An Empirical Analysis of Enterprise Risk Management and Firm's Value: Evidence from Pakistan

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ABSTRACT

Since the last few decades, the firms have shifted their focus towards risk management from traditional risk management practices to enterprise risk management. For this purpose, the current study is designed to investigate the critical firm's characteristics that influence firms to adopt enterprise risk management practices. The data for this study comprises of 65 non-financial firms during the period 2009 to 2017. Binary Logistic and robust least square method was administered to determine the relationship among variables. Empirical results revealed that large firms, firms with a higher return on assets, and firms having more independent directors on board leads towards the implementation of enterprise risk management. The study also found a significant encouraging relationship between implementing of this risk management and Tobin's Q both in the short and long run. The implementation of an enterprise risk management system augments the performance of the firm soon after the induction of this system as revealed by the results.

INTRODUCTION

Over time, managing business becomes remarkably complex, uncertain, and versatile when contrasted to the past. Nowadays, businesses face various kinds of risks. It is indispensable for the existence and value creation of firms to manage these risks effectively. In the past, the approach of firms regarding the management of risks was silo-based, commonly termed as traditional risk management (Hoyt & Liebenberg, 2011). Gordon, Loeb and Tseng (2009) indicated that the behaviour of firms towards managing risks during the last two decades has shifted from traditional risk management towards an integrated approach of risk management often characterized by ERM. Pagach and Warr (2011) identified that in recent past, the ERM concept has become more relevant due to increase in the complexity of risks, dependencies among sources of risks, introducing ERM processes in the rating system, imposed strict regulatory rules of global financial crises, advancement in the risk identification methods & information and quantification technologies. The management of the entire risk portfolio of firms through the enterprise-wide perspective endeavours to improve the shareholder's value through the support of senior management and board of the firm to ensure a sufficient supervising and managing the overall risk portfolio of the firms (Beasley, Clune & Hermanson, 2005).

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The rationale behind the ERM implementation is to assure in creating the firm's value so that the business objectives of the firm to be achieved (Bowen, Cassel, Dickson, Fleet & Ingram, 2006). Most of the researchers (Beasley, Frigo & Litman, 2007; Faisal & Hassan, 2020; Manab & Ghazali, 2013; Maurer, 2009) believe that implementing the ERM system generates value for the firms and has a significant influence on firms over those who do not acquire it. In this regards the majority of the studies were conducted to find the consequences of implementing ERM system on the performance of firms leading towards value creation, like Baxter, Bedard, Hoitash and Yezegel (2013), Bertinetti, Cavezzali and Gardenal (2013), Callahan and Soileau (2017), Eckles, Hoyt and Miller (2014), Farrell and Gallagher (2015), Grace, Leverty, Phillips and Shimpi (2014), Gordon et al. (2009), Hoyt and Liebenberg (2011), McShane, Naik and Rustambekov (2011), Sekerci (2011) and Sprcic, Zagar, Sevic and Marc (2016). Studies conducted to find the determinants of ERM includes; Baxter et al. (2013), Beasley et al. (2005), Liebenberg & Hoyt (2003) and Önder and Ergin (2012),. Some of the researchers used questionnaires, surveys, and interviews to find the stages of ERM adoption, including Altuntas, Berry-Stölzle and Hoyt (2011), Daud, Yazid and Hussin (2010) and Kleffner, Lee and McGannon (2003). However, the academic research endorsed in the field of ERM is limited, and especially the consequences of investigating ERM on the performance of firms. Hence, there is still a question mark whether introducing the ERM system to the firms leads to enhance the performance of the firms?

Thus, the purpose of the current study is to fill the identified gap and to extend the literature by conducting empirical research by evaluating determinants and value of implementing ERM in both short and long-term for Pakistan. The rest of the paper is organized as follows; the second section discussed the literature review. The third section discussed the methodology and data employed for the analysis. The fourth section comprised of results and discussions, while the last part concluded the paper.

