The Valuation Implications of Enterprise Risk Management Maturity

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Abstract

Enterprise Risk Management (ERM) is the discipline by which enterprises monitor, analyze and control risks from across the enterprise, with the goal of identifying underlying correlations and thus optimizing the risk taking behavior in a portfolio context. This study analyses the valuation implications of ERM Maturity. We use data from the industry leading Risk and Insurance Management Society Risk Maturity Model over the period from 2006 to 2011 which scores firms on a 5 point maturity scale. Our results suggest that firms that have reached mature levels of ERM are exhibiting a higher firm value, as measured by Tobin's Q. We find a statistically significant positive relation to the magnitude of 2~~3~~ percent. Upon decomposition of the maturity score we find that the most important aspects of ERM from a valuation perspective relate to the level of top down executive engagement and the resultant cascade of ERM culture throughout the firm. Firms that have successfully integrated the ERM process into both their strategic activities and everyday practices display superior ability in uncovering risk dependencies and correlations across the entire enterprise and as a consequence enhanced value when undertaking the ERM maturity journey ceteris paribus.

1. Introduction

Whilst the tools of portfolio theory are ubiquitous in the practice of finance, the same cannot be said of risk management practice at the enterprise level. Over the past decade, attention has turned to this very issue. Enterprises are subject to risks in many forms and the ultimate goal of Enterprise Risk Management (ERM) is to model, measure, analyze and respond to these risks in a holistic manner, treating each risk exposure not in isolation, but rather in a portfolio context (Gordon et al, 2009). It is now widely recognized that for a firm to control its risk taking it is necessary to set risk budgets amongst the various firm divisions and thus aggregate all the types of risk it is exposed to into one consistent framework (Lleo, 2010). The portfolio based approach to risk management helps reduce inefficiencies caused by a lack of co-ordination between different risk management departments as well as exploiting natural hedges that may occur across the enterprise. As a consequence, ERM programs can lead to significant enterprise cost savings through avoidance of duplication of risk management expenditure (Hoyt and Liebenberg, 2011). Implementation of a comprehensive risk management framework such as an ERM program will be subject to material costs,[1] in terms of both monetary expenditure and opportunity sacrifice, which must therefore be weighed against the benefits of the program to the firm, to ensure the undertaking of ERM is a value additive economically justified activity.

The Casualty Actuarial Society (2003) highlights the ultimate value increasing goal of ERM by defining ERM as *"the discipline by which an organization in any industry assesses, controls, exploits, finances and monitors risks from all sources for the purpose of increasing the organization's short and long-term value to its stakeholders"*. If ERM maturity improves risk-return optimization at the enterprise level in a cost effective manner, it is reasonable to conjecture that it should indeed be value additive. The purpose of our study is to address this very question. We seek to ascertain whether firms with more mature ERM programs, experience enhanced value. Moreover, we examine which aspects and attributes of ERM enhancement are most value additive. Analysis of the relative importance of ERM facets is particularly important given that the concept is nascent and generally found to be broadly defined.[2] Heterogeneity in the valuation implications across ERM attributes provides important information for firm risk management as the discipline itself evolves and matures.

[1]A key finding from the 1776 participants of The Professional Risk Managers' International Association (PRMIA)'s 2008 "ERM: A Status Check on Global Best Practices" survey found that 51% of respondents said that their firm spends under 2% of its operational costs on its ERM program on an ongoing basis, with 27% in the 2–5% range and 22% choosing 5–7%.

[2]Some of the more popular definitions put forward for ERM include those from The Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2004), The Casualty Actuarial Society (2003), The Institute of Internal Auditors (IIA) (2004) and The Risk and Insurance Management Society (RIMS).

This study contributes to the emerging field of research on ERM by analyzing the valuation implications of ERM using a detailed ERM maturity assessment score, obtained from the widely utilized Risk and Insurance Management Society Risk Maturity Model (RIMS RMM).[3] The RIMS RMM ranks the overall ERM maturity of enterprises from many sectors. Our study utilizes these composite scores and we have been able to decompose the overall scores to observe the relative maturity of important attributes that drive overall ERM maturity (hitherto described in section 3).

Current research on ERM firm value implications is relatively limited. This is not surprising given that the formalized discipline of ERM has only been in existence for just over a decade. Furthermore, as a result of a lack of ERM disclosure requirements, research to date has been limited in terms of the lack of an appropriate measurement of the extent of ERM engagement at the firm level. The relevant research has typically utilized a binary proxy variable (such as the appointment of a Chief Risk Officer (CRO) or public ERM related announcement) to indicate whether the firm is currently undertaking an ERM program (see Pagach and Warr, (2010); Hoyt and Liebenberg, (2011); and Lin et al, (2012)). Since 2008 the rating agency, Standard and Poor's, has included an ERM analysis as part of its global corporate credit rating process for insurance companies (Standard and Poor's, May 2008). Use of this rating allowed for a more sophisticated 'extent of ERM implementation' construct variable to be used (see McShane et al, (2011)). To date analyses have been limited to US and Bermudian insurance companies and suffer from small sample sizes and inability to investigate the constructs of the overall rating, which this study seeks to overcome (as discussed in section 3). To our knowledge this study is the first to decompose an ERM maturity rating and examine the specific aspects of ERM which are adding value to the firm.

Consistent with prior research (Hoyt and Liebenberg, (2011)) we find a highly significant valuation premium is associated with firms that have undertaken an ERM program (in our case measured by a maturity score as discussed in section 3) as part of their corporate strategy. Furthermore our study highlights that the valuation premium is being driven by the embedding of risk culture and integration of ERM processes within the organization as well as the degree to which the ERM process is viewed as an integral element in strategy and planning activities.

This article is structured as follows. First, we discuss the evolution of risk management from the traditional approach to the modern-day holistic based ERM approach. We examine the theoretical underpinning of ERM and why it is proposed to add value above the traditional risk management approach. Subsequently we describe the data and model used and we then empirically examine the relationship between ERM maturity attributes and firm value. Finally, we present our empirical results followed by discussion of the results and concluding sections.

2. *Theoretical Background*

2.1 From Traditional Risk Management to Enterprise Risk Management

The Miller and Modigliani (1958) seminal contribution on the irrelevance of an organization's capital structure implies that in perfect capital markets risk management activities also do not create value. Furthermore the Capital Asset Pricing Model (Sharpe, 1964) asserts that well-diversified investors are able to hold portfolios that will have already eliminated the idiosyncratic specific risks of the firm, thus rendering risk management efforts irrelevant in terms of value creation.

[3]The authors would like to acknowledge and thank Carol Fox of The Risk and Insurance Management Society and Steven Minsky of Logic Manager for providing access to the data for this study.

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However, there are various counter arguments suggesting that risk management can and does indeed add value to the firm. Firstly, as highlighted by Grace et al (2010), the commercial environment has many market imperfections in terms of taxes (Miller and Modigliani, 1963), bankruptcy costs (Kraus and Litzenberger, 1973), external capital costs (Froot et al, 1993) and agency costs (Jensen and Meckling, 1976) which can be exploited allowing risk management to add value within the organization. This view is also echoed by Pagach and Warr (2011) who again highlight that attempting to reduce idiosyncratic risk is not a negative net present value project, due to the numerous market frictions and imperfections that exist within the corporate world. Other arguments include recognition of the fact that well diversified investors in fact do not exist (Shimko, 2001) and that risk management enhances firm value by improving the value of expected cash flows (Shapiro and Titman, (1998) and Nocco and Stulz, (2006)). Various studies have also statistically shown that risk management appears to be adding value in the presence of these market imperfections (for example see Smith and Stulz, (1985) and MacKay and Moeller, (2007)).

The world has, however, changed at a rapid rate over the last two decades and with it the role that risk management plays within the organization. An increasingly complex layer of connected risks has called for the adoption of an integrated approach to risk management. Corporate risk management has expanded beyond financial and hazard risk mitigation practices such as using insurance and financial hedging instruments to now include the consideration of a multitude of other risk types such as operational risk, reputational risk and strategic risk. Risk is also no longer being viewed as an activity that can be carried out within the traditional silos of operation that may have existed in the past. Whereas historically risk management activities were compartmentalized and uncoordinated with a focus on using insurance and derivative instruments to protect the firm against hazard and financial risks, a holistic approach has emerged which instead aims to achieve a coordinated management of all significant risk exposures the organization faces (McShane et al, 2011). This emerging integrated approach, to the aggregation of risk, is generally referred to as Enterprise Risk Management.

2.2 ERM and Firm Value

It is generally recognized that ERM attempts to create shareholder value by allowing firms to achieve a more optimized risk-return trade-off. This view is shared by Meulbroek (2002) who argues that *"The goal of risk management is not to minimize the total risk faced by a firm per se, but to choose the optimal level of risk to maximize shareholder value".* Taking an integrated framework approach to managing risk aids the goal of optimal risk-taking. Nocco and Stulz (2006) contend that an evaluation of risk and return at the project level does not allow for optimization at the corporate level as risk diversification and correlations are ignored, thus leading to suboptimal decision making. As a key component of ERM is the examination of the risk interactions and their aggregation it is therefore posited that ERM improves internal decision making and hence ultimately contributes to firm value through more efficient capital allocation (Myers and Read, 2001). Furthermore Nocco and Stulz (2006) argue that ERM can lead to a reduction in the probability of large detrimental cash flow shortfalls (which are economically burdensome to the firm in terms of future growth implications), costly capital acquisition and relinquishing of profitable investments.

A key aspect of ERM (and difference from the traditional risk management approach) is that the firm's major risks, from all sources, are aggregated together in a 'portfolio' of risks, thus embracing a holistic approach to risk management. Rosenberg and Schuermann (2006) use a copula-based method to show that a firm's total amount of risk differs from the sum of the enterprise's individual risks. McShane et al (2011) emphasize the benefits of the ERM risk aggregation approach, attesting that hedging residual risk, rather than independent risks, maximizes value by allowing the organization to benefit from a risk diversification effect or recognition of natural risk hedges. Thus,

only the remaining risk needs to be dealt with which should be less onerous than the amount of risk mitigation required if each risk was dealt with independently.[4] This benefit is also recognized by Hoyt and Liebenberg (2011) who point out that the integration of risks helps firms to avoid duplication of risk management outlay.

In addition, viewing the company's risks as a portfolio should be beneficial to the firm as it should improve both the senior management and the board's ability to oversee the enterprise's risk (Beasley et al, 2005). An improvement in the understanding and transparency of the aggregate level of firm risk, right up to the board level, should allow an efficient level of strategic decision making in line with an optimal risk taking strategy (Chapman, 2006). Hoyt and Liebenberg (2011) posit that this improved understanding, at board level, enhances resource allocation, capital efficiency and equity return.

It should also be noted that ERM goes beyond focusing on just risk avoidance activities in recognition of the value to be gained from exposure to risks for which the firm has a strategic competitive advantage. This is partly in recognition of the fact that the desire for risk avoidance may actually increase the volatility and fragility of financial markets as a whole via certain investment products (Jacobs, 2004).

