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## **ABSTRACT**

Enterprise Risk Management (ERM) has become very critical for governance of enterprises due to rising uncertainties and failure of traditional risk management in recognizing interactions among risks. But ERM implementation across the globe remains immature, more so in India. This study examines determinants of ERM adoption for top 100 National Stock Exchange Indian companies. It further explores whether ERM adoption leads to increase in firm value. The findings suggest that firm size, leverage, profitability, and firm complexity influence the likelihood of ERM adoption. The results further reflect that firms which embrace ERM experience a positive effect on their firm value.

Key Words: Enterprise Risk Management (ERM), Determinants, Firm Value, NSE

## **I. INTRODUCTION**

The volume and complexities of risks affecting businesses are on continuous rise with globalization and dynamic changes in business environment<sup>1</sup>. The global financial crisis of 2008, the spate of corporate governance failures, and the ongoing euro zone volatilities are like wake-up calls for Enterprise Risk Management (ERM). Traditionally, risks have been managed in companies independently (in ‘silos’) by respective functional managers. But traditional risk management fails to recognize that different risks can overlap and cancel out with each other or can even concentrate together to hinder achievement of organizational goals. ERM overcomes the problem by taking a broad, top-down, holistic and strategic approach to managing risks with a ‘portfolio view’. It integrates risk management into decision making in all aspects of an organization, whether it be strategy formulation, reporting, compliance, or daily operations. It involves managing risks at all levels of the organization right from the enterprise level, through division level to the level of business units. Committee of Sponsoring Organizations of the

Treadway Commission (COSO) 2004's 'Enterprise Risk Management – Integrated Framework' defines ERM as

“...a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.”

As per Risk and Insurance Management Society (RIMS), 2009 if ERM was embraced in true spirit, it could have helped the companies which went under during the global financial crisis of 2008-09 identify and mitigate the losses they suffered. RIMS argued that ERM made a difference to Goldman Sachs which adjusted its mortgaged-backed-securities positions in 2006.

There is a growing amount of practitioners' interest in ERM but academic research has not kept pace. Rating agencies like Standards & Poor (S&P) have started incorporating strength of a company's ERM program into their credit rating calculations (S&P Ratings Direct, 2008). Regulatory authorities are tightening risk management norms<sup>2</sup> and are aligning them to COSO 2004's self-regulatory ERM [Sec 404 of Sarbanes-Oxley Act 2002's internal controls, SEC's endorsement of COSO framework, NYSE listing standards, SEBI's clause 49 in India<sup>3</sup> etc].

ERM adoption has been claimed to provide a long term competitive advantage by optimizing the trade-off between risks and returns (Nocco & Stulz, 2006) and thereby improving firm value. A few studies which have been undertaken to check whether firm value increases with ERM adoption have come up with mixed results (Beasley M , Pagach D et al. 2008, Shane et al 2011). Adoption of ERM requires significant amount of resource commitment and therefore needs to be justified. The value of ERM has remained completely unexamined in a fast growing, emerging economy like India.

In spite of its enormous potential to add value in the world of rising uncertainties, ERM adoption around the globe still seems immature (Beasley et al. 2010; COSO 2010). The most recent survey (Beasley et al. 2012 July) covering a four year span of 2009-2012 revealed a steady rise in percentage of organizations that have embraced ERM but it also indicated that only 2.8% of them had claimed presence of a 'robust' risk oversight. One of the surveys conducted on corporate governance<sup>4</sup> in India found that risk management is not considered 'very critical' by 70% of the respondents and 31% of the companies do not have board involvement in risk management.

With globalization, more and more Indian companies are expanding their operations into newer geographies and are getting themselves listed in foreign exchanges. These companies are now exposed to potentially newer and greater risks arising from different economic, political, cultural, and other global uncertainties. Indian companies these days are also enjoying funds from foreign investors and providing outsourcing services to foreign lands. This makes the foreign investors and foreign buyers of outsourcing services exposed to various risks<sup>5</sup>, which they need to be informed about. Such developments have made adoption of ERM very critical for the success and growth of the companies in India.

The Conference Board's (Hexter et al.)<sup>6</sup> assessment of ERM climate in India in 2008 revealed that ERM was at a very basic level and was driven by compliance rather than strategy. Risks were not managed holistically even in the financial institutions and the opportunity side of risks remained unexplored. Other than such surveys, ERM in India remains largely unexamined. So, this study intends to fill in the gap in the literature by examining ERM adoption in Indian companies and its effect of firm value. It would also be insightful to enquire why some companies in India embrace ERM while others do not. The regulators would find the insights

useful in devising means to encourage ERM in practice. Investors and managers would be able to appreciate the value proposition of ERM.