LITERATURE REVIEW

The literature had witnessed a positive association among ERM implementation and performance of the firm, but there were also mixed shreds of evidence. Moreover, the studies performed to ascertain the value creation of ERM implementation are mostly concentrated on developed economies, like studies of (Hoyt & Liebenberg, 2008; Gordon et al. 2009; Hoyt & Liebenberg 2011; Pagach & Warr, 2010; Sprcic et al., 2017) are based on United States data. Bertinetti et al. (2013) and Lechnar & Getzert (2018) studied the European context, Lin et al., (2012) and Zou, Isa, & Rahman (2017) worked on Chinese data. While little research is conducted on developing economies in the field of ERM like Golshan & Rasid (2012) conducted studies in the Malaysian context while Faisal & Hassan (2020) in the Indonesian context. The outcomes of these studies cannot be overgeneralized in the context of Pakistan due to the fact of metamorphoses in the regulatory rules across the borders. At the same time, limited research was found based on the implications of ERM in the milieu of Pakistan. However, Songling, Ishtiaq, & Anwar (2018) focused on analyzing the small and medium enterprises (SMEs) in Pakistan, while Munir (2018) investigated the status of current risk management processes and significance of implementing ERM system in oil and gas sector of Pakistan Stock Exchange (PSX). Both studies observed the positive relationship between ERM adoption and performance of the firms. However, no empirical research was found evaluating the factors of ERM adoption and the long-term relationship of ERM with the firm performance for Pakistan.

Various theoretical frameworks have been established that postulate an outline of the fundamental constituents of ERM. ERM is a process that integrates all the activities of risk management of the corporations into one holistic framework to accomplish a far-reaching corporate perspective. While on the other hand, traditional risk approaches usually deliberate risks on a silo-based and departmental view and measuring risks in isolation. Studies on ERM can be divided into three significant extents; firstly, studies related to ERM implementation, secondly studies related to the factors involved in implementing ERM system, and thirdly, studies related to the effects of ERM on performance or value of the firm (Eckles et al., 2014; Monda and Giorgino, 2013).

Determinants of ERM

Most of the firms have initiated implementing ERM as a strategic tool to view risk as an opportunity and manage it effectively at an appropriate level to attain the firm's objectives. However, according to a survey conducted in 2005 found that only 11 percent implement ERM completely. Still, there is a question about what are the determinants that influence firms to implement ERM. Beasley et al. (2005) concluded that research is required that provide empirical shreds of evidence that why certain organizations are adopting the holistic approach of risk management while others do not. The lack of clear literature about essential firm's characteristics that affect ERM implementation might effectively obstruct the ERM implementation. Subsequently, it is imperative to examine what are the firm's specific characteristics that have a significant relationship with the implementation of ERM.

Liebenberg & Hoyt (2003) were the first academics who investigated the determinants of ERM. They used the Chief Risk Officer (CRO) appointment as a proxy for ERM, and their results suggested that higher leverage is the only variable that influence firms to adopt ERM. Beasley et al. (2005) analyzed the data collected from the survey of 123 firms to investigate the ERM implementation and found having more independent members on board, an appointed CRO, and Big Four auditor firm are key characteristics of firms that have a significant positive influence on the ERM stage of the firms. Sprcic et al. (2017) conducted their study to determine the key ERM drivers in Croatian firms, using questionnaire data, they found that only larger firms and support of managers are the key drivers of ERM implementation in the perspective of Croatian firms. Lechnar & Getzert (2018) conducted an empirical study to investigate the impact of various characteristics of firms on the firms' decisions to implement ERM in the context of Germany. Using ERM as a dummy variable, they divulged that size of the firm and international diversification are having a positive impact on ERM implementation. They also concluded that firms operating in insurance, banking and energy sector tend to implement ERM system due to historical events of crises and strict regulations. Gatzert & Martin (2015), while conducting a study on the study based on the determinants and value creation abilities of ERM adoption, found that literature results on determinants of implementing ERM are somewhat complex.

Following are the key characteristics of firms previously considered, and their expected relationship with ERM implementation and the researcher developed the following hypothesis for this research study;

Gatzert & Martin (2015) indicated that as larger firms face more complexity and uncertainty while in business operations, therefore, they must adopt an effective risk management system.

Prior studies advocated a positive relationship between the firm's size and its engagement in ERM implementation (Pagach & Warr, 2011; Razali et al., 2011). The firm size is computed by taking the natural logarithm of the total assets of each firm in a specific year. This leads to the following hypothesis;

Hypotheses 1: ERM implementation is positively related to firm size.

