International Journal of Financial Management
8 (4) 2018, 15-27
http://publishingindia.com/ijfm/

Submitted: 16 July, 2018
Accepted: 05 September, 2018

Effect of Enterprise Risk Management on Firm Value: Empirical Evidence from Non-Financial Firms in Pakistan

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Abstract

This research examines the effect of enterprise risk management on firm value in Pakistan. Further, this study empirically examines company characteristics that establish the execution of an enterprise risk management system. Using a sample of final dataset of 83 non-financial firms located in Pakistan. The sample included non-financial firms from the year 1999 to 2015 and so up to 17 observation years per company. As in context of Pakistan, most of the organizations have already implemented enterprise risk management (ERM) programs and have established specialized ERM departments as ERM is now a global term and has become increasingly relevant because of the growing risk difficulty and an additional development of regulatory frame works. For the empirical evidences, the data has been collected from non-financial firms listed at the Pakistan Stock Exchange (PSX). Results of logistic regression shows that capital opacity, profitability, financial leverage, firm size and slack have positive impact on the implementation of an ERM system; however Industrial diversification, industry and return on equity are negatively related to an ERM engagement. The results of ordinary least square regression finds positive relationship between the use of an ERM and firm value.

Keywords: Enterprise Risk Management, Firm Characteristics and Firm's Value (Shareholder Value)

Introduction

Enterprise Risk Management (ERM) comparatively is a fresh term in business and ultimately this approach is used to manage the risk. Now auditors include ERM approaches to examine the company audit. Additionally, on many occasions, presentations are being made on ERM topic. Special seminars are conducted on this topic to explain the importance, details about the procedure, as well as present examples of purpose and advantages in this field. Now universities offer this course titled as Enterprise Risk Management (ERM), such as the Columbia University, Boston University's Metropolitan and John's University. The broad new fields of risk management exits, the companies hire specialized expertise that helps the firm to manage the risk.

ERM has become a basic concern in today's global environment. Risk management is the process in which an association identifies threats in future and analyzes those threats to examine the alternatives of threats or reduces those threats. Nowadays, ERM has been associated as the most important key feature of successful organizations that allows the companies to observe all risks and form a plan. ERM has emerged as a construct that apparently overcomes limitations of silo-based traditional risk management (TRM).

If this study defines the ERM, it is defined like this: "ERM process is not only used to manage the risk, it's also used to identify asses and monitor the risk. So that the organization can establishes the strong internal control by these factors. Due to strong internal control, the risk management is coordinated well; as a result organization achieves its objectives in order to maximize the effect on firm's capital earnings by minimizing the risk."

Currently, ERM has received extraordinary international concentration by companies, especially, after the financial crunch that proved no business units, its assets or customer base are resistant toward risk. In reaction to this increasing expectation for risk management by the entire

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enterprise, organizations are dumping their established approaches to manage the risk by silo, where things were controlled in separation from one another by accepting an ERM approach (Hoyt & Lienberge, 2003). Hence, in many of the organizations, risk management has evolved into ERM, where the enterprise risk is managed collectively rather than separately. The organizational risk management exercise revolves around maintaining or even improving shareholders value, in an uncertain environment (Beasley et al., 2008).

The Pakistani industry has grown nationally and internationally. Due to new entrants of local and foreign industries, businesses and organizations face strong and tight scrutiny from the regulatory authorities, specially the security exchange commission of Pakistan (SECP) and State Bank of Pakistan (SBP). This change in the Pakistani industry is new and an increased implementation of information technology and improved business environment can be attributed to the liberalization of the firms. With the adoption of information technology and new systems of operation, the level of risk faced by these industries has reached a worrying level and there is a need of adopting company-wide ERM policies.

The aim of this paper is to see the effect of ERM on firm value. Additionally, this paper aims to find the outcome of ERM on firm value and the determinants of ERM engagement. This study focuses on the estimate determinants of ERM engagement and the effect of ERM on a firm value. The samples were based on companies that function in different industries and were listed in the Pakistan Stock Exchange (PSX) market. The impact of ERM on firm value in the Pakistan has been explained through this study. This research work used financial data of 100 non-financial firm's samples from 1999 to 2015 and, thus, up to 17 observation years per company. This study compiles the data to conduct the two regression types, a static logistic regression and a linear regression.

Most studies concluded that the performance of an ERM system has an important positive effect on organization value; however, evidence was also mixed. Previous researches empirically examined the ERM and give attention to one particular industries and geographic areas, see Hoyt and Libenberg in multiple years just focus on the insurance industry. Some researchers just worked on specific areas, like Hoyt and Libenberg in 2008, 2011 and Pagach and Warr in 2011 worked on US data, Yazid, Razali and Tahir in 2011 and Rashid and Golshan in 2012 worked on Malaysian data and Qiuying Li, Yue Wu, Udechukwu Ojiako, and Alasdai in 2014 worked on Chinese data. Philipp & Nadine in 2017 worked on German data.