The rest of the paper is organized as follows. Section II contains a review of the literature followed by development of hypothesis in Section III and the data, methodology and variable definitions in section IV. Section V reports the results, section VI provides a discussion of the results and section VII concludes the paper.

## **II. LITERATURE REVIEW**

Literature related to this study can be divided into two streams – one which examines the value of ERM and the other which examines the determinants of ERM adoption.

The first stream of literature starts with the question whether risk management has any value. It has been argued that risk management is irrelevant for value creation if markets are perfect and complete, since individual investors would then be able to replicate the firm's risk management activities by adjusting their portfolio exposures without any costs or with minimal costs (Modigliani–Miller's irrelevance hypothesis 1959). If this argument holds, incurring costs for managing risks should reduce firm value. But in reality, markets are not perfect due to various factors like information asymmetry, taxes, underinvestment, costs of financial distress (Schroek, 2002) etc. In practice therefore, risk management can create value by minimizing costs associated with imperfect markets (Smith & Stulz, 1985). This argument has found empirical support with a number of studies finding use of derivatives for hedging risks to be associated with increase in firm value (Dionne & Garand 2003; Graham & Rogers 2002; Adam & Chitru 2006). This literature is focused on traditional risk management where risks such as credit risk, interest rate risks, foreign exchange risks, liquidity risks etc. are managed independently, in a

disaggregated manner. However, there are studies like Schrand & Unal (1998) and Sinkey & Carter (2000) which have found evidence in line with coordinated risk management.

ERM is about taking a ‘big picture’ view and managing multiple risks impacting different parts of a firm, in an integrated and coordinated manner (Meulbroek, 2002). Such coordination helps different parts of the organization align into a cohesive whole, which then function in concert towards achievement of organizational goal. ERM creates risk awareness which adds soundness to the managerial decision making. Natural hedging among different risks diversifies risks and can reduce the transaction costs associated with managing the risks individually. Such efficiency generated by ERM is value-creating. Managing risks individually might also mean ignoring risks which can inter-connect and concentrate to generate a risk exposure which is unexpectedly high, unbearable and can even be survival-threatening (e.g., UBS, Lehman Brothers during the 2008 crisis). ERM reduces the possibility of such exposures and provides better handle on survival threatening risks, thereby providing stability to earnings. Disclosure on ERM improves communication with the stakeholders about firm’s risk profile, particularly if the firm’s business is complex and has opaque assets. ERM implementation is a signal to the market that the company and its board are committed to sound risk management and that investors can be confident about their investment in the company. Improved communication can be expected to minimize regulatory scrutiny as well. ERM adoption can lead to reduced cost of capital if it leads to a better credit rating. With increase in competitive pressures and facilitation by IT developments, ERM has progressed from being a tool for defense against risks, to firm strategy for creating shareholder value through risk-adjusted resource allocation decisions. In view of all these value-enhancing arguments, this study hypothesizes: *Companies with ERM adoption will have higher value than those without.*

Beasley et al. (2008) based on examining the market reaction to announcement of CRO appointment during 1992-2003 found that for non-financial firms, the announcement period returns were positively associated with firm size and volatility of prior period reported earnings while negatively associated with leverage and liquidity. They found such associations to be weak for financial firms. Gordon et al. (2009) examined 112 US firms in 2005 based on their 10K and/or 10Q reports and found that five contingency factors affecting a firm namely environment uncertainty, industry competition, firm size, firm complexity and board of directors' monitoring can influence the relation between firm performance and ERM. Pagach & Warr (2010) fail to find evidence supporting the proposition that ERM is value creating. McShane et al. (2011) using S&P ratings for insurers found that strong or excellent ERM rating does not lead to higher firm value. However Pagach & Warr (2011) found that firms adopt ERM not just for regulatory compliance but also because they derive direct benefits from the same. Hoyt & Liebenberg (2011) examined 117 US listed insurers during 1998-2005 and found that insurers engaged in ERM were valued 20 percent higher than others after having controlled for other value determinants. There is hardly any study in Indian context<sup>7</sup>.

The other stream of literature relates to determinants of ERM adoption. Kleffner et al. (2003) based on a survey found that ERM adoption by Canadian companies was driven by influence of risk manager, encouragement from board of directors, compliance with stock exchange guidelines. Liebenberg & Hoyt (2003) found highly leveraged firms to be more inclined to appointments of CROs. Beasley et al. (2005) found that firm size, auditor type, industry, country of domicile and the leadership of board and senior management can explain the extent of ERM deployment. Desender (2007) examined 100 listed pharmaceutical firms and found that the firms with board independence and CEO separated from Chairman had the highest level of ERM.