Further noted value added benefits of ERM include reduced cost of capital via improved ratings from credit rating agencies (Samanta et al, (2004); Hoyt and Liebenberg, (2011)), improved insights into different types of risk (Meulbroek, 2002), enhanced capacity to inform outsiders such as regulators and investors of the firm's risk profile (Hoyt and Liebenberg, 2011) and better capital structure decision making (Graham and Rogers, 2002).

3. Methodology

3.1 Sampling Data

3.1.1 Data Source: The Risk and Insurance Management Society, Inc. (RIMS)

The data in our analysis originated from an online survey assessment model developed and collated by The Risk and Insurance Management Society, Inc. (RIMS). RIMS is a not-for-profit professional association representing more than 3,500 industrial, service, nonprofit, charitable and government entities throughout the world. RIMS provides networking, professional development and education opportunities to its membership of more than 11,000 risk management professionals who operate in more than 60 countries (Risk and Insurance Management Society, 2013).

The Risk and Insurance Management Society Risk Maturity Model (RIMS RMM) data collection was the result of a coordinated marketing effort by RIMS over the 2006-2011 period. RIMS sent the survey assessment invitation to its entire marketing database of roughly 50,000 risk management individuals (the invitation was purposely not limited to the RIMS membership of approximately 10,000). Targeted search engine traffic from terms such as 'risk maturity models' drove a significant additional number of visitors to take the survey. As a result, RIMS members represented less than 50% of survey participants. Recognizing the prominence of the RIMS RMM, the authors approached

[4] This is an application of portfolio theory generally first conceptualized by Markowitz (1952) whereby it was recognized that an investor can reduce portfolio risk simply by holding combinations of instruments which are not perfectly positively correlated. In a similar fashion the application for ERM assumes that the risks are not 100% correlated.

RIMS in 2011 to provide access to the data, for research purposes, and this was facilitated in a confidential format.

3.1.2 Data Survey Risk Maturity Model: The Risk and Insurance Management Society Risk Maturity Model (RIMS RMM)

The survey itself was designed as a tool (via an online assessment medium[5]) for executives in risk management to develop sustainable ERM programs via the scoring of their risk programs and the provision of a real-time report serving as an organizational roadmap for improvement. It has subsequently been widely used throughout the world as a benchmark of ERM maturity, providing organizations with a mechanism for measuring ERM maturity.

Developed in 2006, the RIMS RMM was conceptualized based upon the Capability Maturity Model Integration (CMMI), a highly utilized maturity model developed by the Software Engineering Institute (SEI). It encompasses various applicable risk management frameworks such as ISO 31000, BS31100, FERMA (2002) and COSO (2004) (Risk and Insurance Management Society, 2011). Maturity models are used in numerous industries for the purposes of assessment and benchmarking as they allow organizations to measure their relative performance position on a pathway to maturity representing an optimal state. As recognized by Lindberg and Seifert (2011) the RIMS RMM is one of the most prominent models for ERM, in existence.

Since ERM involves the complex task of the systematic evaluation of all the significant risks facing an organization and how they affect the organization in aggregate, the ERM process cannot be simply characterized by one or two defining components or attributes. The RIMS RMM for ERM encompasses a total of seven attributes, which describe the fundamental characteristics of an effective ERM program, as shown in table 1.

[Insert table 1 here]

As discussed in the RIMS State of ERM Report (2008), survey respondents are asked to rate each of these seven attributes in three dimensions (effectiveness of ERM activities, degree of proactivity and coverage/pervasiveness throughout the organization), via a number of competency drivers. The data provided by RIMS was a 1-10 scoring of each dimension of each competency driver making up the attribute in question (again, refer to RIMS State of ERM Report (2008) for further information on the competency drivers), across all three previously mentioned dimensions. We proceeded to score the attributes on a 1-10 scale after equally weighting the scoring across the three dimensions and also averaging the competency drivers, as can be seen in the hypothetical example in figure 1. The overall maturity score, calculated by the authors, was the simple average of the attribute scores.

[Insert figure 1 here]

The 1-10 scoring scale corresponds to five distinct levels of maturity depicted in the RIMS RMM as described in table 2.

[Insert table 2 here]

[5][4]The RIMS RMM maturity assessment can be accessed from the following link: http://www.rims.org/resources/erm/pages/RiskMaturityModel.aspx

Essentially the RIMS RMM produces a 1-5 maturity scale assessment for each of the 7 ERM attributes as well as a final ERM maturity score as described above. We examine each of these attributes in isolation in our study as well as the overall ERM maturity score, which we simplify using a binary dummy variable (see section 3.3) for analysis purposes.

3.1.3 Data Cleaning and Validity

As the assessment data was taken from an open online medium, it was important to clean the data both thoroughly and appropriately. We were provided with over 2,000 assessment responses from across the corporate spectrum of public and private firms. We initially removed those where the corporate email address was not provided. Our firm value study focuses on market value and therefore we analyze the subsample of public listed companies, so that we had access to market based measures of value. Analysis of public listed firms also has the benefit of looking at firms which have more mature ERM systems, as shown by Paape and Spekle (2012). We then proceeded to remove respondents for whom the job title[6] was not deemed to be at a level whereby the respondent could adequately provide the required information on the overall organization's risk policies, frameworks and methodologies. Our final sample size of ERM maturity assessments was 225 unique respondents.

Modeling ERM via a maturity model provides additional useful and unique information above the Standard and Poor's rating upon which some previous ERM research has been based (see McShane et al, 2011). Whereas the Standard and Poor's rating is used to evaluate credit worthiness (Standard and Poor's, November 2012) (and therefore only examines a narrow band of ERM characteristics as they pertain to management's risk practices) the RIMS RMM index is a more comprehensive look at an organization's key risk management attributes (discussed below), inclusive of risk appetite management and performance. It should therefore be noted that the Standard and Poor's rating focuses primarily on a limited number of subfactors which are rated "positive, negative or neutral" based on its analysts' review for comprehensiveness and performance standards. It can be argued that such a review does not provide a thorough indication of the organization's risk management practices and capabilities and hence overall ERM maturity levels. In contrast the RIMS RMM assessment is completed by a high level employee with a thorough and strategic oversight of the risk management activities of the organization. The self-reported assessments are available to Internal Audit departments to use as a guide to evaluate and verify the effectiveness of their ERM programs as is required in the Internal Audit mandate. The Internal Audit function helps to provide the assurance that the senior level risk manager self-reporting is indeed accurate. Further, since all results are fully confidential and primarily used for self-improvement, there is no incentive for firms to overstate their actual capabilities.

3.1.4 Data Characteristics

~~Figure 2~~Table 3 highlights the distribution of the overall maturity scores amongst our 225 observations.

[Insert table 3~~figure 2~~ here]

When we decompose the overall maturity score we observe heterogeneity amongst attribute maturities. Table 4~~Figure 3~~ shows the number of firms that have obtained at least a~~cumulative percentage of the sample having obtained at least a~~ certain level of maturity for each~~that~~ attribute.

[6]Appropriate Job titles included titles such as Chief Risk Officer, Director of Risk Management, Director of Enterprise Risk Management, Chief Actuary, Director Internal Audit etc.

It can be noted that attribute 7 (Business Resilience and Sustainability) leads the other attributes in terms of progression towards the upper maturity levels, 4 and 5. It should also be noted that overall, relatively few firms have reached the 'Leadership' level across the seven attributes, indicating there is still much scope for attribute maturation in the future. This is not surprising given that the discipline of ERM is still in its infancy and organizations are still going through the implementation and refinement journey as the discipline continues to evolve.

[Insert table 4 ~~figure 3~~ here]

The distribution of data by sector, ~~and by~~ country and by year is shown below in table ~~3 and table 4 respectively.~~ 5.

[Insert table 5~~3~~ here]

We note from table 5 that manufacturing firms make up almost 40% of those sample. A further 20% come from Transportation, Communications, Electric, Gas and Sanitary Services sector whilst almost 17% are services firms. Firms domiciled in the United States make up the overwhelming majority of the dataset with over 75% of respondents. Finally, survey responses are more concentrated in early years of the sample, when the survey was first made available, and decline over time with a significant drop off in responses between 2009 and 2010.

~~[Insert table 4 here]~~

~~Almost three quarters of the survey responses coincide with 2006 to 2008 financial years for survey respondents, uniformly spread across these years. The remainder corresponds to financial years ranging from 2009 to 2011 as shown in table 5.~~

~~[Insert table 5 here]~~

3.2 Dependent and Independent Variable of Interest

The central focus of this study is to observe the valuation implications of ERM maturity. The natural logarithm of an approximation of Tobin's Q serves as the dependent variable in our model, representing firm value. Tobin's Q was chosen as it has been widely used in empirical risk management studies (Smithson and Simkins, 2005) and in particular three recent, directly applicable, ERM value implication studies performed by Hoyt and Liebenberg (2011), McShane et al (2011) and Lin et al (2012). We calculate the approximate Q ratio using the method performed by Chung and Pruitt (1994). The Tobin's Q approximation in this context is measured as:

Tobin's Q= (MVE+PS+D)/TA

W~~w~~here:

MVE = Market value of equity
PS = Value of preferred stock
D = Debt = (Current Liabilities - Current Assets) + Long Term Debt
TA = Total Assets

Our main independent variable of interest is an ERM engagement variable (see section 3.3) based upon the previously discussed, RIMS RMM maturity rating (see table 1). The other independent variables utilized in our empirical model are described in the empirical analysis below.

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It should be noted that, for consistency and data availability purposes, all financial data utilized in the study is from the financial year closest to the survey filing. For example, if a company has a December 31st fiscal year end and completed the survey on January 5th 2007, the 2006 year-end financial data is used. On the other hand, if the company had alternatively completed the survey on 15th September 2007, the 2007 financial year end data is used.

3.3 Empirical Analysis

When dealing with survey/response based data it is important to acknowledge and analyze selection bias (Heckman, 1979). Firms with ERM programs are not a random sample of all firms. Respondents to the survey have self-selected their status as an organization that has instigated at least preliminary engagement with risk management practice. Heckman (1979) notes that the least squares estimator of the population variance is downward biased under such circumstances. The solution that Heckman proposes is sometimes referred to as a two-step model.

We conjecture that firms which have limited engagement with ERM practices may have latent differences from those that have more formal risk management practice, and these latent factors could possibly impact upon firm value. To ignore this would be to run the risk of sample selection bias, as noted above. As a consequence, in the first stage regression we model the level of ERM in a probit setting.

Looking at the definition of ERM categories from the RIMS RMM we can draw a clear distinction between maturity levels 1 and 2 and maturity levels 3, 4 and 5 as shown in table 2.

