumental variables

In any study that considers the relationship of hedging with company value and company risk there is an inherent problem of endogeneity. This problem provides a constraint on the interpretation of the results or sample size. One reason for endogeneity could be reverse causality (Magee, 2008). Hedging increases company value primarily through the smoothing of cash flow fluctuations and stabilizing the availability of cash. However, there is also a reverse effect as considerations of company performance influence hedging activities and determine hedging decisions. With relation to risk, a major reason for companys to use derivatives is to reduce their risk exposure. Therefore, while derivatives reduce risk, at the same time risk exposures are the motivation for using derivatives. Therefore, the direction of causality between risk and hedging decisions becomes unclear and raises some doubts as to whether derivatives usage impacts company risk, or vice versa. The reverse causal relationships between derivatives and company risk, and company value are depicted in Figure 1.

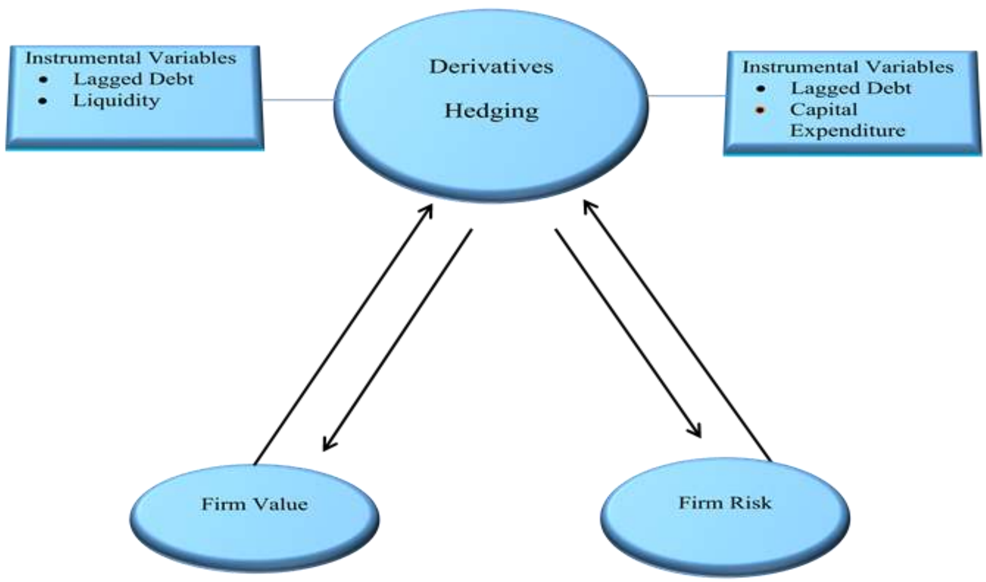

Figure 1: Endogenous Relationship of Derivatives with Company Value and Company Risk

Some (Allayannis and Weston, 2001; Carter et al., 2006; Allayannis et al., 2009) use fixed effects models to examine this reverse causality. Magee (2008) uses both the two stage least squares and the system generalized method of moments estimator to eliminate endogeneity. In this study, we eliminate the potential problem of endogeneity due to reverse causality through use of instrumental variables.

The first instrumental variable is lagged debt in the manner of Michalak and Uhde(2012) who use lagged long-term loan size. When a company utilizes debt, it reduces their debt capacity and increases future costs of financing. A company becomes distressed and reverts to hedging to increase debt capacity, reduce high external costs of financing, and to stabilize cash flows. Thus, there is a direct relationship between debt utilization and derivatives usage. Also, it is expected that utilization of debt in the previous year would carry-over to the current year debt capacity and determine the current year hedging strategies. Arellano and Bond (1991) suggest that using lagged variables avoids the problem of simultaneity and provides the basis for strong instruments. Therefore, we use lagged debt as one of our instruments, and find a significant, positive correlation between lagged debt and derivatives.

The second instrument we use is liquidity ratio. Researchers (Geczy et al., 1997; Allayannais and Ofek, 2001; Graham and Rogers; 2002) have also used financial distress, investment growth opportunities, tax convexity and managerial risk aversion as other instrumental variables for derivatives. A company that has excessive debt and costly external financing, but has sufficient high internal funds and liquidity will not be financially constrained. Therefore, liquidity supplements debt capacity of the company and consequently directly affects a company's hedging decisions. Liquidity is also associated with the investment growth motivation for hedging so that large cash deposits would reduce the underinvestment problem (Froot et al.,1993; Fazzari et al., 1988) and enable higher investment opportunities with a lower reliance on hedging. Therefore, we expect to see a negative relationship of liquidity with derivatives use.