Hoyt & Liebenberg (2011) suggested that higher leverage can foster the possibility of bankruptcy, and hence it can leash to trigger financial distress. Thus, high leveraged firms must cope with the risks to an acceptable level in furtherance to evade financial difficulty and debt default. Firms with increased leverage may urge the adoption of the ERM system (Liebenberg & Hoyt, 2003; Golshan & Rasid, 2012). In this study, leverage is determined as a proportion of the total liabilities in each company's market value over a given year. This leads to the following hypothesis;

Hypotheses 2: ERM implementation is positively related to the firm's leverage.

Kleffner et al. (2003), while assessing Canadian firms, found that the encouragement from the board of directors is the main factor underlying the firm's ERM adoption. Beasly et al. (2005) argued that independent members present on board are the fundamental aspects that imitate the oversight effectiveness of the board and found that the presence of an increased number of independent directors on board is positively correlated with ERM implementation. In this study, board independence is calculated as a percentage of independent members on the board of each firm in the specific year. This leads to the following hypothesis;

Hypotheses 3: ERM implementation is positively related to a higher percentage of independent boards of directors.

Firm's profitability is the other most relevant determinant of adopting ERM by firms (Razali, Yazid, & Tahir, 2011). The firm's profitability is measured as ROA (return on assets). Although they found ROA as an insignificant variable in adopting ERM by firms, they stated ROA signifies as an indicator related to the management efficiency by using its existing resources to make a profit. In this study, ROA is calculated as the company's net profit divided by each company's total assets in a particular year. This leads to the following hypothesis;

Hypotheses 4: ERM implementation is positively related to return on assets.

According to Liebenberg & Hoyt (2003), firms with high growth may take risky actions to accomplish their business objectives. Usually, higher growth firms have a higher financing cost; subsequently, the greater probability of bankruptcy and uncertainty of payoff (Pagach & Warr, 2011). It is evident that firms with higher growth rates may implement the ERM system. In this study, sales growth is calculated as a change in the current year sales when compared to previous year sales. This leads to the following hypothesis;

Hypotheses 5: ERM implementation is positively related to sales growth.

ERM and Firm's Value

ERM is an amalgamated and systematic tactic designed to evaluate and administer all the risks that a firm faces in a holistic way to achieve the firm's objectives (Dickinson, 2001). COSO (2004) indicated that ERM assists the administration of organization to inline risk appetite with the policy of the firms, integrating the prospects of risk management, providing risk response in a better way, reducing operational losses and unacceptable performance variability and seize opportunities. It is emphasized that ERM might enhance the value of the firm (Brown et al., 2006), which is deliberated as most of the business objectives (Yazid, 2011). The purpose of ERM implementation is to assure that the value creation ability of the firms will be enhanced, and the business objective of the firm will be achieved. Stoh (2005) indicated that firms with the knack to establish resilient ERM capability could use the ERM system as a basis for competitive advantage.

Various empirical studies have supported the benefits associated with ERM implementation to a different extent. For instance, McShane et al. (2011) employed Standard & Poor's ERM rating for the insurance industry as a proxy for ERM and found adoption of the ERM system leads towards enhancement of the firm value. Yet they do not find any addition in the firm's value having increased ERM rating that is achieved by increasing the ERM level. On the contrary, Lin et al. (2012) uncovered that instigating ERM impacts negatively on the performance of the firm. In contrast, Hoyt & Liebenberg (2011) substantiated a positive and significant correlation among engaging the ERM system and market value of the insurance companies. They indicated that US insurers with the ERM system have about 20% increased shareholder value than those with no ERM system. Baxter et al. (2013) ascertain that ERM quality has a significant and positive relationship with the accounting performance and firms' market value. Callahan & Soileau (2017) conducted a study to ascertain the ability of ERM to enhance operating performance. Their results show that the ERM maturity level is significant and positive to the operating performance of firms. Li et al. (2014) and Tahir & Razali (2011) analyzed Chinese insurance companies and Malaysian firms, respectively. They found that adopting ERM system wreaks a positive influence on the firm's value but statistically not significant. Lechnar & Getzert (2018) correspondingly illustrates that ERM implementation has a positive and significant relationship with the firm's value. Kraus & Lehner (2012) summarized the previous studies on the association amid implementing ERM system and firm performance and found that the overall relationship is indecisive amidst implementing ERM and the firms' performance. Based on the results of the related research and prior literature on ERM, this study developed and tested the following hypothesis;

Hypotheses 6: There is a positive relationship between ERM implementation and the firm's performance.