Maturity levels 1 and 2 feature a risk management process that lacks discipline but more specifically lack enterprise wide co-ordination. Silo based risk activities are dominant. Both of these descriptions point towards a corporate environment that has not yet engaged in a mature ERM program which at its heart aims to break down silos and instead bring about a holistic enterprise wide coordinated approach to risk management activities. In contrast levels 3 to 5 have established, integrated and repeatable risk management practices in place throughout the enterprise with engagement coming from the top of the firm. Additionally a risk framework is generally in place and risk based discussions are embedded to a strategic level with effective communication throughout the organization. Clearly firms at levels 3 to 5 are engaged in a more holistic portfolio approach to risk which aligns with the general aims of ERM. As such in our first stage regression we state that firms have primitive enterprise risk management engagement until they reach level three where they move to disciplined enterprise risk management engagement.

In our first estimating equation we examine the determinants of ERM to allow us to perform the two-step approach to overcome sample selection bias. The hypothesized impact of these variables, on ERM maturity, is shown in table 6. In order to properly specify the selection process (i.e. the drivers of ERM maturity) we turn to the extant literature (for example seesee e.g. Miccolis and Shah, (2000); Lam, (2001); Hoyt et al, (2001); Liebenberg and Hoyt, (2003); Beasley et al, (2005); Standard and Poor's, (2005;) and Pagach and Warr, (2010)) and decide upon a specification including firm size, financial leverage, sales growth, financial slack, industrial diversification, international diversification, earnings variability, asset opacity, change in firm value and a series of dummies controlling for industry and time.

The resulting first stage specification is therefore a probit model estimated with time and industry fixed effects as follows:

$$ERM\_Engagement\_Dummy = \alpha + \beta_1 * Size + \beta_2 * Leverage + \beta_3 * SalesGrowth + \beta_4 * FinancialSlack + \beta_5 * IndDiv + \beta_6 * IntlDiv + \beta_7 * EarnVariability + \beta_8 * AssetOpacity + \beta_9 * ValueChange + \Sigma\varphi_t * TimeDum_t + \Sigma\gamma_i * IndDum_i + \varepsilon$$

Where:

ERM_Engagement_Dummy = 0 if ERM maturity level (ERMMaturity) is ad-hoc or initial (i.e. levels 1 or 2)
ERM_Engagement_Dummy = 1 if ERM maturity level (ERMMaturity) is repeatable, managed or leadership (i.e. levels 3, 4 or 5)

The first step of the two step procedure allows the researcher to generate an Inverse Mills ratio which is the ratio of the probability density function over the cumulative distribution function calculated using the probit output.

In the second stage, the Inverse Mills ratio is inserted into our specification as an explanatory variable to correct for selection bias in our firm value models.

In controlling for the drivers of firm value, we again turn to the extant literature and include control variables such as firm size, financial leverage, return on equity, sales growth, systematic risk (beta), industrial diversification, international diversification, insider share ownership (and its squared value) and a dividend payment status indicator. These control variables are also augmented with a series of dummy variables focusing on year of assessment completion, as previously described, and the country and industry of the firm surveyed. RIMS RMM data was matched to the specific firm operational and financial characteristics downloaded from Thomson One Banker's Worldscope database.

The second stage model is therefore estimated (with time, industry and country fixed effects) as:

$$LogTobinsQ = \alpha + \beta_1 * ERM\_Engagement\_Dummy + \beta_2 * Size + \beta_3 * Leverage + \beta_4 * ReturnOnEquity + \beta_5 * SalesGrowth + \beta_6 * Beta + \beta_7 * IndDiv + \beta_8 * IntlDiv + \beta_9 * Insiders + \beta_{10} * InsidersSq + \beta_{11} * DividendPaymentStatus + \beta_{12} * InverseMills + \Sigma\varphi_t * TimeDum_t + \Sigma\gamma_i * IndDum_i + \Sigma\lambda_i\ CtryDum_i + \varepsilon$$

It should be noted that the second step estimating equation is log linear. In addition, by estimating in a two-step Heckman manner, the second equation is robust to selection bias in the ERM categorization.

Table 6 defines the variables used in our model.

[Insert table 6 here]

4. Results and Discussion

Table 7 provides summary statistics on the variables utilized in the study.

[Insert table 7 here]

The average ERM maturity of firms in the sample is 2.77. Firms on average have positive sales growth to the magnitude of around 7.44%~~,~~ and the average firm sampled has a systematic risk coefficient (beta as estimated from a market model regression) of 1.15. As many as 75% of firms

included in the study are diversified across industrial lines, whilst 64% are diversified internationally and do business in more than one international market.

[Insert table 8 here]

Table 8 profiles the Pearson correlations between variables used across the two step estimation procedure. The results of the two-step baseline specification estimations are shown in table 9:

[Insert table 9 here]

It can be noted that the key explanatory variable in modeling ERM maturity (via the previously discussed ERM_Engagement_Dummy variable) is that of firm size. Larger firms tend to be further along the ERM maturity spectrum. This finding is consistent with Beasley et al (2005) who found that ERM implementation advancement is positively related to entity size. It is conjectured that larger firms benefit from economies of scale and division of labour to the extent that risks can be more closely dissected and monitored from board level right down throughout the firm. We also find that firms who are internationally diversified tend to have lower ERM maturity scores ceteris paribus. Again this is consistent with prior findings such as Hoyt and Liebenberg (2011). It is suggested that the complexity of doing business across international lines can dilute the operational performance and consistency of formal ERM programs. As ERM is still a relatively new discipline the practices and processes associated with it are continuing to evolve (Frigo and Anderson, 2011). We expect that firms which experience difficulties in implementing ERM across geographical boundaries will improve considerably over the next decade, as ERM process sophistication and efficiency improves.

In the second stage regression our explanatory variable of focus is that of ERM maturity (again via the previously discussed ERM_Engagement_Dummy variable). It can be noted that firms with upper levels of ERM Maturity engagement (i.e. levels 3-5 which are captured via ERM_Engagement_Dummy =1, as discussed in section 3.3) are associated with a 22.5% rise in firm value as measured by our logged approximate Tobin's Q firm value proxy. This equates to a 25.3% (exp(0.225)-1) increase in the unlogged Tobin's Q variable. This result is statistically significant at the 1% significance level. The adjusted R^2 of the model is around 47% and the specification passes the test of joint significance.

Further to the baseline specification, the assessment data collected and compiled by RIMS facilitates the decomposition of the drivers of ERM maturity using the seven key attributes of ERM in their Risk Maturity Model. Table 10 presents the pairwise correlations between ERM attribute maturities:

[Insert table 10 here]

It is clear that there is a significant degree of correlation between the maturity scores for the various attributes, with correlations generally in the range of between 70% and 80%. Given the composition of the RIMS RMM, this finding is to be expected. ERM is a multifaceted corporate objective and one might reasonably expect, for example, that those firms who have significant board level engagement with their ERM programs (attribute 1), more closely integrate risk management objectives with broader corporate objectives (attribute 6), monitor risk more effectively (attribute 5) and focus on root causes of risk events (attribute 4). Owing to the high degree of correlation between the factors, they cannot be used simultaneously in a specification due to variance inflation concerns.[7] As a consequence, we conduct our supplementary estimations for each separate attribute in turn.

[7]In the case of the overall ERM maturity regression separate attributes are collapsed into a single measure by weighting (see section 3.1.2) and as a consequence enter the specification in the form of a single regressand negating co-linearity concerns

In order to test the impact of these attributes on firm value, we again turn to the two step model, this time modeling the selection equation in terms of each ordinal ERM attribute. As a consequence, our specifications are as follows:

$$ERMAttribute_i\_Engagement\_Dummy = \alpha + \beta_1 * Size + \beta_2 * Leverage + \beta_3 * SalesGrowth + \beta_4 * FinancialSlack + \beta_5 * IndDiv + \beta_6 * IntlDiv + \beta_7 * EarnVariability + \beta_8 * AssetOpacity + \beta_9 * ValueChange + \Sigma\varphi_t * TimeDum_t + \Sigma\gamma_i * IndDum_i + \varepsilon$$

Where:

$ERMAttribute_i\_Engagement\_Dummy = 0$ if ERM attribute maturity level (ERMMaturity$Attribute_i$) is ad-hoc or initial (i.e. levels 1 or 2)
$ERMAttribute_i\_Engagement\_Dummy = 1$ if ERM attribute maturity level (ERMMaturity$Attribute_i$) is repeatable, managed or leadership (i.e. levels 3, 4 or 5)

and

$$LogTobinsQ = \alpha + \beta_1 * ERMAttribute_i\_Engagement\_Dummy + \beta_2 * Size + \beta_3 * Leverage + \beta_4 * ReturnOnEquity + \beta_5 * SalesGrowth + \beta_6 * Beta + \beta_7 * IndDiv + \beta_8 * IntlDiv + \beta_9 * Insiders + \beta_{10} * InsidersSq + \beta_{11} * DividendPaymentStatus + \beta_{12} * InverseMills + \Sigma\varphi_t * TimeDum_t + \Sigma\gamma_i * IndDum_i + \Sigma\lambda_i CtryDum_i + \varepsilon$$

The results of these supplementary attribute estimations are shown in table 11:

[Insert table 11 here]

Again focusing on the first stage selection equation, the most significant variable in explaining variation in ERM attribute level maturities is that of firm size. Larger firms consistently outscore their smaller peers when it comes to ERM attribute maturity, further echoing the work of Beasley et al (2005). The effect of size on attribute maturity is most pronounced and also most significant for attributes 1 (ERM-based approach), 2 (ERM Process Management), 3 (Risk Appetite Management), 5 (Uncovering Risks) and 6 (Performance Management). Once again, firms that are internationally diversified tend to have lower ERM attribute scores, indicative of the difficulties in maintaining consistent ERM practice whilst operating across international boundaries.

The key variable of interest in the second stage regressions is $ERMAttribute_i$_Engagement_Dummy, indicating whether or not ERM maturity for attribute i has progressed to the upper levels of maturity as described above.

It can be noted that 5 of the 7 ERM attributes significantly explain variation in firm value (as proxied by Tobin's Q) in their own right. Of the 5 significant ERM attributes, most significance is attached to attribute 2 (ERM Process Management) and attribute 6 (Performance Management – managing uncertainty) (both significant at the 1% level). Mature engagement in attribute 2 (which measures how well the ERM process is being integrated into everyday practices) is associated with a 20.0%~~a~~ (18.3% logged) increase in firm value, whilst mature engagement in attribute 6 (which measures the degree to which the organization is able to execute on vision and strategy alongside their risk management activities) is associated with a 22.9% (20.6% logged) increase in firm value. Attributes 1 (ERM-based Approach), 4 (Root Cause Discipline) and 5 (Uncovering and Identifying Risks) are all statistically significant at the 5% level with marginal valuation effects of 17.0% (15.7% logged), 16.0% (14.9% logged) and 15.3% (14.2% logged) respectively. The positive and significant results of both attributes 1, 2 and 6 are particularly noteworthy. Attribute 1 has a focus on the extent and level of

executive support for ERM whilst attribute 2 examines the further embedding of risk culture within the organization to achieve effective ERM integration and attribute 6 considers whether ERM is viewed as an integral element in strategic activities. This finding is consistent with Sobel and Reding (2004) who acknowledge active participation by an organization's board of directors is positively related to an effective ERM program and the findings of Gordon et al (2009) who find the relation between ERM and firm performance is contingent upon the appropriate match between ERM board of director's monitoring.