In the value models we use liquidity and lagged debt as the instrumental variables, but since liquidity has a direct impact on risk, therefore we do not include it in the risk models. And the other instrumental variable we use is capital expenditure in the risk model. Froot et al. (1993) suggest that companies face the problem of underinvestment when companys have many investment opportunities but cash flow is constrained. Cash flow fluctuations affects prospects of investments and funding, and therefore companies then use hedging minimize this problem (Bessembinder, 1991; Stulz, 1990). Therefore, we expect to see a positive correlation between capital expenditure and derivatives.

6. Empirical Results

6.1 Descriptive Statistics

Table 2, Panel A presents statistics of the dependent variables: value, earnings and risk. Statistics indicate the mean values for value, risk, return on assets and derivatives is 3.65, 3.76, 0.02 and 0.47 respectively. In Panel B we provide statistics on corporate governance. The audit committees' statistics shows a mean of 4.71 members on the boards and is comparable to the 4.53 mean value recorded by Xie et al. (2003) for audit committee size. The average sample board size consists of 8.83 members with a 2.19 standard deviation. The sample dispersion is in line with Adams and Ferreira (2009) who show a mean and standard deviation of 9.38 and 2.68 board size respectively. Panel C presents descriptive statistics the controls and other variables.

Table 2 : Descriptive Statistics for Sample

	N	Mean	Median	Std	Percentiles			
				Dev	5	25	75	95
A. Dependent Variables								
VALUE	12476	3.65	3.81	1.41	1.89	3.18	4.31	5.01
RISK	12476	3.76	3.75	0.48	2.98	3.43	4.08	4.58
ROA	12476	0.02	0.05	0.18	-0.29	0.01	0.09	0.17
DER	12476	0.47	0.00	0.50	0.00	0.00	1.00	1.00
B. Corporate Governance								
ACSize	12476	4.71	4.00	2.06	3.00	3.00	6.00	9.00
ACSIZE	12476	0.55	0.50	0.23	0.30	0.38	0.67	1.00
BDSize	12476	8.83	9.00	2.19	6.00	7.00	10.00	13.00
BDSIZE	12476	2.15	2.20	0.25	1.79	1.95	2.30	2.56
C. Control Variables								
TQMV	12476	0.32	0.24	0.63	-0.56	-0.11	0.70	1.48
CFVOL	12476	-2.92	-3.14	1.45	-4.63	-3.76	-2.45	-0.30
ZSCORE	12476	1.33	1.37	0.92	-0.14	0.83	1.84	2.78
$DEBT_{(t-1)}$	12476	5.06	5.49	2.69	0.02	3.52	6.90	8.88

LIQUIDITY	12476	1.88	1.18	2.45	0.29	0.72	2.06	5.83
LEVERAGE	12476	1.45	1.45	1.03	0.95	1.18	1.78	2.62
CAPEX	12476	0.05	0.03	0.07	0.01	0.02	0.06	0.17
CPX_SALES	12476	0.26	0.04	7.48	0.01	0.02	0.08	0.44
SIZE	12476	6.92	6.96	1.97	3.75	5.82	8.16	9.98
TLCF	12476	0.45	0.00	0.50	0.00	0.00	1.00	1.00
MSC	12476	0.09	0.00	0.28	0.00	0.00	0.00	1.00

Table 3 presents results of the Wilcoxon (1945) rank sum tests to examine the differences between groups of derivatives user and non-user companies. Results reported in Panel B are similar with the results reported by Bartram et al. (2011) depicting lower risks for derivative users. In keeping with literature, ROE, Market Cap and EPS show a larger value for derivative users which is significant at the 1% level. Tobin's Q is lower for the derivative user companys and these are in line with others (Fauver and Nartanjo, 2010; Allayannis et al., 2012; Bartram et al., 2011) who show similar trend in the two groups.