The aforementioned literature on ERM does not contemplate the duration of implementing the system of ERM by the firms neither these studies explore the long-term impact of ERM adoption on the firm's performance. Fraser & Simkins (2010) concluded that to acquire a proficient ERM system, it takes 3 to 5 years. Sprcic et al. (2016) acknowledged that the effects of ERM on the value of the company should become more durable over time and conducted a study to find the long-term impact of ERM on the value of the firm. They found positive but statistically not significant long-term effects of ERM on the firm's value and stated that ERM

does not create value in the long run. Based on the above discussion, the authors developed and test for the following hypothesis;

Hypotheses 7: There is a positive relationship between ERM duration and the firm's performance.

DATA AND METHODOLOGY

Data Description

The study considered the top hundred largest companies (KSE-100 index, non-financial firms only) in terms of market capitalization listed on the Pakistan Stock Exchange (PSX) as in December 2017. The selection of KSE-100 index firms (including non-financial firms) is mainly for two reasons; first, the data for all the firms listed on PSX was not available, and the second and most important reason was that KSE-100 index is the performance representative of all the firms listed on PSX. The final sample for this research study was 65 firms, as the 11 firms with missing annual report data were eliminated from the sample. Thus the study comprised of 65 firms out of which 22 firms have an ERM system in place while 43 firms do not exhibit the ERM system (see Table 3a). The sample data ranging from 2009 to 2017 were extracted from annual financial reports of firms listed on PSX. Binary logistic regression was used to determine the effect of key firm characteristics on the decision of firms to implement ERM system and employed robust least square method to establish the relationship between ERM implementation, ERM duration, and Tobin's Q.

ERM Identification

Base on the work of Hoyt & Liebenberg, (2011); Lechnar and Getzert (2018); Sprcic et al., (2016), current work also utilized ERM as a dummy variable, that takes the value of 1 if the ith firm implementing the system of ERM during the year t, and elsewise 0. For information gathering regarding ERM, the researcher conducted the meticulous keyword search to recognize evidence of implementing ERM by a particular firm. The following keywords were used: enterprise risk management, holistic risk management, risk management committee, risk committee, COSO ERM-framework, Chief risk officer and their synonyms and acronyms. Each successful hit was coded as 1, and 0 otherwise.

Research Model for the Determinants of ERM Implementation

To determine the effect of characteristics of firms on the ERM implementation in firm i, this study follows Lechnar and Getzert (2018) and used Cox proportional hazard regression model on multi-period data. Such type of model is used for decisions of binary variables; in this study, the examination of a firm's characteristics that drives firms to adopt the ERM system. ERM is used as dependent dummy variable which takes the value of 1 if a firm has implemented ERM in year t, and it was explained by

$$Ln(\frac{p(ERM=1)}{1-p(ERM=1)} = b_0 + b_1x_1 + b_2x_2 + \ldots + b_nx_n + \varepsilon_i \text{ -------------------- (1)}$$

ERM Implementation and Firm's Performance

The primary purpose of the current work is to determine the relationship between implementing the ERM system and the firm's performance. Based on prior literature, the present study hypothesizes a positive and significant relationship between implementing ERM and the firm's performance, and the relationship between the duration of ERM and firm performance.

Research Model for the Relationship between ERM Maturity and Firms Performance

Research Model for the Relationship between ERM Maturity and Firms Performance
The firm's value allied with the benefits of ERM adoption which are hypothesized in this study was tested with the following model based on (Sprcic et al., 2016),
Firm performance= f [ERM, control variables] --------------- (2)
The study considered the market-based performance of the firm in terms of Tobin's Q, which is in line with most of the empirical findings (Baxter et al., 2013; Milos Sprcic et al., 2016). Alternatively, to determine the long-term impact of ERM, the study used the ERM duration as the number of years a firm implementing ERM.