It is reasonable to assert that these attributes are complementary, and indeed is evidenced in our correlation analysis. Maturity progression through one attribute is not in isolation and will only be truly effective if the appropriate supporting attributes are in place. ERM is a function of multiple facets measured in the RIMS RMM model. Our estimations do however reveal that attributes 3 (Risk Appetite Management) and 7 (Business Resilience and Sustainability) are insignificant in explaining variation in firm value within our sample.

In terms of the explanatory power of the overall model, we note the adjusted R^2 is consistently around 45% for all seven second stage regressions. All regression variants pass the test of joint significance.

5. Conclusion

This study seeks to build on the nascent literature on the valuation implications of Enterprise Risk Management (ERM) maturity. We use a dataset of 225 publically listed firms, across various sectors, which have completed the Risk and Insurance Management Society ERM Maturity Model assessment over the 2006 to 2011 period. Our results suggest significant evidence of a valuation premium attached to enhanced ERM maturity. The RIMS RMM assessment ranks firms on a 1 to 5 scale and our results suggest that for firms that have fully engaged in ERM so as to be considered mature in their ERM approach, there is a highly significant firm value increase of around 253%.

The structure of our data allows for further decomposition of the ERM maturity score along 7 key themes: the corporate approach to ERM; process management; risk appetite management; root cause discipline; efficacy of uncovering risks; on-going performance management and business resilience and sustainability. Each attribute is given an equal weighting when forming the composite ERM maturity score and thus the marginal valuation impact of an individual attribute can be greater than that of the overall ERM score.

Of the individual attributes, our results suggest that the strongest valuation effects are associated with on-going performance management, process management, the corporate approach to ERM, root cause discipline and the efficacy of uncovering risks respectively. We do not find evidence of value relevance of risk appetite management nor business resilience and sustainability in our sample.

6. Managerial Implications

The findings outlined in this study have clear corporate policy implications. Of all 225 firms sampled, only 83 had progressed to the upper levels of ERM maturity. For the majority of sampled firms there is scope for ERM maturation and thus shareholder value creation. For those entities which have not yet embraced ERM, the arguments to do so are compelling. An ERM maturity transition from a silo

based risk management process that lacks discipline and enterprise wide co-ordination to a mature ERM environment with established enterprise risk management routines and engagement from the top of the firm could create a value improvement of as much as 25~~3~~%. The findings of this study lend weight to the argument that the improvement of formal ERM programs is consistent with the ISO 31000 Risk Management Principles (International Organization for Standardization, ~~(~~2009~~)~~) which state that risk management should create and protect value and should be an integral part of all business.

The decomposition of ERM maturity into its constituent attributes provides an interesting extension that has insights for entities wanting to maximize the value creating potential of ERM maturity. Of paramount importance is an integrated ERM approach consistent with the broader corporate strategic agenda. Support must be from the executive level down and cascade throughout the organization with ERM aligned with the organization's vision and strategy. In accordance with the attribute definition set out in the RIMS RMM, the Board of Directors, Senior Management and Senior Risk Officers must communicate the importance of risk management in daily decision making to each business function throughout the firm. Much deeper engagement is required to maximize the value of ERM maturity. For many organizations this will necessitate a change in culture to ensure that the board's vision and risk initiatives flow effectively throughout the firm hierarchy with the board members, senior management and lower level employees all playing an important role in managing risks in an optimal manner. Furthermore our analysis relating to on-going performance management highlights that in order to attain maturity progression firms must clearly articulate goals to all business units. The goals must be specific, measurable, attainable, realistic and trackable. Deviations from these goals must be measured, reported and acted upon on an on-going basis. Again, the attainment of these ERM goals must be aligned with the broader corporate agenda.

We provide evidence of the strong valuation implications of a firm's ability to uncover and track risk. Best practice with regard to this ERM facet includes explicit risk ownership by business units, formalized measures of risk, the collection of knowledge from employee expertise and electronic databases and documentation of risks and opportunities. The ultimate goal of uncovering and tracking risk information via these mechanisms is to enhance the organization's ability to uncover correlations and dependencies across the entire enterprise. Given the important role that correlations now play within risk management (Lo, 1999), an important consideration for risk managers to keep in mind is that these risk correlations may change drastically in times of market turmoil (Bookstaber, 2010). This aspect is especially important for ERM given its dynamic nature and requirement to capture emerging risks. As a consequence an effective ERM program should achieve a heightened managerial awareness of market volatility.

Finally, it is important to note that these attributes exist not in isolation, but rather as part of a holistic approach to risk management. The ERM maturity journey is a multifaceted one. That said, the heterogeneous valuation implications amongst attributes may provide a useful tool for corporate boards when they seek to concentrate on the value maximizing facets. Here the message is clear: there must be a consistent "tone from the top", an embedding of risk culture throughout the organization, alignment of strategy and risk management activities, on-going documentation of current and emerging risks with clear goal setting and reporting.

7. Limitations and Future Research

The discipline of ERM is still in its infancy and is continuing to evolve both in its practical application and in terms of the academic and practitioner research aiding our understanding. Increasing numbers and diversity of firms initiating ERM programs will provide a natural extension of the

dataset in both the cross sectional and time series dimensions. We also acknowledge that the maturity data used in our study is based upon self-reported assessments based on the responses of a single individual per firm. Self-reporting is subject to obvious bias (Bertrand and Mullainathan, ~~(~~2001~~)~~). To overcome this limitation, we suggest further study which independently measures ERM maturity. A thorough, valid and clear picture of the firm's ERM status would be best achieved through independent assessment of risk procedures and practices as well as group and individual interviews conducted throughout different levels of the organization. This type of assessment would further our understanding of ERM immensely.

Finally, our study was limited by the number of firms which had reached the upper-most level of ERM maturity. As the discipline evolves we expect a higher percentage of firms to have attained a high degree of ERM maturity. Similar studies in the future will therefore enhance our understanding of ERM valuation implications at the uppermost levels of ERM maturity.

8. Declaration of Conflicting Interests

The authors declare that no potential conflicts of interest arise in this work with respect to the research, authorship, and/or publication of this article.

9. References

Allayannis, G., & Weston, J. (2001). The Use of Foreign Currency Derivatives and Firm Market Value. *Review of Financial Studies, 14*, 243-276.

Beasley, M.S., Clune, R., & Hermanson, D.R. (2005). Enterprise risk management: An empirical analysis of factors associated with the extent of implementation. *Journal of Accounting and Public Policy, 24*(6), 521-531.

Bharadwaj, A.S., Bharadwaj, S.G., & Konsynski, B.R. (1999). Information Technology Effects on Firm Performance as Measured by Tobin's Q. *Management Science 45*(7), 1008-1024.

Bertrand, M., & Mullainathan, S. (2001) Do People Mean What They Say? Implications for Subjective Survey Data. *The American Economic Review 91*(2), 67-72.

Bookstaber, R.M. (2010). Risk Management: Foundations for a Changing Financial World, Chapter 1: A Framework for Understanding Market Crisis. *CFA Institute Investment Books.* September (2010), P7-24.

British Standards Institute, (2008), "Risk Management. Code of practice", BSI Knowledge Centre, London.

Casualty Actuarial Society – Enterprise Risk Management Committee. (2003). Overview of Enterprise Risk Management.
http://www.casact.org/area/erm/overview.pdf (accessed August, 2012).

Chapman, R.J. (2006). "Simple tools and techniques for enterprise risk management electronic resource", John Wiley & Sons, Chichester, England ; Hoboken, NJ.

Chung, K.H., & Pruitt, S.W. (1994). A simple approximation of Tobin's q. *Financial Management 23*(3), 70-74.

Colquitt, L. L., Hoyt, R. E., & Lee, R. B. (1999). Integrated Risk Management and the Role of the Risk Manager. *Risk Management and Insurance Review 2*(3), 43-61.

Committee of Sponsoring Organizations of the Treadway Commission (COSO), (2004), "Enterprise Risk Management - Integrated Framework", COSO, New York.

De Wet, J.H.vH. (2006). Determining the Optimal Capital Structure: A Practical Contemporary Approach. Meditari Accountancy Research 14(2), 1-16.

Fama, E.F., & French, K.R. (2002). Testing trade-off and Pecking Order Predictions about dividends and Debt. *The Review of Financial Studies 15*(1), 1-33.

Federation of European Risk Management Associations, (2002), "A Risk Management Standard", FERMA, Brussels.

Frigo, M.L., & Anderson, R.J. (2011). Embracing Enterprise Risk Management: Practical Approaches for Getting Started. Committee of Sponsoring Organizations of the Treadway Commission (COSO).

http://www.coso.org/documents/EmbracingERM-GettingStartedforWebPostingDec110_000.pdf (accessed August, 2012).

Froot, K.A., Scharfstein, D.S., & Stein, J.C. (1993). Risk Management: Coordinating Investment and Financing Policies. *Journal of Finance 48*(5), 1629-1658.

Gordon, L.A., Loeb, M.P., & Tseng, C.Y. (2009). Enterprise Risk Management and Firm Performance: A Contingency Perspective. *Journal of Accounting and Public Policy 28*(4), 301-327.

Graham, J., & Rogers, D. (2002). Do Firms Hedge in Response to Tax Incentives? *Journal of Finance 57*(2), 815-839.

Grace, M.F., Leverty, J.T., Phillips, R.D., & Shimpi, P. (2010). The Value of Investing in Enterprise Risk Management. Georgia State University Working Paper.

Heckman, J.J. (1979). Sample Selection Bias as a Specification Error. *Econometrica 47*(1), 153-161.

Hoyt, R.E., & Liebenberg, A.P. (2011). The Value of Enterprise Risk Management, *Journal of Risk and Insurance 78*(4), 795-822.

Hoyt, R.E., Merkley, B.M., & Thiessen, K. (2001). A Composite Sketch of a Chief Risk Officer. The Conference Board of Canada, Toronto, September.

Institute of Internal Auditors (IIA). (2004). Position Statement: The Role of Internal Audit in Enterprise-wide Risk Management.
http://www.ucop.edu/riskmgt/erm/documents/role_intaudit.pdf (accessed August, 2012).

International Standards Organisation. (2009). ISO 31000 Risk Management-Principles and Guidelines, Geneva.

Jacobs, B.I. (2004). Risk Avoidance and Market Fragility. *Financial Analysts Journal* 60(1), 26-30.

Jensen, M.C., & Meckling, W. (1976). Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure. *Journal of Financial Economics 3*(4), 305-360.