However, previous research is limited because of the geographical area and industrial specification regarding the original dataset so that the empirical results are also generalization. Due to differences in regulation in different continents, consequences are appropriate for the United States (US) or European data and could not essentially be transferrable to Asian countries. It is obvious from the previous literature or studies that the concept of ERM has been covered, both locally and internationally. However, there has been no study conducted locally on the result of ERM practices on the firm value in Pakistan. It is on the basis of this gap that the present study will wish to establish the effect of the implementation of ERM and its result on the firm value of non-financial firm in Pakistan.

In 2011, Subhani and Osman worked on "The Essence of Enterprise Risk Management in Today's Business Enterprises in Developed and Developing Nations". They explained that, when corporations view risk, they are changed accordingly, as of a silo way to an enterprise wide approach, especially, in advanced nations. They also provided the evidence of scores of ERM for selected developed and developing nations. So there has not been any study conducted till date with focus on the Pakistani market sample of firms that operate in several industries, which allows identifying cross-industry difference regarding ERM implementations.

Thus, this paper fills research gap by the contribution for the future literature. So, this study empirically examines characteristics and value of ERM through data collection from the Pakistan Stock Exchange (PSX). This research used two analyses, first is logistic regression analyses, and second is linear regression analyses, for the research the elements of ERM, thus focusing on capital opacity, industrial diversification, industry, profitability, return on equity, financial leverage, firm size and slack. Second, by using Tobin's Q to find firm's value through a simple linear regression to study the value of ERM. The results for determinants of ERM provide insight.

Whether the question is that the ERM is able to create value with focus on the Pakistan stock Market? It's actually depends upon the respective industries and their regulatory bodies. Basically the strong regulation is influencing companies to implement an ERM system. Their regulatory framework in the country and also for international regulations is influencing to implement an ERM system. Actually the main finding for this research work is that Capital Opacity, industry, profitability, return on equity, firm size, financial leverage and dividend are more comforting to implement ERM systems. An also with previous work, this research find a statistically important relation among an ERM on firm value. On the basis of previous results, this research confirmed the value relevance of ERM, as it shows significant positive effect of ERM and firm value.

This research work will also generate a monograph which might be reflected in other sectors of the economy as well. Most significantly, this study will add to the literature on the corporate management and risk management topics. This study expect that the end result might be important to the academicians, if someone find useful research gaps that may arouse interest in further research in future. Recommendations will be made on possible areas of future studies. This study is further justified since it will be of value to those interested in setting up firms in the country since they will be able to understand what to do right to succeed and what if done wrong would bring the business down.

The remaining of the part of paper planned as like this. Chapter 2 related to the literature review of ERM and hypotheses development. Chapters 3 describe the data and methodology design. Chapter 4 presented the results and discussion related to the results. Chapter 5 conclusion related to the work and future recommendations.

Literature Review

Historically, Risks are of different kinds so different kinds of risk can separately managed by the organization. Risk is an event that cannot be eliminated by the definition and by nature. Even though risk and uncertainty are used as reciprocally but there is a difference between them. Whenever, one does not know about what will occur in the future then the uncertainty exits. Risk is uncertainty that has a potential of a loss. Conventionally when any one talked related to risk management, what approaches in mind was rather insurance, broker or auditor.

By following the Nocco and Stulz (2006) theory related to my research is risk-return theory. The broad feature on the firm's risk collection was planned to make value for organizations by enhancing their risk/return tradeoff. As a result, produces long term competitive advantages by those corporations which identify, manage and monitor risks individually. Some researcher argued in favor of ERM that ERM provided confidence for businesses to carry out new investment projects by reduces financial distress costs, expected tax payments, enhance managerial risk aversion and solve under investment problems. Improve confidence of investors and rating of the company and reduces the cost of capital, which shows that the organization has ability to service debt under possible conditions through ERM process and enhancing companies performance (Fraser & Simkins, 2007).

Concept was introduced by Gordon, Loeb and Tseng. According to them the board of directors monitors the relationship between ERM as well as company performance depends on industrial competition, firm size, environment uncertainty and firm complexity. This involve that companies should estimate the ERM execution on the basis of appropriate variables about the firm (Gordon, Loeb, & Tseng, 2009).

Pagach and Warr (2010) examined data from 1992 to 2004 about 138 firms that made adoption of ERM announcements of senior risk officer's appointments to bring changes in financial feature. The studies indicated that negligible confirmation in their sample of ERM adopters for several significant changes in different important firm variables.

McShane, Nair, and Elzotbek (2011) worked on dataset of insurer groups consists of 152 companies for the calculation of risk management activities on firm value. S&P released by an ERM rating through publicly traded insurers; therefore their concluding dataset consists of the 82 publicly traded insurers along with they make use of the 5 different collection of S&P and ERM insurance rating. Their result revealed a positive association among a growing level of risk management and firm value. Razali and Tahir (2011) discussed the explanation of ERM and its expansion over the years. On the other hand, the same year investigated the association among ERM and firm value. The data collected from of 528 Malaysian firms of 2007. Their study found that statically important relations among them, even more mature level of ERM was connected with enhance organization value.

On the other hand, Hoyt and Liebenberg in 2011 examine insurance firms for the 11-year period from 1995 to 2005, for association among the value of ERM of 275 insurance firms that operated during in these years. Their study found that extremely strong relation among firm value and ERM, with ERM growing the investor's value for united state insurance firms through about 16–20% in the same way. Golshan and Rasid (2012) worked in Malaysian data and they explain that a company's capital structure, international diversification and the sale volume are major drivers for ERM system.