The following model is used to evaluate the relationship between ERM implementation and firm performance:

Tobin's Qit = β_0 + β_1ERM$_{it}$ + β_2ROA$_{it}$ + β_3SIZE$_{it}$ + β_4LEV$_{it}$ + β_5DIV$_{it}$ + β_6SG$_{it}$ + ε ---------- (3)

Dependent Variable

Tobin's Q: This research used Tobin's Q ratio as a proxy for firm's performance, which is in line with the previous empirical studies like (Sprcic et al., 2016; Hoyt & Liebenberg, 2011; Lechnar & Getzert, 2017). Tobin's Q dominates other measurements of the performance of the firm as it is not distressed by the manipulation of managers (Hoyt & Liebenberg, 2011). Moreover, Tobin's Q does not entail normalization or adjustment for risk (Lang & Stulz, 1993).

Independent Variables

The independent variables used in the models to determine the relationship between ERM adoption and the firm's performance are ERM and duration of ERM. The ERM implementation is a dummy variable that takes the value of 1 if the firm is implementing ERM in that year, else 0. ERM duration is the number of years a firm implementing ERM. The ERM is used as a dependent variable in model 2, while the duration of ERM is a dependent variable in model 3.

The following variables discussed were used as a control variable to determine more specific results.

Size of the Firm: From prior research, it is evident that firm size is positively correlated with the ERM adoption, which dictates that larger firms are having a higher possibility of confirmation of ERM system (Beasley et al., 2005; Colquitt et al., 1999). On the contrary, some of the work found a negative correlation between the size of the firm and the performance of the firm (Allayannis & Weston, 2001; Lang & Stulz, 1994). Therefore, it is

vital to control for deviation in Tobin's Q due to the size of the firm. For this research, the firm size is calculated as the natural logarithm of total assets of firm i in year t.

Leverage: Prior studies do not confirm the tendency of the relationship between capital structure and firm's performance. On one side, the higher debt to equity ratio is beneficial in tax savings, thus allowing firms to increase their value (Tahir & Razali, 2011). Moreover, higher debt to equity ratio may lead to improve firm performance through moderating free cash flow of the firm that might be invested in inefficient projects for the firm and beneficial to managers (Jensen, 1986). On the other side, higher debt to equity ratio may leash to financial distress due to the higher chances of bankruptcy (Hoyt & Liebenberg 2011). Following Farrell & Gallagher (2015), this study calculated leverage as a ratio of total liabilities to the market value of the equity of firm i in the year t.

Sales Growth: Firms having more growth opportunities may be distracted from implementing the ERM system (Pagach & Warr, 2010). Sales growth enhances firm performance by providing opportunities for learning curve benefits, economies of scale, and creating investment opportunities as a whole (Kaplan & Norton, 1996). Hence, it is very prominent to control for the variable of sales growth. Following Hoyt & Liebenberg (2011), this study calculated sales growth as a change in the current year sales when compared to previous year sales.

Return on Assets: Prior literature has found a statistically positive correlation between ROA and firm's performance (Allayannis & Weston, 2001; Arif & Syed, 2015). Hence it is very crucial to consider ROA as a control variable while assessing a firm's profitability (Hoyt & Liebenberg, 2011; McShane et al.,2011). In this study, ROA is calculated as the net profit of the firm divided by the total assets of the firm i in the year t.

Industry: As the data of this study includes non-financial firms that are distributed over different sectors, so it is essential to control for potential differences in profitability. In this study, the industry is used as a binary variable, which takes the value of 1 if the firm is operating in the banking, insurance or energy, elsewise 0 (Hoyt & Liebenberg, 2011).Table 1A provides an overview of the variables used in this research in the appendices.

RESULTS AND DISUCSSION

Descriptive Statistics

The researchers first focused on the descriptive statistics, as it is very important in understanding the variables of the study. In this segment, the researchers presented the descriptive analysis of the two sub-sample data (i.e., ERM and Non-ERM firms) and compared the descriptive aspects of ERM firms with that of Non-ERM firms. In Table 1, the descriptive statistics are shown. The mean, maximum, minimum and standard deviation of ERM firms and Non-ERM firms are separately presented. From the analysis, it is concluded that out of 65 firms, 22 firms have implemented the ERM system. In comparison, no evidence was found for ERM implementation during assessing the annual reports of the remaining 43 firms of Pakistan during the year 2017.