Jensen, M.C., & Meckling, W. (1976). Agency Costs of Free Cash Flow, Corporate Finance and Takeover. *American Economic Review 76*(2), 323-329.

Kraus, A., & Litzenberger, R.H. (1973) A State Preference Model of Optimal Financial Leverage. Journal of Finance 28(4), 911-922.

Lam, J., (2001). The CRO Is Here to Stay. *Risk Management, 48*(4), 16-20.

Lang, L. & Stulz, R. (1994). Tobin's Q, Diversification, and Firm Performance. *Journal of Political Economy 102*(6), 1248-1280.

Liebenberg, A.P., & Hoyt, R.E. (2003). The Determinants of Enterprise Risk Management: Evidence from the Appointment of Chief Risk Officers. *Risk Management and Insurance Review, 6*(1), 37–52.

Lin, Y., Wen, M. & Yu, J. (2012). Enterprise Risk Management: Strategic Antecedents, Risk Integration, and Performance. *North American Actuarial Journal 16*(1), 1-28.

Lindberg, D.L., & Seifert, D.L. (2011). Enterprise Risk Management (ERM) Can Assist Insurers in Complying with the Dodd-Frank Act. *Journal of Insurance Regulation 30*, 319.

Lleo, S. (2010). Risk Management: Foundations for a Changing Financial World, Chapter 5: Risk Management: A Review. *CFA Institute Investment Books.* September (2010), P73-111.

Lo, A.W. (1999). The Three P's of Total Risk Management. *Financial Analysts Journal* 55(1), 13-26.

MacKay, P., Moeller, S. (2007). The Value of Corporate Risk Management. *Journal of Finance 62*(3), 1379-1419.

McShane, M.K., Nair, A., & Rustambekov E. (2011). Does Enterprise Risk Management Increase Firm Value? *Journal of Accounting, Auditing and Finance 26*(4), 641-658.

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance 7*(1), 77-91

Marks, N. (2011). Navigating Risk Management. *Internal Auditor* 68(3), 26-33.

Miccolis, J., & Shah, S. (2000). Enterprise Risk Management: An Analytic Approach. Tillinghast–Towers Perrin Monograph (New York).

Miller, M. & Modigliani, F. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review 48*(3), 261–297.

Miller, M. & Modigliani, F. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review 53*(3), 433-443.

Meulbroek, L.K. (2002). Integrated Risk Management for the Firm: A Senior Manager's Guide,. *Journal of Applied Corporate Finance 14*(4), 56-70.

Myers, S.C., & Read, J.A. (2001). Capital Allocation for Insurance Companies. *The Journal of Risk and Insurance 68*(4), 545-580.

Nocco, B.W., & Stulz, R.M. (2006). Enterprise Risk Management: Theory and Practice. *Journal of Applied Corporate Finance 18*(4), 8-20.

Pagach, D.P., & Warr, R.S. (2010). The Effects of Enterprise Risk Management on Firm Performance Available at SSRN: http://ssrn.com/abstract=1155218 or http://dx.doi.org/10.2139/ssrn.1155218

Pagach, D.P., & Warr, R.S. (2011). The Characteristics of Firms That Hire Chief Risk Officers. *Journal of Risk & Insurance, The American Risk and Insurance Association 78*(1), 185-211.

Pandley, I.M., (2005). What Drives the Shareholder Value? *Asian Academy of Management Journal of Accounting and Finance 1*, 105-120.

Paape, L., & Spekle, R.F. (2012). The Adoption and Design of Enterprise Risk Management Practices: An Empirical Study. *European Accounting Review* 21(3), 533-564.

The Professional Risk Managers' International Association (PRMIA). (2008). ERM: A Status Check on

Global Best Practices.
http://www.prmia.org/pdf/ERM-A_Status_Check_on_Global_Best_Practices.pdf
(accessed August, 2012).

Risk and Insurance Management Society (RIMS), (2006). RIMS Risk Maturity
Model (RMM) for Enterprise Risk Management.
www.rims.org/resources/erm/pages/RiskMaturityModel.aspx (accessed August, 2012).

Risk and Insurance Management Society (RIMS), (2008). RIMS State of ERM Report.
Available from: http://www.rims.org/ERM/Pages/RiskMaturityModel.aspx (accessed August, 2012).

Risk and Insurance Management Society (RIMS), (2011). An Overview of Widely Used Risk
Management Standards and Guidelines.
Available from:
http://www.rims.org/resources/ERM/Documents/RIMS%20Executive%20Report%20on%20Widely%20Used%20Standards%20and%20Guidelines%20March%202010.pdf (accessed April, 2013).

Risk and Insurance Management Society (RIMS), (2013).
http://www.rims.org/aboutRIMS/Pages/MissionandDescription.aspx (accessed May, 2013).

Rosenburg, J., & Schuermann, T. (2006). A General Approach to Integrated Risk Management with Skewed, Fat-tailed Risks. *Journal of Financial Economics 79*(3), 569-614.

Samanta, P., Azarchs, T., & Martinez, J. (2004). The PIM Approach to Assessing the TRM Practices of Financial Institutions. New York, NY: Standard and Poor's/McGraw-Hill.

Sharma, A.K. (2006). Financial Leverage and Firm's Value: A Study of Capital Structure of Selected Manufacturing Firms in India. *The Business Review 6*(2), 70-76.

Shapiro, A., & Titman, S. (1998). An Integrated Approach to Corporate Risk Management. The Revolution in Corporate Finance, 3rd ed., Blackwell, Oxford.

Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. *Journal of Finance 19*(3), 425-442.

Shimko, D. (2001). NPV No More: RPV for Risk-based Valuation. Mimeo Risk Management Partners, New York, NY.

Smith, C.W., & Stulz, R. (1985). The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis 20*(4), 391-405.

Smithson, C., & Simkins, B.J. (2005). Does Risk Management Add Value? A Survey of the Evidence. *Journal of Applied Corporate Finance* 17(3), 8–17.

Sobel, P.J., & Reding, K.F. (2004). Aligning Corporate Governance with Enterprise Risk Management. *Management Accounting Quarterly 5*(2), 29–37.Standard & Poor's. (2005). Evaluating The Enterprise Risk Management Practices Of Insurance Companies. Available from: http://www.standardandpoors.com (accessed August, 2012).

Standard and Poor's Ratings Direct. (2008). Standard and Poor's to apply Enterprise Risk Analysis to Corporate Ratings. Standard and Poor's, New York.

http://www.nyu.edu/intercep/ERM%20for%20Non-Financial%20Companies%205.7.08.pdf (accessed August, 2012).

Standard and Poor's Ratings Direct. (2012). How We Use Management And Governance Credit Factors. Standard and Poor's, New York. http://www.standardandpoors.com/spf/upload/Ratings_US/Managment_Governance_Criteria_2.pdf (accessed April, 2013).

Titman, S., & Wessels, R. (1988). The Determination of Capital Structure Choice. *Journal of Finance*. *43*(1), 1-19.

Tables

Table 1: RIMS RMM Attribute descriptions

Attribute	Description	Focus	Journey Description	Measures of Maturity
1	ERM-Based Approach	Extent and level of executive support for ERM	From conforming with regulation to value extraction focus	Communication in daily decision making Risk management competency as pre-requisite for promotion to leadership position
2	ERM Process Management	How well the ERM process is being integrated into everyday practices. The extent to which repeatable and scalable risk management processes have been incorporated into the various business units aided by qualitative and quantitative risk management analyses, strong risk management reporting and clear roles and hierarchy of risk related responsibility.	Further embedding of risk culture within the organization Encouraging employees to take a more risk aware approach to their business activities and tasks	Enterprise-wide communication of risk-based initiatives Finally true employee risk management accountability
3	Risk Appetite Management	The organization's degree of understanding and accountability toward the risk-reward trade-off The quantity of risk exposure which the organization is willing to undertake and the optimal maximization of value or opportunity from the appointed risk amount	Setting effective prioritization criteria for the organization in terms of its strategic goals and management of associated risks	Enhanced organizational understanding and accountability toward the risk-reward trade-off
4	Root Cause Discipline	Ability to proactively identify critical trends in order to both minimize or prevent impact of adverse events and maximize value extraction from opportunities	Improved understanding of risk exposures of the organization	Attribute is scored highly if deconstruction of past events is carried out along with thorough analysis of likelihood and frequency of identified

		The extent of discipline and effort which is directed toward understanding the source of a problem (its root cause)		risks as part of routine risk management activities
5	Uncovering and identifying risks	Capability in ongoing risk measurement and reporting The quality and coverage given to documenting risks and opportunities throughout the organization to aid effective risk identification and mitigation or exploitation	Ensuring that the risk management process is keeping abreast with new emerging risks and facilitating identification of risk and opportunity through front-line employee engagement	The penetration achieved in effectively obtaining risk information from different areas such as employee expertise, databases and other electronic files with the goal of uncovering dependencies and correlation across the enterprise Special attention is paid to critical risk indicators and the efficacy to which they are regularly reviewed along with the review of the impact and likelihood risk scoring used by various business units
6	Performance Management – managing uncertainty	The degree to which the organization is able to execute on vision and strategy alongside their risk management activities	The ERM process is viewed as an integral element in strategy and planning activities	Level of communication of the business goals throughout the organization Deviation from stated goals are measured as well as being reported and aligning the goals associated with the ERM program with the organization's strategic goals and objectives
7	Business Resilience and Sustainability - managing low probability/high consequence events	Organization's ability to recover quickly from setbacks Organization's ability to maintain something of value Denotes the extent to which the organization integrates these two components for its operational planning into its ERM process	Continuous adaptation is a key requirement to ensure an appropriate response to changing business conditions is achieved	Balance between short-term deliverables and longer-term value Engaging in activities such as stress-testing and scenario analysis to understand what can go wrong under varying scenarios and how it might therefore be avoided to allow business continuity and growth

Table 2: RIMS RMM Levels

Maturity (level)	Maturity Level Characteristics
Ad hoc (1)	Implies an extremely primitive level of ERM maturity where risk management typically depends on the actions of specific individuals, with improvised procedures and poorly understood processes.
Initial (2)	Risk is managed in silos, with little integration or risk aggregation. Processes typically lack discipline and rigour. Risk definitions often vary across the silos.
Repeatable (3)	A risk assessment framework is generally in place with the Board of Directors being provided with risk overviews. Approaches to risk management are established and repeatable.
Managed (4)	Enterprise-wide risk management activities, such as monitoring, measurement and reporting are integrated and harmonized with measures and controls established.
Leadership (5)	Risk procedures are communicated and fully understood throughout the organization with the risk management principles integrated fully within the management process. Risk based discussions are embedded to a strategic level, such as long-term planning, capital allocation and decision-making. Risk appetite and tolerances are clearly understood with alerts in place to ensure the Board of Directors and Executive Management is made aware when risk thresholds are exceeded.