Using announcement of CRO appointment as a proxy for ERM adoption during 1992 to 2005, Pagach & Warr (2011) found firms which are larger in size, have more volatile cash flows, riskier stock returns and have greater institutional ownership are more likely to adopt ERM. They also found that firms, where CEO had incentive to take risks and banks, which had lower Tier1 capital, were more inclined to adopt ERM. Pagach & Warr (2007) using the same proxy for ERM adoption had earlier found that firms adopted ERM when they had poorer stock performance, greater earnings volatility and more leverage. They also concluded that ERM adoption seemed like means to offset CEO risk taking incentives and to improve operating performance.

Most of the studies in the literature have focused on a particular industry like insurance industry, banks, or pharmaceutical firms. The literature has become dated with latest research by Pagach & Warr (2011) and Hoyt & Liebenberg (2011) both covering a period till 2005. The world of risks has undergone dramatic change with Global Financial Crisis (GFC) of 2008-09 and the ongoing euro-zone crisis. So, there is an urgent need for looking at the ERM relationships afresh for a wider variety of firms particularly in the context of a fast growing, globally integrating emerging economy.

### **III. HYPOTHESIS DEVELOPMENT**

As regards the enquiry into the company specific characteristics, this study hypothesizes the following factors to influence the likelihood of ERM adoption by a company: size, leverage, profitability, liquidity, opacity of assets, volatility of stock returns, extent of global customers, firm complexity and governance factors like board independence and institutional ownership.

**Size:** ERM implementation requires significant resource commitment. Larger companies which enjoy economies of scale in their operations and have greater access to resources are more

capable to engage in ERM adoption kind of fixed costs. As a company becomes large, the volume and complexity of the risks faced by it also increases. So, larger companies also have greater need for ERM adoption.

**Leverage:** Firms which have higher leverage have greater financial risks and cost of financial distress. Expected costs of financial distress vary directly with the probability of default as well as with the costs associated with bankruptcy. Smith and Stulz (1985) argued that hedging through reduction of variability of future firm value reduces the probability of default and hence lowers the probability of incurring bankruptcy costs. Based on the same argument, highly levered firms can be expected to be more likely to embrace ERM in order to reduce their costs of financial distress.

**Profitability:** A company which is profitable has earned resources which it can use for creating such assets, which are difficult for competitors to imitate (resource based theory). If investment in ERM is perceived as a means to create such competitive advantage, higher the profitability of a firm higher is its likelihood of embracing ERM.

**Liquidity:** A company which had higher amount of cash generated from its operations internally is likely to have greater slack available which it can use for funding ERM adoption. So, higher liquidity can facilitate a firm to adopt ERM.

**Asset characteristics:** Companies with assets that are predominantly characterized by opacity or intangibility would suffer from larger information asymmetry problem. Firms would find it difficult to recover its investment in such assets at the time of financial distress (Pagach & Warr 2011). So firms with greater opacity in assets can be expected to be more likely to realize the value in using ERM by communicating its risk management initiatives to outsiders and, thereby reducing information asymmetry.

Volatility of stock returns: A higher volatility in stock returns of a company might signal greater risks and uncertainties associated with its operating performance. So, a company with greater volatility in its returns can be hypothesized to have higher incentive to invest in ERM so as to minimize the risks which can hinder achievement of organizational goals.

Global customers: A higher 'export to sales' ratio would reflect the dependence of a company's performance on foreign sources. Higher such dependence, lesser is the control on factors affecting its flow of earnings. Therefore, a higher risks associated with higher percentage of exports can be expected to encourage a firm to embrace ERM.

Firm Complexity: Greater the number of subsidiaries or greater the number of business segments a company has higher is the firm complexity. Firms which are complex in nature typically face coordination and integration challenges and weaknesses of internal controls (Doyle Ge & McVay 2007). So, a higher level of firm complexity can drive companies to adopt ERM.

Corporate Governance factors like Board independence (Desender 2007) and Institutional ownership (Pagach & Warr 2011) can also have any impact on ERM adoption.

Board independence: The directors on the board of a company are representatives of the shareholders and have a key role to play in monitoring the risks and internal controls of a company (COSO 2004). Larger the number of independent directors on board, one can expect better monitoring and lower agency costs. In line with this argument, board independence has been empirically found to reduce earnings management (Peasnell, Pope, & Young, 2000).

Board is considered to be responsible for overall risk oversight of a firm (SOX 2002, Clause 49 of the SEBI's listing agreement, NYSE listing standards). The Conference Board, 2006's survey of US corporate boards revealed that increasing number of directors acknowledge risk oversight

as part of their strategy-setting role. Board needs to ensure that the risks taken by a firm towards increasing firm value remains within its risk-appetite. Board independence can be hypothesized to bring in greater risk governance and hence more likely to encourage adoption of ERM. This hypothesis is in line with Kleffner et al. (2003) who found encouragement from Board as the main factor driving ERM adoption for many Canadian companies.