Table 1:

Descriptive Statistics of Variables for ERM and Non-ERM Firms for the period of 2009-17

ERM Firms (22 firms)				Non-ERM Firms (43 firms)				
Variables	Mean	Max	Min	Std. Dev.	Mean	Max	Min	Std. Dev.	Mean difference
TOBIN'S Q	1.87	17.55	0.47	2.05	2.76	216.38	0.27	14.12	-0.89 (0.1207)
Size (Mn)	100476	627288	4110	119475	33837	337182	324	40718	66639 (0.2932)
SG	0.11	2.29	-0.59	0.26	0.30	48.58	-0.94	2.56	-0.19 (0.2810)
ROA	0.11	0.41	-0.10	0.09	0.09	0.67	-0.48	0.09	0.02* (0.0554)
LEV	2.16	25.65	0.03	3.80	2.71	132.90	0.001	8.77	-0.55* (0.0718)
BI	0.21	0.75	0	0.16	0.16	0.71	0	0.14	0.05* (0.0820)

Note: Mean difference is the difference of means between ERM and Non-ERM firms; ***, **, * is the statistical significance at 1%, 5%, and 10% confidence level; and statistical significance of mean differences is based on t-test; the values in parentheses of the mean difference column are p-values of t-test.

From the descriptive analysis, it is evident that the difference amidst the mean value of Tobin's Q for ERM firms and non-ERM firms is -0.89, which shows that ERM is not relevant to Tobin's Q, but this difference is statistically not significant. Moreover, the standard deviation value of Tobin's Q is 2.05 for ERM firms, which is more stable than the standard deviation value of Tobin's Q for non-ERM firms which is 14.12, thus stating the ambiguous effect of ERM on Tobin's Q. From the analysis related to the characteristics of firms, we found that the ERM firms are having greater mean value for the firm's size and the lower mean value of sales growth, and both the values are statistically insignificant. The firms with the ERM system have greater significant mean value for ROA but the lower and significant mean value of leverage. Also, we found that ERM firms have more independent members on board than non-ERM firms, and this value is statistically significant.

Correlation Analysis

The researchers conducted a correlation analysis to check the degree of association among the variables. Table 2a in the Appendix shows the correlation analysis among the variables under consideration. Further, the possibility of multicollinearity does not posture any problem in the analysis due to the nonexistence of the high-level correlation coefficient among the explanatory variables.

Determinants of Enterprise Risk Management

Table 2 represents the results for the determinants of ERM implementation. By applying the Method of ML - Binary Logit (Newton-Raphson / Marquardt steps), this model uses ERM as a dependent variable for the duration of 2009 to 2017. The calculation of the McFadden R squared is done in this model to estimate for goodness-of-fit of the logit model. The computed value of R-squared is 0.128, which in line with various previous studies in this regard (Lechnar & Getzert, 2018; Beasley et al., 2005).

The analysis results indicate that larger firms are more likely to adopt the ERM system, which is in line with the other previous studies like (Farrell and Gallagar, 2015; Lechnar and Getzert, 2018; Pagach and Warr, 2011). Also, our analysis shows that ROA is statistically significant and positively correlated with the ERM adoption, which is also supported by previous studies like Bertinetti et al. (2013); Pagach and Warr (2008); Sprcic et al. (2017). The board's independence has a statistically positive value which contradicts the results of Desender (2007) who do not find any impact of board independence on ERM adoption. Furthermore, this study does not find any evidence for the impact of leverage and sales growth on the ERM engagement.

Table 2:
Results of ERM Determinants

Dependent variable: ERM	
Variable	Coefficient
C	-13.22388***
SIZE of firm	0.457732***
Return on assets	5.548176***
Leverage	-0.010722
Board independence	2.809939***
Sales growth	-0.375578
***, **, * are significance level at 1%, 5% and 10% respectively.	

Results of impact of ERM adoption on firm's value

As one of the main objectives of this study is to determine the consequences of ERM adoption on the value of the firm analyzing the firms listed on PSX. In this section, the results relating to the impact of ERM adoption on the value of the firms are discussed. In this section, the researcher first discussed the relationship between ERM adoption on the firm's value, then the impact of the duration of ERM and the value of the firm.

Table 3 represents the results for the developed model 2, which was established to determine the relationship between ERM implementation and Tobin's Q (a proxy for firm value) and the Robust Least Square analysis was used with the M-estimation for this purpose. A panel data for the duration of 2009 to 2017, having a total of 575 observations, was used for the analysis data of overall firms and 198 observations were used for the firms implementing the ERM system.