Sources: Adapted from RIMS (2006), Marks (2011) and Lindberg and Seifert (2011)

Table 3: Distribution of Data by Sector			
Industry	Freq.	%	Cum. %
Agriculture, Forestry and Fishing	2	0.89	0.89
Finance, Insurance and Real Estate	14	6.22	7.11
Manufacturing	87	38.67	45.78
Mining and Construction	18	8	53.78
Services	38	16.89	70.67
Transportation, Communications, Electric, Gas and Sanitary Services	44	19.56	90.22
Wholesale and Retail Trading	22	9.78	100
Total	225	100	

Table 3: ERM Maturity Breakdown		
Overall Maturity Level (ERMMaturity)	Count	Percentage
Ad Hoc (1)	19	8.44%
Initial (2)	64	28.44%
Repeatable (3)	93	41.33%
Managed (4)	48	21.33%
Leadership (5)	1	0.44%
Total	225	100.00%

Notes: ERMMaturity is defined in table 6 and the maturity levels are described in table 2

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Table 4: Maturity Distribution by Attribute

Attribute Specific Maturity Level (ERMMaturity_Attribute$_i$)	Attribute$_1$	Attribute$_2$	Attribute$_3$	Attribute$_4$	Attribute$_5$	Attribute$_6$	Attribute$_7$
Ad Hoc (1)	33	36	35	39	28	36	18
Initial (2)	65	67	77	79	75	81	66
Repeatable (3)	85	77	70	73	85	72	81
Managed (4)	38	44	37	31	36	33	56
Leadership (5)	4	1	6	3	1	3	4
Total	225	225	225	225	225	225	225

Notes: ERMMaturity_Attribute$_i$ is defined in table 6 and the attribute description is summarized below

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Attribute	Description
1	ERM-Based Approach
2	ERM Process Management
3	Risk Appetite Management
4	Root Cause Discipline
5	Uncovering and Identifying Risks
6	Performance Management – managing uncertainty
7	Business Resilience and Sustainability - managing low probability/high consequence events

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Table 5: Characteristics of Responding Firms			
Panel A: Distribution of Data by Sector			
Industry	Freq.	%	Cum. %
Agriculture, Forestry, And Fishing	2	0.89	0.89
Finance, Insurance, And Real Estate	14	6.22	7.11
Manufacturing	87	38.67	45.78
Mining & Construction	18	8	53.78
Services	38	16.89	70.67
Transportation, Communications, Electric, Gas and Sanitary Services	44	19.56	90.22
Wholesale and Retail Trading	22	9.78	100
Panel B: Distribution of Data by Country*			
Australia	7	3.11	3.11
Canada	16	7.11	10.22
United Kingdom	5	2.22	12.44
United States	170	75.56	88.00
Other	27	12	100
Panel C: Distribution of Data by Year**			
2006	60	26.67	~~2~~6.67
2007	53	23.56	~~5~~0.22
2008	48	21.33	~~7~~1.56
2009	38	16.89	~~8~~8.44
2010	14	6.22	~~9~~4.67
2011	12	5.33	100
Total	225	100	

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~~**Table 4:** Distribution of Data by Country~~			
~~Country~~	~~Freq.~~	~~%~~	~~Cum. %~~
~~Australia~~	~~7~~	~~3.11~~	~~3.11~~
~~Canada~~	~~16~~	~~7.11~~	~~10.22~~
~~United Kingdom~~	~~5~~	~~2.22~~	~~12.44~~

United States	170	75.56	88.00
Other*	27	12.00	100
Total	225	100	

Notes: *Countries constituting less than 2% of dataset included in "Other"

Table 5: Distribution of Data by Year

Year	Freq.	%	Cum. %
2006	60	26.67	26.67
2007	53	23.56	50.22
2008	48	21.33	71.56
2009	38	16.89	88.44
2010	14	6.22	94.67
2011	12	5.33	100
Total	225	100	

NNotes: *Based upon the year the survey was completedCountries constituting less than 2% of dataset included in "Other"

**Based upon the year the survey was completed

Table 6: Definition of Model Variables

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Name	Description	Hypothesised impact on	Hypothesised impact on

		dependent variable (TobinsQ). Supporting literature in brackets	dependent variable (ERM_Engagement_Dummy). Supporting literature in brackets
ERMMaturity	Overall ERM 1-5 maturity level calculated from the RIMS' RMM maturity scores (see table 2)		
ERMMaturity_Attribute$_i$	ERM Attribute maturity score (see table 2) for attribute i (attributes 1-7, see table 1)		
ERM_Engagement_Dummy	*ERM_Engagement_Dummy =0* if ERMMaturity level is ad-hoc or initial (i.e. levels 1 or 2 as described in table 2) *ERM_Engagement_Dummy =1* if ERMMaturity level is repeatable, managed or leadership (i.e. levels 3, 4 or 5 as described in table 2)		
ERMAttribute$_i$_Engagement_Dummy	ERMAttribute$_i$_*Engagement_Dummy =0* if ERMMaturity_Attribute$_i$ level is ad-hoc or initial (i.e. levels 1 or 2 as described in table 2) ERMAttribute$_i$_*Engagement_Dummy =1* if ERMMaturity_Attribute$_i$ level is repeatable, managed or leadership (i.e. levels 3, 4 or 5 as described in table 2)		
Size	Natural logarithm of the book value of total assets	Negative (Allayannis and Weston (2001), Lang and Stulz (1994))	Positive (Paape and Spekle (2012), Beasley et al (2005), Colquitt et al (1999))
SalesGrowth	(Sales in year $_t$ minus sales in year $_{t-1}$)/ sales in year $_{t-1}$	Positive (Titman and Wessels (1988))	Positive (conjectured by the authors)[8]
Leverage	Book value of liabilities/Market value of equity	Ambiguous (De Wet (2006), Fama and French (2002), Jensen (1986), Sharma (2006))	Positive (Pagach and Warr (2011))
FinancialSlack	Cash and short-term investments/Book value of assets		Ambiguous (Pagach and Warr (2010))
EarnVariability	Coefficient of variation of earnings before interest and taxes, in the five financial years up to and including that corresponding to survey completion		Ambiguous (Liebenberg and Hoyt (2003), Pagach and Warr (2010))
AssetOpacity	Intangible assets/Book value of assets		Positive (Liebenberg and Hoyt (2003))
ValueChange	(firm value in year t minus firm value in year t−1) / firm value in year t−1		Negative (Pagach and Warr (2011))
Insiders	Percentage of outstanding shares owned by insiders	Ambiguous	

[8]It is conjectured that companies that are faced with opportunities to expand and subsequently undergoing rapid growth will have a greater need for more advanced ERM practices.

InsiderSq	Insiders × Insiders	Ambiguous	
DividendPaymentStatus	Given an indicator value 1 if firm paid dividends in that year, 0 otherwise	Ambiguous	
ReturnOnEquity	Net income/Market value of equity	Positive (Allayannis and Weston (2001), Pandley (2005))	
Beta	Covariance(firm excess returns, market returns)/Variance(market returns) over 5 years	Negative (Capital Asset Pricing Model: Sharpe (1964))[9]	Positive (conjectured by the authors)[10]
IndDiv	Industrial diversification indicator (equal to one if firm is industrially diversified as exhibited by Thompson One Banker's Worldscope database showing sales in SIC codes in more than one industry)	Positive (Bharadwaj et al(1999))	Positive (Standard and Poor's (2005))
IntlDiv	International diversification indicator (equal to one if firm is internationally diversified as exhibited by Thompson One Banker's Worldscope database showing foreign sales)	Positive (Bharadwaj et al (1999))	Positive (Standard and Poor's (2005))
TimeDum	Dummy variable for year assessment carried out		
IndDum	Dummy variable for industry type		
CtryDum	Dummy variable for country		
InverseMills	Probability density function / cumulative distribution function from 1st stage equation (discussed in section 3.3)		
TobinsQ	Approximation of Tobin's Q defined as per section 3.2		
LogTobinsQ	Natural logarithm of TobinsQ		
ε	An i.i.d error term with mean zero		

Table 7: Summary Statistics

[9]The Capital Asset Pricing Model (Sharpe, 1964) assets that a higher level of systematic or non-diversifiable risk results in a higher expected rate of return. In other words investors will discount the future cash flows at a higher rate, which results in a lower firm value. We therefore expect the firm's beta, which proxies the firm's systematic risk, to be negatively related to firm value.

[10]We expect firms with varying levels of volatility, and thus systematic risk, to have greater need for and therefore levels of ERM sophistication and maturity as a direct result of the greater risk levels, by definition.

Variable	Mean	StdDev	1st Quartile	Median	3rd Quartile
TobinsQ	1.2563	0.7576	0.7492	1.0983	1.5672
LogTobinsQ	0.0606	0.6122	-0.2887	0.0938	0.4493
ERMMaturity	2.7689	0.8964	2.0000	3.0000	3.0000
ERMMaturity_Attribute$_1$	2.6222	0.9885	2.0000	3.0000	3.0000
ERMMaturity_Attribute$_2$	2.5867	0.9923	2.0000	3.0000	3.0000
ERMMaturity_Attribute$_3$	2.5644	1.0249	2.0000	3.0000	3.0000
ERMMaturity_Attribute$_4$	2.4667	0.9774	2.0000	2.0000	3.0000
ERMMaturity_Attribute$_5$	2.5867	0.9175	2.0000	3.0000	3.0000
ERMMaturity_Attribute$_6$	2.4933	0.9734	2.0000	2.0000	3.0000
ERMMaturity_Attribute$_7$	2.8311	0.9533	2.0000	3.0000	4.0000
ERM_Engagement_Dummy	0.6311	0.4836	0.0000	1.0000	1.0000
Size	3.6869	0.6656	3.3158	3.7309	4.1362
Leverage	1.0344	1.4693	0.3493	0.6363	1.2015
SalesGrowth	0.0744	0.2006	-0.0128	0.0747	0.1538
FinancialSlack	0.3776	4.0613	0.0245	0.0571	0.1478
IndDiv	0.7511	0.4333	1.0000	1.0000	1.0000
IntlDiv	0.6444	0.4797	0.0000	1.0000	1.0000
EarnVariability	0.6083	6.1729	0.1718	0.3052	0.5824
AssetOpacity	0.1988	0.1928	0.0331	0.1510	0.3143
ValueChange	0.0789	0.4984	-0.2589	0.0655	0.2993
ReturnOnEquity	-0.1012	2.4907	0.0635	0.1314	0.2052
Beta	1.1480	0.8322	0.6126	1.0013	1.4600
Insiders	0.1735	0.1993	0.0082	0.1152	0.2529
InsidersSq	0.0697	0.1320	0.0001	0.0133	0.0640
DividendPaymentStatus	0.7378	0.4408	0.0000	1.0000	1.0000

Notes: Variables are defined in table 6

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Table 8: Pearson Correlation Matrix