Table 3: Mean Differences for Derivative Users & Non-users

	USER			NON USER			Diff in	Wilcoxon
	N	Mean	Median	N	Mean	Median	Means	p-value
Panel A. Dependent Variables								
VALUE	5878	3.74	3.88	6598	3.57	3.73	0.18	0.000
RISK	5878	3.72	3.69	6598	3.80	3.79	-0.08	0.000
ROA	5878	0.02	0.05	6598	0.01	0.05	0.02	0.553
Panel B. Corporate Governance Variables								
ACSize	5878	4.81	4.00	6598	4.62	4.00	0.19	0.000
ACSIZE	5878	0.54	0.50	6598	0.56	0.50	-0.02	0.000
BDSIZE	5878	2.19	2.20	6598	2.11	2.08	0.08	0.000
Panel C. Control & Other Variables								
TQMV	5878	0.23	0.15	6598	0.41	0.33	-0.18	0.000
CFVOL	5878	-3.06	-3.20	6598	-2.79	-3.09	-0.26	0.000
BETA	5878	0.09	0.12	6598	0.10	0.13	-0.01	0.201
ZSCORE	5878	1.20	1.27	6598	1.45	1.48	-0.25	0.000
ROE	5878	0.07	0.11	6598	0.04	0.10	0.03	0.000
$DEBT_{(t-1)}$	5878	5.76	6.06	6598	4.44	4.84	1.32	0.000
LIQUIDITY	5878	1.46	1.02	6598	2.26	1.36	-0.80	0.000
LEVERAGE	5878	1.54	1.55	6598	1.37	1.36	0.16	0.000
CAPEX	5878	0.06	0.04	6598	0.05	0.03	0.01	0.000
CPX_SALES	5878	0.39	0.04	6598	0.14	0.03	0.25	0.000
SIZE	5878	7.34	7.35	6598	6.55	6.59	0.79	0.000
EQUITY	5878	6.63	6.61	6598	6.04	5.95	0.60	0.000
MKTCAP	5878	7.47	7.41	6598	6.99	6.83	0.48	0.000
EPS	5878	10.05	1.35	6598	-3.62	0.96	13.67	0.000
TLCF	5878	0.45	0.00	6598	0.45	0.00	0.00	0.432
MSC	5878	0.09	0.00	6598	0.09	0.00	0.00	0.305

Variable form is the same as in Appendix 1.

6.1.1 Interpretation of Results of Empirical Tests

Functional form of our empirical tests and interpretation of interaction variables in models are shown below:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_1X_2 + \varepsilon$$

For instance if: AC (ACSize) = $X_{1;}$ Derivatives (DER) = $X_{2;}$ and Value = Y. And DER is a dummy variable taken as 1 for derivative user companys and 0 for other companys. The equations now become:

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Value= b_0 + b_1ACSIZE (When DER=0) and
Value = $b_0 + b_1$*ACSIZE + DER ($b_2 + b_3$ ACSIZE) (when DER = 1)

6.2 Audit Committee and Company Value

Table 4 presents the results for audit committee size in respect to company value. The first OLS model indicates a weak negative correlation of audit committee size with value for the derivative non-user companys. While the joint effect DER_ACSIZE exhibits a positive coefficient of 0.25 which is significant at 5% level, indicating that audit committees increase value in companys that use derivatives. Board size has a positive association with value, though derivatives show no significant results. Column 4 and 5, show that both instrumental variables: $DEBT_{(t-1)}$ and LIQUIDITY in the 2 SLS IV model are significant and in the direction of theory where debt increases derivatives use, and liquidity has a negative correlation with derivatives. ACSIZE induces a reduction in the extent of use of derivatives while BDSIZE shows a positive relationship with derivatives.

In columns 6 and 7, DER and DER_ACSIZE use the predicted value from the first stage equation. After controlling for endogeneity, audit committee size for non-users and board size are now insignificant. Now DER shows a positive significant effect on company value, and the joint effect DER_ACSIZE indicates that audit committees increase company value, as found in the OLS model. Though capital expenditure and leverage show a positive association with value in keeping with literature, they are not significant. As indicated in the literature our results indicate that ROA, ZSCORE, CFVOL and SIZE have a positive relationship with company value.