From Table 3, it is evident that the coefficient value of ERM is significant with the positive with the value of0.233966 (also 0.200257 for ERM firms only). This indicates that firms having an ERM system in place are having higher Tobin's Q values on average of 0.23 (0.20 for ERM firms only) when compared to firms without the ERM system. This result confirms the proposed hypothesis in this study related to the value-creating ability of ERM implementation. The analysis result of this variable is coherent with similar studies like Sprcic et al. (2016), Lechnar and Getzert (2018), and Baxter et al. (2013).

Table 3:

Relationship between ERM and Firm's Value

Dependent Variable: Tobin's Q	Overall Firms	ERM Firms only
	Coefficient	Coefficient
Variable		
C	0.398011	1.037763
ERM	0.233966***	0.200257***
Return on Assets	4.577417***	5.487853***
Firm Size	0.011330	0.008814
Leverage	0.008983***	0.015823
Dividend paid	0.112990	-0.075236
Sales Growth	-0.009413	-0.0883730
R-squared	0.195256	0.342790
***, **, * are significance level at 1%, 5% and 10% respectively		

In line with the assumption of this study, the results show a positive coefficient for ROA having a value of 4.57 and is significant at 1 percent level. Thus, confirming that firm's profitability enhances the shareholders' value. The coefficient value of leverage is 0.008983 and also positive at a significance level of 10 percent. The value of the coefficient for sales growth is negative but not significant, which is against the assumption of this study. The dividend payout and firm's size have a low but positive coefficient value; also, these variables are not significant to shareholders' value.

Table 4 is representing the results for the developed model 3, which was established to determine the consequences of ERM duration and the firm's value, and Robust Least Square analysis was used with the M-estimation for this purpose. A panel data for the period of 2009 to 2017, having a total of 575 observations, was used for the analysis data of overall firms and 198 observations were used for the firms having an ERM system.

The analysis results in Table 4 show a positive relationship between the duration of ERM and the firm's value in terms of Tobin's Q, as the coefficient value of ERM duration is 0.064474 and is significant at 1 percent level. This result also validates the developed hypothesis regarding the impact of ERM duration on the value of the firms. This result is in line with the Nocco and Stulz (2006), who indicated that the impact of the ERM adoption on the value of the firm becomes stronger upon a time. This result contradicts the findings of Sprcic et al. (2016). Moreover, this analysis only found a statistically positive relationship between return on assets and Tobin's Q.

Table 4:

Results of Relationship between ERM Duration and Firm's Value

Dependent Variable: Tobin's Q	Overall Firms	ERM Firms
	Coefficient	Coefficient
Variable		
C	0.268	0.745
ERM Duration	0.064***	0.056***
Return on Assets	4.569***	5.417***
Firm Size	0.017	0.002
Leverage	0.009	0.018*
Dividend paid	0.110	-0.084
Sales Growth	-0.009	-0.040
R-squared	0.201	0.359
***, **, * are significance level at 1%, 5% and 10% respectively		

This study also analyzes ERM duration as a categorical variable to check for the yearly effect of ERM duration and Tobin's Q (a proxy for the firm's value) as depicted in Table 5. Table 5 shows the results for both the samples, i.e. overall firms and ERM firms only. The A panel data for the duration of 2009 to 2017, having a total of 575 observations, was used for the analysis data of overall firms and 198 observations were used for the firms implementing the ERM system.

The analysis results in Table 5 show that ERM duration enhances the value of the firms in the later years than the initial years, i.e., the coefficient of implementing ERM in initial years is positive but not significant, but in the fourth year of implementing ERM system has a positive and significant relationship with the performance of firms for both overall data and ERM firms only. These results are in line with the statement of (Nocco & Stulz, 2006), as they stated that the ERM system is a complex process and takes years for firms to establish a sound ERM system.