Li et al. (2014) investigated the relationship between ERM and firm value. The data collected from of 119 China Insurance firms of 2007. From the whole population of insurers operating in China in 2010 the initial sample was collected. They concluded that firms value can enhance with an increasing mature level of ERM are associated. Their study also found that statically significant relationship among variables. In 2015, Farrell and Gallagher worked on cross-sectional study and they confirmed statistically important relations, telling that a growing level of ERM related with improved value of the firm. From some mixed verification empirical results they argued that a comprehensive strong ERM is able to add value for the firm therefore in general confirm that theoretical arguments.

In 2017, Lechner and Gatzert empirically determine the impact of an ERM on firm value plus also determined the effect of company characteristics on a company's result to implement ERM programs. The data was collected from German Stock Indies (Dax, Mdax, Sdax and Tecdax). The time was of five years from 2009 to 2013. The sample was composed of 160 companies. Their results about determinants of ERM showing that better firms as well as internationally operating companies were more probably to adopt ERM system and explain importance and supportive impact of ERM on shareholder value following controlling for other determinants of firm value.

Given some ERM be able to make value, the question about the determinants occurrence, which creates an implementation further conforming for companies. In this context, the majority articles observe an irrelevant relation between ERM and capital opacity (Pagch & Warr, 2010; Yazid, Raziland, & Tahir, 2011; Hoyt & Libenberg, 2011; Philipp and Nadine, 2017). Further finding was more significant positive relation of ERM and firm size (Pagch & Warr, 2011; Hoyt & Libenberg, 2011; Farrell & Gallagher, 2015; Philipp and Nadine, 2017) apart from Hoyt and Liebenberg (2003). Additionally, a significant negative relation of ERM and Financial leverage was observed in Hoyt and Libenberg (2011), Farrell and Gallagher (2015) and Lechner and Gatzert (2017), which was different from the finding of the Golshan and Rashid (2012) and Hoyt and Libenberg (2003). Moreover, focusing on Malaysian data, Razil, Yazid, and Tahir in 2011 further significant positive relation of ERM adoption with Profitability, a firm's capital structure and sales volume were major drivers for ERM systems.

Hypotheses Development

To seek the outcome of ERM on a firm's value first find Determinants of ERM engagement (see Philipp and Nadine, 2017) first this study mainly focused on estimation the determinants of ERM engagement with then the effect of ERM on a firm value. On the implementation of ERM system in firm through estimate the effect of the firm characteristics (determinants). So first follow Philipp and Nadine (2017) and Hoyt and Liebenberg (2003), make used of a logistic regression model based on multi-period sample, because logistic regression model normally used for binary decisions. The main plan of the study was to observe the effect of ERM on a firm's shareholder value. On the basis of previous empirical literature, this study hypothesize that Random Effect model was appropriate or Fixed Effect model was appropriate, when a firm has a positive impact by the implementation of an ERM system. Even though initiating and maintaining an ERM system may be highly cost-intensive (Hoyt & Liebenberg, 2011; Lin, Wen, & Yu, 2012; Philipp and Nadine, 2017).On the way to find the outcome of ERM on a firm's value first find the determinants of ERM engagement (Philipp and Nadine, 2017). So target of this study was to estimate the determinants of ERM engagement or after that the effect of ERM on a company's value. For determine the ERM engagement, the following variables are employed so the equation is for:

$$ERM_{it} = f(CAPOPT, DIVIND, IND, PROF, ROE, SIZE, FLEV, SLACK)_i$$

Capital Opacity: As suggested by Philipp and Nadine (2017) organizations were probably applying an ERM system by increasing capital opacity. In 2008 the financial crisis was on peak. Companies face the issue regarding

the liquidation of the assets at their fair market value, due to non-transparency of the assets. In addition, firms by increasing capital opacity were usually undervalued due to superior information asymmetry (Pagach & Warr, 2011). This study follow Philipp and Nadine (2017), Intangible assets by the BV of total assets is the ratio of Capital Opacity. Capital Opacity = Intangible assets / book value of total assets

H1: Companies with increasing capital opacity also comforting to apply an ERM system.

Diversification of Industry: Those companies broadly diversified which were engaged in more than one number of segment or business units (see Pagach & Warr, 2011; Golshan & Rasid, 2012). For the diversification status uses dummy variable, if companies working in two or more different sectors or businesses =1, if working in only one sector or businesses = 0 (See Hoyt & Libenberg, 2011; Philipp and Nadine, 2017).

H2: If companies working in two or more sector or businesses are more comforting to apply an ERM system.

Industry: Energy sector industry already was more comforting to implement an ERM system because higher degree of risk in energy sector and different regulatory requirements as compared to other sectors (see Golshan & Rasid, 2012). Follow Hoyt and Liebenberg (2011), Golshan and Rasid (2012) Philipp and Nadine (2017)

For the energy industry this study used dummy variable, firms operating in energy sector =1 or otherwise =0.

H3: If companies are working in other sector than energy sector are more comforting to apply an ERM system.