**Institutional Ownership:** Institutional investors are believed to play an important role in monitoring management of a firm perhaps because they satisfy the criteria prescribed by Coffee (1991) namely ability to hold large stakes, inclination to hold the stakes over longer term over which improved monitoring can be expected to pay off, and absence of any substantial conflict of interest. Institutional investors are believed to be better informed, more active and influential than other investors due to their lower average costs in acquisition and processing of information resulting from the economies of scale they enjoy. So, the study hypothesizes that higher the extent of shares held by institutional investors, better the monitoring, and hence greater is the probability of a firm adopting ERM.

Regarding the effect of ERM on firm value, as discussed before the study hypothesizes:  
***Companies with ERM adoption will have higher value than those without.***

In order to find out the effect of ERM on firm value, it is important to control for the effect of all other factors which can influence the firm value. Based on the existing literature (Allayannis & Weston 2001), this study expects size, leverage, profitability, liquidity, growth, systematic risks to influence firm value and therefore controls for them. Firm value can be expected to increase with higher profitability, growth, and cash generating ability. Large size provides a firm with greater economies of scale and market power but these benefits can be overpowered by the difficulty of controls and higher bureaucracy. Systematic risks are non-diversifiable and therefore a

higher amount of such risks can have a negative impact on firm value. If the cost of debt is not very high, a higher leverage can bring in higher returns. A higher leverage can also increase firm value by reducing agency costs through imposing greater discipline on use of cash (Jensen, 1986).

#### **IV. METHODOLOGY, SAMPLE AND VARIABLES**

The sample for this study comprises of top 100 National Stock Exchange (NSE) companies by market capitalization as on 31<sup>st</sup> March 2012. Since ERM adoption is at a very basic stage in India, large and publicly listed companies are expected to provide a rich sample of ERM adoption story due to their higher visibility and greater involvement of public interest.

**Research Methodology:** One of the biggest challenges of ERM research is to identify companies which have adopted ERM. Since adoption of ERM is not mandatory, companies might not make explicit disclosures on whether they have adopted ERM. One of the ways to handle the challenge is to conduct surveys (Kleffner et al. 2003; Beasley et al. 2010; COSO's 2010 Report on ERM by Beasley et al. 2010; Deloitte & Touche LLP commissioned by COSO, 2012). Some studies have made use of a signal for ERM adoption like appointment of chief risk officer (CRO) (Liebenberg & Hoyt 2003; Pagach and Warr 2007). A few studies have made use of content analysis of annual reports to identify companies which have embraced ERM. McShane et al. (2011) adopted a very objective measure namely S&P ERM ratings for insurers. Such ratings are not yet available for companies in India.

A company which has implemented ERM has all the reasons to disclose the same in its annual report because the same improves the communication with stakeholders. So, this study examines the annual reports of the companies to look for key words like 'enterprise risk management', managing risks in a 'holistic'/ 'comprehensive'/ 'integrated' way or at 'corporate level', 'risk management committee' (of the Board), 'risk management framework', existence of a dedicated

‘chief risk officer’ (CRO). These contexts are then manually analyzed to judge whether the firm has ERM in place. Based on such analysis ERM dummy variable is created such that ERM dummy = 1 if the firm has ERM in place, 0 otherwise. The determinants of ERM adoption is estimated using a probit specification of the following form:

$$D_i^* = w_i\theta + u_i \quad \text{Where } D_i = \begin{cases} 1 & \text{if } D_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

The decision to adopt ERM is modeled as the outcome of an unobserved latent variable  $D_i^*$ . ERM adoption is observed, i.e. the ERM dummy  $D_i$  equals 1 when this latent variable surpasses some critical value.  $D_i^*$  in turn is assumed to depend on a vector  $w_i$  – the determinants of the firm’s probability of adopting ERM.

The next question the study examines relates to impact of ERM on firm value. Different variables have been used in the literature to capture firm value. Gordon et al. (2009) used one year excess stock market returns at the end of the year while Beasley (2008) used market reaction to announcements of CRO. Market reaction/returns measures have a very short term focus. Firm value can be measured using accounting firm performance variables like Return on equity (ROE) or profit after tax (PAT) but accounting variables are considered to be inadequate because it captures past and immediate short run performance and can be biased by managerial accounting choice. Market based measures capture the long run performance because it reflects the consensus of the market about company’s past financial performance and future earnings prospects. It is less likely to be influenced by differences in accounting procedures. So, this study uses market based measure namely Tobin’s Q to capture firm value. Tobin’s Q has been a popular measure of firm value in the accounting literature (Allayannis & Weston 2001; Smithson & Simkins 2005; Hoyt & Liebenberg 2011). Tobin’s Q is defined as the ratio of market value of

the firm to replacement cost of its assets. It is calculated using the following formula:

$$\text{Tobin's } Q = \frac{\text{Total Assets} + \text{Market Capitalization} - \text{Net Worth}}{\text{Total Assets}}$$