Table 5:
ERM Duration as a Categorical Variable and Firm Performance

Dependent Variable: Tobin's Q		
	Overall Firms	ERM Firms only
Variable	Coefficient	Coefficient
C	0.278	0.726
Return on assets	4.599***	5.499***
Size of firm	0.017	0.003
Leverage	0.009***	0.019*
Dividend paid	0.107	-0.098
Sales growth	-0.009	-0.044
ERMD=1	0.151	Base Year
ERMD=2	0.103	0.080
ERMD=3	0.163	0.151
ERMD=4	0.208*	0.207*
ERMD=5	0.355***	0.321**
ERMD=6	0.540***	0.544***
ERMD=7	0.307**	0.253
ERMD=8	0.498***	0.437***
ERMD=9	0.841***	0.745***

***, **, * are significance level at 1%, 5% and 10% respectively.

CONCLUSION

The purpose of this research was to investigate the key firm characteristics that influence firms to adopt the ERM system as well as the impact of ERM implementation on the value of the firm in the context of Pakistan. This study also investigated the long-term impact of ERM adoption on a firm's value. For this purpose, the study considered the non-financial listed in KSE-100 index with the period of 2009 to 2017. It used the binary logistic regression analysis to determine the effect of key firm characteristics on the decision of firms to implement ERM system. Robust least square method was administered to determine the relationship between ERM implementation and Tobin's Q and the relationship between ERM duration and Tobin's Q.

Results related to the determinants of ERM implementation showed that firms with a greater return on assets and larger firms have a positive and statistically significant relationship with the extent of ERM adoption. Furthermore, the study found that firms having more independent directors on board are more likely to implement the ERM system. The study also revealed that less leveraged firms and an increase in the sales of the firms are insufficient to influence firms to adopt the ERM system. Regarding the value relevance of adopting the ERM system, the current study explored a positive and significant relationship between implementing ERM and Tobin's Q by controlling for certain determinants of a firm's value. These findings are in line with various preceding studies that declared that the Pakistani market is consistent with other international markets like Indonesia, the US, and Germany.

Regarding the long-term impact of the ERM system on Tobin's Q value, the authors used the duration of ERM as an independent variable. After controlling for certain determinants of the firm's worth, the current study found a positive and statistically significant impact of ERM duration on Tobin's Q for Pakistan. This study also found that implementing the ERM system enhances the value of the firms in the succeeding years. Although this work has its importance, but certain limitations are to be considered in the future. Firstly, the study only considered the Non-financial KSE-100 index firms listed on PSX and ignore the rest of the market. Secondly, the authors used ERM implementation as a dummy variable that might lead to a bias in the selection of the variable.

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Appendix

Table 1a:
Summary of Variables

Variable	Measurement	Predicted Sign
Tobin's Q	(market value of equity + the book value of debt) / book value of total assets of the company	N/A
ERM	ERM implementation, 1= firm i implement ERM in year t, 0 otherwise	+ Tobin's Q
ERMD	ERM duration, Number of years firm i implementing ERM in year t	+ Tobin's Q
Size	Ln (book value of total assets of firm i in year t)	+ Tobin's Q + ERM
ROA	Return on Assets= Net Profit/Total Assets	+ Tobin's Q + ERM
LEV	Leverage= Book value of long-term liabilities / market value of equity of firm i in year t	+ Tobin's Q + ERM
GROWTH	Sales Growth= (Salesi,t – Sales i,t-1) / Sales i,t-1	+ Tobin's Q + ERM
BOD_IND	Number of independent board members present on board of firm i in year t	+ ERM
Div	Dividend paid in year i by firm t = 1, elsewise = 0	+ Tobin's Q

Table 2a:
Correlation Analysis

	TOBINSQ	ERM	ERMD	SIZE	ROA	LEV	DIV	SG	BI
TOBINSQ	1								
ERM	0.26***	1							
ERMD	0.27***	0.99***	1						
SIZE	0.0044	0.20***	0.19***	1					
ROA	0.60***	0.19***	0.20***		1				
LEV	-0.73***	-0.2***	-0.25***	0.02	-0.72***	1			
DIV	0.18***	0.17***	0.17***	0.18***	0.32***	-0.3***	1		
SG	0.06	-0.025		-0.03	-0.07	0.20***	-0.04	0.09**	1
BI	0.13***	0.16***	0.18***	0.14***	0.04	-0.11**	0.04	-0.08*	1

Note: Variables are explained in Table 1A; and ***, **, * are the statistical significance at 1%, 5% and 10% confidence level

Table 3a:
The ERM Disclosure
Panel A

	ERM implementation during 2009-2017	%
ERM = 1	22	33.85%
ERM = 0	43	66.15%