Table 4: Tests for Value and Audit Committee Size for Derivative User & Non-user Companys

	OLS Model 1		2 SLS IV Model 2			
	Value		DER		Value	
Variables	coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
$DEBT_{(t-1)}$			0.09*** (0.008)	10.98		
LIQUIDITY			-0.04*** (0.008)	-5.73		
CAPEX	0.63** (0.268)	2.35	0.53*** (0.182)	2.90	0.33 (0.282)	1.17
LEVERAGE	0.05* (0.028)	1.72	0.03*** (0.012)	2.69	0.03 (0.028)	1.10
ROA	0.94*** (0.134)	7.02	0.09 (0.086)	1.06	0.94*** (0.131)	7.19
SIZE	0.19*** (0.011)	17.50	0.00 (0.012)	0.30	0.15*** (0.016)	9.65
CFVOL	0.04*** (0.012)	3.54	0.00 (0.011)	0.08	0.04*** (0.012)	3.29
ZSCORE	0.22*** (0.018)	12.09	-0.03 (0.017)	-1.63	0.28*** (0.027)	10.49
ACSIZE	-0.15* (0.090)	-1.66	-0.15** (0.060)	-2.49	0.09 (0.070)	1.25
BDSIZE	0.23*** (0.069)	3.33	0.25*** (0.058)	4.36	0.08 (0.085)	0.91
TLCF			0.04* (0.024)	1.71		
DER	-0.09 (0.068)	-1.38				
DER[a]					0.72** (0.344)	2.11

	OLS Model 1		2 SLS IV Model 2			
	Value		DER		Value	
Variables	coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
DER_ACSIZE	0.25** (0.111)	2.23				
DER_ACSIZE[b]					0.31*** (0.080)	3.87
Fixed effects	Yes		Yes		Yes	
Constant	1.59*** (0.146)	10.83	-1.00*** (0.135)	-7.38	1.74*** (0.158)	11.03
Observations	12,476		12,476		12,476	
R^2/Pseudo R^2	0.13		0.05		0.08	
F test statistic					121.56	
p-value					0.000	
Tests of Endogeneity						
Durbin χ^2			12.040			
p-value			0.000			
Wu-Hausman F-statistic			12.038			
p-value			0.000			
Test of Overidentifying Restrictions						
Hansen's J χ^2			1.808			
p-value			0.179			
Test of Weak Instruments						
Stock Yogo Test F-statistic			45.32			
p-value			0.000			

[a,b] depict predicted values from other equation. The p-value are provided as ***, **, * to show statistical significance at the 0.01, 0.05 and 0.10 levels respectively, and robust standard errors are given in parentheses. See Appendix 1 for definitions of variables.

6.3 Audit Committee and Company Risk

Table 5 presents results for the risk model. In the OLS Model, derivatives use and board size reduce risk, audit committee increases risk in non-users, while the joint effect is insignificant. Columns 4 and 5 show that both instruments: DEBT(t-1) and CAPEX_SALES are significant and increase derivatives use. However, when we control for endogeneity between risk and derivatives use, we find audit committee reduces the extent of derivatives use by the company, while board size increases derivatives. Columns 6 and 7, show that ACSIZE continues to show a positive risk impact for non-user companys, while board size reduces stock return risk, and derivatives has a negative and stronger impact on risk. The joint effect indicates that audit committees have a negative impact (-0.46 + 0.08) on risk at 5% level of significance for derivative user companys. In keeping with other researchers, we find a risk reducing impact of derivatives hedging. Guay (1999) finds a stock-return volatility reduction ranging from 5% to 22% depending on the derivative instrument; while Bartram et al., (2011) record a 18% lower stock return volatility compared to non-derivative users

Table 5: Tests for Risk and Audit Committee Size for Derivative User & Non-user Companys

	OLS Model 1		2 SLS IV Model 2			
	Risk		DER		Risk	
Variables	coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
$DEBT_{(t-1)}$			0.09*** (0.007)	12.57		