Profitability: In 2011 Micheal K Mcshane, Anil Nair and Elzotbek Rustambekov used Profitability as control variable by Return on Assets (ROA) in percentage for year. Razali, Yazid and Tahir in same year also determine ERM through profitability of the firms. Profitability can be measured through Return on Assets (ROA), formula used for ROA as: ROA =Net Income / Book value of total assets. As a result, this studies using:

PROF= ROA in percentage for Year.

H4: Companies with increasing profitability are more comforting to apply an ERM system.

Return on Equity: One of the previous studies suggested that the proxy for the firm value can be use the return of equity. (Li et al., 2014) **and** one of the same related determinant for ERM was also study. In the previous literature was the Return on Equity and measure through accounting return via using return on equity, ROE = Net Income / Book Equity (see Pagach & Warr, 2010).

ROE = Net Income / Book Equity.

H5: Companies with increasing Return on equity are more comforting to apply an ERM system.

Financial Leverage: In relation among capital structure and firm value, so to manage the relation between them. They used financial leverage as a variable. Formula was the book value of liabilities by the market value of equity was the ratio of financial leverage, but the results were unclear with significant negatively (Hoyt & Libenberg, 2008, 2011) as well as positive relations were also there (Golshan & Rasid, 2012). Due to excessive leverage causes more chances of liquidation or the firm's owners also to bear financial distress costs (Hoyt & Libenberg, 2011). Hence this study used

FLEV = Book value of Liabilities / Book value of Equity

H6: Companies with increasing financial leverage are more comforting to apply an ERM system.

Firm Size or Size: By follow Lechner and Gatzert added the principle of proportionality in their paper, with a growing firm size is connect with a rising number of risks, which are likely to effect in a higher probability of ERM implementation. There were positively relation among Size variable and performance for the reason that larger firms must be more capable of ERM (Hoyt & Liebenberg, 2008).This study follows pervious literature in applying the natural logarithm of book value of total.

So, Size = Natural logarithm of book value of total Assets.

H7: Companies with increasing firm size are more comforting to apply an ERM system.

SLACK: The chief risk officer appointments determinants model included as a measure of financial slack (Pagach & Warr, 2010), they also argue in paper that due to an importance of risk management on reducing the probability of financial distress may have ERM user's superior levels of financial slack. On the other hand, they also note that due to improvement in risk management, the ERM users may be able to reduce the level of financial slack. Cash or marketable securities by total assets are the ratio of Slack.

SLACK = Cash and Marketable Securities / Total Assets

H8: Companies with increasing slack are more comforting to apply an ERM system.

Data and Methodology

Sample Description

The plan of this work to examined the impact of ERM on firm value in Pakistan. Due to restrictions in receiving data, the study used panel data of 100 non-financial firms to be easily found in Pakistan. The sample includes non-financial firms from the year 1999 to 2015 and so up to seventeen observation years per company. The data was obtained from the Balance Sheet Analysis (BSA) and Financial Statement Analysis (FSA) published by The State Bank of Pakistan, DWH department. The nature of data was secondary. In Pakistan Stock Exchange (PSX) there are two types of firm's traded financial firms or non-financial firms, the non-financial firms listed at PSX which has been the largest stock exchange Pakistan as compared to financial firms. The samples of firms that selected were categorized non-financial firms. This database covers 100 non-financial companies on the bases of capitalization. I had to eliminate17 firms due to missing of the data, resulting in 83 remaining companies.

Determinants of ERM Engagement

So earlier said that first target of this study was to estimate the determinants of ERM engagement. After that effect of ERM on a company's value. For determine the ERM engagement, the following variables are employed for the equation:

Equation for Determinants of ERM Engagement

ERMit = f (CAPOPT, DIVIND, IND, PROF, ROE, SIZE, FLEV, SLACK)i

ERM Identification

The final sample was collected from 83 non-financial firms. The data collected through annual report from 1999 to 2015, where 53 firms' used ERM system. Normally companies do not reveal their correct level of risk managing activities of ERM (Gatzert & Martin, 2015). Study followed (Philipp and Nadine, 2017) for the ERM identifications, following keywords investigate through using the best set of phrase& their synonyms and acronyms 'The ERM, Chief Risk Officers (CFO), COSO II-Integrated Framework (Control Environment, Risk Assessment, Control Activities, Information and Communication and Monitoring), risk committee, holistic risk management and centralized risk management'. Since 25 companies does not disclose several proof of ERM, they still in the final dataset with full seventeen observation years, due to disclosure requirements of the publicly traded firms in Pakistan, so study do not have to eliminate any firm as a consequence of missing or erroneous data. Therefore provided 83 company year observations.