Tobin's Q is modeled as a linear function of the ERM dummy as well as other determinants of firm value.

$$Y_i = \gamma_0 + \gamma'X_i + \delta D_i + \varepsilon_i \quad (2)$$

where  $Y_i$  is the measure of firm value – Tobin's Q,  $X_i$  is a vector of determinants of firm value,  $D_i$  is the ERM dummy, and  $\varepsilon_i$  is the error term.

Endogeneity: A problem frequently encountered in estimating Equation (2) is the potential endogenous nature of the ERM dummy causing the ordinary least squares (OLS) estimates of Equation (2) to be biased. Such endogeneity might arise due to unobserved factors that influence both the Tobin's Q and the firm's decision to adopt ERM resulting in the ERM dummy to be correlated with the error term. To correct for endogeneity, a two-step treatment effects approach (Maddala 1987) has been used that jointly estimates the firm's decision to adopt ERM and the effect of the decision on the firm's Tobin's Q. In the first step, a 'selection model' is estimated using probit (Equation 1) that determines the likelihood of a firm adopting ERM. The residuals from the probit model capture all unobserved determinants of ERM adoption and are used to construct a hazard lambda variable. In the second-step, the hazard lambda is included as an additional regressor in Equation (2). The two-step treatment effects estimation is valid only if the estimated coefficient of hazard lambda in the second-step is significant.

Table 1 defines and lists the independent/control variables.

**Table 1: Definition of Independent/Control Variables**

| <b>Variable</b>             | <b>Mnemonics</b>   | <b>Variable Description</b>                                                                        |
|-----------------------------|--------------------|----------------------------------------------------------------------------------------------------|
| Size                        | ln_ta              | Natural logarithm of Total Assets <sup>8</sup>                                                     |
| Financial Risks             | leverage           | Total Assets / Net Worth                                                                           |
| Profitability               | roa                | Return on Assets                                                                                   |
| Liquidity                   | cfo_ta             | Net cash flow from operating activities/ Total Assets <sup>9</sup>                                 |
| Asset characteristics       | opacity            | Intangible assets/tangible assets                                                                  |
| Volatility of stock returns | Std_ann_ret_5      | Standard deviation of annual stock returns over a five year preceding the current year             |
| Global customers            | exports_sales_perc | Export / Sales (%)                                                                                 |
| Firm Complexity             | No_subsidary       | Number of subsidiaries                                                                             |
| Board independence          | perc_indep_dir     | Percentage of independent directors over the total number of directors on the Board of the company |
| Institutional holding       | institn            | Percentage shares held by institutional investors                                                  |
| Growth of the company       | growth_ta          | Growth of Total assets over last year (%)                                                          |
| Systematic risk             | Beta               | Obtained directly from CMIE Prowess database                                                       |
| Growth                      | Growth_ta          | Growth in total assets over previous year                                                          |

## V. RESULTS

Table 2 provides descriptive statistics for the sample variables. The average of erm\_dummy is 0.5 reflecting an encouraging scenario that 50 percent of the top 100 listed companies in India have ERM in place. Table 3 reports pair-wise correlations among the independent variables. Since the magnitudes of the correlation coefficients were not found to be large at 1%, 5% or 10% levels of significance, multi-collinearity is unlikely be a problem in our estimations.