	LogTobinsQ	ERM Maturity	ERM_Engagement_Dummy	Size	Leverage	Return OnEquity	Sales Growth	Beta	IndDiv	IntlDiv	Insiders	InsidersSq	Financial Slack	Earn Variability	Asset Opacity	Value Change	DividendPaymentStatus
LogTobinsQ	1																
ERMMaturity	0.0754	1															
ERM_Engagement_Dummy	0.0605	0.8529	1														
Size	-0.0159	0.2154	0.1818	1													
Leverage	-0.5703	0.036	0.0503	0.1596	1												
ReturnOnEquity	-0.0219	0.0552	0.0651	0.0418	-0.0325	1											
SalesGrowth	0.2187	-0.0677	-0.0884	-0.0419	-0.1184	0.1079	1										
Beta	-0.0589	-0.0637	-0.0583	0.0048	0.0961	-0.0633	-0.0424	1									
IndDiv	-0.1167	-0.0223	0.0073	0.1421	0.1253	0.127	-0.0347	-0.0206	1								
IntlDiv	0.0488	-0.0362	-0.0483	0.2909	-0.004	-0.0348	-0.1181	0.1109	-0.2167	1							
Insiders	-0.1014	-0.0007	0.0002	-0.255	0.0455	0.0207	0.0522	-0.0224	-0.1076	0.0206	1						
InsidersSq	-0.0591	-0.003	-0.0077	-0.2002	0.0084	0.0289	0.0667	-0.0444	-0.1558	0.0203	0.9352	1					
FinancialSlack	-0.0314	-0.0549	-0.0857	-0.2654	0.0116	0.0084	0.0143	-0.0014	-0.0347	-0.0834	-0.0255	-0.0301	1				
EarnVariability	-0.0325	0.0404	0.0729	0.0557	-0.0021	0.0017	-0.1359	-0.0717	-0.0546	0.0788	0.076	0.1002	-0.0037	1			
AssetOpacity	0.1472	-0.0023	0.0233	0.0643	-0.1266	0.0454	0.0034	-0.1185	-0.0004	0.1567	-0.0091	-0.0256	-0.0706	-0.0737	1		
ValueChange	0.3502	0.0179	-0.0336	-0.0248	-0.2601	0.1126	0.1508	-0.0362	-0.0921	-0.0804	0.0136	0.0344	-0.0477	0.0137	-0.0793	1	
DividendPaymentStatus	0.0824	0.0267	0.0049	0.2501	-0.0154	0.0035	-0.0347	-0.1936	-0.0307	0.106	-0.0253	-0.0068	0.0318	-0.015	-0.1559	0.0641	1

Table 8: Pearson Correlation Matrix

	LogTobinsQ	ERM Maturity	ERM_Engagement_Dummy	Size	Leverage	Return OnEquity	Sales Growth	Beta	IndDiv	IntlDiv	Insiders	InsidersSq	Financial Slack	Earn Variability	Asset Opacity	Value Change	DividendPaymentStatus
LogTobinsQ	1																
ERMMaturity	0.0754	1															
ERM_Engagement_Dummy	0.0605	0.8529	1														
Size	-0.0159	0.2154	0.1818	1													
Leverage	-0.5703	0.036	0.0503	0.1596	1												
ReturnOnEquity	-0.0219	0.0552	0.0651	0.0418	-0.0325	1											
SalesGrowth	0.2187	-0.0677	-0.0884	-0.0419	-0.1184	0.1079	1										
Beta	-0.0589	-0.0637	-0.0583	0.0048	0.0961	-0.0633	-0.0424	1									
IndDiv	-0.1167	-0.0223	0.0073	0.1421	0.1253	0.127	-0.0347	-0.0206	1								
IntlDiv	0.0488	-0.0362	-0.0483	0.2909	-0.004	-0.0348	-0.1181	0.1109	0.2167	1							
Insiders	-0.1014	-0.0007	0.0002	-0.255	0.0455	0.0207	0.0522	0.0224	-0.1076	0.0206	1						
InsidersSq	-0.0591	-0.003	-0.0077	-0.2002	0.0084	0.0289	0.0667	-0.0444	-0.1558	0.0203	0.9352	1					
FinancialSlack	-0.0314	-0.0549	-0.0857	-0.2654	0.0116	0.0084	0.0143	0.0014	0.0347	-0.0834	-0.0255	-0.0301	1				
EarnVariability	-0.0325	0.0404	0.0729	-0.0557	-0.0021	0.0017	-0.1359	-0.0717	-0.0546	0.0788	0.076	0.1002	-0.0037	1			
AssetOpacity	0.1472	-0.0023	0.0233	0.0643	-0.1266	0.0454	0.0034	-0.1185	0.0004	0.1567	-0.0091	-0.0256	-0.0706	-0.0737	1		
ValueChange	0.3502	0.0179	-0.0336	-0.0248	-0.2601	0.1126	0.1508	0.0362	-0.0921	-0.0804	0.0136	0.0344	-0.0477	0.0137	-0.0793	1	
DividendPaymentStatus	0.0824	0.0267	0.0049	0.2501	-0.0154	0.0035	-0.0347	-0.1936	0.0307	0.106	-0.0253	-0.0068	0.0318	-0.015	-0.1559	0.0641	1

Notes: Variables are defined in table 6

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Table 9: Overall ERM Engagement Regression Results

VARIABLES	ERM_Engagement_Dummy	LogTobinsQ
ERM_Engagement_Dummy		0.22544***
		(0.07176)
Size	0.51653***	-0.00755
	(0.16884)	(0.10768)
Leverage	-0.02067	-0.20968***
	(0.07158)	(0.02453)
ReturnOnEquity		-0.01453
		(0.01267)
SalesGrowth	-0.58314	0.57587***
	(0.51717)	(0.21298)
Beta		0.00104
		(0.03917)
IndDiv	-0.00648	-0.10308
	(0.22073)	(0.07963)
IntlDiv	-0.59482**	0.18088
	(0.23605)	(0.12268)
Insiders		-0.84017
		(0.53254)
InsidersSq		0.97445
		(0.86288)
DividendPaymentStatus		0.18926**
		(0.08032)
FinancialSlack	-0.02715	
	(0.06187)	
EarnVariability	0.02676	
	(0.03520)	
AssetOpacity	-0.23319	
	(0.54383)	
ValueChange	-0.02556	
	(0.24702)	
InverseMills		0.16108
		(0.27985)
Constant	-1.18440	-0.14528
	(1.08397)	(0.86713)
Observations	225	225
R-squared		0.57820
Adj R-squared		0.47216
Log Likelihood	-131.97404	
Chi^2	32.31467	

Notes: Variables are defined in table 6

~~* denotes statistical significance level (*(10%), **(5%), ***(1%))~~Standard errors in parentheses and

* denotes statistical significance level (*(10%), **(5%), ***(1%))

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Table 10: Pearson Correlation Matrix by ERM Attribute Maturity

	ERMMaturity_Attribute$_1$	ERMMaturity_Attribute$_2$	ERMMaturity_Attribute$_3$	ERMMaturity_Attribute$_4$	ERMMaturity_Attribute$_5$	ERMMaturity_Attribute$_6$	ERMMaturity_Attribute$_7$
ERMMaturity_Attribute$_1$	1						
ERMMaturity_Attribute$_2$	0.8232	1					
ERMMaturity_Attribute$_3$	0.7137	0.7264	1				
ERMMaturity_Attribute$_4$	0.7423	0.7889	0.7876	1			
ERMMaturity_Attribute$_5$	0.7524	0.8069	0.7239	0.7985	1		
ERMMaturity_Attribute$_6$	0.8023	0.7898	0.7354	0.7752	0.7642	1	
ERMMaturity_Attribute$_7$	0.7799	0.7848	0.6874	0.7701	0.7926	0.7637	1

Table 10: Pearson Correlation Matrix by ERM Attribute Maturity

	ERMMaturity_Attribute1	ERMMaturity_Attribute2	ERMMaturity_Attribute3	ERMMaturity_Attribute4	ERMMaturity_Attribute5	ERMMaturity_Attribute6	ERMMaturity_Attribute7
ERMMaturity_Attribute1	1						
ERMMaturity_Attribute2	0.8232	1					
ERMMaturity_Attribute3	0.7137	0.7264	1				
ERMMaturity_Attribute4	0.7423	0.7889	0.7876	1			
ERMMaturity_Attribute5	0.7524	0.8069	0.7239	0.7985	1		
ERMMaturity_Attribute6	0.8023	0.7898	0.7354	0.7752	0.7642	1	
ERMMaturity_Attribute7	0.7799	0.7848	0.6874	0.7701	0.7926	0.7637	1

Notes: ERMMaturity_Attribute$_i$ is defined in table 6 and the attribute description is summarized below

Attribute	Description
1	ERM-Based Approach
2	ERM Process Management
3	Risk Appetite Management
4	Root Cause Discipline
5	Uncovering and Identifying Risks
6	Performance Management – managing uncertainty
7	Business Resilience and Sustainability - managing low probability/high consequence events

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Table 11: Attribute Specific Regression Results