	OLS Model 1		2 SLS IV Model 2			
	Risk		DER		Risk	
Variables	coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
CPX_SALES			0.00* (0.002)	1.78		
LIQUIDITY	-0.00*** (0.002)	-2.78	-0.04*** (0.008)	-5.90	-0.01*** (0.002)	-4.11
LEVERAGE	-0.01 (0.005)	-1.31	0.02** (0.012)	2.14	-0.00 (0.005)	-0.32
ROA	-0.48*** (0.026)	-18.76	0.15* (0.089)	1.70	-0.49*** (0.029)	-17.18
SIZE	-0.10*** (0.003)	-34.93	-0.01 (0.011)	-0.85	-0.09*** (0.004)	-24.10
TQMV	-0.19*** (0.006)	-29.33	-0.14*** (0.021)	-6.55	-0.21*** (0.008)	-25.22
BDSIZE	-0.10*** (0.018)	-5.27	0.25*** (0.058)	4.26	-0.05** (0.022)	-2.41
MSC	0.01 (0.013)	0.56	-0.06 (0.041)	-1.53	0.00 (0.015)	0.19
ACSIZE	0.23*** (0.021)	10.94	-0.19*** (0.061)	-3.05	0.24*** (0.020)	11.93
TLCF			0.03 (0.024)	1.24		
DER	-0.04** (0.018)	-2.20				
DER[a]					-0.46*** (0.085)	
DER_ACSIZE	0.03 (0.030)	1.12				
DER_ACSIZE[b]					0.08** (0.038)	2.21
Fixed effects	Yes		Yes		Yes	
Constant	4.60*** (0.039)	118.81	-0.83*** (0.132)	-6.30	4.66*** (0.050)	92.85
Observations	12,476		12,476		12,476	
R^2/Pseudo R^2	0.39		0.06		0.19	
F test statistic					455.15	
p-value					0.000	
Tests of Endogeneity						
Durbin χ^2			57.280			
p-value			0.000			
Wu-Hausman F-statistic			57.480			
p-value			0.000			
Test of Overidentifying Restrictions						
Hansen's J χ^2			0.099			
p-value			0.753			
Test of Weak Instruments						
Stock Yogo Test F-statistic			60.59			
p-value			0.000			

[a,b,] depict predicted values from other equation. The p-value are provided as ***, **, * to show statistical significance at the 0.01, 0.05 and 0.10 levels respectively, and robust standard errors are given in parentheses. See Appendix 1 for definitions of variables.

6.4 Audit Committee and Earnings/Performance
In Table 6, when we remove the impact of endogeneity, then BDSIZE has a negative correlation with profitability and audit committee also reduces profitability in both derivative user and non-user companies. The joint effect, DER_ACSIZE further indicates that that audit committees reduce profitability.
In the 2 SLS IV regressions we use Hausman (1978) tests to examine whether endogeneity exists and we reject the null hypothesis that the variables are exogenous in all cases. Further our results of the Hansen (1982) tests:of the null hypothesis that the instruments are not correlated with error term, are significant, indicating that the instruments are valid. We also report the weak instruments test statistics. P-values for the Hausman (1978) test of endogeneity and Hansen (1982) test of overidentifying restrictions under the null hypothesis indicate that all orthogonality conditions are satisfied.

Table 6: Tests for Audit Committee Size & ROA for Derivative User & Non-user Companys

	OLS Model 1		2 SLS IV Model 2			
	ROA		DER		ROA	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
$DEBT_{(t-1)}$			0.09*** (0.008)	11.68		
LIQUIDITY			-0.05*** (0.008)	-5.95		
CAPEX	0.13*** (0.036)	3.67	0.67*** (0.183)	3.63	0.20*** (0.042)	4.88
LEVERAGE	-0.01*** (0.002)	-2.59	0.02** (0.012)	2.10	-0.00 (0.002)	-0.86
TQMV	0.03*** (0.004)	7.69	-0.17*** (0.024)	-7.04	0.02*** (0.005)	3.89
SIZE	0.03*** (0.001)	23.70	-0.00 (0.012)	-0.20	0.04*** (0.002)	17.80
CFVOL	-0.03*** (0.002)	-15.88	0.01 (0.011)	1.33	-0.03*** (0.002)	-14.91
ZSCORE	0.03*** (0.003)	9.88	0.05** (0.019)	2.45	0.02*** (0.004)	5.43
ACSIZE	0.01 (0.012)	0.57	-0.17*** (0.061)	-2.86	-0.03*** (0.009)	-3.64
BDSIZE	-0.08*** (0.008)	-3.25	0.24*** (0.058)	4.14	-0.05*** (0.009)	-5.40
TLCF		-10.71	0.03 (0.024)	1.36		
DER	0.02*** (0.008)	3.03				
DER[a]					-0.20*** (0.043)	-4.75
DER_ACSIZE	-0.04*** (0.013)	-3.25				