**Table 2: Summary Statistics**

| Variable           | Count | Mean | SD   | Min   | Q1   | Q2   | Q3   | Max   |
|--------------------|-------|------|------|-------|------|------|------|-------|
| erm_dummy          | 100   | 0.5  | 0.5  | 0     | 0    | 1    | 1    | 1     |
| tobins_Q           | 100   | 2.7  | 2.2  | 0.7   | 1.1  | 1.9  | 3.3  | 11    |
| ln_ta              | 100   | 10.2 | 1.5  | 7.3   | 9.2  | 10.3 | 11.1 | 14.1  |
| leverage           | 100   | 4.2  | 4.8  | 1     | 1.6  | 2.2  | 3.7  | 20.3  |
| roa                | 100   | 9.2  | 9    | -20.2 | 2.4  | 6.9  | 13.9 | 36.2  |
| beta               | 96    | 1    | 0.4  | 0.3   | 0.7  | 0.9  | 1.3  | 1.8   |
| cfo_ta             | 100   | 6.7  | 9    | -19.9 | 1.2  | 6.5  | 12.5 | 32.2  |
| growth_ta          | 100   | 16.1 | 10.9 | -7.8  | 9.5  | 14.7 | 22.8 | 55    |
| opacity            | 100   | 0.01 | 0.05 | 0     | 0    | 0    | 0    | 0.26  |
| std_ann_ret_5      | 99    | 2.5  | 1.1  | 0.1   | 1.7  | 2.4  | 3.2  | 6.3   |
| exports_sales_perc | 100   | 17.2 | 28.9 | 0     | 0    | 3.1  | 18.2 | 106.4 |
| no_subsiary        | 100   | 4.9  | 5.9  | 0     | 1    | 2    | 7    | 36    |
| perc_indep_dir     | 100   | 0.4  | 0.2  | 0     | 0.4  | 0.5  | 0.5  | 0.8   |
| institn            | 100   | 27.6 | 16   | 0     | 16.5 | 26.1 | 37.8 | 85.9  |

**Table 3 : Correlation Matrix**

| Variables          | ln_ta    | leverage | roa      | beta     | cfo_ta  | growth_ta | opacity | std_ann_ret_5 | exports_sales_perc | no_subsiary | perc_indep_dir |
|--------------------|----------|----------|----------|----------|---------|-----------|---------|---------------|--------------------|-------------|----------------|
| ln_ta              | 1        |          |          |          |         |           |         |               |                    |             |                |
| leverage           | 0.63***  | 1        |          |          |         |           |         |               |                    |             |                |
| roa                | -0.54*** | -0.46*** | 1        |          |         |           |         |               |                    |             |                |
| beta               | 0.39***  | 0.23**   | -0.51*** | 1        |         |           |         |               |                    |             |                |
| cfo_ta             | -0.52*** | -0.41*** | 0.70***  | -0.45*** | 1       |           |         |               |                    |             |                |
| growth_ta          | 0        | 0.11     | 0.07     | -0.03    | -0.07   | 1         |         |               |                    |             |                |
| opacity            | -0.05    | -0.14    | 0.05     | -0.11    | 0.20*   | -0.09     | 1       |               |                    |             |                |
| std_ann_ret_5      | 0.30***  | 0.14     | -0.23**  | 0.46***  | -0.25** | 0         | -0.06   | 1             |                    |             |                |
| exports_sales_perc | -0.09    | -0.16    | 0.13     | -0.21**  | -0.05   | 0.09      | -0.07   | 0.05          | 1                  |             |                |
| no_subsiary        | 0.22**   | -0.04    | -0.19*   | 0.28***  | -0.24** | 0.06      | -0.07   | 0.21**        | -0.06              | 1           |                |
| perc_indep_dir     | -0.27*** | -0.54*** | 0.11     | -0.04    | 0.24**  | 0.01      | 0.16    | 0             | 0.16               | -0.06       | 1              |
| institn            | 0.21**   | 0.25**   | -0.1     | -0.02    | -0.19*  | 0.08      | -0.03   | 0.13          | 0.08               | 0.31***     | -0.08          |

Table 4 summarizes the treatment effect estimates in two panels. The third column of Panel B shows the results of probit specification related to the determinants of ERM. Size, leverage, profitability and firm complexity (captured through number of subsidiaries) are the company specific characteristics which affect the likelihood that a company embraces ERM and all of these factors have a positive influence on ERM adoption.