Variable	ERMAtt1_ Engag Dummy		ERMAtt2_ Engag Dummy		ERMAtt3_ Engag Dummy		ERMAtt4_ Engag Dummy		ERMAtt5_ Engag Dummy		ERMAtt6_ Engag Dummy		ERMAtt7_ Engag Dummy	
ERMAtti		0.15662**		0.18256***		0.11123		0.14860**		0.14225**		0.20590***		0.06547
Engag_Dummy		(0.07136)		(0.06989)		(0.07150)		(0.06854)		(0.07030)		(0.07210)		(0.07243)
Size	0.42778***	-0.01769	0.62296***	-0.14970	0.53847***	-0.09578	0.38730**	-0.04885	0.44919***	-0.03824	0.59177***	-0.13214	0.35591**	-0.03674
	(0.16398)	(0.08725)	(0.16702)	(0.14518)	(0.16187)	(0.10981)	(0.15675)	(0.09644)	(0.16206)	(0.09667)	(0.16937)	(0.09583)	(0.16646)	(0.06614)
Leverage	0.03836	-0.21295***	-0.04487	-0.19972***	0.10643	-0.22015***	0.01889	-0.21172***	-0.01220	-0.21081***	-0.03684	-0.19977***	0.03310	-0.20896***
	(0.06976)	(0.02540)	(0.06787)	(0.02681)	(0.08266)	(0.02701)	(0.06634)	(0.02480)	(0.06728)	(0.02484)	(0.08107)	(0.02516)	(0.07366)	(0.02511)
ReturnOnEquity		-0.01516		-0.01496		-0.01185		-0.01209		-0.01395		-0.01534		-0.01283
		(0.01293)		(0.01279)		(0.01289)		(0.01282)		(0.01290)		(0.01270)		(0.01299)
SalesGrowth	-0.05824	0.57681***	-0.59080	0.67607***	-0.57965	0.65677***	-0.42702	0.58189***	-1.58635***	0.63763**	-0.77484	0.72932***	-0.51811	0.61714***
	(0.49495)	(0.18887)	(0.51958)	(0.20607)	(0.51367)	(0.20362)	(0.50837)	(0.19705)	(0.54533)	(0.31898)	(0.52825)	(0.21167)	(0.53395)	(0.19585)
Beta		0.00472		-0.00834		-0.00431		-0.00260		0.00093		0.01182		-0.01048
		(0.03998)		(0.03997)		(0.03994)		(0.04020)		(0.04003)		(0.03958)		(0.04407)
IndDiv	-0.21644	-0.08676	-0.14299	-0.05941	0.02533	-0.09325	0.02997	-0.09011	-0.01391	-0.09110	-0.18612	-0.04986	-0.22472	-0.06964
	(0.22026)	(0.08884)	(0.21874)	(0.08601)	(0.21712)	(0.08097)	(0.21383)	(0.08048)	(0.21781)	(0.08112)	(0.22240)	(0.08580)	(0.22690)	(0.08974)
IntlDiv	-0.48630**	0.18666*	-0.50064**	0.28942**	-0.70719***	0.27078**	-0.66119***	0.24263*	-0.33653	0.19976**	-0.62614***	0.28842**	-0.50816**	0.21958**
	(0.22951)	(0.10658)	(0.22873)	(0.13098)	(0.23019)	(0.13137)	(0.22601)	(0.14071)	(0.22546)	(0.09900)	(0.23971)	(0.11126)	(0.23369)	(0.10253)
Insiders		-0.80109		-0.82657		-0.78597		-0.76118		-0.80223		-0.78211		-0.72852
		(0.54241)		(0.53459)		(0.54715)		(0.53779)		(0.54380)		(0.54205)		(0.54522)
InsidersSq		1.01580		1.02894		0.85916		0.85910		0.86473		0.88456		0.81587
		(0.88371)		(0.86656)		(0.89031)		(0.86968)		(0.88242)		(0.87662)		(0.87829)
DividendPaymentStatus		0.19024**		0.18989**		0.20115**		0.20056**		0.19430**		0.19279**		0.19945**
		(0.08131)		(0.08052)		(0.08201)		(0.08126)		(0.08134)		(0.08005)		(0.08324)
FinancialSlack	-0.03071		-0.01432		-0.02866		-0.02583		-0.02541		-0.02388		2.09485**	
	(0.05651)		(0.05056)		(0.09560)		(0.05404)		(0.05588)		(0.07187)		(0.91882)	
EarnVariability	0.03893		-0.01302		0.03107		-0.00379		0.02561		0.11112		0.02500	
	(0.04399)		(0.01689)		(0.03024)		(0.01681)		(0.03254)		(0.08256)		(0.03233)	
AssetOpacity	-0.64966		-0.27109		-0.19108		-0.52547		-0.64692		-0.07327		-0.31758	
	(0.53019)		(0.53366)		(0.52820)		(0.53051)		(0.52707)		(0.54701)		(0.54275)	
ValueChange	0.15348		0.26134		0.28005		0.27920		0.15994		0.16737		0.25437	
	(0.22748)		(0.26163)		(0.25311)		(0.24572)		(0.24708)		(0.25027)		(0.27221)	
InverseMills		0.06851		-0.22011		-0.14053		-0.04288		0.02615		-0.17940		-0.11315
		(0.22363)		(0.32690)		(0.23285)		(0.26692)		(0.25647)		(0.19040)		(0.24556)
Constant	-1.52663	-0.15886	3.84336	0.05238	-0.81394	0.19486	-5.07029	0.19493	-0.65648	-0.04823	-2.78957**	0.57162	-0.95144	0.01232
	(1.09182)	(0.87837)	(230.55722)	(0.81725)	(1.07982)	(0.85704)	(119.82898)	(1.64736)	(1.07214)	(0.84146)	(1.14847)	(0.89725)	(1.11313)	(0.79247)
Observations	225	225	225	225	225	225	225	225	225	225	225	225	225	225
R-squared		0.56606		0.57255		0.56142		0.56637		0.56436		0.57730		0.55752
Adj R-squared		0.45697		0.46509		0.45117		0.45735		0.45484		0.47104		0.44628
Log Likelihood	-135.5		-135.9		-139.1		-143.0		-138.6		-132.1		-134.6	
Chi^2	37.25		38.43		33.65		25.41		33.18		47.45		28.18	

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Table 11: Attribute Specific Regression Results

VARIABLES	ERMAttribute1_ Engagement_Dummy	LogTobinsQ	ERMAttribute2_ Engagement_Dummy	LogTobinsQ	ERMAttribute3_ Engagement_Dummy	LogTobinsQ	ERMAttribute4_ Engagement_Dummy	LogTobinsQ	ERMAttribute5_ Engagement_Dummy	LogTobinsQ	ERMAttribute6_ Engagement_Dummy	LogTobinsQ	ERMAttribute7_ Engagement_Dummy	LogTobinsQ
ERMAttributei_ Engagement_Dummy		0.15662**		0.18256***		0.11123		0.14860**		0.14225**		0.20590***		0.06547
		(0.07136)		(0.06989)		(0.07150)		(0.06854)		(0.07030)		(0.07210)		(0.07243)
Size	0.42778***	-0.01769	0.62296***	-0.14970	0.53847***	-0.09578	0.38730**	-0.04885	0.44919***	-0.03824	0.59177***	-0.13214	0.35591**	-0.03674
	(0.16398)	(0.08725)	(0.16702)	(0.14518)	(0.16187)	(0.10981)	(0.15675)	(0.09644)	(0.16206)	(0.09667)	(0.16937)	(0.09583)	(0.16646)	(0.06614)
Leverage	0.03836	-0.21295***	-0.04487	-0.19972***	0.10643	-0.22015***	0.01889	-0.21172***	-0.01220	-0.21081***	-0.03684	-0.19977***	0.03310	-0.20896***
	(0.06976)	(0.02540)	(0.06787)	(0.02681)	(0.08266)	(0.02701)	(0.06634)	(0.02480)	(0.06728)	(0.02484)	(0.08107)	(0.02516)	(0.07366)	(0.02511)
ReturnOnEquity		-0.01516		-0.01496		-0.01185		-0.01209		-0.01395		-0.01534		-0.01283
		(0.01293)		(0.01279)		(0.01289)		(0.01282)		(0.01290)		(0.01270)		(0.01299)
SalesGrow th	-0.05824	0.57681***	-0.59080	0.67607***	-0.57965	0.65677***	-0.42702	0.58189***	-1.58635***	0.63763**	-0.77484	0.72932***	-0.51811	0.61714***
	(0.49495)	(0.18887)	(0.51958)	(0.20607)	(0.51367)	(0.20362)	(0.50837)	(0.19705)	(0.54533)	(0.31898)	(0.52825)	(0.21167)	(0.53395)	(0.19585)
Beta		0.00472		-0.00834		-0.00431		-0.00260		0.00093		0.01182		-0.01048
		(0.03998)		(0.03997)		(0.03994)		(0.04020)		(0.04003)		(0.03958)		(0.04407)
IndDiv	-0.21644	-0.08676	-0.14299	-0.05941	0.02533	-0.09325	0.02997	-0.09011	-0.01391	-0.09110	-0.18612	-0.04986	-0.22472	-0.06964
	(0.22026)	(0.08884)	(0.21874)	(0.08601)	(0.21712)	(0.08097)	(0.21383)	(0.08048)	(0.21781)	(0.08112)	(0.22240)	(0.08580)	(0.22690)	(0.08974)
IntlDiv	-0.48630**	0.18666*	-0.50064**	0.28942**	-0.70719***	0.27078**	-0.66119***	0.24263*	-0.33653	0.19976**	-0.62614***	0.28842**	-0.50816**	0.21958**
	(0.22951)	(0.10658)	(0.22873)	(0.13098)	(0.23019)	(0.13137)	(0.22601)	(0.14071)	(0.22546)	(0.09900)	(0.23971)	(0.11126)	(0.23369)	(0.10253)
Insiders		-0.80109		-0.82657		-0.78597		-0.76118		-0.80223		-0.78211		-0.72852
		(0.54241)		(0.53459)		(0.54715)		(0.53779)		(0.54380)		(0.54205)		(0.54522)
InsidersSq		1.01580		1.02894		0.85916		0.85910		0.86473		0.88456		0.81587
		(0.88371)		(0.86656)		(0.89031)		(0.86968)		(0.88242)		(0.87662)		(0.87829)
DividendPaymentStatus		0.19024**		0.18989**		0.20115**		0.20056**		0.19430**		0.19279**		0.19945**
		(0.08131)		(0.08052)		(0.08201)		(0.08126)		(0.08134)		(0.08005)		(0.08324)
FinancialSlack	-0.03071		-0.01432		-0.02866		-0.02583		-0.02541		-0.02388		2.09485**	
	(0.05651)		(0.05056)		(0.09560)		(0.05404)		(0.05588)		(0.07187)		(0.91882)	
EarnVariability	0.03893		-0.01302		0.03107		-0.00379		0.02561		0.11112		0.02500	
	(0.04399)		(0.01689)		(0.03024)		(0.01681)		(0.03254)		(0.08256)		(0.03233)	
AssetOpacity	-0.64966		-0.27109		-0.19108		-0.52547		-0.64692		-0.07327		-0.31758	
	(0.53019)		(0.53366)		(0.52820)		(0.53051)		(0.52707)		(0.54701)		(0.54275)	
ValueChange	0.15348		0.26134		0.28005		0.27920		0.15994		0.16737		0.25437	
	(0.22748)		(0.26163)		(0.25311)		(0.24572)		(0.24708)		(0.25027)		(0.27221)	
InverseMills		0.06851		-0.22011		-0.14053		-0.04288		0.02615		-0.17940		-0.11315
		(0.22363)		(0.32690)		(0.23285)		(0.26692)		(0.25647)		(0.19040)		(0.24556)
Constant	-1.52663	-0.15886	3.84336	0.05238	-0.81394	0.19486	-5.07029	0.19493	-0.65648	-0.04823	-2.78957**	0.57162	-0.95144	0.01232
	(1.09182)	(0.87837)	(230.55722)	(0.81725)	(1.07982)	(0.85704)	(119.82898)	(1.64736)	(1.07214)	(0.84146)	(1.14847)	(0.89725)	(1.11313)	(0.79247)
Observations	225	225	225	225	225	225	225	225	225	225	225	225	225	225
R-squared		0.56606		0.57255		0.56142		0.56637		0.56436		0.57730		0.55752
Adj R-squared		0.45697		0.46509		0.45117		0.45735		0.45484		0.47104		0.44628
Log Likelihood	-135.5		-135.9		-139.1		-143.0		-138.6		-132.1		-134.6	
Chi^2	37.25		38.43		33.65		25.41		33.18		47.45		28.18	

Notes: Variables are defined in table 6

Standard errors in parentheses and * denotes statistical significance level (*(10%), **(5%), ***(1%))

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ERMAttribute$_i$ Engagement Dummy variable shortened to ERMAtt$_i$ Engag Dummy for presentation purposes

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