The Value of ERM

The main map of this paper is to inspect the effect of ERM on a firm's shareholder value. On the basis of previous empirical literature, this study hypothesize that the implementation of an ERM by the execution of an ERM system has a significant positive impact on firm value even though initiating and maintaining an ERM system may be highly cost-intensive (Hoyt & Liebenberg, 2011; Lin et al., 2012; Philipp and Nadine, 2017). This study used a linear regression. Based on a 17 years sample, several with 8 control variables and estimated the equation (Razali & Tahir, 2011; Philipp and Nadine, 2017).

$$Q_{it} = \beta 0 + \beta 1 ERM_i + \beta 2\ CAPOPT_{it} + \beta 3\ IND_{it} + \beta 4\ PROF_{it} + \beta 5\ ROE_{it} + \beta 6\ SIZE_{it} + \beta 7\ FLEV_{it} + \beta 8 DIV_{it} + \varepsilon_{it}$$

The DV for this equation was Tobin's Q. In 2017 Lechner and Gatzert separate the relationship among ERM and Tobin's Q they control for other firm variable. Follow Hoyt and Liebenberg (2008, 2011), Gallagher and Farrell (2015), Philipp and Nadine (2017) Tobin's Q used as an alternative for firm value. So the measurement or calculate of Tobin's Q is follow:

Q = (MVE + BVL)/ BVTA

ERM: The ERM was independent in this equation. This was dummy variable. The firm adopt ERM assumes a value of 1 and otherwise 0. So I follow Philipp and Nadine (2017) and Hoyt and Liebenberg (2003).

Capital Opacity: Capital Opacity is defined as the implication of opacity in financial markets for shareholder behavior, asset prices, and welfare (see Christopher Small, 2014).Organizations are probably to apply an ERM system

with increasing capital opacity. As suggested by Philipp and Nadine (2017) the variable of capital opacity (to manage for the collision of opaque assets on shareholder value). This study follows Philipp and Nadine (2017), intangible assets by the BV of total assets is the ratio of Capital Opacity.

Capital Opacity = Intangible assets / book value of total assets

Industry: Previous literatures recommend that companies from specific industries like banking, energy and insurance were more probably to implement an ERM structure than any others, reason for that of diverse authoritarian necessities and also because of a superior (diverse) quantity of risk consciousness within the particular industry as compared to other sectors (see Beasley et al., 2005; Golshan & Rasid, 2012). This study not consider financial sector so not considering the insurance and banking industry. Energy sector industry already was more comforting to implement an ERM system because higher degree of risk in energy sector and different regulatory requirements as compared to other sectors Golshan and Rasid (2012). Follow the Hoyt and Liebenberg (2011), Golshan and Rasid (2012) and Philipp and Nadine (2017). For the energy industry this study used dummy variable, firms operating in energy sector = 1 or otherwise = 0. According to previous argumentation, this study assume.

IND = Operating in energy sector = 1, otherwise = 0

Financial Leverage: In the relation between firm value and capital structure, so to control for the relation among them. They include a financial leverage variable. Formula, the book value of liabilities by the market value of equity was the ratio of financial leverage, but the results were unclear with significant negatively (Hoyt & Libenberg, 2008, 2011) as well as positive relations were also there (Golshan & Rasid, 2012). Due to excessive leverage causes more probability of bankruptcy and the firm's owners to bear financial distress costs (Hoyt & Libenberg, 2011). Hence study used:

FLEV = Book value of Liabilities / Market value of Equity

Profitability: In 2011 McShane, Nair and Rustambekov used Profitability as control variable by Return on Assets (ROA) in percentage for year. Razali, Yazid and Tahir in same year also determine relation between ERM and firm's value through profitability and Return on assets was used the measured profitability. ROA = Annual net income/book value of total assets. Therefore, this study used: PROF = ROA in percentage for Year.

Return on Equity: One of the previous studies suggested that the proxy for the firm value can be use the return of equity. (See Qiuving, Wu Yue, Ojiako Udechukwu, Marshall Alasdair, & Chipulu Maxwell, 2014) **and** one of the similar related determinant for ERM also study in the previous literature was the Return on Equity. Measure through accounting return via using return on equity: ROE = Net Income / Book Equity (see Don Pagach & Richard Warr, 2010). ROE = Net Income / Book Equity

Firm Size or Size: By follow Lechner and Gatzert added the principle of proportionality in their paper, with a growing firm size was connected with an increasing number of risks, which were likely to effect in a higher probability of ERM implementation. There were positively relation among Size variable and performance for the reason that larger firms must be more capable of ERM (Hoyt & Liebenberg, 2008). This study follows pervious literature in applying the natural logarithm of book value of total. Size = Natural Logarithm of book value of total Assets

Dividend: By follow Hoyt and Liebenberg (2011), this study consists in model a dividend payment indicator (Dividends). If a dividend paid in the current year by the company its equal to 1, if the company can't paid a dividend is equal to 0.The predictable sign is unclear. Further to the other level to dividends decrease its free cash flow that could be used for managerial privilege consumption, the payment of dividends is expected to positively affect firm value. 1=firms paid dividends, 0=otherwise.

DIV = 1=firms paid dividends, 0=otherwise

Model Specification

In Table 1 the discussion related to variables and their abbreviations which were used in the models. The column related to the dependent and independent of the variable. The Formula for the variables which were used to determines the final variable. The predicted sing were also included in the Table and final column related to the references the variables were used by these authors in their research work.