	OLS Model 1		2 SLS IV Model 2			
	ROA		DER		ROA	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
DER_ACSIZE[b]					-0.03**	-2.51
					(0.013)	
Fixed effects	Yes		Yes		Yes	
Constant	-0.19***	-11.18	-0.94***	-7.03	-0.20***	-9.72
	(0.017)		(0.134)		(0.021)	
Observations	12,476		12,476		12,476	
R^2/Pseudo R^2	0.30		0.06			
F test statistic					139.60	
p-value					0.000	
Tests of Endogeneity						
Durbin χ^2			49.287			
p-value			0.000			
Wu-Hausman F-statistic			49.427			
p-value			0.000			
Test of Overidentifying Restrictions						
Hansen's J χ^2			1.096			
p-value			0.2951			
Test of Weak Instruments						
F-statistic			53.511			
p-value			0.000			

[a,b] are the predicted values from the other equation. The p-value for the one-tailed test of the null hypothesis that the coefficient is zero is indicated as ***, **, * to show statistical significance at the 0.01, 0.05 and 0.10 levels respectively, and robust standard errors are shown in parentheses. See Appendix 1 for definitions of dependent and independent variables.

6.4 Robustness Checks

In Table 7 we perform additional tests of sensitivity by also examining the impact on return on sales through 2 SLS IV, as used in our main analysis. Further we use the two-step dynamic panel generalized method of moments estimator with instrumental variables (GMM IV) for our robustness tests. We are interested in seeing whether the relationships for audit committee size are similar with our main tests.

Table 7: Tests for Audit Committee Size & ROS for Derivative User & Non-user Companys

	OLS Model 1		2 SLS IV Model 2			
	ROS		DER		ROS	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
$DEBT_{(t-1)}$			0.09***	11.68		
			(0.008)			
LIQUIDITY			-0.05***	-5.95		
			(0.008)			
CAPEX	0.47***	3.28	0.67***	3.63	0.83***	4.49
	(0.144)		(0.183)		(0.185)	
LEVERAGE	-0.01	-0.78	0.02**	2.10	0.01	0.56
	(0.012)		(0.012)		(0.012)	
TQMV	-0.01	-0.38	-0.17***	-7.04	-0.06***	-2.82
	(0.018)		(0.024)		(0.022)	

	OLS Model 1		2 SLS IV Model 2			
	ROS		DER		ROS	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	t-stat
SIZE	0.11*** (0.008)	14.66	-0.00 (0.012)	-0.20	0.16*** (0.012)	13.45
CFVOL	-0.15*** (0.010)	-14.10	0.01 (0.011)	1.33	-0.14*** (0.010)	-13.42
ZSCORE	0.06*** (0.013)	4.27	0.05** (0.019)	2.45	0.02 (0.016)	0.98
ACSIZE	-0.00 (0.044)	-0.01	-0.17*** (0.061)	-2.86	-0.17*** (0.035)	-4.94
BDSIZE	-0.40*** (0.038)	-10.39	0.24*** (0.058)	4.14	-0.24*** (0.051)	-4.64
TLCF			0.03 (0.024)	1.36		
DER	0.06** (0.030)	2.13				
DER[a]					-0.96*** (0.252)	-3.79
DER_ACSIZE	-0.14*** (0.047)	-2.95				
DER_ACSIZE[b]					-0.17** (0.079)	-2.17
Fixed effects	Yes		Yes		Yes	
Constant	-0.46*** (0.069)	-6.72	-0.94*** (0.134)	-7.03	-0.54*** (0.098)	-5.46
Observations	12,476		12,476		12,476	
R^2/Pseudo R^2	0.24		0.06			
F test statistic					35.33	
p-value					0.000	
Tests of Endogeneity						
Durbin χ^2			79.285			
p-value			0.000			
Wu-Hausman F-statistic			79.702			
p-value			0.000			
Test of Overidentifying Restrictions						
Hansen's J χ^2			4.156			
p-value			0.042			
Test of Weak Instruments						
F-statistic			53.511			
p-value			0.000			

[a,b]are the predicted values from the other equation. The p-value for the one-tailed test of the null hypothesis that the coefficient is zero is indicated as ***, **, * to show statistical significance at the 0.01, 0.05 and 0.10 levels respectively, and robust standard errors are given in parentheses. The t/z values are also provided. See Appendix 1 for definitions of dependent and independent variables.

Therefore, we perform GMM IV tests on all models: return on assets, company value and company risk. We report the second stage results of these tests in Table 8: Model 1 for Share Price; Model 2 for Return on Assets; Model 3 for Risk, along with the test statistics. All the results provide support for the findings in the main results.