**Table 4: Treatment Effect Results**

| Variables                                          | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  |
|----------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Panel A: Second Step: Tobin's Q Estimations</b> |                      |                      |                      |                      |                      |
| ln_ta                                              | -1.668***<br>(0.234) | -1.058***<br>(0.213) | -1.089***<br>(0.219) | -1.109***<br>(0.226) | -1.104***<br>(0.224) |
| leverage                                           | 0.053<br>(0.055)     | 0.100**<br>(0.039)   | 0.105***<br>(0.041)  | 0.105**<br>(0.041)   | 0.104**<br>(0.041)   |
| roa                                                |                      | 0.106***<br>(0.025)  | 0.107***<br>(0.028)  | 0.108***<br>(0.028)  | 0.106***<br>(0.029)  |
| beta                                               |                      | -0.794*<br>(0.425)   | -0.801*<br>(0.426)   | -0.678*<br>(0.387)   | -0.799*<br>(0.422)   |
| cfo_ta                                             |                      |                      | 0.000<br>(0.023)     | 0.001<br>(0.023)     | 0.000<br>(0.023)     |
| growth_ta                                          |                      |                      | -0.015<br>(0.011)    | -0.015<br>(0.011)    | -0.015<br>(0.011)    |
| erm_dummy                                          | 3.538***<br>(1.070)  | 1.790*<br>(0.960)    | 1.951**<br>(0.987)   | 2.033**<br>(1.014)   | 2.034**<br>(1.008)   |
| Constant                                           | 17.659***<br>(1.995) | 11.912***<br>(2.035) | 12.348***<br>(2.122) | 12.388***<br>(2.132) | 12.474***<br>(2.156) |
| <b>Panel B: First Step: Probit Estimations</b>     |                      |                      |                      |                      |                      |
| ln_ta                                              | 0.463***<br>(0.156)  | 0.485***<br>(0.158)  | 0.485***<br>(0.158)  | 0.501***<br>(0.153)  | 0.487***<br>(0.156)  |
| leverage                                           | 0.113*<br>(0.068)    | 0.117*<br>(0.071)    | 0.117*<br>(0.071)    | 0.120*<br>(0.068)    | 0.119*<br>(0.070)    |
| roa                                                | 0.058**<br>(0.029)   | 0.056*<br>(0.029)    | 0.056*<br>(0.029)    | 0.051*<br>(0.027)    | 0.054*<br>(0.028)    |
| cfo_ta                                             | 0.004<br>(0.028)     | 0.005<br>(0.028)     | 0.005<br>(0.028)     | 0.008<br>(0.026)     | 0.009<br>(0.026)     |
| opacity                                            | 0.883<br>(2.740)     | 0.447<br>(2.780)     | 0.447<br>(2.780)     |                      |                      |
| std_ann_ret_5                                      | 0.203<br>(0.138)     | 0.143<br>(0.145)     | 0.143<br>(0.145)     |                      | 0.140<br>(0.144)     |
| exports_sales_perc                                 | -0.001<br>(0.005)    | -0.002<br>(0.005)    | -0.002<br>(0.005)    |                      |                      |
| no_subsidary                                       | 0.087**<br>(0.039)   | 0.088**<br>(0.039)   | 0.088**<br>(0.039)   | 0.097**<br>(0.039)   | 0.090**<br>(0.039)   |
| perc_indep_dir                                     | -0.642<br>(1.063)    | -0.540<br>(1.064)    | -0.540<br>(1.064)    | -0.531<br>(1.027)    | -0.614<br>(1.043)    |
| institin                                           | -0.004<br>(0.012)    | -0.008<br>(0.012)    | -0.008<br>(0.012)    | -0.009<br>(0.012)    | -0.008<br>(0.012)    |
| Constant                                           | -6.147***<br>(1.689) | -6.091***<br>(1.682) | -6.091***<br>(1.682) | -5.935***<br>(1.632) | -6.117***<br>(1.673) |
| hazard lambda                                      | -2.073***<br>(0.651) | -1.123*<br>(0.595)   | -1.221**<br>(0.609)  | -1.259**<br>(0.619)  | -1.273**<br>(0.620)  |
| Observations                                       | 99                   | 96                   | 96                   | 96                   | 96                   |
| Wald Chi2                                          | 79.16                | 188.95               | 183.47               | 181.28               | 179.16               |
| Prob>Chi2                                          | 0.00                 | 0.00                 | 0.00                 | 0.00                 | 0.00                 |

Standard errors in parentheses; \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 4 summarizes the results of treatment effect estimates in two panels - Panel A and Panel B. The first step probit estimates are reported in Panel B and the estimates of the Tobin's Q are reported in Panel A. Alternative specifications are estimated to study the robustness of the results to the choice of independent variables. Columns (1), (2) and (3) report alternative specifications of Tobin's Q holding the probit specification constant while columns (4) and (5) report the results for alternative probit specifications. Results of probit specification indicate that size, leverage, profitability and firm complexity (captured through number of subsidiaries) are the company specific characteristics which affect the likelihood that a company embraces ERM and all of these factors have a positive influence on ERM adoption. Coefficients on all other variables were found to be insignificant.

The self selection parameter, hazard lambda, is found to be significant in all the specifications. This implies that one can reject the hypothesis that the errors of the first step selection equation and that of the second stage regression equation are uncorrelated, and that the endogeneity exists. This indicates that the second step results of the treatment effect model are valid. As hypothesized, one can see that leverage and profitability have a positive effect while size and systematic risk have a negative influence on firm value, captured through Tobin's Q. Most importantly, the coefficient of the variable of interest, the ERM dummy is positive and significant across all specifications. A large in magnitude on the ERM dummy suggests that the premium for ERM adoption is quite high.