Table 1: Model Specification (Variable, Abbreviation, Formula, Predicted Sign and References of Variables in Regression Analysis)

SR. No	Variable	Dependent variable or Independent variable	Abr.	Formula	Predicted Sign	References
1	Tobin's Q	Dependent variable	Q	Market value of equity + Book value of liabilities/ Book value of assets	No one define	Hoyt and Liebenberg (2008, 2011), Rustambekov and MsShane Nair (2011), Razali and Tahir (2011), Gallagher and Farrell (2015), Philipp and Nadine (2017)
2	Enterprise Risk Management	Dependent variable or Independent variable	ERM	ERM=1 and Otherwise =0	+(Tobin's Q)	Hoyt and Liebenberg (2011), Pagach and Warr (2011), Golshan and Rasid (2012), Philipp and Nadine (2017)
3	Firm Size	Independent variable	FIRM-SIZE	Natural Log of Book value of TA.	+ (ERM) ± (Tobin's Q)	Hermanson , Beasley, and Clune (2005), Hoyt and Liebenberg (2008), Razali, Yazid, and Tahir (2011), Golshan and Rasid (2012), Philipp and Nadine (2017)
4	Financial Leverage	Independent variable	FLEV	Book value of Liabilities / Book value of Equity	+ (ERM) ± (Tobin's Q)	Hoyt and Liebenberg (2008, 2011), Gallagher and Farrell (2015), Philipp and Nadine (2017)
5	Industry.	Independent variable	IND	1 = Operating in other then energy sector , o = otherwise	+ (ERM)	Hoyt and Liebenberg (2011), Golshan and Rasid (2012), Philipp and Nadine (2017)
6	Industry Diversification	Independent variable	DivInd	Companies working in two or more sectors or businesses =1, working in only one sector or business=0.	+ (ERM) ± (Tobin's Q)	Hoyt and Liebenberg (2008, 2011), Gordon, Loeb, and Tseng (2009), Gallagher and Farrell (2015), Philipp and Nadine (2017)
7	Capital Opacity	Independent variable	CAPOPT	Intangible assets / book value of total assets	+ (ERM)	Hoyt and Liebenberg (2011), Warr, Pagach, and Beasley (2008), Pagach and Warr (2010, 2011), Golshan and Rasid (2012) and Philipp and Nadine (2017)
8	Dividends	Independent variable	DIV	1=firms paid dividends , 0=otherwise	± (Tobin's Q)	Hoyt and Liebenberg (2008, 2011), Gallagher and Farrell (2015), Philipp and Nadine (2017)
9	Profitability	Independent variable	PROF	ROA in percentage for 2008	+ERM	McShane et al. (2011)
10	Return of Equity	Independent variable	ROE	Net Income/Book Equity	-ERM	Pagach and Warr (2010), Li et al. (2014) (China)
11	Slack	Independent variable	SLACK	Cash and Marketable Securities / Total Assets	+ERM	Pagach and Warr (2010)

Results and Discussion

Binary Logistic Regression Model

First this study focused to conduct a binary logistic regression analysis because normally for the binary decisions, the logistic regression was used. In statistic results, logistic regression and Logit model were basically used as a regression model where the dependent variable was clear or definite (means categorical). A binary variable answer depend on one or more than one predictor or independent variables (features) which can be determine by using the binary logistic model. For the estimation impact of firm characteristic on firm's decisions even if they were implemented ERM or not. The results depend on the sample with firm data for year 1999 to 2015.

In this result the Descriptive statistic also contains standard deviations and values of mean were not included in the table but reported below the Table 2. ERM was the dependent variable where as other all were independent variables. The values of binary logistic regression model were reported in Table 2. There was positively semi strong relationship among dependent and independent variable.

Table 2: Results of Variables of Determinants

Variable	*Coefficient*	*Std. Error*	*z-Statistic*	*Prob.*
C	364.4754	62.81853	5.802037	0.0000
CAPOPT	14077.35	2798.438	5.030431	0.0000
DIVIND	1.084847	0.428359	2.532565	0.0113
IND	-0.137680	0.331038	-0.415903	0.6775
PROF	49486.49	9529.446	5.193008	0.0000
ROE	-26.52556	8.458282	3.136046	0.0017
FLEV	-21.29021	3.706652	-5.743784	0.0000
FIRMSIZE	5.229647	1.050582	4.977859	0.0000
SLACK	150.6305	32.31641	4.661113	0.0000
McFadden R^2 =0.5145				

Dependent variable was ERM and the method used was Binary Logit (Quadratic hill climbing). For the estimation of the goodness-of-fit of the Logit model, the McFadden R-squared was calculated and the R squared was 0.514560.

The result in Table 2 showing that capital opacity was found to be positive and significant to apply an ERM system. It suggested that the companies with increasing capital opacity are more comforting to apply an ERM system. Further, conflicting with my expectations, there was statically significant relation among capital opacity and ERM was in my results, which was not similar to previous literature. Might be the one possible reason was Pakistani stock market has not too big as compared with USA, Malaysia and Germany. And the investment behavior was different in these countries. But in Pakistan Investor was very conscious related to investment so an important outcome of the opacity was that, investors can (apparently) monitor the total return from a fund; they cannot see the composition of that return. So maybe that's the firms were very serious related to implementation of ERM. Thus H1 was accepted.