Table 8: Robustness Tests for Audit Committee Size & Value GMMIV Models

	Model 1 Value		Model2 ROA		Model3 Risk	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	z-stat
CAPEX	0.25	0.89	0.19***	4.81		
	(0.285)		(0.040)			
LEVERAGE	0.04	1.25	-0.00	-0.98	-0.00	-0.21
	(0.028)		(0.002)		(0.005)	
ROA	0.92***	7.10			-0.49***	-16.74
	(0.130)				(0.029)	
TQMV			0.02***	4.62	-0.21***	-24.84
			(0.005)		(0.008)	
SIZE	0.14***	9.39	0.04***	18.65	-0.09***	-23.42
	(0.015)		(0.002)		(0.004)	
CFVOL	0.04***	2.98	-0.03***	-15.73		
	(0.012)		(0.002)			
ZSCORE	0.30***	11.89	0.02***	6.22		
	(0.025)		(0.003)			
LIQUIDITY					-0.01***	-4.24
					(0.002)	
MSC					0.00	0.15
					(0.016)	
ACSIZE	0.09	1.31	-0.03***	-3.64	0.24***	11.56
	(0.071)		(0.009)		(0.021)	
BDSIZE	0.04	0.45	-0.05***	-5.87	-0.05**	
	(0.084)		(0.009)		(0.023)	
DER[a]	1.12***	3.83	-0.17***	-4.36	-0.53***	-5.68
	(0.292)		(0.040)		(0.093)	
DER_ACSIZE[b]	0.26***	3.05	-0.03**	-2.52	0.10**	2.17
	(0.084)		(0.014)		(0.045)	
Fixed effects	Yes		Yes		Yes	
Constant	1.68***	10.52	-0.20***	-9.89	4.67***	85.48
	(0.159)		(0.020)		(0.055)	
Observations	12,476		12,476		12,476	
R^2			0.07		0.13	
Wald χ^2		1417.11		1793.43		5130.23
p-value		0.000		0.000		0.000
Hansen's J χ^2	1.808			1.096		0.992
p-value	0.179			0.295		0.7528

	Model 1 Value		Model2 ROA		Model3 Risk	
Variables	Coefficient	t-stat	coefficient	z-stat	coefficient	z-stat
CAPEX	0.25	0.89	0.19***	4.81		

	(0.285)		(0.040)			
LEVERAGE	0.04	1.25	-0.00	-0.98	-0.00	-0.21
	(0.028)		(0.002)		(0.005)	
ROA	0.92***	7.10			-0.49***	-16.74
	(0.130)				(0.029)	
TQMV			0.02***	4.62	-0.21***	-24.84
			(0.005)		(0.008)	
SIZE	0.14***	9.39	0.04***	18.65	-0.09***	-23.42
	(0.015)		(0.002)		(0.004)	
CFVOL	0.04***	2.98	-0.03***	-15.73		
	(0.012)		(0.002)			
ZSCORE	0.30***	11.89	0.02***	6.22		
	(0.025)		(0.003)			
LIQUIDITY					-0.01***	-4.24
					(0.002)	
MSC					0.00	0.15
					(0.016)	
ACSIZE	0.09	1.31	-0.03***	-3.64	0.24***	11.56
	(0.071)		(0.009)		(0.021)	
BDSIZE	0.04	0.45	-0.05***	-5.87	-0.05**	
	(0.084)		(0.009)		(0.023)	
DER[a]	1.12***	3.83	-0.17***	-4.36	-0.53***	-5.68
	(0.292)		(0.040)		(0.093)	
DER_ACSIZE[b]	0.26***	3.05	-0.03**	-2.52	0.10**	2.17
	(0.084)		(0.014)		(0.045)	
Fixed effects	Yes		Yes		Yes	
Constant	1.68***	10.52	-0.20***	-9.89	4.67***	85.48
	(0.159)		(0.020)		(0.055)	
Observations	12,476		12,476		12,476	
R^2			0.07		0.13	
Wald χ^2		1417.11		1793.43		5130.23
p-value		0.000		0.000		0.000
Hansen's J χ^2	1.808			1.096		0.992
p-value	0.179			0.295		0.7528

[a,b]are the predicted values from the other equation. The second stage of the GMM IV tests are presented. The p-value for the one-tailed test of the null hypothesis that the coefficient is zero is indicated as ***, **, * to show statistical significance at the 0.01, 0.05 and 0.10 levels respectively, and robust standard errors are given in parentheses. The z values are also provided. See Appendix 1 for definitions of dependent and independent variables.