## **VI. DISCUSSION**

The results of the study suggest that firms which are larger in size, and therefore have greater access to resources and greater risks to manage, are more likely to adopt ERM. This is in line with the findings of Beasley et al (2005) and Pagach and Warr (2011). Consistent with

Liebenberg and Hoyt (2003) and Pagach and Warr (2011), the study found highly levered firms to be more likely to adopt ERM. These firms are probably motivated to use ERM to reduce their costs of financial distress. This study also suggests that the companies with higher profitability are investing the resources they have earned, into ERM adoption towards creating a competitive advantage. This is supportive of the resource based theory of business. The probability that a company will have embraced ERM is also influenced by how complex its business has become, reflected in the number of subsidiaries it has. Liquidity, opacity of assets, volatility of stock returns, and dependence on global markets do not seem to influence the likelihood of a firm to embrace ERM. Interestingly, the corporate governance factors like independence of the board or institutional ownership also seem to have no impact on ERM adoption for Indian companies.

As far as the firm value is concerned, the signs of the control variables like leverage, profitability and beta are consistent with the expectations. Size shows a negative impact on firm value possibly due to difficulty of control and greater bureaucracy inherent in larger firms. Overall, ERM adoption is definitely found to lead to improvement in firm value.

## **VII. CONCLUSION AND FUTURE RESEARCH DIRECTION**

This study contributes to the literature on determinants and value implications of adopting enterprise risk management in a world which has become lot more risky with the global financial crisis (GFC) of 2008-09, the subsequent recession and the ongoing euro-zone crisis, combined with the failure of traditional risk management to recognize the interactions among the myriad of risks. This is one of the first academic studies to examine ERM in the context of an emerging economy which is growing very fast and is getting integrated globally. It broadens the nature of the sample from insurers and banks which are typically examined for ERM. The study is one of the few which takes care of potential endogeneity bias in examining the impact of ERM adoption

on firm value. The results suggest that firms which adopt ERM do improve on their value after having controlled the influence of factors like size, leverage profitability, systematic risk and the endogeneity bias. The study reveals that in India it is the size, leverage, profitability and firm complexity which are the main drivers of ERM adoption by companies. The study also suggests the need for higher board involvement in risk oversight and need for improvement in the monitoring role of institutional investors for the companies in India.

It is expected that the results of the study would be insightful to the regulators who need to take care of shareholder interests, to board members who need to provide risk oversight, to senior executives who need to handle risks, as well as to the investors, employees and other stakeholders interested in risk profile of the company.

However the study is limited to the extent the annual reports reflect the true state of affairs of the company's risk management practice. The dichotomous ERM variable also fails to capture the varying level of ERM implementation across companies. Future research could broaden the source of information including company level surveys and focus on developing an index to capture the level of ERM implementation in companies.

## **ENDNOTES**

<sup>1</sup> Say technology advancements, changes in regulations, shortening of product life cycles etc.

<sup>2</sup> Other risk norms which are being tightened include Risk-based capital adequacy norms for banks (BASEL) and SOLVENCY norms for insurers.

<sup>3</sup> SEBI's KMB recommendations issued in 2000 required the 'audit committee' to review among other things the risk management policies of a company. Senior management was required to discuss 'risks and concerns' of business in the Management Development and Analysis (MD&A) section of the Annual report. Narayana Murthy Committee recommendations issued in 2003 required the management of a company to place before the Board every quarter, a report documenting the business risks faced by the company, the measures to address and minimize such risks and the limitations to the risk taking capacity of the company. This was more holistic than before and in line with ERM philosophy. Clause 49 of SEBI's listing agreement effective

from December 2005 further required the management to put in place procedures to inform the Board about the risk assessment and minimization initiatives. These procedures were required to be reviewed periodically to ensure that executive management controls risk through means of a properly defined framework. So, the risk management regulations in India have become aligned to ERM philosophy.

<sup>4</sup> <http://www.financialexpress.com/news/survey-poor-governance-in-indian-cos/942023/0>

<sup>5</sup> Like risks arising from rigid labour laws in India, fraud etc.

<sup>6</sup> It documented four case studies on India-based MNCs namely Tata Motors, Dr. Reddy's, ICICI bank and Tata Chemicals.

<sup>7</sup> There is one study by Dash and Chopra who have identified major risks faced by 14 Indian IT companies by looking at their Annual Reports of 2007-08. They have analyzed whether these risks can be explained by geographical concentration, industry concentration and service concentration.

<sup>8</sup> Size has been captured in the literature through total assets, total sales or number of employees. We do not use total sales because a significant part of our sample consists of financial institutions. In the current era of mechanization, the number of employees might not be able to capture the size of a company correctly. So, we preferred use of natural log of total assets as a measure of firm size.

<sup>9</sup> We have not used measures like quick ratio or current ratio because they are static measures. Since cfo relates to a period, it is a dynamic and hence more meaningful measure to capture ability of the company to meet short term cash needs.

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