The coefficient for DIVIND (Dummy = 0) was positive but not significant to apply an ERM system. The basic reason for the diversification has to minimize unsystematic risk because each kind of investment usually involved some degree of risk. Companies mostly evolved with greater number and further complex risks, and also have to obey with various rules and regulations, so ERM can be very supportive for preventing against terror activities and strongly implementing an ERM system in the firm. However, in Pakistan context, it turns into interesting thing that the research finds that firms which expand its business in Pakistan were not significant. Result also show there was weak relationship among ERM and industrial diversification, which was not similar to past work. Probably one of the reason may be that economic situation in Pakistan was not strong and healthy due to political and terror activities in these years. According to the results for the Pakistan market, it suggested that companies working in two or more sectors or business lines were not comforting to apply an ERM system. Thus H2 was rejected.

The coefficient for IND was also (Dummy = 0) it's negative and highly insignificant. The reason behind that energy sector is more risky than any sector while other was not more risky, because of different regulatory requirement and different level of information regarding the risk contained by the relevant sector as compared to other sector. So the other sectors were not encouraging to apply an ERM. This finding was in not line with Golshan and Rasid (2012), although consists with the result in Philipp and Nadine (2017), Industry was associated with the Energy sector were more comforting to execute an

ERM system, which was similar to previous literature. So Firms were not comforting to apply an ERM system if they were working in other sector than energy sector. Thus H3 was rejected.

The Return on Assets (ROA) used as an alternative for profitability was positive and significant to apply an ERM system. It confirms there was positive association among profitability and an ERM system in Pakistan. Companies with an increasing profitability were more comforting to apply an ERM system. When firms have profit they increase their business and required tight scrutiny for business, and apply the ERM system to check everything. Matching the result with Razil, Yazid, and Tahir (2011). Thus H4 was accepted.

Unexpectedly, I find negative and statically do not significant relation of Return on Equity and apply an ERM system. It shows there was no relationship between return on Equity and firm ERM implementation in Pakistan. Dependable with the result with Li et al. (2014) that companies with increasing return on equity were not comforting to apply an ERM system. Thus H5 was not accepted.

The coefficient for LEV was negative and significant to apply an ERM system conforming to Hoyt and Liebenberg (2008, 2011) and as well as Philipp and Nadine (2017). The result shows a statically significant negative association between financial leverage and ERM implementation. So Companies with rising financial leverage were more comforting to apply an ERM system. Thus H6 was accepted.

The coefficient for SIZE was positive and significant to apply an ERM system. Previous research recommended that larger firms should increase firm value (see Hoyt and Lienbenberg research work in 2008).Was equal with Hoyt and Liebenberg (2011), Farell and Gallagher (2015) as well as Philipp and Nadine (2017), this research find companies with increasing firm size are more comforting to apply an ERM system also find statically important confirmation for the positive connection between firm size and the execution of an ERM system. Thus H7 is acceptable.

The result in Table 2 shows that SLACK was found to be positive and significant to apply an ERM system. Further, different with our expectations, this results show a statically significant relation among Slack and ERM, which was not similar to previous literature. The result was different from Pagch and Warr (2010). It suggested that the companies with increasing SLACK were more comforting to apply an ERM system. Thus H8 is accepted.

Table 3: Contrast Table of ERM Determinants for Pakistan Market Among Previous Studies for Other Countries

Hypothesis	Variable	Predicted Sign	Logistic Regression	Hoyt and Liebenberg (2011) (USA)	Pagch and Warr (2010) (USA)	Razil, Yazid and Tahir (2011) (Malaysia)	Li et al. (2014) (China)	*Farrell and Gallagher (2015) (international)*	*Lechnerand and Gatzert (2017) (Germany)*	*Nasir (2018) (Pakistan)*
H1	Capital Opacity	+	Non significance	Ns	Ns	Ns		Ns	Ns	Ns
H2	Div Industry	+	Non significance	Ns	Ns	Ns		Ns	Ns	Ns
H3	Industry	+	Non significance			Ns			+***	Ns
H4	Prof	+	+***			+***				+***
H5	Roe	-	-***		-***		-***			-***
H6	Financial Leverage	+	-***	-***	-***	Ns		Ns	-***	-***
H7	Firm Size	+	+***	+***	+***	Ns		+***	+***	+***

Hypothesis	Variable	Predicted Sign	Logistic Regression	Hoyt and Liebenberg (2011) (USA)	Pagch and Warr (2010) (USA)	Razil, Yazid and Tahir (2011) (Malaysia)	Li et al. (2014) (China)	*Farrell and Gallagher (2015) (international)*	*Lechnerand and Gatzert (2017) (Germany)*	*Nasir (2018) (Pakistan)*
H8	Slack	+	Non significance		Ns					+***

Variable Description; +*** above 90% than means statically significance confidence level, -*** above 90% than means statically insignificance and Ns means Non Significance.

The Value of ERM

The basic aim of this study was to measure the effect of ERM on firm's value. By follow Lechner and Gatzert (2017) applying Tobin's Q as an alternative (proxy) for company value by running a simple linear regression for the year 1999 to 2015. The results for this regression analysis were show in Table 4.