7. Discussion and Conclusion

The study finds that audit committees manage risk effectively in those companies employing derivatives. Their risk monitoring role induces a decrease in the extent of derivatives showing a control on derivatives usage over-hedging activities to achieve value-enhancing and risk-reducing hedging activities. These beneficial risk effects are not evidenced for derivative non-users, indicating that audit committees are more involved with risk management activities within companies using derivatives, which may stem from the larger risks and responsibilities that are involved in the reporting of financial derivatives. Indirectly, the committee's involvement discourages the misuse of derivatives and the larger committee size with more expertise and resources exerts considerable influence. Their monitoring of internal control systems, and risk assessments and controls appear to provide better risk environment for derivative users. And, audit committees are more vigilant and effective with respect to financial derivatives risks.

We do not find the same effects for non-users, and the results show audit committees have an insignificant effect on value and an increase in risk. This indicates that audit committees may be less concerned with risk in companies that do not have to report financial derivatives. For the group of companies that employ derivatives, the results support researchers who believe that bigger and meaningful audit committees provide superior vigilance (Kalbers and Fogarty, 1993) and internal control; and would be astute in discovering glitches and deceit (Pincus et al., 1989) due to having the financial expertise and power and resources to exact optimal vigilance (Zaman et al. 2011) and command more power, status and resources, and leads to lower interest rates for debt. (Anderson et al., 2004) implying a reduction of risk. Therefore, importantly the findings show that audit committees are taking on additional responsibilities of risk management in derivative user companies. It is a natural consequence of their responsibility for the risks related to financial derivatives which appears to be extending beyond just financial reporting.

However, there is a negative correlation between audit committees and profitability. The results appear to be capturing audit committees' failure in respect of their overall financial reporting functions which is impacting both derivative users and non-users. It seems to suggest that the increased range of functions in other areas may be taking a toll on their primary financial reporting functions (exhibiting the symptoms that many warn of) to detrimentally impact profitability.

This study highlights the importance of audit committees within companies using financial derivatives. The results indicate that audit committees effectively impact hedging decisions to result in the decreased risk and enhanced value. It supports (Subramaniam et al., 2009) to suggest that audit committees should be involved in risk management activities committee in companies that use derivatives. However, the research raises an important question regarding the detrimental effect of audit committees on profitability. It appears that audit committees effective risk management activities are impairing their overall financial reporting functions in both derivative user and non-user companies. Therefore, the research underscores the need for a reexamination of the functions and roles of the audit committee that need to be properly defined. This appears to find support in Liao and Hsu (2013) who also advocate a reexamination of the committee structures in order to adequately separate tasks and functions of the committees toward the improvement in the quality of financial reports.

It is evident that audit committees are becoming more involved in overseeing the company's operational and financial risks that are an integral part of financial statements. At the same time, it is evident that they are managing derivative risks effectively. Therefore, their role in respect of risk management needs to be addressed such that the audit committee's ever increasing and larger involvement with company risks does not impair its effectiveness in other areas. Regulators have become more focused on risk management in response to the financial crisis. While some (McNulty et al., 2013) see risk control as a prime responsibility of the board of directors, our study suggests that the audit committees are effective in the risk management of financial derivatives. Therefore, audit committees should oversee the overall risk activities of the company and should remain actively involved in the risk management of derivatives hedging activities of the company. In keeping with SOX, our study does not advocate a mandatory risk management committee for non-financial companies, but suggests this function may be performed by audit committee in companies that use financial derivatives.

8. Theoretical Contribution

Corporate governance reforms have had the greatest impact on audit committee structure and functioning. The audit committee oversees the external auditors and preapproves all audit and non-audit services to be provided by them. Under the new regulations, the audit committee is also responsible for internal controls in relation to accounting and auditing matters and the oversight of the financial reporting process. The audit committee has additional responsibilities with respect to risk assessment and management of risk policies, and is required to report to the board of directors regularly in this regard. Additionally, the annual reports are required to include a report on the internal control of financial reporting process of the company.

The study draws from the agency theory to show that corporate governance is an important tool in the control of the agency conflict between the agents (managers) and the shareholders. And towards this, audit committees provide the internal control and monitoring function over the managements' activities to negate the agency conflict. As such Audit Committee is an important pillar in the Corporate Governance framework.

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