The result in shown Table 4 and empirical findings confirm this research hypothesis the value relevance of ERM, a statically significant positive result at the 90.28% confidence level. Further investigation for hypothesized, the ordinary least square regression analysis run to check the relationship among firm value and an ERM. Regression results reports in Table 4. The results show that there is no problem of multi co linearity because VIF not exceed than 10. (Beasley et al., 1980 stated that variance inflationary factor should not exceed than 10). Because this work values VIF ranging from 2.3452 to 2.466 so this is confirmed by the values. The F statistical probability was 0.0000 which represented that the model was good fitted. The value of adjusted R-square represented that 90.28%. And the adjusted R square is 88.84%.

The empirical findings were in Table 4. The confidence level was 90.38% showing a statistically significant positive and confirm hypotheses regarding the significance value of ERM. Companies with an ERM system showed if Q-value greater than 1 on average compared to Non ERM organization, consider the respective control factors. The goodness of fit was checked through comparable with past studies. The multi co linearity does not exist in this analysis as can be seen as of the correlation statistic likewise the variance inflation factor, which were far lower and above the critical values of 0.1 and 10. Durbin Watson used to detected the presence of autocorrelation (relationship among values separated from each other by a given time covers) in the residual in a regression analysis. The Durbin Watson Stat always among 0 and 4.

The Capital opacity and Industry were perfectly significant; therefore, it's verifying the assumption that profitability increases the firm's shareholder value. The statement of a positive relation among firm size and shareholder value through benefits of economics of scale and scope or lower costs of liquidation risks, an increasing firm size has a positive effect on Tobin's Q, the result conflict with the Philipp and Nadine (2017). The influence of financial leverage, is significant but with negative sign. Furthermore, this research confirmed that dividend payment reduce the shareholder value of firm so dividend has a negative effect on Tobin's Q. This research conducted simple linear regression to test the result mentioned in Table 4 very sensitive ways. The Control variables were added one by one to the explanatory variable ERM to make sure the robustness of the relation of Tobin's Q and ERM.DV was TOBIN'S Q and the method was used Panel Least Squares.

Table 4: Results of Variables

Variable	*Coefficient*	*Std. Error*	*t-statistics*	*Prob.*
C	-9.445273	1.840611	-5.131598	0.0000
ERM	0.042657	0.006974	6.116498	0.0000
CAPOPT	-373.5240	64.02578	-5.833962	0.0000
IND	0.134478	0.007782	17.28163	0.0000
PROF	-1308.713	284.7697	-4.595690	0.0000
ROE	1.427383	0.376956	3.786609	0.0002
FIRMSIZE	0.580282	0.103112	5.627686	0.0000
FLEV	-0.168790	0.005785	-29.17875	0.0000
DIV	0.000584	0.005551	0.105238	0.9162
R^2 = 0.9028	**Adjusted R^2**=0.8844	**VIF** = 2.345—2.46	**Prob (F-statistic)** = 0.0000	**Durbin Watson**= 2.0441

The R-squared is 0.902867.and the Adjusted R-squared is 0.88447. The VIF values ranging from 2.345 to 2.466 and Prob (F-statistic) is 0.0000.The Durbin Watson stat is 2.04415.

Conclusion and Future Recommendations

This study analytically examined the effect of company characteristics on firm decision to implement ERM programs. Further the effect of ERM on firm value for the Pakistan Stock Exchange (PSX) market, which basically represented one of the first studies used Panel dataset for an Asian countries and the first case for the Pakistan as well. This study basically used a logistic regression analysis with different time series and cross-sectional check out the drivers of ERM, and a simple linear regression was used to examine the effect of ERM on a firm value by using an alternative is Tobin's Q.

The result about the determinants of ERM confirmed that firms with large size were more comfortable to apply an ERM system. Hence, the rising amount, difficulty of risks and different national regulatory requirements may encourage larger firms to invest the essentially financial and human resources to apply a comprehensively ERM system. Study shows there was no relationship between return on Equity and firm ERM implementation in Pakistan. Furthermore, it shows that more leveraged firms were comfortable to apply an ERM system because leverage was use a tax shield in Pakistan, implying that companies with a comprehensively risk management system may increase the amount of debt capital. This study also finds that other sectors were also not comfortable to apply an ERM system. Contrary to our expectations, this research find a significant positive relationship between the Profitability and ERM implementation.

This study provided initial confirmation on the effect of ERM on firm value. One of the main challenges faced in this research was to identify companies that implemented the ERM system. Many firms don't clearly disclose data regarding ERM implementation. As companies usually do not reveal their correct level of risk management of ERM activities (Gatzert & Martin, 2015), I follow (Philipp and Nadine, 2017), a comprehensive keyword search, by using phrases and their synonyms and acronyms: The ERM, Chief Risk Officer, COSO II-Integrated Framework (Control Environment, Risk Assessment, Control Activities, Information and Communication and Monitoring), risk committee, holistic risk management and centralized risk management.

The association among firm value and ERM is positive and discovered in this research for emerging country Pakistan. The firms should adopt ERM system on the basis of these factors. This will provide help to Firms in managing their ERM system for better system. The study has been taking on only non-financial sector industries of Pakistan. The study needs to be tested on both financial and non-financial sector for better result. Secondly the sample selected was not enough because of the most of the companies not implementing an ERM system. Study can be further classified in two groups, (like 1st group be firms adopting ERM and 2nd group be firms which cannot adopt ERM). Furthermore, other variables can be used for ERM (like International Diversification and ROA) to check the firm's value.

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